Stáisiún Uí Chonghaile, Baile Átha Cliath 1, D01 V6V6
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T 01 703 4293 **E** info@irishrail.ie **W** www.irishrail.ie

Mark Gleeson
Email: mark.gleeson@railusers.ie

17th June 2026

Re: Response: FOI request IE_FOI_1030

Dear Mark,

I refer to your request dated 8th January 2026 made under the Freedom of Information Act 2014, which was received my office on 9th January 2026 for records held by Iarnród Éireann.

Request:

Any reports or documentation with respect to the closure or replacement of level crossings on the southside of Dublin with bridges/tunnels or other alternatives. Specifically XR001 Lansdowne Rd, XR002 Serpentine Ave, XR003 Sandymount, XR004 Sidney Parade, XR005 Merrion Gates, XR011 Bray Station, records since 1 Jan 2016

I, Patrick Conway, have now made a final decision to Part Grant your request on 17th June 2026.

Please find a copy of these records below.

Rights of appeal

In the event that you are not happy with this decision you can make an appeal in relation to this matter, you can do so by writing to the FOI Unit, Corporate Communications, Iarnród Éireann Irish Rail, Connolly Station, Amiens St, Dublin 1 or by e-mail to foi@irishrail.ie. You should make your appeal within 4 weeks (20 working days) from the date of this notification, where a day is defined as a working day excluding, the weekend and public holidays, however, the making of a late appeal may be permitted in appropriate circumstances.

The appeal will involve a complete reconsideration of the matter by a more senior member of the staff of this body.
Should you have any questions or concerns regarding the above, please contact the FOI Office on 087 1482648.

Yours sincerely,

PP

Katie O'Toole

Patrick Conway, Decision Maker, Iarnród Éireann

Cathaoirleach Chairman - F Allen, **Stiúrthóirí** Directors: S Byrne, C Griffiths (UK), D Guinan, V Little, M McGreevy (UK), Dr. P Mulholland, S Roarty, T Wynne; **Príomh Fheidhmeannach** Chief Executive: J Meade
Iarnród Éireann – Irish Rail, cuideachta ghníomhaíochta ainmnithe, faoi theorainn scaireanna, cláraithe in Éirinn ag Stáisiún Uí Chonghaile, Baile Átha Cliath 1, Ur. 119571 Ur. CBL: IE 4812851 O
Iarnród Éireann – Irish Rail, a designated activity company, limited by shares, registered in Ireland at Connolly Station, Dublin 1, No. 119571 VAT No. IE 4812851 O

Freedom of Information Request:
Schedule of Records for IE_FOI_1032 : Summary for Decision Making

Record No.	Date of Record	Brief Description	No. of Pages	Decision: Grant/Part Grant/Refuse	Section of Act if applicable	Record Edited/Identify Deletions
1		D+WP56-ARP-P2-SL-RP-GE-000204 SL Annex 3.1 Constraints Report P03	101	Part Grant	37 (1)	disclosure of personal information
					36 (2)(e)	disclosure of the information concerned is necessary in order to avoid a serious and imminent danger to the environment
2		Annex 3.2 Sandymount Area Level Crossings-D+WP56-ARP-P2-SL-RP-GE-000211-P06	350	Part Grant	37 (1)	disclosure of personal information
					36 (2)(e)	disclosure of the information concerned is necessary in order to avoid a serious and imminent danger to the environment
3		Annex 3.4 TOR Bray Level Crossing D+WP56-ARP-P2-SL-RP-GE-000208 P04	133	Part Grant	37 (1)	disclosure of personal information
					36 (2)(e)	disclosure of the information concerned is necessary in order to avoid a serious and imminent danger to the environment
4		Annex 3.4 TOR Bray Level Crossing D+WP56-ARP-P2-SL-RP-GE-000208 P04	95	Part Grant	37 (1)	disclosure of personal information
					36 (2)(e)	disclosure of the information concerned is necessary in order to avoid a serious and imminent danger to the environment
5						

Signed: Katie O'Toole
Data Protection & Freedom of Information Office

Iarnród Éireann

DART+ Coastal South

Annex 3.1: Constraints Report

Reference: D+WP56-ARP-P2-SL-RP-GE-000204

P03 | 13 May 2022

This report takes into account the particular instructions and requirements of our client. It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 297733

Ove Arup & Partners Ireland Limited
50 Ringsend Road
Dublin 4
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arup.com

ARUP

Document Verification

Project title	DART+ Coastal South
Document title	Annex 3.1: Constraints Report
Job number	297733
Document ref	D+WP56-ARP-P2-SL-RP-GE-000204
File reference	

Revision	**Date**	**Filename**	D+WP56-ARP-P2-SL-RP-GE-000204.docx		
P01	01 March 2022	**Description**	Issued for IÉ to review and comment		
			Prepared by	**Checked by**	**Approved by**
		Name **Name** **Signature**	[redacted]		
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			Prepared by	**Checked by**	**Approved by**
		Name **Signature**	[redacted]		
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		Description	Updated in new template addressing comments from P02.		
			Prepared by	**Checked by**	**Approved by**
		Name **Signature**	[redacted]		

Issue Document Verification with Document ✓

CONTENTS

Tables 3
Figures 3
Appendices 4
ABBREVIATIONS 1
1. INTRODUCTION 3
1.1 Purpose of the Report 3
1.2 DART+ Programme Overview 3
1.3 DART+ Coastal South Project 5
1.4 References 8
1.5 Geographic Context and Study Area 8
2. ENVIRONMENTAL CONSTRAINTS 10
2.1 Overview 10
2.2 Traffic & Transportation 10
2.3 Landscape and Visual Impact 14
2.4 Archaeology & Cultural Heritage 18
2.5 Architectural Heritage 26
2.6 Noise & Vibration 29
2.7 Air Quality & Climate 31
2.8 Material Assets 32
2.9 Population and Human Health 34
2.10 Geology and Soils 40
2.11 Water Resources 44
2.12 Biodiversity 46
REFERENCES 52

Tables

Table 1: List of key documents associated with this report 8
Table 2: Recorded archaeological sites within 50m of the existing railway infrastructure 23
Table 3: Geological Heritage Areas 42
Table 4: River sub-basins 44
Table 5: Canal waterbodies 44
Table 6: Transitional and coastal waterbodies 45
Table 7: Groundwater Bodies 45

Figures

Figure 1: DART+ Programme of works overview 4
Figure 2: DART+ Coastal South project extents 6
Figure 3: The Location and Constraints Study Area of DART+ Coastal South 9

Appendices

Appendix A
Constraint Mapping: Landscape Constraints
Appendix B
Constraint Mapping: Heritage Constraints
Appendix C
Architectural Heritage Features
Appendix D
Constraint Mapping: Noise Constraints
Appendix E
Constraint Mapping: Utilities and Licenced Facilities
Appendix F
Constraint Mapping: Land Use (Zoning) Constraints
Appendix G
Constraint Mapping: Water Services
Appendix H
Constraint Mapping: Population Constraints
Appendix I
Planning Application Monitor
Appendix J
Register of Relevant Planning Applications within Study Area
Appendix K
Constraint Mapping: Geology Constraints
Appendix L
Constraint Mapping: Aquifer Vulnerability Constraints
Appendix M
Constraint Mapping: Aquifer Bedrock Constraints
Appendix N
Constraint Mapping: Groundwater Constraints
Appendix O
Constraint Mapping: Surface Water Constraints
Appendix P
Constraint Mapping: Biodiversity Constraints

ABBREVIATIONS

Abbreviation	Definition
ACA	Architectural Conservation Area
AEP	Annual exceedance probability
BCI	Bat Conservation Ireland
CGS	County Geological Sites
DDLETB	Dublin and Dún Laoghaire Education and Training Board
DCIHR	Dublin City Council Industrial Heritage Record
DHLGH	Department of Housing, Local Government and Heritage
EIAR	Environmental Impact Assessment Report
EC	European Commission
END	Environmental Noise Directive
EPA	Environmental Protection Agency
ESB	Electricity Supply Board
EU	European Union
FIHS	Fingal Industrial Heritage Survey
GAA	Gaelic Athletic Association
GDA	Greater Dublin Area
GNI	Gas Networks Ireland
GNR(I)	Great Northern Railway of Ireland
GSI	Geological Survey Ireland
HA	High Amenity
HSA	Health and Safety Authority
IÉ	Iarnród Éireann
IED	Industrial Emissions Directive
IPC	Integrated Pollution Control
IPPC	Integrated Pollution Prevention Control
NBDC	National Biodiversity Data Centre
NHA	Natural Heritage Area
NIAH	National Inventory of Architectural Heritage
NMI	National Museum of Ireland
NMS	National Monuments Service

Abbreviation	Definition
NPWS	National Parks and Wildlife Service
NTA	National Transport Authority
OLE	Overhead Line Electrical
OPW	Office of Public Works
OSI	Ordnance Survey Ireland
PAG	Project Appraisal Guidelines
pNHA	Proposed Natural Heritage Area
PO	Preservation Order
PRAI	Property Registration Authority of Ireland
QI	Qualifying Interest
RMP	Record of Monuments & Places
RPS	Record of Protected Structures
SAC	Special Area of Conservation
SCI	Site of Community Importance
SCI	Special Conservation Interest
SHD	Strategic Housing Development
SID	Strategic Infrastructure Development
SMR	Sites and Monuments Record
SPA	Special Protection Area
TII	Transport Infrastructure Ireland
WFD	Water Framework Directive
ZoI	Zone of Influence

1. INTRODUCTION

1.1 Purpose of the Report

This report provides an overview of the environmental constraints identified at the outset of the options assessment phase of the DART+ Coastal South project.

The aim of the report is to provide a general overview of the key constraints which occur along the route and its associated study area at this early stage of the project. This information will also inform the options assessment process and the identification of the emerging preferred options for the scheme.

As the options assessment and scheme development progresses, more detailed information in respect of constraints will become available and will further inform the environmental assessment process.

1.2 DART+ Programme Overview

DART+ is a transformative programme of projects that aims to modernise and improve existing rail services in the Greater Dublin Area (GDA). It will provide a sustainable, electrified, reliable and more frequent rail service, improving capacity on rail corridors serving Dublin.

The scope of works for the programme is summarised in **Figure 1**.

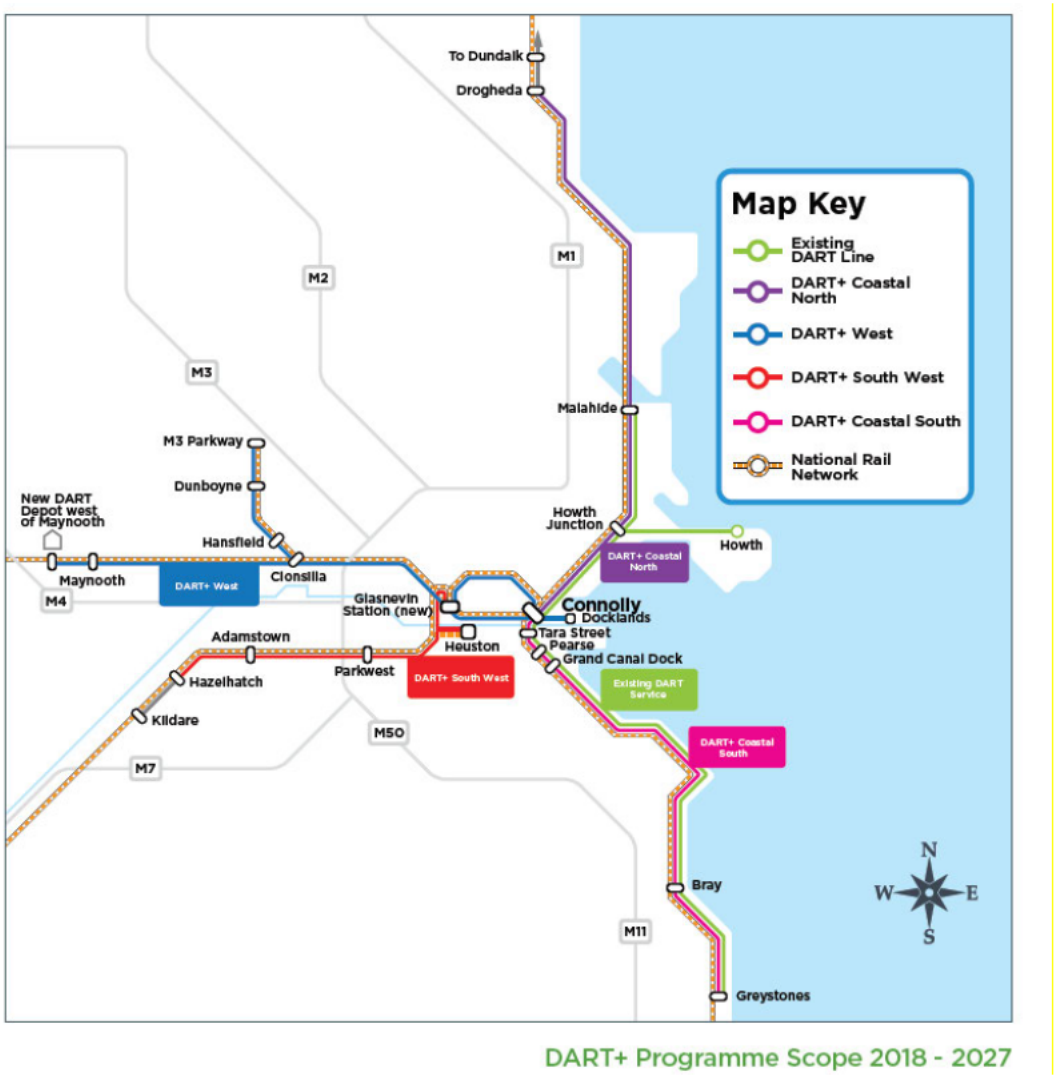

Figure 1: DART+ Programme of works overview

The current DART network is 50km long, extending from Malahide/Howth to Greystones. The DART+ Programme will increase the length of the DART network to 150km of railway corridor through the electrification and upgrade of existing lines transforming commuter train travel in the GDA.

The DART+ Programme is required to facilitate increased train capacity to meet current and future demands which will be achieved through a modernisation of the existing railway corridors. It will also contribute to Ireland's transition to a low carbon and climate resilient society. The DART+ Programme comprises the following improvement projects across the four main rail corridors:

- DART+ West - Maynooth and M3 Parkway to the City Centre;
- DART+ South West - Hazelhatch & Celbridge to the City Centre;
- DART+ Coastal North - Drogheda to the City Centre;
- DART+ Coastal South - Greystones to the City Centre; and
- DART+ Fleet - purchase of new train fleet to increase train services.

The DART+ Programme is a key element of the national public transportation network as it will provide a high-capacity transit system for the GDA and better connectivity to outer regional cities and towns. This will benefit all public transport users.

Delivery of the DART+ Programme will promote transport migration away from the private car and to public transport. This transition will be achieved through a more frequent and accessible electrified service, which will result in reduced road congestion, especially during peak commuter periods.

The DART+ Programme will provide enhanced, greener public transport to communities along the DART+ Programme routes delivering economic and societal benefits for current and future generations.

1.3 DART+ Coastal South Project

1.3.1 Project Overview

The delivery of the DART+ Coastal South project will form the fourth infrastructural project of the DART+ Programme.

DART+ Coastal South is seeking to ensure that capacities can be achieved in line with the DART+ Programme. This includes assessing the level crossings along the route, potential turnback facilities and stabling, and increases to line capacity of the Bray-Greystones section. The project extents are displayed in **Figure 2**.

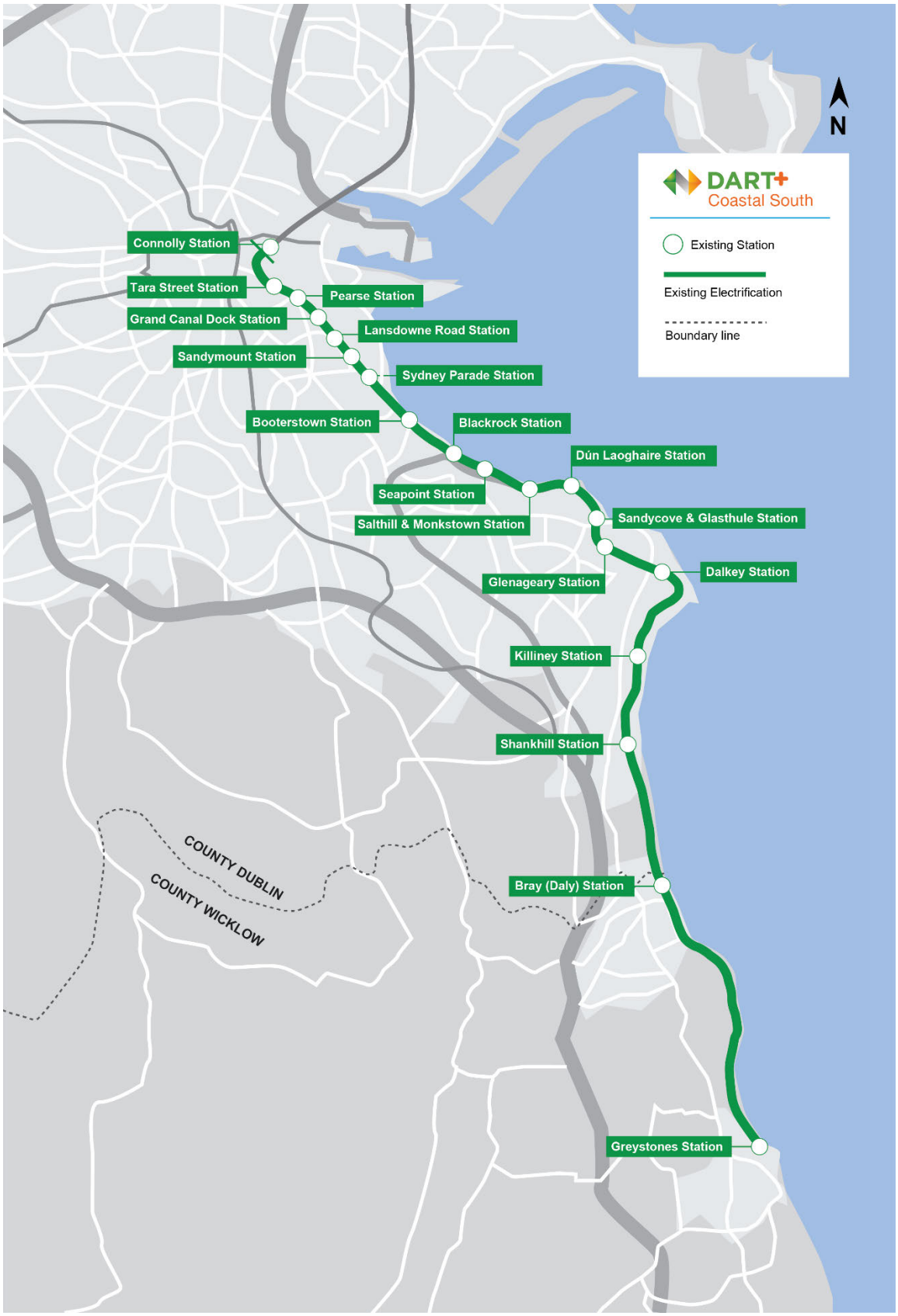

Figure 2: DART+ Coastal South project extents

Delivery of this project will support existing communities along the railway and support future sustainable development. It will serve all existing stations along the railway corridor between Dublin City Centre and Greystones. The frequency and quality of service will provide a viable transport alternative for communities along the route and help encourage people to migrate from private car use. This will assist Ireland in reducing greenhouse gas emissions from transport and help combat climate change.

The project will follow the existing railway corridor and will include reconfiguration of existing track layout and infrastructure in the vicinity of Bray (Daly) and Greystones Stations, to allow line capacity to increase between the two towns. Interventions outside of the railway corridor may also be required for some of the scheme elements, for example where level crossings may be closed. Appropriate levels of access will be maintained through providing infrastructure solutions.

1.3.2 Key infrastructural elements of DART+ Coastal South

The following is a high-level summary of the key infrastructural elements of the DART+ Coastal South project:

- Assessment of existing level crossings and consideration of potential for removal, reducing constraints on both rail and road traffic;
- Providing infrastructure to maintain appropriate levels of accessibility where level crossings are closed;
- Increase line capacity between Bray and Greystones;
- Construction of turnback facilities and stabling at Bray; and
- Undertaking upgrades to existing signalling, telecoms and power supplies.

1.4 References

This report should be read in conjunction with the following related optioneering reports:

Table 1: List of key documents associated with this report

Annex	Title	Description
N/A	DART+ Coastal South Preliminary Option Selection Report Main Report	The main report summarises the optioneering process and the different packages of proposed works on the DART+ Coastal South project.
N/A	DART+ Coastal South Preliminary Option Selection Report – Executive Summary	This report summarises the main Preliminary Option Selection Report
1	Emerging Preferred Option Maps	Includes drawings for each Draft Emerging Preferred Option, to support the Preliminary Option Selection Report
2.1	Policy Context	This presents a detailed review of the European, National, Regional and Local policy context for the DART+ Programme and the DART+ Coastal South project.
2.2	Useful Links	A list of links to publicly available documents or websites referred to in this report
3.1	Constraints Reports (this document)	This report reviews the DART+ Coastal South environmental constraints and includes constraints mapping.
3.2	Sandymount Area Level Crossings Technical Optioneering Report	The Technical Optioneering Report for Sandymount Area Level Crossings. The report addresses infrastructure solutions to maintain accessibility at closed level crossings.
3.3	Bray Station, Turnback and Stabling Technical Optioneering Report	The Technical Optioneering Report for Bray Station, Turnback and Stabling. The report addresses modifications to the station to meet the planned increase of train services.
3.4	Greystones Capacity Enhancements Technical Optioneering Report	The Technical Optioneering Report for Greystones Capacity Enhancements. The report addresses modifications between Bray and Greystones to meet the planned increase of train services.
3.5	Bray Level Crossing Technical Optioneering Report	The Technical Optioneering Report for Bray Level Crossing. The report addresses infrastructure solutions to maintain accessibility where the level crossing is closed.
3.6	Ennis Lane Level Crossing Technical Optioneering Report	The Technical Optioneering Report for Ennis Lane Level Crossing. The report addresses infrastructure solutions to maintain accessibility where the level crossing is closed.

1.5 Geographic Context and Study Area

For the purposed of the constraints report a 500m buffer study area has been considered which includes 250m either side of the DART+ South project centreline. This reflects that the existing corridor will be the main focus for all upgrade works. A buffer up to 300m from the centreline is shown on all the constraints drawings within the Appendices. The location of the DART+ South within the wider context of major urban areas in the region is illustrated in **Figure 3**.

The project extends from the city centre, south of Connolly Station at the Junction of Tara Street and Georges Quay (at the River Liffey), along the existing main Dublin-Greystones railway line, southwards, as far as Greystones.

The project passes through urban, sub-urban and rural coastal environments along the route and is located within the administrative areas of Dublin City Council, Dún Laoghaire-Rathdown County Council and Wicklow County Council.

Figure 3: The Location and Constraints Study Area of DART+ Coastal South

2. ENVIRONMENTAL CONSTRAINTS

2.1 Overview

This section provides a general overview of the environmental constraints within the study corridor for the DART+ Coastal South project. More detailed, location specific information in relation to each of the proposed interventions will be provided in the individual technical optioneering reports, as listed within **Table 1**.

2.2 Traffic & Transportation

2.2.1 Overview

The purpose of the traffic and transportation section is to highlight the key traffic and transportation constraints within the existing study area. This will allow the design team to make informed developmental and structural decisions based on available desktop information at this stage of the project. This section identifies desktop information on traffic and transportation which will be relevant for the proposed development.

The study area is located within the Greater Dublin Area and Wicklow County and is accessible by local roads. These are generally of a good standard and capable of accommodating construction vehicles. Road links of regional importance connect the sites to the N11/M11 national road corridor.

The scheme may require the closure of five level crossings in the Sandymount area, namely Lansdowne Road, Serpentine Avenue, Sandymount Avenue, Sydney Parade, and Merrion Gates. This is a densely populated area, and these crossings are of strategic, as well as local importance. Approximately 17,000 vehicle trips cross the railway at these locations on a daily basis. Between 19% and 25% of residents in Sandymount go to work, school or college in the area to the west of the Dart line that is within walking or cycling distance.

In Bray, the scheme may also include the closure of an existing level crossing namely the Quinsborough Road Level Crossing. The crossing is located in the centre of Bray, immediately to the north of Bray Dart Station, and is the main access to the town's seafront. Approximately 1,200 vehicle trips cross the rail line at this location on a daily basis.

The scheme may also include the closure of an existing level crossing in Greystones referred to as the Ennis Lane Level Crossing. The crossing is located on the edge of Greystones and primarily provides pedestrian and cyclist access to the Bray Greystones Cliff Walk / proposed East Coast Greenway. This crossing also provides occasional vehicular access to agricultural lands to the east of the rail line.

Should the level crossings be closed as part of the scheme, there will be the need for improved pedestrian and cycling connectivity at each level crossing location. Additional infrastructure may be

required, depending on the crossing location and design solution, to provide for such pedestrian, cycling and vehicular connectivity.

The potential closure of the level crossings, in the absence of suitable mitigation, may have an impact on traffic in terms of connectivity, additional delays or queueing in the wider area. In addition to this potential operational impact, construction activities are expected to generate a temporary increase in traffic to the area, although this will be a relatively low number of additional vehicular journeys, and will, at most, have a minor temporary impact on the traffic conditions of the local road network.

In the event of the closure of the level crossings, the main issues to consider from an environmental impact point of view are therefore the impact on operational traffic flow; the impact on the environment should additional infrastructure be required to facilitate the closure of the level crossings; and access provision for the envisaged construction traffic. In this regard the following needs to be considered:

- The width of the local access roads;
- The linkages to roads of strategic importance; and
- The surrounding environment.

Most construction site options which might be considered are likely to be accessible by local roads. Narrow access roads may need to be widened temporarily to accommodate construction traffic. Alternatively, or in addition, new temporary access roads to construction sites can be constructed. Care should be taken to accommodate the need for parking, pedestrians and cyclists during temporary construction phases.

Given the location of the scheme, all construction sites will likely be accessible via the N11/M11 strategic road corridor, which will be important for the movement of construction material. Where potential construction sites are only accessible through built-up areas, additional traffic management measures may be required.

2.2.2 Key Constraints

2.2.2.1 Level crossings as constraints to transport networks

The presence of a total of 7 level crossings along the railway line relevant to this project poses specific constrains to transport networks in two different ways.

- The level crossings impact on the capacity of the rail line to increase frequencies without a compromise on safety. There is a limit to which the headways can be reduced while still allowing for movements of pedestrians, cycles and motorised vehicles across the line in a safe manner; and
- The level crossings also hinder the seamless connections of pedestrians, cyclists, public transport users and private vehicles across the railway line. The times the barriers are down are, in effect, reflected in a temporary severance of the networks. This is especially notable during peak times, when demand for multi-modal journeys across the railway line is at its highest and at the same time, higher frequencies of train services mean longer periods of severance.

2.2.2.2 Sandymount Area Level Crossings

The potential closure of the five level crossings in the Sandymount area presents some mobility and accessibility constraints to general traffic. These include reduced east-west accessibility to the strategic road network (for example Strand Road and the connection to Dublin Port).

Pedestrian and cycling accessibility between residential and employment areas to the east and west of the line, as well as accessibility to transport corridors to the west (e.g. Merrion Road and N11) may also be constrained by the closure of the existing level crossings.

Three of the five level crossings (Lansdowne Road, Sandymount Avenue and Sydney Parade) also offer an alternative for access to the Railway Station platforms. However, the stations are not reliant on the level crossings, as all include grade-separated connections between the two platforms. These are provided within the station and available only to rail patrons.

Accessibility for emergency services in terms of minimum response time is also a constraint as is access to education, health and retail facilities. The impact on traffic in terms of additional delays or queueing should also be considered. Planned schemes in the area, such as the Dublin BusConnects scheme, should be taken into account.

It is likely that additional infrastructure will be required to provide improved pedestrian and cycling accessibility across the rail line and to maintain vehicular accessibility to a level that is commensurate with the existing levels of accessibility.

There are physical limitations in terms of existing space availability around the crossing locations. The proximity to the River Dodder between Lansdowne Road and Serpentine Avenue is a constraint that will impact any potential proposals to lower the rail line.

In terms of planning and environmental impact, the proximity of the coastline near Merrion Gates is a constraint. In some areas, the impact on properties and impediments to adequate property access in the area around the crossing location is a constraint as it would lead to private land acquisition or the creation of alternative access points. Some structures have significant importance such as the Aviva Stadium located near the Lansdowne Road level crossing and may be a constraint. There may also be some utility constraints during the implementation phase. These may include electricity cables in the proximity of the required constructions works, some of which may serve the rail line. It is likely that most locations will have gas lines and fibre networks that may be impacted by construction.

2.2.2.3 Bray Level Crossing

The potential closure of the level crossing at Quinsborough Road presents some mobility and accessibility constraints to high clearance vehicles, pedestrians and cyclists, as all the alternatives are underbridges, some of which have relatively low height restrictions. These include access to the businesses and public amenities along the Bray seafront and a Dublin Bus depot which requires high clearance for double-decker buses.

It is likely that additional infrastructure will be required to provide improved pedestrian and cycling accessibility across the rail line and to maintain high clearance vehicular accessibility. The current vertical clearance at Quinsborough Road crossing is 5m and the crossing has two lanes allowing two-way traffic.

The Quinsborough Road level crossing also offers an alternative for access to the Railway Station platforms. However, the station is not reliant on the level crossing, as it includes grade-separated connection between the two platforms. This is provided within the station and available only to rail patrons.

In terms of vehicular crossings, seven other alternative crossing locations are available along the rail line in Bray. These are all underpasses with constrained vertical clearance at less than 5m. These alternative crossings are also narrow and in most instances, provide only one lane; or only for vehicle movement in one direction.

Any works to these locations to accommodate high clearance vehicles will therefore also have to consider potential changes to the current one-way system operational along Strand Road.

In terms of planning and environmental considerations any proposals to widen Strand Road could potentially be constrained by the proximity to the Bray seafront. In some areas the impact on properties and impediments to property access in the area around the crossing locations is a constraint in terms of private land acquisition or the creation of alternative access points. Some properties have significant importance such as Carlisle Grounds (football stadium) and the war memorial located near the Quinsborough Road level crossing and may be a constraint. There may also be some utility constraints during the implementation phase. These may include electricity cables in the proximity of the required constructions works, some of which may serve the rail line. It is likely that most locations will have gas lines and fibre networks that may be impacted by construction.

Accessibility to emergency services in terms of minimum response time is also a constraint. The impact on traffic in terms of additional delays or queueing should also be considered. The integration with any planned schemes in the area, for example the Bray transport interchange should be taken into consideration.

2.2.2.4 Ennis Lane Level Crossing

The potential closure of the level crossing at Ennis Lane presents some mobility and accessibility constraints to vehicles, pedestrians, and cyclists. These include pedestrian and cyclist access to the Bray Greystones Cliff Walk / Proposed East Coast Greenway and the Greystones Marina; as well as vehicular access to the farmland to the east of the rail line.

An alternative crossing exists at Victoria Avenue, about 1km to the south of Ennis Lane. However it is likely that the potential provision of additional infrastructure will have to be considered to provide improved pedestrian and cycling accessibility across the rail line and to maintain vehicular accessibility to the farmland.

In terms of planning and environmental considerations any proposals should consider the proximity to the coastline. The impact on properties and impediments to property access in the area around the crossing location may be a minor constraint. Accessibility to emergency services in terms of minimum response time should also be taken into account.

2.2.2.5 Other Areas

Some potential additional works may be required near Killiney Railway Station and around the Greystones Railway Station. The works are related to signalling, telecoms and LV power and will likely be limited to cabling and possibly a small number of new structures like sub-stations.

The low speed and function of the access roads through built-up areas will need to be considered in the context of construction traffic generated by the works in these areas. In Killiney, the bridge which provides access to the site from the south has a limit of 3 tonnes which may be a constraint in terms of construction traffic.

2.2.3 Summary of issues for further consideration

In summary, the potential upgrades are part of a scheme that will increase the capacity of the rail system and consequently the attractiveness for trips to be undertaken by public transport in the Greater Dublin Area. As such, it brings about positive benefits to sustainable transportation.

The potential closure of the level crossings along the rail line in Sandymount, Bray and Greystones may lead to accessibility constraints for vehicles, pedestrians and cyclists. Any potential infrastructure to be provided to improve pedestrian and cycling accessibility or to accommodate vehicle accessibility will be constrained by the physical limitations in terms of existing space availability around the crossing locations, the impact on property access, the environment and significant structures.

Construction activities are expected to generate a relatively low number of additional vehicular journeys.

2.3 Landscape and Visual Impact

2.3.1 Overview

The purpose of the landscape and visual impact section is to highlight the key landscape and visual constraints that exist within the constraints study area. This will allow the design team to make informed developmental and structural decisions based on available desktop landscape and visual information at this stage of the project. A landscape and visual impact assessment of the potential effects of the proposed DART+ Coastal South will be undertaken to accompany the Railway Order application.

The landscape and visual impact assessment is being prepared having regard to the following legislation, policy and guidelines:

- Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment;
- Planning and Development Acts 2000 – 2022;
- Planning and Development Regulations 2001 – 2022;
- Dublin City Development Plan 2016-2022, Dublin City Council, 2016;
- Draft Dublin City Development Plan 2022-2028, Dublin City Council, 2022;
- George's Quay Local Area Plan 2012, Dublin City Council, 2012;
- Dún Laoghaire-Rathdown Development Plan 2022-2028 (comes into force 21 April 2022), Dún Laoghaire-Rathdown County Council, 2022;
- Blackrock Local Area Plan 2015-2021, Dún Laoghaire-Rathdown County Council, 2015;
  - Woodbrook – Shanganagh Local Area Plan 2017-2023, Dún Laoghaire-Rathdown County Council, 2017;
- Wicklow County Development Plan 2016-2022, Wicklow County Council 2016;
- Draft Wicklow County Development Plan 2022-2028, Wicklow County Council, 2022;
  - Bray Municipal District Local Area Plan 2018-2024, Wicklow County Council, 2018;
  - Bray Head Special Amenity Area Order 2007, Wicklow County Council, 2007;
  - Greystones-Delgany & Kilcoole Local Area Plan 2013-2019, Wicklow County Council, 2013;
- Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports, Environmental Protection Agency, 2017;
- Advice Notes on Current Practice in the Preparation of Environmental Impact Statements, Environmental Protection Agency, 2003;
- Environmental Impact Assessment of Projects – Guidance on the Preparation of the Environmental Impact Assessment Report, European Commission, 2017;
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment, Department of Housing, Planning and Local Government, 2018; and
- Guidelines for Landscape and Visual Impact Assessment, 3rd Ed., Landscape Institute and Institute of Environmental Management & Assessment, 2013.

The landscape and visual constraints are identified from a desk study of relevant planning and landscape / visual documents, including the respective development plans, local area plans and landscape character assessments for areas applicable to the study area.

2.3.2 Key Constraints

The key constraints for Landscape & Visual are presented in Annex 3.1 Appendix A – Constraint Mapping: Landscape Constraints.

The proposed development follows the corridor of the existing Coastal Railway Line between Dublin City Centre and Greystones, passing through a range of urban, sub-urban, town centre townscapes and rural landscapes. These include the following townscape / landscape character areas:

- The Urban Townscape of Dublin City;
- The High Sensitivity Coastal Landscape / Townscape of Dún Laoghaire-Rathdown;
- The High Sensitivity Coastal Landscape of Wicklow County; and
- The Suburban / Urban Townscape of Bray and Greystones.

The study area includes the following key landscape / townscape and visual constraints (as identified on the Land Use (Zoning) Constraints Maps in Appendix F where data is available) for Dublin City, Dún Laoghaire-Rathdown and County Wicklow):

- Community, residential, and open space land-uses and amenities:

  – Dublin City Area (Map E, F and H of Development Plan):

  – Z1 lands (Residential Amenity);

  – Z2 lands (Residential Conservation Areas Amenity))

  – Z3 lands (Neighbourhood Facilities)

  – Z8 lands (Architectural and Civic Design Character / Conservation Objective)

  – Z9 lands (Recreational Amenity, Open Space and Green Networks).

  – Z11 lands (Canal, Coastal and River Amenity)

  – Dún Laoghaire-Rathdown (Maps 2, 3, 4, 7, 10 and 14 of Development Plan):

  – A, A1, A2 lands (Residential and Neighbourhood Amenity)

B lands (Rural Amenity)
F lands (Open Space)

  – GB lands (Greenbelt)

  – G3 – Conservation, Amenity or Buffer Space

  – Wicklow County Council

  – AOS lands (Active Open Space)

  – OS lands (Open Space)

  – R lands (Residential)

  – SF lands (Sea Front)

- TC lands (Town Centre)

- Protected townscape / landscape areas, features or sites and visual aspects:
  - Dublin City Area:
  - Conservation Areas;
  - Architectural Conservation Areas (ACA);
  - Protected Structures;
  - Recorded Monuments.
  - Dún Laoghaire-Rathdown
  - Architectural Conservation Areas (ACA) and candidate ACAs;
  - Preserved Views and Prospects;
  - Protected Trees and Woodlands, including Tree Preservation Orders (TPOs);
  - Tree Preservation Orders;
  - Protected Structures;
  - Recreation Routes and Ways.
  - Wicklow County Council
  - Architectural Conservation Areas in Greystones;
  - Preserved Views / Views and Prospects;
  - Tree Preservation Orders;
  - Protected Structures.
- Landscape Character Areas
  - Dún Laoghaire-Rathdown
  - Shanganagh
  - Wicklow County Council
  - Area of Outstanding Beauty at Bray Head / Bray to Greystones Cliff Walk
  - Bray Head Special Amenity Area

- Coastal Landscape Area

Refer also to Section 2.4 Archaeology and Cultural Heritage for further detail in relation to recorded monuments; to Section 2.5 Architectural Heritage for further detail in relation to protected structures and architectural conservation areas; and to Section 2.12 Biodiversity for further detail in relation to natural heritage.

In addition to the above the following items are also noted as landscape and visual constraints:

- Sections of the railway are elevated / exposed and therefore, more visually prominent in their immediate surrounds;
- Sections of the railway corridor are bounded by mature hedgerows, some with mature trees, which are of landscape and screening value;
- Even where they are not recorded as protected structures, many of the structures associated with the railway, including bridges and station buildings are important historical features; and
- Sections of the railway corridor are openly visible / viewed from adjoining residential and other properties and from open spaces and amenities. This is of particular note in suburban areas, town centres and villages.

2.3.3 Summary of Issues for Further Consideration

The key landscape and visual constraints for further consideration relate to:

- Potential widening of the railway corridor;
- Associated earthworks / structures;
- Impact on existing boundaries, corridor hedgerows and plantings;
- Impact on protected or historic structures; and
- Visibility of interventions / new elements including from residential, open space and / or protected landscape / visual areas.

2.4 Archaeology & Cultural Heritage

2.4.1 Overview

The purpose of the archaeology and cultural heritage section is to highlight the recorded archaeological monuments and sites, areas of archaeological potential and cultural heritage interest within the constraints study area. This will allow the design team to make informed developmental and structural decisions based on available desktop cultural heritage information at this stage of the project. This section identifies all sites of an archaeological interest within 50m on either side of the existing railway infrastructure and provides an historical context for the archaeological and cultural heritage potential of this landholding.

2.4.2 Key Constraints

The key constraints for Archaeology & Cultural Heritage are presented in Annex 3.1 Appendix B – Constraint Mapping: Heritage Constraints.

Sensitive receptors identified for the purpose of this study are:

- National Monuments in State care, as listed by National Monuments Service (NMS) of the Department of Housing, Local Government and Heritage;
- Sites with Preservation Orders (PO);
- Sites listed in the Register of Historic Monuments;
- Record of Monuments and Places (RMP) and the Sites and Monuments Record (SMR) from the Archaeological Survey of Ireland;
- Designated Zones of Notification (Areas of Archaeological Potential); and
- General Areas of Archaeological Potential.

Key sources of information relating to features identified within these databases have been verified by aerial imagery, Ordnance Survey historic mapping and information contained within the relevant Development Plans, namely Dublin City, Dún Laoghaire-Rathdown and Wicklow. There are no National Monuments, sites listed with preservation orders or recorded on the register of historic monuments within the constraints study area. There are, however, a number of recorded archaeological monuments and these are listed below (see Section 2.4.3).

The study area commences south of the River Liffey within the historic city of Dublin (RMP DU018-020). The boundaries of the historic City of Dublin, extend from the Royal Canal in the north to St. Stephen's Green in the south. This reflects the continuous intense occupation of a relatively confined area from the Mesolithic period; however the majority of archaeological sites within this area date from the late medieval period. The continuous occupation of the historic City of Dublin was greatly influenced by the presence of early medieval and medieval trade centres and the protection afforded to the citizens of Dublin by the town walls on the south banks of the River Liffey. The latter, in association with the Rivers Poddle, Bradogue and Stein, were a focus of concentrated industry throughout the history of Dublin.

Within the city, there are four recorded individual archaeological sites located within 50m of the railway line and the railway stations at Tara and Pearse Street. Two of these sites reflect the industrial development of the city, in the form of a windmill at the quays and a former brickworks. St Mark's Church is the oldest building on Pearse Street (DU018-020347) and is located to the northeast of the railway line. This freestanding Church of Ireland was built in 1729 and is set back from the street. The railway overlooks the site of the other church (DU018-020648) which was excavated by John Channing in 1992. This site was located on the south side of Poolbeg Street, at its junction with Luke Street, in an area reclaimed from the Liffey estuary. The main interest on the site was provided by a series of burials, some of which had been disturbed prior to the arrival of the archaeologists. These interments appeared to be associated with a Lutheran church of early eighteenth century date shown on the first edition O.S. six-inch map.

An archaeological site excavated at the corner of Luke Street and Townsend Street revealed a timber shore revetment and wharf, constructed almost entirely of oak and dated by dendrochronology to sometime after AD1655. The timber revetments extended across the site parallel with the Liffey and stood in places to a height of 1.50m. They were well constructed, and many of the boards had carpenter's assembly marks in Roman numerals. A range of mid- to late-seventeenth century

artefacts, including pottery, clay pipes and leather shoes, were recovered from around the timbers of Poolbeg and Luke Street.

All environments have an inherent archaeological potential and this potential is borne out where there are recorded archaeological sites (listed in Section 2.4.3), in addition to more recently discovered sites identified through aerial photography, geophysical survey and archaeological testing. The recorded presence of this section of the coastline showcases the later defensive structures designed to protect the city and wealthy developing suburbs. Many of these suburbs are centred on earlier rural villages, which have grown and developed their own unique sense of community and distinct cultural heritage.

During the Napoleonic war this stretch of coastline was heavily defended. Martello towers were constructed as part of a string of defences along the coast as well as coastal batteries. Some seventy-four towers were built around Ireland for the purpose of resisting an attack from Napoleon's French fleet and there are five towers within 50m of the railway line located at Bray, Killiney (where there are two), Dunleary and Intake. They were erected during the period 1801 to 1804 and each took about six months to build, under the direction of Col. Benjamin Fisher (Kerrigan 1995). The average cost was £1800 per tower and many were built attached to a battery or fort such as at Killiney.

The stone-built towers were forty feet high, with eight-foot thick walls and the entrance door was usually positioned ten or fifteen feet above the ground (Pearson 1998).

While these later impressive stone-built structures dominate the archaeological record along the railway line along the coast, the region is known to have been settled in prehistory. For example, earlier prehistoric Mesolithic activity (c.8000BC to 4000BC) has been identified through material assemblages. During the Mesolithic period, people hunted, foraged, and gathered food, and appear to have had a nomadic lifestyle, probably occupying seasonal, temporary settlements. The most common evidence found to indicate such temporary settlements are scatters of worked flint material, a by-product from the production of flint implements. Flint production has been found on Dalkey Island. Shell middens also date to this period and occur where the earliest inhabitants settled coastal and riverine locations and deposited waste from food consumption (shellfish, plant remains, and animal bone) and preparation.

Stone axes found in in Ballsbridge and Blackrock are indicative of activity (NMI 1940:42 and NMI 1978:283) during the Neolithic (c.4500BC to 2500BC). This was a time when a farming economy had been adopted in Ireland, where stone axes were often used to clear areas of woodland to provide space for cultivation of crops and grazing for animals. Further indication of prehistoric activity comes from a Tripartite Bowl (NMI RIA1921:3), a food vessel deposited as grave goods, which was found in 1892 during the excavation of a sand pit in Ballsbridge. Such vessels typically date to the Early Bronze Age (c. 2500 BC to -1500 BC). In Bray, barbed and tanged flint arrowheads (NMI Reg. No. 1899:1) were found in 1898, these artefacts also date to the Early Bronze Age.

One of the few Roman sites known in Ireland was discovered at what is now Esplanade Terrace in Bray where, in 1835, several extended burials were found in a sandbank (WI004:004). This find spot is located just outside the 50m constraint area to the east. Coins found with the skeletons included

those of the emperors Hadrian (AD 177–138) and Trajan (AD 97–117). The skeletons were orientated east–west with a stone at each head (Davies 1998; Bradley and King 1989).

In the early medieval period, this coastal area, in which the proposed redevelopment of the railway line is situated, was part of the territory of the Dál Messin Corb, the first of the Leinster dynasties. The Dál Messin Corb were eventually displaced from the Liffey plain and gradually pushed further into Wicklow under pressure from other dynasties that were themselves being displaced by Scandinavian settlements being established from the ninth century onwards. It is possible that the area later became part of the domain of the Ui Briúin Chualann, who dominated the southern parts of County Dublin and the coastal strip towards Wicklow.

As shown on the first edition 6-inch Ordnance Survey maps of Dublin, the intended route of the railway between Pearce Street Station and the then known Kingstown (now referred to as Dún Laoghaire) was shown within an urban and suburban city and coastal landscape. The proposal was obviously intended to link the developing suburbs of Ballsbridge, Sandymount, Merrion, Booterstown and Blackrock to the harbour and trading town of Kingstown (Dún Laoghaire).

South of Dún Laoghaire an atmospheric railway provided transport links with Dalkey and this was introduced in 1844. To the south of Dalkey to Greystones, the railway was built at a later stage and the constraints area is shown as coastal green fields, rock face and cliffs on the first edition 6-inch Ordnance Survey map.

The arrival of the railway in the 19th century, proved to be a very effective means of transport. The first line to open was the Dublin to Kingstown (Dún Laoghaire) railway line, in 1834, arising from proposals by the merchants of Dublin to link the city with Dún Laoghaire Harbour. The latter was increasingly being used by larger ships because of the levels of silt at Dublin Port. The line ran from Westland Row (Pearse Street) to Seapoint and shortly after was extended to Dún Laoghaire. Within the city centre the railway ran on an embankment from south of the River Liffey to south of Bath Avenue. The construction of the embankment marked a major engineering feat and its continued survival and use further underline the technical achievement of its construction and is recorded in the Dublin City Industrial Heritage Record (DCIHR 18 12 041). The railway line (DCIHR 23 01 001), its bridges, stations and level crossings are all included in the DCIHR. These structures are all addressed within the architectural heritage section of the report (Section 2.5).

The railway would radically alter both the coastline and the land alongside it, with the expansion of formerly small fishing villages such as Booterstown and Blackrock and the growth of suburbs along its route. Blackrock Station opened on 17 December 1834. These changes can be most easily appreciated through a comparison of Rocque's map of Dublin in 1760 with the first edition Ordnance Survey six-inch mapping, published in 1843.

Prior to the introduction of the railway there had been a slight inlet between Blackrock and Williamstown, where salt was collected from ponds. A salt tower (presumably for the drying and storing of salt) is shown near here on a mid-18th century engraving of Blackrock (Pearson 1998). The railway embankment created an area that flooded at high tide, which was described in the 1860s as a 'dismal, foul-smelling swamp' (Wakeman 1865). In 1873, the land was reclaimed to create the present Blackrock Park, at a cost to the Blackrock Town Commissioners of £3000 (Pearson 1999).

Another area that was markedly altered by the new railway embankment was at Booterstown, where there had previously been a popular sandy beach (Bennett 2005). The embankment created a marsh that is now the site of a bird sanctuary.

On July 10, 1854 the Dublin–Bray railway line opened for business. The work was supervised by the celebrated railway engineer, William Dargan. Dargan is also remembered as one of the chief architects of the 'new' town of Bray that was planned as a seaside resort in the fashion of those found in England and Wales. In 1852, Bray's most prominent entrepreneur, John Quin, entered into a bargain with the Dublin and Wicklow Railway Co. whereby he made available lands along the coast for the railway in return for a new forty-foot road from Main Street to the seashore parallel with the existing Quin's Road. This new road (later named Quinsborough Road) became the new artery between the 'old' Bray and the new (Davies 1998).

By the late nineteenth century, Bray had more of the feel of an English seaside resort than an Irish town. Indeed, it was often referred to from 1860 onwards as 'the Brighton of Ireland'. The main development of the town took place between the coming of the railway and the turn of the twentieth century when the number of buildings went from 668 (1851) to 1,614 (1901) and the population of the town more than doubled (Davies 1998).

In Wicklow, an area of interest that requires a closer look is located at Rathdown Upper, the existing level crossing at Ennis Lane is located in this area. A complex of medieval structures and features revealed from aerial photography (CUCAP BDP025/026) and geophysical survey (Burbridge et. al. 2017 and Leigh 2016) form a significant complex on either side of the existing railway line. The church known locally as St Crispin's Cell is located on a gentle east-facing slope in undulating pasture overlooking a small stream and the coastline of the Irish Sea is located 290m to the east. The church is located 49m west of the existing railway line. The site of Rathdown Castle (WI008-011----) is located over 100m to the east of the railway line while the deserted medieval settlement (WI008-011002-) is located adjacent to the railway.

In 1827 the deserted settlement of Rathdown was described as following; 'Wild and deserted as the whole of this district, from the Windgate road to the beach, now appears, with scarcely a comfortable residence (none at all now) and no arborical vegetation, it was once the site of the village of Rathdown and surrounded by baronial and ecclesiastical edifices. The castle [WI008-011----], St. Crispin's Cell [WI008-012001-], and the parish church, were within short distances of each other and of the village. Upon the final deletion of the village, Col. Farrar the proprietor, razed the tomb stones, disinterred the bones in the church yard and recommitted all the earth again in one large pit dug for the purpose, after which he erased the church itself' (Wright 1827, 20).

In 2016 a gradiometer and resistance survey was undertaken by Leigh Surveys under licence No. 16R0063 (Burbridge et. al. 2017 and Leigh 2016). The results of the survey were summarised as follows;

'The results have detected responses indicative of archaeological activity. The responses identified are fragmented. There is clear correlation with the aerial photograph but much of the site has remained undetected in the data, with the responses identified having a fragmented appearance.

This suggests this site has been heavily plough damaged. Nevertheless, the responses are indicative of a former field system, with ditched boundary features and clear ploughing trends'.

Apart from the archaeological investigations mentioned above, all other monitoring, testing and excavations undertaken within the immediate vicinity of the railway line have not revealed any features of an archaeological significance.

2.4.3 Summary of Issues for Further Consideration

The proposed lands for the railway development have been subjected to a number of disturbances during the construction of the railway and over the years. The railway is in cut, in fill on embankments and at grade from Dublin to Wicklow and passes through urban, sub-urban and rural coastal environments. While this is likely to have reduced the archaeological potential, nonetheless, it is possible that archaeologically enriched soils, features and deposits may survive subsurface as evidenced from recent findings. Mitigation measures that may be required include by preservation in situ, preservation by design and/ or preservation by record.

There are several recorded archaeological sites or their zones of notification within the constraints area (50m on either side of the existing railway line) and these sites are described and listed in **Table 2**, from north to south.

Table 2: Recorded archaeological sites within 50m of the existing railway infrastructure

RMP No & Irish Transverse Mercator (ITM)	Townland	Site Type	Distance	Description
DU018-020464 716166 734436	Dublin South City	Windmill	50m to the west of the elevated track	No description available.
DU018-020648 716228 734347	Dublin South City	Church	28m to the west of the elevated track	No description available.
DU018-020347 716472 734146	Dublin South City	Church	39m to the east of the existing track.	No description available.
DU018-020439 716573 734082	Dublin South City	Brickworks	50m to the northwest of the elevated track.	No description available.
DU023-002 720723 730004	Intake	Martello Tower	17m to the south of the railway infrastructure.	Situated on an east facing slope with views of the coastline, north of Blackrock, now a park bordering on the railway line. Built of dressed granite, the tower is free-standing. Doorway is in the south. The upper parapet is carried on a double corbel. A blocked-up tall narrow opening was probably the original entrance on the west side of the structure.

RMP No & Irish Transverse Mercator (ITM)	Townland	Site Type	Distance	Description
DU023-048 722260 729222	Seapoint	Castle-unclassified	11m to the south of the railway infrastructure	The Down Survey (1655-6) map shows a castle in the immediate area of Seapoint Station, however it is not precisely located. The possible site is located in a green space bedside the railway line.
DU023-052001 723849 728974	Dunleary	Promontory Fort	27m north of the railway infrastructure	Situated north of Crofton Road and York Road on the coast. A promontory fort noted by Reverend Stokes (1893)[1] as 'Dun of Dunleary' and located left of the old pier at Dún Laoghaire.
DU023-052003- 723852 728973	Dunleary	Martello Tower	25m north of the railway infrastructure	A martello tower was built in the middle of the pier (mentioned above). Its position is marked on Rocque's map of County Dublin (1765) as a circular mound by the harbour. The area was levelled to make way for the railway in 1834. The material from the dismantled earthwork was used to level the ground and form a foundation for the road (Casey 2001)[2].
DU023-070 725936 726890	Dalkey	House 16th/17th century	40m south of the railway infrastructure	Situated on the south side of Barnhill Road, part of a multi-period residence named Dalkey Lodge on the First OS 6-inch edition maps, set with in gardens as a detached house. The earlier house, a rectangular, 2-storey rendered masonry structure is placed with its long axis facing the street along an ENE-WSW axis.
DU026-012 725924 724871	Killiney	Battery	Adjacent to the western side of the railway track.	Located at the end of Vico Road, this structure dates to the post-1700 AD period (Turner 1983)[3].
DU026-089 725855 724205	Killiney	Martello Tower	35m to the west of the railway track	The martello tower was located on the coast at the junction of the Military Road and Sea Road (Turner

[1] Stokes, M. 1893. St. Beoc of Wexford, and Lan Veoc in Brittany. Journal of the Royal Society of Antiquaries of Ireland, 23, 380-5.

[2] Casey, M. 2001. The coastal promontory forts of Ireland: interim report for the Heritage Council. Unpublished specialist report, National Monuments Service, Department of Arts, Heritage and the Gaeltacht.

[3] Turner, K. 1983. If you seek monuments: a guide to the antiquities of the barony of Rathdown. Rathmichael Historical Society.

RMP No & Irish Transverse Mercator (ITM)	Townland	Site Type	Distance	Description
				1983). The martello tower dates to Post-1700 AD.
DU026-014001 725941 723838	Killiney	Martello Tower	50m to the east of the railway infrastructure	The Martello tower dates to post-1700 AD and it is located in a coastal location, close to a beach. The property is called Granagh. The tower is built of granite with a doorway in the west and a marked string course. It is accessible from beach and it has a two storey addition with a turret.
DU026-032 725709 722956	Shanganagh	Enclosure	38m to the east of the railway infrastructure	An aerial photograph (CUCAP, AIB 42) shows a roughly circular cropmark enclosure (diam. c. 50m). There is an opening in the NNE which maybe the original entrance. A housing estate now occupies this site.
DU026-124 726560 719491	Cork Great	Linear Earthwork	Located immediately to the west of the railway infrastructure	Rob Goodbody (pers. comm.) has identified a section of bank running through Bray Golf Course which may be part of the Pale Ditch. It follows the line of the county boundary and is in flat coastal terrain with views onto the Sugarloaf Mountain in the South. It is a continuous curving section of bank approximately 150m long which runs on a NNE -WSW axis. It comprises a splayed, flat-topped bank (1.60m wide at the top and 10m at its base. It is 0.80m high and some mature Sycamores grow along the side.
WI004-002 726807 719060	Bray	Martello Tower	24m east of the railway infrastructure	Detached multiple-bay two-storey former Martello tower, built 1804-5, and now in use as a private residence. The structure overlooks the railway line.
WI008-011002 728719 713825	Rathdown Upper	Deserted Medieval Settlement	The existing railway line traverses the area of archaeological potential that surrounds this	Cripmarks from aerial photographs appear to represent earthworks associated with the medieval village of Rathdown[4]. Recently, further archaeological activity was detected

[4] CUCAP - Cambridge University Collection of Aerial Photographs. Unit for Landscape Modelling, Department of Geography, University of Cambridge.

RMP No & Irish Transverse Mercator (ITM)	Townland	Site Type	Distance	Description
			significant cluster of medieval sites	through a geophysical survey (Leigh, 2016)[5].
WI008-012001 728611 713597	Rathdown Upper	Church	49m west of the railway line	The church is known locally as St Crispin's Cell. The remains consist of a small single cell church with square-shaped porch at the west end. The well preserved walls are upstanding to the eaves and are built with rubble and granite with quartzitic quoins.
WI008-012002 728612 713592	Rathdown Upper	Graveyard	48m west of the railway line	In the early seventeenth century this graveyard which was associated with St Crispin's Cell (WI008-012001-) was cleared and the disinterred bodies were 'buried in one pit at the east end' (O'Flanagan 1928)[6].

2.5 Architectural Heritage

2.5.1 Overview

The purpose of the architectural heritage section is to highlight the recorded features of architectural heritage interest within the constraints study area. This will allow the design team to make informed developmental and structural decisions based on available desktop architectural heritage information at this stage of the project.

2.5.2 Key Constraints

The key constraints for Architectural Heritage are presented in Annex 3.1 Appendix B – Constraint Mapping: Heritage Constraints.

Identified sensitive receptors identified for the purpose of this study are:

- Structures included in the Records of Protected Structures, in the Development Plans of Dublin City, Dún Laoghaire-Rathdown and Wicklow County Councils;
- Architectural Conservation Areas included in the Development Plans of Dublin City, Dún Laoghaire-Rathdown and Wicklow County Councils;
- Buildings included in the National Inventory of Architectural Heritage's Building Survey;

[5] Leigh, J. M. 2016. Geophysical survey report, St. Crispin's Church, Greystones, County Wicklow (Licence no. 16R0063). Unpublished report, National Monuments Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.

[6] O'Flanagan, Rev. M. (Compiler) 1928. Letters containing information relative to the antiquities of the county of Wicklow collected during the progress of the Ordnance Survey in 1838. Bray.

- Gardens included in the National Inventory of Architectural Heritage's Garden Survey;
- Designed Landscapes as identified with reference to aerial photographs, Ordnance Survey and historic mapping; and
- Other Structures of Built-Heritage Interest as identified with reference to aerial photographs, Ordnance Survey and historic mapping.

The railway was built by the Great Southern- Dublin & Southeast Railways {D.&.S.E.R}. The company previously traded under the names Waterford, Wexford, Wicklow & Dublin Railway (WWW&DR or 3WS) to 1848, Dublin and Wicklow Railway (D&WR) to 1860 and Dublin, Wicklow and Wexford Railway (DW&WR) until 1906 (Shepherd 1988).

Amongst the lines forming the DSER was the Dublin and Kingstown Railway, which was authorised in 1831 and opened in 1834 – the first public railway in Ireland (DCC 2009). The City Centre terminus was originally at Westland Row (now Pearse Station). The inner city sections are raised above street level as the railway was designed around the existing streetscapes of the inner city. This is most evident in the number of over bridges between Grand Canal Quay and City Quay. The section between Lansdowne Road and Grand Canal Quay was also connected to warehouses and gas works in the Grand Canal Dock. North of the Liffey the railway was similarly connected to warehouses, depots, docks and the Dublin Steam Packet Railway Terminus on the North Quays.

The Kingstown – Dalkey section was operated by atmospheric traction for a short while. The Dublin and Kingstown Railway heralded a major transformation in Irish transport. It was one of the world's first and most successful commuter routes, relying on passengers and mail rather than freight. The construction of the line between Bray and Greystones involved considerable challenges, not least, the tunnelling of Bray Head.

In 1844 Isambard Kingdom Brunel informed the Dublin and Kingstown Railway that he intended to build a broad-gauge railway line to Rosslare (Love 2021). His offer of expert help with this line led to the formation of the Waterford, Wexford, Wicklow and Dublin Railway. Though Brunel was engaged by the above-mentioned company, and had taken on an assistant engineer named Gibbons, the project was cancelled, as major backers had pulled out by November 1844.

The entity that became the DSER was incorporated by Act of Parliament in 1846 as the "Waterford, Wexford, Wicklow and Dublin Railway Company". They leased the Dublin and Kingstown railway in 1854, converted it from 4ft 8+1⁄2in (1,435 mm) gauge to their 5ft 3in (1,600mm) gauge. The remainder of the line to Wexford was opened over the next 20 years in stages.

In 1846 two undertakings, for the construction of an inland railway from Dublin to Bray, and a line from Bray to Wicklow, amalgamated, and were incorporated as the Waterford Wexford Wicklow and Dublin Railway Company. This association obtained a 999 year lease of the Dublin and Kingstown Railway, and also acquired the Dalkey atmospheric line in order to convert it to locomotive traction, and extend it to Bray. Brunel engineered the Bray to Wicklow section. Work on Brunel's railway was revived in 1853.

The first section of D&W line from Dalkey to Bray was opened on 10 July 1854. By July 1854 the line to Bray was opened. The present station was designed by George Wilkinson (NIAH 2021a).

A continuous route from Dublin to Wicklow was established the following year, when the section from the Dublin and Kingston terminus at Dalkey (atmospheric station) to D&W's Dalkey station was opened on 10 October 1855, and the extension from Bray to Wicklow (Murrough) opened 3 weeks later on 30 October.

Problems were discovered at Bray Head however (Love 2021). Brunel would use his experience from the Thames Tunnel to carve three tunnels through Bray Head in 1855. The tunnels were designed for double track, though only a single track was laid. These tunnels were built by William Dargan. The tunnels were named the Brabazon, a 210-yard tunnel, the Brandy Hole a 300-yard tunnel, and the Cable Rock, which was a 143-yard tunnel.

The station in Greystones was built c. 1855 when the present station was built. Both Bray and Greystones developed as seaside resorts with the advent of the Railway, as evidenced by the construction of terraced houses in the mid-19th century.

In 1860 the railway was renamed the "*Dublin, Wicklow and Wexford Railway Company*" in keeping with the southwards expansion of the railway.

The first viaduct was fraught with difficulty, as when it was near completion, the whole fabric was swept away overnight.

On August 9th, 1867, there was an accident on the viaduct. A passenger train had reached half-way across it, when the engine left the line, and sprang into the ravine at the land side, dragging with it a third-class carriage, while the next carriage turned over on its side, and hung suspended, half on the bridge. Two persons were killed and fifteen injured. This accident resulted in the line being diverted inland, and the building of a longer tunnel. Also a wall was built, 100ft above the railway line, to reduce risk from falling stone.

In 1909, the railway company had obtained the powers to construct a new line further inland, but the funds were not available. In 1876, Brabazon Tunnel was bypassed by two shorter tunnels. Also, two timber trestle viaducts south of the Brandy Hole were replaced by a single masonry arch and two arched sections built to support the cliff above the track.

In 1889, the Brandy Hole and Cable Rock tunnels were relined with stone and brick, though without altering the loading gauge. Also, another bridge was replaced.

In 1913, due to further erosion at the base of the cliff around Bray Head, a major deviation project was deemed necessary. This included the building of the Long Tunnel, which was designed by the engineer Courtney Edward Moore. The Tunnel was commenced in 1913 by Naylor Brothers of Huddersfield and completed in 1917 by the Engineer William Henn Hinde. The Long Tunnel is 1084 yards in length, 15ft high and has a 9ft 6 inch diameter ventilation shaft, 100 feet deep.

Coastal erosion has continued to poise problems on the route to Wicklow, forcing the opening of a deviation between Ballybrack and Bray on 1 October 1915, and numerous deviations between Bray and Wicklow. Amiens Street Station (now Connolly Station), was built as the terminus of the Dublin & Drogheda Railway (later Great Northern Railway) to the designs of John Macneill and William

Deane Butler in 1846, with subsequent additions built in the 1850s and 1880s. The additions built in 1891 correspond with the construction of the Loopline Bridge which was built as a viaduct across the Liffey to connect the Great Northern Railway to the Dublin Wicklow & Wexford Railway. As on the Dublin Wicklow & Wexford Railway, the inner city sections are raised above street level. This is most evident in the over bridges at Abbey Street, Gardiner Street, Talbot street and Amiens Street, Seville Place as well as the Loopline Bridge. Tara Street Station, which is also above street level also dates from this period.

2.5.3 Summary of Issues for Further Consideration

Appendix C presents a table of Architectural Heritage features for further consideration. These features should be considered as the design develops for the key infrastructure elements of the project.

2.6 Noise & Vibration

2.6.1 Overview

The DART+ Programme aims to modernise and improve the existing rail services in the greater Dublin area. For DART+ Coastal South, this includes improving rail capacity by considering the potential closure or partial closure of various level crossings. Works undertaken to achieve this will include the construction of over/underpasses at some existing level crossing locations.

These works have the potential to change the existing noise and vibration environment along the DART+ Coastal South Rail Corridor. The increased rail capacity may result in an increase in overall noise and vibration levels associated with the rail corridor, while the removing of level crossings will result in a decrease in noise at some receptors as there are expected to be fewer alarm signals.

The closing of level crossings also has potential to cause redistributed traffic in local areas, which may impact the noise levels at some residential receptors.

The main constraints relating to noise and vibration generated from a railway line are sensitive receptors. The design of the proposed development will seek to minimise noise and vibration generated during construction and operation at nearby sensitive receptors as far as reasonably practicable.

Sensitive receptors for noise are defined in the EPA guidance note for Noise (NG4)[7] as:

- Residential dwellings, including houses and apartments;
- Hotels or hostels;
- Health buildings;

[7] Environmental Protection Agency Office of Environmental Enforcement (OEE), Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4), January 2016

- Educational establishments;
- Places of worship or entertainment;
- Any other facility or area of high amenity for which its proper enjoyment requires the absence of noise at nuisance levels.

Sensitive receptors for vibration are defined as:

- Residential dwellings, including houses and apartments;
- Protected or heritage structures;
- Residential day care centres;
- Operating theatres;
- Premises with optical or electron microscopes, microbalances, lithography equipment or other vibration sensitive equipment;
- Data centres; and
- Any other location in which inhabitants may be disturbed by vibrations from the nearby rail corridor.

Key sources of information in relation to noise and vibration include EPA Guidance Note for Noise (NG4), Dublin City Council Noise Action Plan (2018 – 2023)[8], Dún Laoghaire-Rathdown County Council Noise Action Plan (2018 – 2023)[9], and the Wicklow County Council Noise Action Plan (2013)[10].

Information within this report on key constraints has been compiled via desktop review. Detailed site investigations along the railway corridor and proposed works areas will be scheduled as the project progresses, including baseline noise surveys at sensitive receptors.

2.6.1.1 Strategic Environmental Noise Mapping: Major Sources

The Environmental Noise Directive (END) (2002/29/EC) sets out the obligation of member states to assess and manage environmental noise and is the main EU instrument to identify noise pollution levels. The Directive mandates that Member States must prepare and publish noise maps and noise management action plans every 5 years. Strategic noise maps have been produced by Iarnród Éireann (Irish Rail) for:

- Major heavy rail (more than 30,000 vehicle passages per annum) within and outside the Dublin Agglomeration Area; and

[8] Dublin Agglomeration environmental Noise Action Plan, December 2018 – July 2023 – Volume 1 – Dublin City Council, December 2018.

[9] Dublin Agglomeration Environmental Noise Action Plan December 2018 – July 2023 – Volume 2 | Dún Laoghaire-Rathdown County Council, December 2018

[10] Wicklow County Council Noise Action Plan 2013, Version 1.01, Transportation & Roads Infrastructure Department, Wicklow County Council, August 2013

- All rail (irrespective of the number of vehicle passages per annum) within the Dublin Agglomeration Area.

Three rounds of strategic noise mapping have taken place – for base years 2006, 2011, and 2016. The Round 3 mapped contours for areas that are part of the proposed DART+ Coastal South are presented in Appendix C. It should be noted that information on the section between Bray and Greystones does not yet exist so is not presented within the noise maps.

2.6.2 Key Constraints

The key constraints for Noise are presented in Annex 3.1 Appendix D – Constraint Mapping: Noise Constraints.

Noise and vibration sensitive receptors within the study area are residential dwellings, commercial premises, and community facilities near the DART+ Coastal South railway corridor.

The following items are key constraints at this stage:

- Proximity of sensitive receptors to the rail corridor, especially residential receptors;
- Additional noise and vibration from increased frequency of trains, although this may be mitigated by fewer bells and signals at level crossings that are removed; and
- Construction noise and vibration where new infrastructure must be built for the removal of level crossings and other works adjacent to sensitive receptors.

2.6.3 Summary of Issues for Further Consideration

As well as the key sensitive receptors and constraints referenced above, which will all be subject to further consideration, there are a number of other issues which will also be further examined. This includes sensitive properties such as cultural heritage sites, buildings, monuments, and bridges, as well as other potentially sensitive fauna. This may include birds associated with EU and nationally designated sites.

2.7 Air Quality & Climate

2.7.1 Overview

The DART+ Programme will contribute to Ireland's transition to a low carbon and climate resilient society by providing sustainable, electrified, reliable and more frequent rail service. The proposed DART+ Coastal South is seeking to ensure that capacities can be achieved in line with the DART+ Programme. This includes level crossing removal, potential turnback facilities and stabling, and increases in line capacity of the Bray-Greystones section. The frequency and quality of service will provide a viable transport alternative for communities along the route and help encourage people to migrate from private car use. This will assist Ireland in reducing greenhouse gas emissions from transport and help combat climate change.

2.7.2 Key Constraints

At a regional level, the proposed project has the potential to result in a positive impact on air quality and climate due to encouraging a modal shift away from private car. However, there is the potential for local impacts where traffic is redistributed as a result of level crossing closures. There is the potential for air quality impacts to be generated at sensitive receptors located in proximity to the works during the construction phase. A significant number of sensitive receptors are located in proximity to the works, particularly where major works are likely in densely populated areas such as Sandymount and Bray.

2.7.3 Summary of Issues for Further Consideration

The selection of construction materials with a low carbon content is worthy of further consideration. This would reduce the embodied carbon generated during the construction phase. In addition, low-emission construction plant may be specified to minimise emissions during the construction phase where practicable.

2.8 Material Assets

2.8.1 Overview

The DART+ Coastal South project is located between Dublin City Centre and Greystones Station. It passes through urban, sub-urban and coastal areas along its route, including some agricultural lands at the southern end of the line.

A desk-based assessment of key constraints has been carried out to date. This section considers material assets primarily in respect of agricultural land and utilities.

2.8.1.1 Material Assets – Agriculture

The proposed DART+ Coastal South development for the most part, will be within existing IÉ property and therefore, there are unlikely to be significant constraints from the point of view of agriculture. Therefore, the magnitude of potential impacts on agriculture as a result of the proposed development, including land-take and disturbance due to increased frequency of service, etc, is expected to be low. Where access to separated land is modified the potential impacts are higher.

- The following sources of information informed the constraints study:
- Google[11] aerial maps were used to identify yards, farm facilities, forestry, scrub and rough boggy land; and

[11] Google Aerial Mapping (2021). Available from: https://www.google.com/maps [Accessed January 2022]

- The Property Registration Authority of Ireland (PRAI)[12] open database was used to identify folio land parcels.

2.8.1.2 Material Assets – Non-Agricultural

Some of the material assets constraints, such as water resources, soils and geology are covered in other sections of this Report and in the constraint mapping included in the appendices. These aspects are not covered herein.

There is also considerable utilities infrastructure present within the overall study area. Key sources of information for this utilities infrastructure, includes ESB, GNI, the EPA, Health and Safety Authority (HSA) as well as relevant local authorities.

2.8.2 Key Constraints

Some of the key constraints for Material Assets are presented in Annex 3.1, as follows:

- Appendix E – Constraint Mapping: Utilities and Licenced Facilities;
- Appendix F – Constraint Mapping: Land Use (Zoning) Constraints; and
- Appendix G – Constraint Mapping: Water Services.

2.8.2.1 Agricultural land adjoining the railway line between Dublin City Centre and Greystones Station

Aerial imagery was examined to describe agriculture along the DART line. Between Dublin City Centre and Greystones Station the railway line crosses through Counties Dublin and Wicklow for approx. 30.5km. The majority of the land adjoining the railway line is non-agricultural. For the first 20km (from the city centre southwards) the land use is predominantly urban and coastal with none of the line crossing through agricultural land. South of Shankill Railway Station, the line crosses grassland for 300m, however this land is owned by Dublin City Council and is used for recreational purposes. Adjoining this land is a golf course through which the DART crosses for . c1.75km. Further south the line crosses along the eastern perimeter of Bray Head for c. 3.25km. The land here is mainly non-agricultural with limited use for rough grazing. Between Bray Head and Greystones the line crosses agricultural land (one tillage farm) for c. 1.5kms before entering the Greystones urban area. In summary the line crosses through rough grazing for approximately 11% of its length and crosses productive agricultural land for approximately 5% of its length. The rough grazing land at Bray Head is very low sensitivity from an agricultural perspective. The tillage farm north of Greystones is medium sensitivity.

2.8.2.2 Material Assets – Non-Agricultural

Key utility constraints within the study area are shown on the constraints maps in Appendix E (Utilities and Licenced Facilities) and Appendix G (Water Services). These include the medium and

[12]Property Registration Authority. Available from https://www.landdirect.ie/index. [Accessed in January 2022]

high voltage electricity network, existing potable water, surface water and foul sewer infrastructure and the gas transmission and distribution network in the vicinity of the study area. While not shown on the constraint mapping herein, telecommunications infrastructure is also considered a constraint which will need to be considered as part of the proposed development.

More detailed information showing these utilities is available to the design team.

EPA licensed sites (waste and IED facilities) are also shown on the constraint maps in Appendix E.

There is one licensed waste facility within 1 km of the study area:

- Sita Environmental Limited, Lower Oriel Street, North Wall, Dublin 1, Licence W0083-01.

There are three IED licensed facilities within 1 km of the study area:

- Brooks Thomas Limited, Upper Mayor Street, Dublin 1, Licence reference P0345-01;
- Everlac Paints Limited, Hanover Quay, Dublin 2, Licence reference P0468-01; and
- Nypro Limited, Corke Abbey, Bray County Dublin, licence reference P0567-02.

There are no Seveso sites within 1km of the proposed development.

2.8.3 Summary of Issues for Further Consideration

Further consultation will also be undertaken with relevant utilities providers in respect of any interactions with utilities infrastructure.

2.9 Population and Human Health

2.9.1 Overview

The proposed development will provide for improved accessibility to employment, community and social infrastructure, and friends and family from a catchment extending from Dublin, through Dún Laoghaire-Rathdown and into County Wicklow. It will potentially open up new areas to changes in land use subject to local spatial planning policy and zoning. When operational, the development will permit an increased frequency of train services, but during the construction phase there could be environmental effects which could impact on people living or working locally or on businesses and community facilities.

2.9.2 Key Constraints

The key constraints for Population are presented in Annex 3.1 Appendix H – Constraint Mapping: Population Constraints.

The population assessment is based on five criteria of journey characteristics, journey amenity, general amenity and community facilities, community severance and economic. The assessment of these same criteria can inform the Project Appraisal Guidelines (PAG) criteria of social inclusion and accessibility, active travel and transport integration. The presence of roads, cycleways or footpaths

can present a constraint if there is a possibility of impacts on journey characteristics such as journey time, for example where bridges are affected or diversions are necessary during construction. These types of impacts can, in turn, affect journey amenity or the pleasantness of journeys, for example due to traffic congestion or proximity to construction vehicles, or create community severance where access to community facilities can be impeded temporarily or permanently. Community facilities are themselves a constraint as their use may be impacted by severance or by environmental effects such as noise. Environmental effects or land take can also impact on local businesses, and therefore employment, even though the proposed development as a whole will have positive economic and social effects.

- For the purposes of the population assessment, constraints are represented by:
- Towns, villages and other residential areas;
- Schools and colleges;
- Religious facilities, including cemeteries;
- Health facilities and nursing homes;
- Sports facilities, including golf courses;
- Other local community facilities such as community centres, meeting places creches or playgrounds;
- Sites used for recreation and amenity, including greenways;
- Tourism, including beaches, hotels, museums and other attractions;
- Retail facilities;
- Private businesses; and
- Bridges, level crossings and road access.

Residential development

The proposed development passes through the Dublin suburbs of Sandymount, Sydney Parade, Booterstown, Blackrock, Seapoint, Monkstown, Dún Laoghaire, Sandycove, Dalkey, Killiney and Shankill. It then goes into Wicklow passing through the urban areas of Bray, continuing onto Greystones. Individual houses and clusters of residential properties are also found along the railway line at various locations. Construction works are not anticipated along the entirety of these locations, however communities will be impacted at various points along the proposed development (see Section 1.3 for project overview).

Nearby residential properties present a constraint because occupants can be impacted by noise, air quality effects or visual intrusion. These specific impacts are addressed by the relevant specialisms, but there is a need to be conscious of the community dimension where, for example, residential developments may be high density, such as apartments, or occupied by vulnerable population subsets, including people working nights.

Community facilities

The use of community facilities varies in its sensitivity to environmental effects such as noise or lighting, for which most impacts can be expected during the proposed construction works. For example, churches or other religious buildings, nursing homes, healthcare facilities, public parks,

greenways or amenity green space would be sensitive to these environmental effects. Some sports facilities such as golf courses or equestrian facilities could be sensitive to noise or powerful lighting. Similarly, hotels and other accommodation such as guest houses and Bed & Breakfasts, while private, also have a community dimension and would be sensitive to environmental effects. Likewise, some other types of private business would be sensitive to environmental effects.

Recreation facilities and amenity destinations can be subject to environmental effects which would impact on the amenity of users. Although this use might be relatively short-term compared with the needs of local residents, such sites could be visited by large numbers of people and also have a tourism or economic dimension.

Bridges

Some bridges and level crossings would require temporary construction works of varying scale. Temporary and permanent closures would have a severance effect on local accessibility and connectivity and could require formal or informal detours, and consequently lengthier journey times, to destinations such as workplaces or community facilities. Pedestrian, cycle and public transport access could be affected as well as journeys by car or commercial vehicles.

2.9.2.1 Planning Applications

A planning applications monitor has been established to track live planning applications within the study area within Appendix I – Planning Application Monitor. A review of all planning applications submitted within the last 5 years of September 2021 within 200m from the DART+ Coastal South project centreline has been undertaken. Maps showing the locations of relevant planning applications within the study area (Planning Application Monitor) are provided in Appendix I of this report. A register of all relevant planning applications within the study area is included in Appendix J of this report. The Planning Application Monitor is a live document and is current to September 2021. It is noted that as this is a live register, the enclosed information represents a point in time and will evolve as the project progresses.

The search of national planning applications found 1,442 approved or currently active cases in the study area. The vast majority of applications in the area are for minor works (e.g. housing extensions). An investigation into other planning application types, such as Strategic Infrastructure Developments (SIDs), Strategic Housing Developments (SHDs) and Local Authority Applications (Part 8s), identified seven further proposals of interest.

Significant developments of note are as follows:

- ABP-305844-19: SHD for 685 no. residential units (207 no. houses, 478 no. apartments), creche and associated site works. Located in townland of Cork Little and Shanganagh (Shankill), on lands east and west of DART line.
- ABP-308418-20: SHD for 193 no. Build To Rent apartments and associated site works. Located north of Shankill Railway station, west of DART line.
- ABP-309098-21: SHD for 102 no. Build to Rent apartments and associated site works. Located directly south of DART line, close to Dún Laoghaire Railway Station.

- ABP-311181-21: SHD for 591 no. residential units (76 no. houses, 515 no. apartments), childcare facility and associated site works. Located north of the River Dargle and Bray (Daly) Railway Station, directly west of the DART line (split decision).
- 18/1386: Local Authority Part 8 Application for the regeneration of the Bray (Daly) Railway Station forecourt and public realm improvements to Quinsborough Road, Adelaide Road and Florence Road.
- 21/869: Local Authority Part 8 Application for Bray Sustainable Transport Bridge Project over the River Dargle, north of Bray (Daly) Railway Station (application currently undecided).
- 4166/21: National Planning Application for the demolition of existing 2-storey dwelling and garage, and construction of new 3-storey dwellings and garage for 2 cars at The Hermitage, 22 Strand Road, adjacent to Merrion Gates Level Crossing.

The national planning applications have been plotted using available data from data.gov.ie. Some data for applications relating to SHDs and Local Authority developments have been obtained from the Local Authorities and An Bord Pleanála, however it must be noted that the available digital data is incomplete and therefore missing some specific proposals. The planning application monitor will continue to be updated throughout the planning of the project, and additional data will be mapped as it becomes available.

It should be noted that projects such as the Dodder Greenway upgrades and BusConnects will be considered during the planning and development of the proposed development. In March 2022, the Irish Government approved the preliminary business case for the BusConnects Programme for Dublin. This permits the National Transport Authority (NTA) to submit planning applications for the Core Bus Corridors to ABP. At the time of writing one planning application for BusConnects has been lodged. This is the BusConnects Clongriffin to City Centre Core Bus Corridor Scheme which was lodged on 01 April 2022. All schemes will be considered during the planning and development of the proposed development where relevant.

2.9.2.2 Listed Constraints

The following list is not intended to be exhaustive but lists the main constraints along the Dublin to Greystones railway line.

Educational facilities

- Post Primary Schools:
  - Marian College; Herbert Road; Ballsbridge, Dublin;
  - St. Michael's College, Ailesbury Road, Dublin;
  - St. Andrews College; Booterstown Avenue, Blackrock, Dublin;
  - Willow Park School, Blackrock, Dublin;
  - Holy Child Secondary School, Killiney, Dublin;
  - Colaiste Raithin, Bray, Co. Dublin;
  - St. Thomas Community College, Bray, Co. Wicklow;

  - Presentation College, Bray, Co. Wicklow;
  - Loreto Secondary School, Bray, Co. Wicklow.
- Primary Schools:
  - Booterstown Boys; Booterstown, Dublin.
  - Our Lady of Mercy Convent School, Booterstown Avenue, Blackrock, Dublin;
  - Scoil Chualann, Bray, Co. Wicklow;
  - St. Patrick's Loreto Catholic Primary School, Bray, Co. Wicklow;
  - Scoil Chrónáin Naofa, Bray, Co. Wicklow;
  - Gaelscoil Uí Chéadaigh; Bray, Co. Wicklow.
  - St. Brigid's School, Greystones, Co. Wicklow;
  - St. Kevin's, N.S, Greystones, Co. Wicklow;
- Special Schools:
  - Enable Ireland Sandymount School; Sandymount Avenue, Dublin 4;
  - Enable Ireland Marino Centre, Bray, Co Wicklow.
  - New Court School, Bray, Co. Wicklow.

Religious facilities

- St. Marks Church, Pearse Street, Dublin;
- St. John the Evangelist, Sandymount, Dublin;
- Our Lady, Queen of Peace, Merrion Road, Dublin;
- St. John the Baptist, Blackrock, Dublin;
- Our Lady Queen of Peace Bray, Co. Wicklow,
- Cornerstone church at the Well, Bray, Co. Wicklow;
- Bray Methodist Church, Bray, Co. Wicklow;
- The Holy Redeemer Catholic Church, Bray, Co. Wicklow;
- Holy Rosary Catholic church, Greystones, Co. Wicklow;
- Greystones Presbyterian Church, Greystones, Wicklow;
- St. Patricks Church, Greystones, Co. Wicklow.

Health facilities

- St Vincent's University Hospital, Elm Park, Dublin 4;
- Blackrock Clinic – Private Hospital, Rock Road, Dublin 4;
- Merrion Gates Medical Centre, Merrion Rd., Dublin 4;
- Ailesbury Dental Practice, Ailesbury Rd., Dublin 4;

Sports facilities

- Aviva Stadium, Lansdowne Road, Dublin 4;
- Lansdowne Football Club, Lansdowne Road, Dublin 4;

- Monkstown Rugby Club, 4 Park Avenue, Dublin 4;
- Sandymount YMCA sports ground, Dublin 4;
- Pembroke Wanderers Hockey Club, 27A Serpentine Avenue, Dublin 4;
- Elm Park Golf & Sports Club, Nutley Lane, Dublin;
- Woodbrook Golf Club, Bray, Co. Wicklow;
- Bray Golf Club, Bray, Co. Wicklow;
- Greystones Golf Club, Greystones;
- Bray Wanderers, Carlisle Grounds, Bray, Co. Wicklow;
- Greystones Harbour Marina, Greystones, Co. Wicklow.

Other community facilities and services

- St. Johns House Nursing Home, Merrion Rd., Dublin 4;
- St. Marys Centre Nursing Home, Merrion Rd., Dublin 4;
- Shannagh Bay Nursing Home, Bray, Co. Wicklow;
- Kinvara House Nursing Home, Bray, Co. Wicklow;
- First Care Nursing Home, Bray, Co. Wicklow;
- Roseville Nursing Home, Bray, Co. Wicklow;
- Greystone Nursing Home, Co. Wicklow.

Amenities and recreational facilities

- Sandymount Strand;
- Merrion Strand;
- Seafront Park Bray;
- Greystone Beach;
- Killiney Strand;
- Blackrock Park;
- Bray Head - Greystones Cliff Walk;
- Sea Life Aquarium Centre
- Booterstown Marsh;

Key business areas which may be affected by the proposed DART+ Coastal South project include those in the following locations. Note this is not intended to be an exhaustive list but rather to identify business areas in close proximity to the proposed development (where interventions may occur) that may benefit / be impacted by the scheme, including businesses in:

- Lansdowne;
- Sandymount;
- Serpentine Avenue;
- Ballsbridge;
- Merrion;
- Booterstown;
- Blackrock;
- Killiney;

- Bray; and
- Greystones.

2.9.2.3 Constraints Specific to Irish Rail Infrastructure

Other constraints are those present at Irish Rail stations, for example where passengers need to cross platforms or reach distant platforms. Consideration should be given to the distance and signage or spatial legibility by which passengers can purchase a ticket, pass through barriers and locate and board their train. In particular, consideration must be given to the needs of people with disabilities by providing at-grade connections at minimal distance where possible, or ramp or lift facilities which are easy to access and use. Consideration should also be given to the safety and mobility of passengers who are visually or hearing impaired, to more elderly passengers, and parents with children.

Any works proposed at stations as part of the proposed development, will need to consider access by pedestrians, public transport users, cyclists and car drivers, including especially drivers who are more elderly, are accompanied by young children or who may have disabilities.

2.9.3 Summary of Issues for Further Consideration

For the most part, impacts on population are likely to be contained within the rail corridor. However, impacts could arise from level crossing / bridge closures or diversions during construction and operation which could affect access to workplaces and community facilities. Impacts on communities, or community facilities, could also occur directly from any land take that is deemed necessary or from environmental effects such as noise, vibration, lighting and visual intrusion, or air quality. The sensitivity of community facilities depends on their use, including the nature and level of use, and the sensitivity of users.

2.10 Geology and Soils

2.10.1 Overview

This constraints study was undertaken to identify the key constraints from available published information, which will be taken into account as the project progresses. The following sources were studied in order to identify soils and geological constraints.

- Ordnance Survey Ireland (OSi) – Historic and recent topographical and geographic maps, orthophotos and datasets;
- Geological Survey Ireland (GSI) - Geological Mapping and publications including soils, subsoils bedrock geology, active quarries, geological heritage sites, mineral localities, landslides and economic geology mapping; and
- Environmental Protection Agency (EPA) – Licensed Waste Facilities and IPPC Sites.

The main constraints relating to geology and soils as a result of the proposed project relate to the following geology and soils sensitive receptors:

- Soils: well drained of agricultural value, wetland areas or those potentially requiring excavation and disposal for construction activities;
- Soil stability;
- Geological Heritage Areas (County Geological Sites and those recommended for Geological National Heritage Areas (NHA));
- Contaminated sites and unsuitable material (landfills, dumping sites, burial grounds, existing and historic pits and quarries, industrial facilities, and historic land use contamination);
- Existing quarries and pits;
- National Coastal Erosion Areas (use of Coastal Maps developed by the Commissioners of Public Works in Ireland as part of the Catchment Flood Risk Assessment and Management (CFRAM) Programme together with Dublin City Council, other Local Authorities and Ordnance Survey Ireland); and
- Economic Geology (Economically viable or extractable mineral resources).

2.10.2 Key Constraints

The key constraints for Geology and Soils are presented in Annex 3.1, Appendix K – Constraint Mapping: Geology Constraints.

The land cover for the study area includes artificial, industrial, commercial, recreational and urban fabric in urban and developed areas and along the railway corridor with agricultural and semi-natural areas in between. Despite the limited historic ground investigation information available along the proposed project corridor, it is anticipated that the overburden stratigraphy consists of made ground to a depth of up to 2m in urban areas.

The subsoils within the study area comprise recent deposits of fine and coarse grained alluvial, estuarine and marine deposits associated with river channels, estuaries and coastal zones. These overlie or are adjacent to Quaternary glacial deposits derived from the underlying bedrock with widespread glacial tills including Irish Sea till adjacent to the coast.

The underlying bedrock is variable along the proposed project corridor comprising the dark limestones and shale of the Carboniferous Lucan formation (Lansdowne level crossing to Booterstown), granite with microcline phenocrysts (Blackrock to Victoria Road), dark blue-grey slate, phyllite and schist of the Ordovician Maulin formation (Victoria Road to Bray Harbour) and finally, the oldest rocks in the region greywacke and quartzite of the Cambrian Bray Head and Devils Glen formations (Bray station to Greystones) respectively.

2.10.2.1 Soil Stability

The GSI Landslide Susceptibility mapping indicates that the proposed project corridor is comprised of areas with susceptibility to landslides ranging from low to high as detailed below.

- The coastal areas between Lansdowne level crossing to Dalkey Railway station and Killiney Railway station to Bray Harbour are indicated as areas with a low susceptibility to landslides with no landslide event recorded;

- The area between Dalkey Railway station and Killiney Railway station is considered to have a moderately low to high landslide susceptibility with two past landslide events noted; and
- At approximately 3km to the south east of the overbridge OBR147, the stretch of coastline adjacent to the Bray to Greystones Cliff walk region is categorised as an area of high susceptibility to landslides with three past landslide events recorded.

There is potential for soft and unstable soils associated with historic and EPA waterbodies located near Lansdowne and Sydney Parade level crossings and between Bray and Greystones, respectively.

2.10.2.2 Geological Heritage Areas

Table 3 provides details on the Geological Heritage Areas located along the proposed project corridor.

Table 3: Geological Heritage Areas

GHA	Site Code	Designation	Description	Geological	Distance from railway (m)
Dalkey Hill	DLR005	CGS	Large, disused granite quarry	This is one of the best places to examine large faces and areas of the granite around Dublin	0
Killiney Hill	DLR008	CGS	Coastal hill site, laid out as a public park with a mixture of heath and outcrop around the summit	This is probably the best example of a number of composite roche moutonnée ridges in Dublin	100
Killiney Bay	DLR007	CGS*	A 5 kilometres long coastal section exposes a succession of several units of glacial till	A particularly impressive exposure into deep till with many sedimentological characteristics exposed	0 - 450
Bray Head	WW013	CGS*	Coastal headland with extensive natural exposure and sea cliffs, plus railway cuttings	The Cambrian trace fossils found on Bray Head are a type locality for some species, and important	0
Greystones Beach	WW036	CGS*	A 2 km long coastal section exposing several units of glacial till	A particularly impressive exposure into deep glacial tills, with several unique elements exposed	0 - 200
Greystones (Appinite)	WW035	CGS	A section of rocky coastline on the scenic and popular Greystones waterfront	The igneous rocks at Greystones are unique because the contact zone is crowded with inclusions	250
Wicklow-Greystones Coast	WW060	CGS	An uninterrupted shingle beach extending for over 17km long between Greystones and Wicklow	The shingle ridge (beach) is a feature understood to have formed around 5,000 years ago	0 - 100

*recommended for Geological NHA

2.10.2.3 Contaminated Land and Existing Quarries and Pits

Potential sources of contamination within the study area have been investigated and identified ranging from historic heavy industries, such as gas and sewerage works and coal yards in urban areas, to a number of historical quarries and pits on and along the proposed route. There are numerous light industries within the study area which are not considered to be a significant constraint for soils and geology. The railway itself poses a potential source for contaminated land.

2.10.2.4 Coastal Erosion

The EMODnet geology and OPW coastal maps indicate the following coastal behaviour within the study area of the proposed development:

- The coastline between Merrion Gates level crossing and Blackrock has a coastal migration rate classed as stable with accretion (coastline progradation) while most of the region at or within 250m of the study area between Blackrock and Greystones is associated with erosion (coastal retrogradation).
- The ICPSS National Coastal Erosion map indicates that it is anticipated that part of the study area located between Merrion Gates level crossing and Blackrock, Loughlinstown and Greystones will be affected by erosion based on the predicted 2050 Coastal Erosion Line.

2.10.2.5 Economic Geology

There are no active quarries along and within 250m of the proposed project corridor. Several metallic and non-metallic mineral locations were identified between Dún Laoghaire and Loughlinstown as well as Bray and Greystones. The crushed rock aggregate potential for the study area ranges from Low to Very High across the area with increasing potential to the south and pockets of very low potential around Strand Road.

2.10.3 Summary of Issues for Further Consideration

The key constraints in terms of land and soils at this stage of the project includes the removal of soils and subsoils and the generation of earthworks material which may include contaminated land unsuitable for direct reuse within the proposed development.

Areas with a medium to high susceptibility to landslides should be further assessed along with the potential impacts of coastal erosion along the proposed development.

Understanding the expected ground conditions along the proposed route through ground investigations and further assessment will be necessary to mitigate against design or construction risks and potential impacts on existing earthworks or structures and interactions with sensitive receptors and designated sites.

2.11 Water Resources

2.11.1 Overview

Water resources within the study area are described below under the headings of:

- Surface water bodies;
- Groundwater; and
- Flooding.

2.11.1.1 Surface water bodies

The DART+ Coastal South route extends through seven river sub-basins. The river sub-basins and their respective Water Framework Directive (WFD) status and risk from Greystones to Dublin city centre are summarised in **Table 4**.

Table 4: River sub-basins

River sub-basin	WFD code	River Waterbody WFD Status 2013-2018	WFD Risk
Three Trouts Stream_010	IE_EA_10T030580	Unassigned	Not at risk
Kilruddery_Deerpark_010	IE_EA_10K520710	Unassigned	Under review
Dargle_040	IE_EA_10D010300	Good	Not at risk
Shanganagh_010	IE_EA_10S010600	Moderate	At risk
Kill of the Grange Stream_010	IE_EA_10K020200	Poor	At risk
Brewery Stream_010	IE_EA_09B130400	Unassigned	Under review
Dodder_050	IE_EA_09D010900	Moderate	At risk

Two canal waterbodies are within the DART+ Coastal South extents and are summarised in **Table 5**.

Table 5: Canal waterbodies

River sub-basin	WFD code	Canal Waterbody WFD Status 2013-2018	WFD Risk
Grand Canal Main Line (Liffey and Dublin Bay)	IE_09_AWB_GCMLE	Good	Not at risk
Grand Canal Basin (Liffey and Dublin Bay)	IE_09_AWB_GCB	Moderate	At risk

Downstream of the river sub-basins there are four transitional and three coastal waterbodies. A summary of the transitional and coastal waterbodies is provided in **Table 6**.

Table 6: Transitional and coastal waterbodies

Waterbody type	Waterbody	WFD code	River Waterbody WFD Status 2013-2018	WFD Risk
Coastal	Dublin Bay	IE_EA_090_0000	Good	Not at risk
Transitional	Liffey Estuary Lower	IE_EA_090_0300	Good	Under review
Transitional	Liffey Estuary Upper	IE_EA_090_0400	Good	Under review
Coastal	Irish Sea Dublin (HA 09)	IE_EA_070_0000	Good	Not at risk
Coastal	Southwestern Irish Sea - Killiney Bay (HA10)	IE_EA_100_0000	High	Not at risk
Transitional	Dargle Estuary	IE_EA_110_0100	Unassigned	Under review

A number of the transitional and coastal waterbodies are associated with protected habitats including South Dublin Bay SAC, SPA, and pNHA, North Dublin Bay pNHA, Tolka Estuary SPA, Dalkey Coastal Zone and Killiney Hill NHA, Dalkey Islands SPA, Rockabill to Dalkey Island SAC, and Bray Head SAC and pNHA.

2.11.1.2 Groundwater

The bedrock along the DART+ Coastal South route alternates between locally important aquifer and poor aquifer. The area from Dublin city centre to Blackrock and between Killiney and Bray is underlain with a *Locally Important (Ll) Aquifer which is Moderately Productive only in Local Zones*. Between Blackrock and Killiney and south of Bray the area is underlain by a *Poor (Pl) Aquifer which is Generally Unproductive except for Local Zones*.

The groundwater vulnerability along the route ranges from Low to X-Extreme (Rock at surface).

There are no significant karst features identified along the DART+ Coastal South route.

There are no high yielding water supply springs and wells i.e. public water supplies or group water scheme supplies along the route corridor. No Source Protection Zones associated with public or group groundwater supply schemes are located along the route.

The DART+ Coastal South route extends over three groundwater bodies, summarised in **Table 7**.

Table 7: Groundwater Bodies

Ground Waterbodies	WFD Code	Status	Risk
Dublin	IE_EA_G_008	Good	Not at risk
Kilcullen	IE_EA_G_003	Good	At risk
Wicklow	IE_EA_G_076	Good	Under review

2.11.1.3 Flooding

Historical flooding has been assessed by examining reports and maps from the OPW's National Flood Hazard mapping. Some parts of the DART+ Coastal Southern Line are at medium risk of fluvial (1% annual exceedance probability - AEP) or coastal flooding sources (0.5% AEP). Specifically, there is medium risk of fluvial flooding between Grand Canal Dock and Lansdowne Road Stations, Lansdowne Road and Sandymount Stations and at the Serpentine Avenue Level Crossing. There is risk of coastal flooding between Sydney Parade and Booterstown Stations and at Merrion Level Crossing. There is risk of both fluvial and coastal flooding between Killiney and Shankill Railway Stations and Shankill and Bray (Daly) Railway Stations. While parts of the track between stations are at medium risk in the aforementioned locations, none of the stations fall within the 1% fluvial and 0.5% coastal current flood extents.

In addition to the above locations, there are areas within the project extents that are at low risk of fluvial or coastal flooding (between 1% and 0.1% AEP for fluvial or 0.5% and 0.1% coastal flooding). These areas are between Sandymount station and Sydney Parade and between Bray and Greystones. The Sydney Parade Railway Station and level crossing is also shown at risk during the 0.1% AEP fluvial event.

2.11.2 Key Constraints

The key constraints in terms of water resources are the surface water bodies including river water bodies, transitional and coastal waterbodies, protected water dependant habitats, underlying aquifers and areas of fluvial and coastal flooding.

The key constraints for Water are presented in Annex 3.1 Appendix L – Aquifer Vulnerability Constraints, Appendix M – Aquifer Bedrock Constraints, Appendix N – Groundwater Constraints and Appendix O – Surface Water Constraints.

2.11.3 Summary of Issues for Further Consideration

The key constraints in terms of water resources, which include surface water, groundwater and flooding need to be included for future consideration with particular consideration where there are surface water crossings and direct interactions with protected habitats. Flooding risk is significant from both fluvial and coastal sources and any improvement works on or near the existing DART line should assess this risk in greater detail.

2.12 Biodiversity

2.12.1 Overview

This section describes the potential biodiversity constraints identified within the study area for the DART+ Coastal South project. The objective of the biodiversity constraints report is to identify the important biodiversity receptors or sites to be taken into account and inform the subsequent options

selection, EIA phases, Appropriate Assessment Screening Report and subsequent Natura Impact Statement Report. The key issues to examine are:

- What are the features of ecological relevance within the study area and environs?
- What habitats are present within and adjacent to the railway line?
- What plant species are present within and adjacent to the railway line?
- What fauna species are present within and in lands adjacent to the railway line?
- What ecological rating should be attached to the railway line and environs?
- What is the Zone of Influence of the ecological features present?
- What are the potential Impacts on Natura 2000 sites and National Heritage Areas (NHAs)?

Key sources of information relating to these types of features have been identified with reference to: National Parks and Wildlife Service (NPWS); National Biodiversity Data Centre (NBDC); Bat Conservation Ireland (BCI); Environmental Protection Agency watercourse and water quality data; Geological Survey of Ireland (GSI) geology, soils and hydrogeology data; Ordnance Survey maps and orthophotography; Wicklow County Development Plan 2021-2027; Draft Dún Laoghaire-Rathdown Development Plan 2022 – 2028; Draft Dublin City Development Plan 2022-2028; datasets on invasives and badger setts provided by Irish Rail; photos provided by Arup of bridges and level crossings along the railway line. The constraints information on biodiversity has to date constituted a desk-based study of the entirety of the existing rail line from Dublin City to Greystones, Co. Wicklow.

2.12.2 Key Constraints

The key constraints for Biodiversity are presented in Appendix P – Constraint Mapping: Biodiversity Constraints.

2.12.2.1 European sites

There are a number of European sites traversed by the DART+ Coastal South project, or in close proximity to, or hydrologically linked. This includes:

- **South Dublin Bay and River Tolka Estuary SPA** [004024]. [redacted] he DART+ Coastal South is within *c.* 5m of this European site;
- **South Dublin Bay SAC** [0000210]. Qualifying Interests (QIs) include; Mudflats and sandflats not covered by seawater at low tide, Annual vegetation of drift lines, Salicornia and other annuals colonising mud and sand, Embryonic shifting dunes. The DART+ Coastal South is within *c.* 5m of this European site;
- **North Dublin Bay SAC** [000206]. QIs include: Mudflats and sandflats not covered by seawater at low tide, Annual vegetation of drift lines, *Salicornia* and other annuals colonising

mud and sand, Atlantic salt meadows (*Glauco-Puccinellietalia maritimae),* Petalwort *Petalophyllum ralfsii,* Mediterranean salt meadows (*Juncetalia maritimi*), Embryonic shifting dunes, Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes), Fixed coastal dunes with herbaceous vegetation (grey dunes), and Humid dune slacks. The DART+ Coastal South is within c. 5m of this European site;

- **Dalkey Islands SPA** [004172]. SCIs include; Roseate Tern *Sterna dougallii,* Common Tern *Sterna hirundo*, Arctic Tern *Sterna paradisaea*. The DART+ Coastal South is within c. 400m of this European site;
- **Rockabill to Dalkey Island SAC** [003000]. QIs include; Reefs, and Harbour Porpoise *Phocoena phocoena.* The DART+ Coastal South is within *c.* 400m of this European site;
- **Ballyman Glen SAC** [000713]. QIs include; Petrifying springs with tufa formation (Cratoneurion), and Alkaline fens. The DART+ Coastal South is within c. 2.7km of this European site;
- **Knocksink Wood SAC** [000725]. QIs include; Petrifying springs with tufa formation (Cratoneurion), Old sessile oak woods with Ilex and Blechnum in the British Isles, Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae). The DART+ Coastal is within c. 4.9km of this European site;
- **Wicklow Mountains SAC** [002122]. QIs include; Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*), Natural dystrophic lakes and ponds, Northern Atlantic wet heaths with *Erica tetralix*, European dry heaths, Alpine and Boreal heaths, Calaminarian grasslands of the *Violetalia calaminariae*, Species-rich Nardus grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe), Blanket bogs (* if active bog), Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*), Calcareous rocky slopes with chasmophytic vegetation, Siliceous rocky slopes with chasmophytic vegetation, Old sessile oak woods with Ilex and Blechnum in the British Isles, [redacted]. The DART+ Coastal South is within c. 8.3km of this European site;
- **Wicklow Mountains SPA** [004040]. [redacted] *s*. The DART+ Coastal South is within c. 8.5km of this European site;
- **Bray Head SAC** [000714]. QIs include; Vegetated sea cliffs of the Atlantic and Baltic coasts, European dry heaths. The DART+ Coastal South traverses this European site;
- **Glen of the Downs SAC** [000719]. QIs include; Old sessile oak woods with Ilex and Blechnum in the British Isles. The DART+ Coastal South is within 3.1km of this European site;
- **The Murrough Wetlands SAC** [002249]. QIs include; Annual vegetation of drift lines, Perennial vegetation of stony banks, Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*), Mediterranean salt meadows (*Juncetalia maritimi*), Calcareous fens with *Cladium mariscus* and species of the Caricion davallianae, Alkaline fens. The DART+ Coastal South is within c. 3.4km of this European site; and
- **The Murrough SPA** [004186]. [redacted] The DART+ Coastal South is within c. 4.4km of this European site.

2.12.2.2 National sites

There are no NHAs traversed by or in proximity to the DART+ Coastal South project. There are a number of pNHAs traversed by the project or located in close proximity. This includes:

- **Grand Canal Dock pNHA** [002104]. The ecological value of the canal lies more in the diversity of species it supports along its linear habitats than in the presence of rare species. It crosses through agricultural land and therefore provides a refuge for species threatened by modern farming methods (NPWS, 1995). The DART+ Coastal South traverses this National site at Grand Canal Dock in Dublin City Centre;
- **South Dublin Bay pNHA** [000210] (see South Dublin Bay SAC/SPA in Section 2.12.2.1);
- **Booterstown Marsh pNHA** [001205]. Booterstown Marsh, a Nature Reserve, is located in Booterstown, County Dublin, between the coastal railway line and the Rock Road. It is an area of salt marsh and muds, with brackish water. It includes the only salt marsh, and the only bird sanctuary, in south Dublin Bay. See also South Dublin and River Tolka Estuary SPA. The DART+ Coastal South is within *c.* 5m of this National site;
- **Dalkey Coastal Zone And Killiney Hill pNHA** [001206]. This site represents a fine example of a coastal system with habitats ranging from the sub-littoral to coastal heath. The flora is well developed and includes interesting species. The islands are important bird sites and are known nesting and roosting areas for many species, as well as Dalkey Sound being noteworthy for the occurrence of many coastal invertebrate species. The DART+ Coastal South is within *c*. 35m of this National site;
- **Loughlinstown Woods pNHA** [001211]. This site is a good example of demesne-type mixed woodland. It is now used chiefly for amenity purposes. The DART+ Coastal South is within *c*. 304m of this National site; and
- **Bray Head pNHA** [000714]. See SAC in Section 2.12.2.1. This site is also an important roosting and nesting site for a range of seabirds. The DART+ Coastal South traverses this National site.

2.12.2.3 Other Potential Key Constraints

There are a number of other biodiversity features that are present or potentially present within the existing railway line, and in the surrounding environs.

- Habitats listed on Annex I of the Habitats Directive that are without designated sites, but within the ZoI of the project and associated works;
- Plant species listed on Annexes II and IV of the Habitats Directive, Flora (Protection) Order 2015, and Red List species on data lists No.8, and No. 10. Railway lines can support interesting flora species due to the calcareous nature of the ballast and their often relatively undisturbed nature;
- [redacted]

- [redacted]:
  - [redacted]
  - [redacted] using the line and associated habitat for commuting/foraging and burrows/dens in close proximity;
  - [redacted]) in ponds and wetlands close to or hydrologically connected to the railway line;
  - [redacted] utilising the hedgerows, trees or scrub along or in close proximity to the railway line for nesting and foraging; and
  - [redacted]
- Non-native invasive species as listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011-2015; *e.g.,* Japanese knotweed *Reynoutria japonica* recorded in various locations near the trainline (Irish Rail database); Sandymount, Merrion Row, Booterstown Marsh, Salthill and Monkstown, Dalkey, and Greystones, and [redacted] database). Other locations and species may be present, surveys will ascertain any further locations and the current extent of invasives on the railway line.

2.12.3 Summary of Issues for Further Consideration

Further to the location-specific issues identified above, consideration has also been given to aspects of the development that may result in further constraints for project delivery. The Biodiversity Chapter of the EIAR will address the ecological impact from the development based on defined habitat types, the character of the areas traversed and the specific land use activities. It will provide comprehensive information on habitat loss, habitat and species disturbance, impacts on watercourses and impacts to European and Nationally designated area and qualifying interests. Potential impacts on biodiversity due to excavation and construction works, and new overhead and underground infrastructure will include the following:

- Loss and/or degradation of habitat (trimming or removal of hedgerows, trees, grassland);
- Fragmentation of commuting/foraging corridors;
- Spread of Third Schedule non-native invasive species;
- Disturbance (e.g. noise, vibration, lighting) resulting from machinery use during construction and operation;
- Disturbance and/or displacement to protected species (e.g. nesting birds and roosting bats);
- Collision risk associated with new infrastructure such as overhead lines/masts; and

- Deterioration of local waterbodies and waterbodies downstream resulting in changes to hydrological regimes and the species that rely on these.

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Appendix A

Constraint Mapping: Landscape Constraints

Appendix B

Constraint Mapping: Heritage Constraints

Appendix C
Architectural Heritage Features

Table 1: Table of Architectural Heritage Features

Description	Underbridge / Overbridge IE Ref	RMP Reference	Protected Structure Reference	Architectural Conservation Areas	NIAH Building Survey Reference	NIAH Garden Survey Reference	Industrial
Great Southern Railways {D.&.S.E.R. - Dublin & Southeast Railway}							DCIHR 230100101
Wicklow: The Burnaby				Wicklow: The Burnaby			
Wicklow: The Burnaby				Wicklow: The Burnaby			
Killincarraig House Demesne, Killincarraig Townland							
Killincarraig Farm House Demesne, Killincarraig Townland						NIAH 4319	
Greystones Carnegie Free Library			WCC RPS 08-24		16304095		
Greystones Railway Station Building	OBR153		WCC RPS 08-63		16304058		
Signal Box, Greystones Railway Station							
Greenane, Bow Lane, Greystones,Co. Wicklow							
Rose Cottage, Bow Lane, Greystones, Co. Wicklow							
Coroin Mhuire, Latouche Road Graystones					16304027		
Ard-Na-Ree, Latouche Road Graystones					16304028		

Description	Underbridge / Overbridge IE Ref	RMP Reference	Protected Structure Reference	Architectural Conservation Areas	NIAH Building Survey Reference	NIAH Garden Survey Reference	Industrial
Roslea House/Teevinore House, Latouche Road Graystones					16304029		
Burrischool House/Glenhest House, Latouche Road Graystones					16304030		
Greystones Post Office, Latouche Road Graystones					16304031		
Catholic Church Of The Most Holy Rosary, Latouche Road Graystones			WCC RPS 08-47		16304032		
Roseair, Eden Road, Greystones, Co. Wicklow							
Wemyss, Eden Road, Greystones, Co. Wicklow							
Ardenza, Eden Road, Greystones, Co. Wicklow							
Eden Bungalow, Eden Road, Greystones, Co. Wicklow							
Myrtle Cottage, Eden Road, Greystones, Co. Wicklow							
Ivy Cottage, 1 Eden Road, Greystones, Co. Wicklow							
Davis Motors, Eden Road, Graystones					16304052		

Description	Underbridge / Overbridge IE Ref	RMP Reference	Protected Structure Reference	Architectural Conservation Areas	NIAH Building Survey Reference	NIAH Garden Survey Reference	Industrial
Bridge At Latouche Place	OBR152						
La Touche Place, Greystones, Co. Wicklow							
Laburnum, Trafalgar Road, Greystones, Co. Wicklow							
Trafalgar Road Greystones Co. Wicklow, A63 Fa07, A63 H973							
Sweetbriar Cottage, Trafalgar Road, Greystones, Co. Wicklow							
Presbyterian Church Trafalgar Road Greystones			WCC RPS 08-46		16304019		
Hillview, Trafalgar Road Greystones Co. Wicklow, A63 Hh33							
Brooklands Cottage, Trafalgar Road, Greystones, Co. Wicklow, A63 Vp27							
Balmoral, Trafalgar Road, Greystones, Co. Wicklow							
Frascati, Trafalgar Road, Greystones, Co. Wicklow							
Emily Cottage, Trafalgar Road, Greystones, Co. Wicklow							
Pedestrian Bridge, Turnpike Lane, Wicklow	OBR151						

Description	Underbridge / Overbridge IE Ref	RMP Reference	Protected Structure Reference	Architectural Conservation Areas	NIAH Building Survey Reference	NIAH Garden Survey Reference	Industrial
Knockaulinn, Turn Pike Lane, Greystones, Co. Wicklow							
Former Seapatrick Hotel, Now Greystones Nursing Home, Church Road, Greystones, Co. Wicklow, A63 Hk44							
Baravor, Trafalgar Road, Greystones, Co. Wicklow							
Coolnagreina, Trafalgar Road, Greystones, Co. Wicklow, A63 Y046							
Mews To Burlington Victoria Road, Graystones, Wicklow			WCC RPS 08-60				
Mews To Duncairn Victoria Road, Graystones, Wicklow			WCC RPS 08-38				
Arch Cottage, Victoria Road, Greystones, Co. Wicklow, A63 Kh56							
Bridge, Victoria Road, Wicklow	UBR150						
Arch House, Victoria Road, Greystones, Co. Wicklow,A63 Kw90							
1 To 10 The Bawn, Greystones, Co. Wicklow							
Church And Graveyard, Rathdown Upper		RMP WI008012001 to WI008-012002					

Description	Underbridge / Overbridge IE Ref	RMP Reference	Protected Structure Reference	Architectural Conservation Areas	NIAH Building Survey Reference	NIAH Garden Survey Reference	Industrial
Killruddery Demesne					16400816	4304	
Lodge To Killruddery Demesne, Located Above The Railway Line							
Bridge Afoot Of Bray Head, Strand Road, Wicklow	OBR147						
1- 6 Fentenoy Terrace, Strand Road, Bray,			WCC RPS B100/93		16400802 to 16400807		
Bray Head Hotel, Bray, Wicklow			WCC RPS B99/92		16400801		
Innisowen House, Grosvenor Avenue Bray, Co. Wicklow, A98 V8e2							
Kilshane, Grosvenor Avenue, Bray, Co. Wicklow, A98 Y6x3							
The Cottage, Grosvenor Avenue, Bray, Co. Wicklow, A98 A3f8							
Railway Cottage, Grosvenor Avenue, Bray, Co. Wicklow, A98 X8y4							
Bray Coastguard Station And Outbuildings To Rear					16400808		
Bridge At Putland Road	UBR146						
Fana Na Graíne, Putland Road, Bray, Co. Wicklow, A98 E2d2							
Ivanhoe, Putland Road, Bray, Co. Wicklow, A98 T1w7							

Description	Underbridge / Overbridge IE Ref	RMP Reference	Protected Structure Reference	Architectural Conservation Areas	NIAH Building Survey Reference	NIAH Garden Survey Reference	Industrial
Whitegate, Putland Road, Bray, Co. Wicklow, A98 Y5d6							
Railway Terrace, Now St. Mary's Terrace (Former Fishermens Cottages)			WCC RPS B102/95				
Strand House, Strand Road, Bray, Co. Wicklow, A98 Ah05							
Mount Norris Villas, Strand Road, Bray, Bray, Wicklow			WCC RPS B98/91		16301014		
1 To 2 Brookfield Ave.,, Meath Road, Bray, Co. Wicklow							
50 To 54, Meath Rd., Bray, Co. Wicklow, A98 HC63							
Esplanade Hotel Bray, Wicklow			WCC RPS B82/75		16301015		
Roseville House, Meath Road Bray, Wicklow					16301024		
Inveragh House, Meath Road Bray, Wicklow					16301025		
Glenholme, Convent Avenue, Bray, Co. Wicklow, A98 X851							
Bridge To Convent Avenue, Wicklow	UBR145						
Bella Vista, Strand Road, Bray, Wicklow			WCC RPS B83/76		16301017		

Description	Underbridge / Overbridge IE Ref	RMP Reference	Protected Structure Reference	Architectural Conservation Areas	NIAH Building Survey Reference	NIAH Garden Survey Reference	Industrial
Esplanade Terrace, Strand Road, Bray, Wicklow			WCC RPS B91/84		16301018 to 16301020		
Killisk House And Outbuildings To Rear					16301026		
Heyford House, Meath Road, Bray, Wicklow					16301027		
Meath Road, Bray, Wicklow					16301028		
Earlsbrook House, Meath Road, Bray, Wicklow			WCC RPS B52/47		16301029		
Grosvenor Cottage, Victoria Avenue, Bray, Co. Wicklow, A98 Fa33							
Bridge Victoria Avenue, Wicklow	UBR144						
Seafield Cottage, Victoria Avenue, Bray, Co. Wicklow, A98 Ca37							
Strand View, Strand Road, Bray, Co. Wicklow							
Montebello, Strand Road, Bray, Co. Wicklow							
Trosyrafon Terrace, Strand Road, Bray, Co. Wicklow							
Richmond Terrace, Meath Road, Bray, Wicklow			WCC RPS B54/49		16301314 to 16301319		
Seanchara House, Strand Road, Bray, Wicklow			WCC RPS B90/83		16301129		

Description	Underbridge / Overbridge IE Ref	RMP Reference	Protected Structure Reference	Architectural Conservation Areas	NIAH Building Survey Reference	NIAH Garden Survey Reference	Industrial
Jim Doyle's, Strand Road, Bray, Wicklow			WCC RPS B89/82		16301128		
1-2 Claremount Terrace, Meath Road, Bray, Wicklow			WCC RPS B55/50		16301135		
The Porter House, Strand Road, Bray, Wicklow			WCC RPS B88/81		16301127		
The Martello Hotel Strand Road Bray, Wicklow							
1 Jones' Terrace Sidminton Avenue, Wicklow	UBR143						
Bridge, Sidminton Avenue, Wicklow							
2 to 15 Brennan's Parade, Bray, Wicklow					16301112 to 16301125		
1 To 2 Albert Avenue, Wicklow							
Bridge, Galtrim Rd/Albert Avenue, Wicklow	UBR142						
Boundary Walls to Bray Railway Station, Albert Avenue, Wicklow							
Walls of Former Livery Stables, Bray Railway Station, Wicklow							
15-16 Albert Avenue, Wicklow							
Kerbs Albert Avenue, Wicklow							

Description	Underbridge / Overbridge IE Ref	RMP Reference	Protected Structure Reference	Architectural Conservation Areas	NIAH Building Survey Reference	NIAH Garden Survey Reference	Industrial
Derelict Houses Backing on to Albert Walk							
Buildings Fronting on to Albert Walk and Florence Road, A98C8X4							
Heritage kerbs to albert walk							
Heritage sets to Albert Walk							
Bray Railway Station, Wicklow			WCC RPS B80/73		16301269		
Stone kerbs at Bray station							
1 to 4 Marine Terrace, Strand Road, Bray, Wicklow					16301092 to 16301095		
Signal box Quinnsborough Road							
The Hibernia In and 2 to 5 Royal Marine Terrace, Strand Road, Bray, Wicklow			WCC RPS B86/79		16301091 to 16301087		
Bray Martello Tower, Royal Marine Park Bray, Wicklow		RMP WI004-002	WCC RPS B85/78		16301084		
San Court Lodge, Royal Marine Park, Bray, Wicklow							
The Battery, Strand Road, Wicklow			WCC RPS B101/94				
Bridge at Seapoint Road	UBR140						
Harbour Bar, Seapoint Road							
Dockyard number 8, Harbour Road							

Description	Underbridge / Overbridge IE Ref	RMP Reference	Protected Structure Reference	Architectural Conservation Areas	NIAH Building Survey Reference	NIAH Garden Survey Reference	Industrial
Bridges over the Dargle River	UBR139						
Bridge/overparr, ravenswell road	UBR138						
Ravenswell house						4299	
Corke abbey, Dublin		RMP DU026068001-2				2572	
Wooodbrook House Demesne, Dublin			DLR RPS 1870		60260157	5676	
Former Cricket Pavilion, now Golf Club, Wooodbrook, Dublin			DLR RPS 2060		60260159		
Shanganagh Castle Demesne, Dublin		RMP DU026-120	DLR RPS 1845		60260146	2556	
Shanganagh park/House Demesne					60260120	2557	
Martello and earthwork Strand Road, Killiney, Co. Dublin.		RMP DU026-014001, DU026-014002	DLR RPS 1761				
Railway Station Seafield Road, Dublin							DLIHS
Killiney Architectural Conservation Area, Dublin				Killiney Architectural Conservation Area			
Dun Mhuire, Seafield Road, Killiney			2134				
Vartry Lodge, Strand Road, Killiney, Co. Dublin			DLR RPS 1757				

Description	Underbridge / Overbridge IE Ref	RMP Reference	Protected Structure Reference	Architectural Conservation Areas	NIAH Building Survey Reference	NIAH Garden Survey Reference	Industrial
Dunmara, Strand Road, Killiney, Co. Dublin			DLR RPS 1755				
Carrig na Mara, Strand Road, Killiney, Co. Dublin			DLR RPS 1753				
Casa Sara, Strand Road, Killiney, Co. Dublin.			DLR RPS 1751				
Boundary Stone, Adjacent to footpath leading to the beach from bridge at Strand Road, Killiney							DLIHS
Killacoona (Society of Holy Child Convent School, Military Road, Killiney, Co. Dublin			DLR RPS 1745				
Mentone, Military Road, Killiney, Co. Dublin			DLR RPS 1737				
Killeen Marino Avenue East, Killiney, Co. Dublin.			DLR RPS 1721				
Saint Leonard Marino Avenue East, Killiney, Co. Dublin.			DLR RPS 1716				
Eirene Marino Avenue East, Killiney, Co. Dublin.			DLR RPS 1709				
Railway Station, Station Road, Killiney, Dublin	OBR124						DLIHS
Battery, Strathmore Road, Killiney, Dublin		RMP DU 026-012					

Description	Underbridge / Overbridge IE Ref	RMP Reference	Protected Structure Reference	Architectural Conservation Areas	NIAH Building Survey Reference	NIAH Garden Survey Reference	Industrial
Undercliff, Strathmore Road, Killiney, Co. Dublin			DLR RPS 1681				
Mount Mapas House, Victoria Road, Dalkey, Co. Dublin			DLR RPS 1908				
Mount Eagle, Vico Road, Killiney, Co. Dublin.			DLR RPS 1644				
Vico Road, Sorrento Point, Dalkey Architectural Conservation Area, Dublin				Vico Road, Sorrento Point Architectural Conservation Area			
Strawberry Hill, Vico Road, Killiney, Glenageary, Co. Dublin.			DLR RPS 1628				
Sign, Hawk Cliff, Dublin							DLIHS
Tunnel Vico Road, Sorrento, Dublin	UBR117						
Coastguard Cottages Beacon Hill, Nerano Road, Dalkey, Glenageary, Co. Dublin.			DLR RPS 1551 - 1558				
Arcadia (Amritsar) Knock-na-cree Road, Dublin			DLR RPS 2128				
Bridge (Over Railway) leading over the railway to Sorrento Heights, Dublin	OBR115		DLR RPS 1547				
Laragh, Ardeevin Road, Dalkey, Co. Dublin			DLR RPS 1530				

Description	Underbridge / Overbridge IE Ref	RMP Reference	Protected Structure Reference	Architectural Conservation Areas	NIAH Building Survey Reference	NIAH Garden Survey Reference	Industrial
Montpellier, Ardeevin Road, Dalkey, Co. Dublin			DLR RPS 1529				
Dalkey Village Architectural Conservation Area				Dalkey Village Architectural Conservation Area			
Dalkey Dart Station	OBR110 OBR111		DLR RPS 1517				
Saint Michaels, Ardeevin Road, Dalkey, Co. Dublin			DLR RPS 1522-1523				
Tudor House, Castle Street, Dalkey, Glenageary. Co. Dublin			DLR RPS 1516				
The Metals, Candidate Architectural Conservation Area				The Metals, Candidate Architectural Conservation Area			
Dalkey Lodge, Barnhill Road, Dalkey, Glenageary, Co. Dublin.		RMP DU023-070,	DLR RPS 1483				
Railway Bridge, Barnhill Road, Dalkey, Co. Dublin	OBR105		DLR RPS 1955				
Former Forge Barnhill Road, Dalkey, Co. Dublin							DLIHS
Railway Bridge, Castle Park Road, adjacent to Metals	OBR104						DLIHS
Silchester Road, Marlbrough Road, Glenageary, Candidate Architectural Conservation Area				Silchester Road, Marlbrough Road, Glenageary, Candidate Architectural Conservation Area			
Glasthule Lodge, Adelaide Road, Glenageary, Co. Dublin.			DLR RPS 1423				

Description	Underbridge / Overbridge IE Ref	RMP Reference	Protected Structure Reference	Architectural Conservation Areas	NIAH Building Survey Reference	NIAH Garden Survey Reference	Industrial
Silchester Road, Marlbrough Road, Glenageary Architectural Conservation Area				Silchester Road, Marlbrough Road, Glenageary Architectural Conservation Area			
Letter Box, Adelaide Road, Glenageary, adjacent to railway bridge	OBR101						DLIHS
Saint Paul's Church Adelaide Road, Glenageary, Co. Dublin			DLR RPS 1430				
Claremont Villas, Glenageary, Co. Dublin.			DLR RPS 1407, 1408, 1410-1418				
Eden Park, Summerhill Road, Glenageary, Co. Dublin			DLR RPS 1167, 1169, 1174-1179, 1182, 1188, 1190, 1191, 1193				
Peoples Park, Dun Laoghaire, Candidate Architectural Conservation Area	OBR96			Peoples Park, Dun Laoghaire, Candidate Architectural Conservation Area			
Martello Tower, site, Peoples Park Dun Laoghaire		RMP DU023-017					
Windsor Terrace, Dun Laoghaire, Co. Dublin			DLR RPS 918, 932, 938, 940, 944, 948, 953, 958, 961, 965, 968, 970, 977, 983,				
Haigh Terrace to Park Road, Architectural Conservation Area				Haigh Terrace to Park Road, Architectural Conservation Area			

Description	Underbridge / Overbridge IE Ref	RMP Reference	Protected Structure Reference	Architectural Conservation Areas	NIAH Building Survey Reference	NIAH Garden Survey Reference	Industrial
Dun Laoghaire Harbour, Dun Laoghaire Seafront, Pavilion Complex, Moran Park and Adelaide Street Candidate Architectural Conservation Area				Dun Laoghaire Harbour, Dun Laoghaire Seafront, Pavilion Complex, Moran Park and Adelaide Street Candidate Architectural Conservation Area			
Park Road, Dun Laoghaire, Co. Dublin			DLR RPS 886				
Park Road, Dun Laoghaire, Co. Dublin			DLR RPS 882				
Ardeen House, Marine Terrace, Dun Laoghaire, Co. Dublin.			DLR RPS 877				
Marine Terrace, Dun Laoghaire, Co. Dublin.			DLR RPS 837, 841, 846, 849, 854, 871, 873				
The Pierre, Victoria Terrace, Dalkey, Co. Dublin.			DLR RPS 805				
Kingston Hotel, Haddington Terrace, Dun Laoghaire, Co. Dublin			DLR RPS 801				
Haddington Terrace, Dun Laoghaire, Co. Dublin			DLR RPS 774, 778, 781, 785, 786, 788, 793				
Victorian Chain Fencing and Bollards from RNLI Lifeboat House to the Bandstand and East Pier, Dun Laoghaire, Co. Dublin.			DLR RPS 307				

Description	Underbridge / Overbridge IE Ref	RMP Reference	Protected Structure Reference	Architectural Conservation Areas	NIAH Building Survey Reference	NIAH Garden Survey Reference	Industrial
Section of Railings on Northern Side of Queens Road to steps leading down to East Pier			DLR RPS 1894				
RNLI Lifeboat House, East Pier, Dun Laoghaire, Co. Dublin.			DLR RPS 754				
National Yacht Club, Dun Laoghaire			DLR RPS 726				
Bollards and Chains, Queens Road, Dun Laoghaire, Co. Dublin.			DLR RPS 673				
Moran Park House, Queen's Road, Dun Laoghaire, Co. Dublin.			DLR RPS 731				
Statue of Christ The King, Queen's Road, Dun Laoghaire, Co. Dublin.			DLR RPS 757				
Wrought Iron Gates Royal Marine Hotel, Marine Road, Dun Laoghaire, Co. Dublin.			DLR RPS 800				
George IV Monument, Queen's Road, Dun Laoghaire			DLR RPS 687				
Royal Saint George Yacht Club, Dun Laoghaire			DLR RPS 599				
Queen Victoria Fountain, Dun Laoghaire, Co. Dublin			DLR RPS 1954				
County Hall, Marine Road, Dun Laoghaire, Co. Dublin.			DLR RPS 642				

Description	Underbridge / Overbridge IE Ref	RMP Reference	Protected Structure Reference	Architectural Conservation Areas	NIAH Building Survey Reference	NIAH Garden Survey Reference	Industrial
Mallin Railway Station, Harbour Road, Dun Laoghaire, Co. Dublin	OBR87		DLR RPS 564				
Granite Flank Walls of former Railway Shed, Harbour Road, Dun Laoghaire, Co. Dublin.			DLR RPS 534				
Harbour Lodge, Harbour Square, Crofton Road, Dun Laoghaire, Co. Dublin.			DLR RPS 629				
Royal Irish Yacht Club, Harbour Road, Dun Laoghaire, Co. Dublin.			DLR RPS 458				
Charlemont Terrace, Crofton Road, Dun Laoghaire, Co. Dublin			DLR RPS 520-522, 526, 531, 535,				
Commercial Premises Crofton Road, Dun Laoghaire, Glenageary, Co. Dublin			DLR RPS 507				
Crofton Hall Crofton Road, Dun Laoghaire, Glenageary, Co. Dublin			DLR RPS 502				
Albert Terrace, Crofton Road, Dun Laoghaire, Glenageary, Co. Dublin			DLR RPS 480, 482, 487, 489, 492-494, 496,				
Crofton Terrace, Dun Laoghaire, Glenageary, Co. Dublin			DLR RPS 466,469, 470, 472, 474, 475, 478				
Coastguard Cottages, Harbour Road, Dun Laoghaire, Co. Dublin.			DLR RPS 388, 393, 396, 400, 403, 406, 409, 414, 417				

Description	Underbridge / Overbridge IE Ref	RMP Reference	Protected Structure Reference	Architectural Conservation Areas	NIAH Building Survey Reference	NIAH Garden Survey Reference	Industrial
Promontory Fort Coastal and Martello Tower Site Dunleary Road		RMP DU023-052001, 023-052003					
Old Pier/Coal Quay, Dun Laoghaire, Co. Dublin			DLR RPS 401				
West Pier, Dun Laoghaire, Co. Dublin.			DLR RPS 127				
Monkstown Architectural Conservation Area				Monkstown Architectural Conservation Area			
Brighton Terrace, Seapoint Avenue, Blackrock, Co. Dublin			DLR RPS 533, 540, 547, 553, 556				
East View, Seafield Avenue, Monkstown, Blackrock, Co. Dublin.			DLR RPS 486				
Letter Box, Seapoint Avenue at junction with Seafield Avenue							DLIHS
Seafield House Seafield Avenue, Monkstown, Blackrock, Co. Dublin			DLR RPS 433				
Terrace, Seapoint Avenue, Blackrock, Co. Dublin.			DLR RPS 420-422, 426, 428				
Battery Bridge (Over Railway Seapoint Avenue, Monkstown, Blackrock, Co. Dublin.			DLR RPS 383				
Martello Tower Brighton Vale, Blackrock, Co. Dublin.		RMP DU023-010	DLR RPS 358				

Description	Underbridge / Overbridge IE Ref	RMP Reference	Protected Structure Reference	Architectural Conservation Areas	NIAH Building Survey Reference	NIAH Garden Survey Reference	Industrial
Trafalgar Terrace, Blackrock, Co. Dublin.			DLR RPS 371, 372, 375, 377, 379, 380, 382, 386, 387, 391, 392, 394, 395, 397, 399, 402, 404, 405, 408, 411, 412, 415				
Terrace Seapoint Avenue, Blackrock, Co. Dublin.			DLR RPS 365, 369				
Seapoint Avenue, Blackrock, Co. Dublin.			DLR RPS 354				
Terrace Brighton Vale, Blackrock, Co. Dublin.			DLR RPS 288, 294, 299, 302, 306, 312, 320, 323, 325, 333, 343, 346, 352, 355, 359,				
Brighton Vale, Blackrock, Co. Dublin.			DLR RPS 287				
The Breakers Brighton Vale, Blackrock, Co. Dublin.			DLR RPS 266				
The Cormorants Brighton Vale, Blackrock, Co. Dublin.			DLR RPS 263				
Walls of former stable Seapoint Dart Station			DLR RPS 260				
House Seapoint Avenue, Blackrock, Co. Dublin			DLR RPS 297				

Description	Underbridge / Overbridge IE Ref	RMP Reference	Protected Structure Reference	Architectural Conservation Areas	NIAH Building Survey Reference	NIAH Garden Survey Reference	Industrial
Osborne House, Seapoint Avenue, Blackrock, Co. Dublin			DLR RPS 296				
Ardenza Terrace, Monkstown, Blackrock, Co. Dublin			DLR RPS 267, 271-273, 275- 278				
Tobernea Terrace, Blackrock, Co. Dublin.			DLR RPS 268-270, 274				
Holy Well, Tobernea Terrace, Blackrock, Co. Dublin.		RMP DU023-009					
Folly, Railings and Grotto, Newtown Avenue, Blackrock, Co. Dublin			DLR RPS 195				
Vance's Harbour, Blackrock, Co. Dublin			DLR RPS 1900				
Lord Cloncurry's Temple/Bathing House, Newtown Avenue, Blackrock, Co. Dublin.			DLR RPS 196				
Tunnel between Blackrock and Seapoint Stations, Dublin	OBR75		DLR RPS 1893				
Lord Cloncurry's Bridge (Over Railway), Newtown Avenue, Blackrock, Co. Dublin.	OBR74		DLR RPS 1895				
Idrone Terrace, Blackrock, Candidate Architectural Conservation Area, Dublin				Idrone Terrace, Blackrock, Candidate Architectural Conservation Area			

Description	Underbridge / Overbridge IE Ref	RMP Reference	Protected Structure Reference	Architectural Conservation Areas	NIAH Building Survey Reference	NIAH Garden Survey Reference	Industrial
Idrone Terrace, Blackrock, Co. Dublin.			DLR RPS 121, 123, 124, 126, 130, 132, 136, 139, 140, 144, 146, 149, 151, 153, 154, 156, 158, 161, 163, 167, 169, 173, 176, 178, 181, 187, 189,				
Blackrock Village, Candidate Architectural Conservation Area, Dublin				Blackrock Village, Candidate Architectural Conservation Area			
EBS, Main Street, Blackrock, Co. Dublin.			DLR RPS 134				
Commercial Premises Main Street, Blackrock, Co. Dublin.			DLR RPS 128				
Former Post Office, Main Street, Blackrock, Co. Dublin.			DLR RPS 118				
Blackrock Railway Station	OBR72 OBR73		DLR RPS 106				
Deepwell, Rock Hill, Blackrock, Co. Dublin.			DLR RPS 110				
Blackrock Park, Dublin							
Band Stand Blackrock Park, Dublin			DLR RPS 1888				
Phoenix Terrace, Booterstown, Blackrock, Co. Dublin.			DLR RPS 73, 75, 79, 82, 85, 86,				

Description	Underbridge / Overbridge IE Ref	RMP Reference	Protected Structure Reference	Architectural Conservation Areas	NIAH Building Survey Reference	NIAH Garden Survey Reference	Industrial
Seafort Parade, Rock Road, Blackrock, Proposed Conservation Areas, Dublin				Seafort Parade, Rock Road, Blackrock, Candidate Architectural Conservation Area			
Montreux Lodge 18 Seafort Parade, Dublin			DLR RPS 52				
19 Seafort Parade, Dublin			DLR RPS 57				
20 Seafort Parade, Dublin			DLR RPS 58				
4 to 17 Seafort Parade, Dublin			DLR RPS 35, 37, 39, 40, 42, 44-48, 50, 51, 53, 54				
1 Seafort Parade, Dublin			DLR RPS 36				
2 Seafort Parade, Dublin			DLR RPS 34				
3 Seafort Parade, Dublin			DLR RPS 33				
1-5 Martello Terrace Blackrock, Dublin							
Martello Tower Seafort Parade, Blackrock, Dublin		RMP DU023-002	DLR RPS 25				
Williamstown, Booterstown Park, Dublin							
Booterstown Station, Dublin	OBR67						
Merrion Railway Station, Dublin							DCIHR 230100401
Merrion Gates Level Crossing, Dublin							DCIHR 230100201

Description	Underbridge / Overbridge IE Ref	RMP Reference	Protected Structure Reference	Architectural Conservation Areas	NIAH Building Survey Reference	NIAH Garden Survey Reference	Industrial
Foot Bridge, Sydney Parade station, Dublin	OBR65						DCIHR 191300201
Sydney Parade Station, Dublin							DCIHR 191300401
Level Crossing, Sydney Parade, Dublin							DCIHR 191300301
Level Crossing, Sandymount avenue, Dublin	UBR64						DCIHR 181601501
Level Crossing, Serpentine Avenue, Dublin							DCIHR 181601401
Engine House, Railway cottages, the Avenue, Sandymount, Dublin							DCIHR 181601701
Railway cottages, the Avenue, Sandymount, Dublin							DCIHR 181603401
Dodder Conservation Area				Dodder Conservation Area			
Wooden Bridge over the Dodder in Ballsbridge, Dublin	UBR63						DCIHR 181601301
Footbridge Lansdowne Road Station, Dublin	UBR62						DCIHR 181601201
Lansdowne Road Station, Dublin							DCIHR 181601901
Flour Mill, Lansdowne Road, Dublin							DCIHR 181603601
Level Crossing, Lansdowne Road, Dublin							DCIHR 181601101

Description	Underbridge / Overbridge IE Ref	RMP Reference	Protected Structure Reference	Architectural Conservation Areas	NIAH Building Survey Reference	NIAH Garden Survey Reference	Industrial
58-62 landstown Road, Dublin (even numbers only)			DCC RPS 4305, 4307, 4309				
Bridge (rail/road), Bath Avenue, Dublin	UBR61						DCIHR 181213801
Bridge (rail/road), South Lotts Road, Dublin	UBR60						DCIHR 181213701
Bridge, Barrow Street, Dublin	UBR59		DCC RPS 878				DCIHR 181213401
Doneda Clothing Factory {Railway Works (D &S.E.R.); Railway Engine & Coach Fcty}							DCIHR 181213501
Railway Engine Shed, Grand Canal Dock, Dublin							DCIHR 181213301
Grand Canal Conservation Area, Dublin				Grand Canal Conservation Area			
Grand Canal Dock, Dublin			DCC RPS 8844				DCIHR 181210501
Grand Canal circular line, Dublin							DCIHR 181205401
Grand Canal Quay, Dublin					50100334		
Bridge (rail/road), Grand Canal Quay, Dublin	UBR57		DCC RPS 883				DCIHR 181203601
Malt House Grand Canal Quay, Dublin			DCC RPS 3277		50100332		DCIHR 181203901

Description	Underbridge / Overbridge IE Ref	RMP Reference	Protected Structure Reference	Architectural Conservation Areas	NIAH Building Survey Reference	NIAH Garden Survey Reference	Industrial
Bridge (rail/road), Grand Canal Quay, Dublin	UBR58		DCC RPS 3276		50100333		
City of Dublin Bakery {Bakery}, Dublin							DCIHR 181204401
L Connaughton and sons Grand Canal Quay, Dublin					50100331		
The Hammond Lane Foundry {Distillery; Sugar Works}, the Enterprice Centre Pearse St, Dublin			DCC RPS 3278				DCIHR 181203801
Bridge, Macken Street, Dublin	UBR56		DCC RPS 885		50100329		DCIHR 181203501
Flats, Conway Court, Macken Street, Dublin					50100328		
Bridge (rail/road), Erne Place, Brunswick Place, Dublin	UBR55				50100327		DCIHR 181203401
Soap Candle Factory Erne Street, Dublin							DCIHR 181206601
Bridge (rail/road), Erne Street, Dublin	UBR54		DCC RPS 882		50100321		DCIHR 181203301
Post Office Garage, Sandwith Street Upper, Dublin					50930341		
Bridge (rail/road), Sandwith Street, Dublin	UBR53		DCC RPS 889		50100314		DCIHR 181203201

Description	Underbridge / Overbridge IE Ref	RMP Reference	Protected Structure Reference	Architectural Conservation Areas	NIAH Building Survey Reference	NIAH Garden Survey Reference	Industrial
Pearse Station Westland Row, Dublin	UBR51b		DCC RPS 8520		50930337		DCIHR 181203101, 181115001
Post and Sorting Office {Saw Mills}, Pearse Street, Dublin							DCIHR 181203001
Christian Brothers' School, Cumberland Street, Dublin					50100305		
St. Andrew's Church and Presbytery, Westland Row, Dublin					50930336		
Post box Westland Row, Dublin					50930338		
Bridge Westland Row, Dublin	UBR51b		DCC RPS 890		50020427		
O'Reilly Institute, Trinity College Dublin 11 Westland Row, Dublin			DCC RPS 8484, 8485		50020428		
TCD 12 Westland Row, Dublin			DCC RPS 8486		50020516, 50020429, 50020430, 50020431		
St Mark's Church, Pearse Street, Dublin			DCC RPS 6503		50020352		
The Trinity Inn, 37b Pearse Street, Dublin					50020348		
Office Mark Street, Dublin					50020346		
Tile Factory {School; Mission House}, Townsend St, Dublin							DCIHR 181119501

Description	Underbridge / Overbridge IE Ref	RMP Reference	Protected Structure Reference	Architectural Conservation Areas	NIAH Building Survey Reference	NIAH Garden Survey Reference	Industrial
Poundens Foundry, Luke St, Dublin							DCIHR 181120701
The Liffey Quays Conservation Area, Dublin				The Liffey Quays Conservation Area			
Tara Street Station, Dublin							DCIHR 181114901
The Workshop Pub, George's Quay, Dublin			DCC RPS 3175		50020311		
George's Quay, Dublin		RMP DU018-020458-	DCC RPS 8841		50020257		
Loopline Bridge (rail/river), G.S.Rys (Great Southern Railways) - City of Dublin Junction Railway, Dublin	UBLL44c		DCC RPS 881		50010159		DCIHR 181114701, 181114801, 180709101
Butt Bridge, Dublin	UBLL44b				50060554		DCIHR 181114401

Appendix D

Constraint Mapping: Noise Constraints

Appendix E

Constraint Mapping: Utilities and Licenced Facilities

Appendix F

Constraint Mapping: Land Use (Zoning) Constraints

Appendix G

Constraint Mapping: Water Services

Appendix H

Constraint Mapping: Population Constraints

Appendix I
Planning Application Monitor

Appendix J

Register of Relevant Planning Applications within Study Area

Appendix K
Constraint Mapping: Geology Constraints

Appendix L

Constraint Mapping: Aquifer Vulnerability Constraints

Appendix M

Constraint Mapping: Aquifer Bedrock Constraints

Appendix N

Constraint Mapping: Groundwater Constraints

Appendix O

Constraint Mapping: Surface Water Constraints

Appendix P
Constraint Mapping: Biodiversity Constraints

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CONTENTS

ABBREVIATIONS & GLOSSARY 1

1. INTRODUCTION 4

1.1 Purpose of the Report 4
1.2 Report Structure 4
1.3 Packages of work 4
1.4 Option Assessment Approach 5
1.5 References 7

2. EXISTING SITUATION 8

2.1 Overview 8
2.2 Railway Infrastructure 9
2.2.1 Existing Operations and Rail Services 12
2.2.2 Level Crossings 12
2.2.3 Lansdowne Road (XR001) 13
2.2.4 Serpentine Avenue (XR002) 15
2.2.5 Sandymount Avenue (XR003) 17
2.2.6 Sydney Parade Avenue (XR004) 19
2.2.7 Merrion Gates (XR005) 21
2.2.8 Signalling 23
2.2.9 Permanent Way and Tracks 23
2.2.10 Structures 23
2.2.11 Stations 24
2.3 Traffic and Transportation 24
2.3.1 Connectivity to Work, School, or College across the Rail line 24
2.3.2 Accessibility to Local Amenities across the Rail Line 25
2.3.3 Pedestrian / Cyclists Volumes across the Rail Line 27
2.3.4 Vehicle Volumes across the Rail Line 28
2.4 Utilities 31
2.4.1 Lansdowne Road 31
2.4.2 Serpentine Avenue 32
2.4.3 Sandymount Avenue 33
2.4.4 Sydney Parade Avenue 34
2.4.5 Merrion Gates 35
2.5 Ground Conditions 37
2.5.1 Lansdowne Road 37
2.5.2 Serpentine Avenue 38
2.5.3 Sandymount Avenue 39

2.5.4 Sydney Parade Avenue 40
2.5.5 Merrion Gates 41
2.6 Environmental 42
2.6.1 Landscape and Visual Quality 42
2.6.2 Archaeology and cultural heritage 42
2.6.3 Architectural heritage 43
2.6.4 Noise and Vibration 43
2.6.5 Air quality and climate 43
2.6.6 Agricultural and non-agricultural 43
2.6.7 Geology and soils 43
2.6.8 Water resources 46
2.6.9 Biodiversity 47

3. PROGRAMME OBJECTIVES AND REQUIREMENTS 48
3.1 DART+ Coastal South Project Specific Objectives 48
3.2 DART+ Coastal South Specific Requirements 48
3.3 Design standards 49

4. CONSTRAINTS 51
4.1 Technical 52
4.1.1 Railway Infrastructure 52
4.1.2 Traffic and Transportation 55
4.1.3 Utilities 56
4.1.4 Geotechnical 57
4.2 Environmental 59
4.2.1 Landscape and Visual Quality 59
4.2.2 Archaeology and Cultural Heritage 59
4.2.3 Architectural Heritage 60
4.2.4 Noise and Vibration 60
4.2.5 Air Quality and Climate 60
4.2.6 Agricultural and Non-agricultural 60
4.2.7 Geology and Soils 61
4.2.8 Water Resources 62
4.2.9 Biodiversity 62
4.3 Planning 62

5. OPTIONS 64
5.1 Longlisting of Possible Options Approach & Methodology 64
5.2 Accessibility Concept Options 65
5.3 Infrastructure Concept Options 68

5.3.1 Full Crossing Concept Options 70
5.3.2 Pedestrian / Cyclist Crossing Concept Options 71

6. OPTION SELECTION PROCESS 73

6.1 Shortlisting of Possible Options Approach & Methodology 73
6.2 Accessibility Options 73
6.2.1 Option 1 74
6.2.2 Option 2A 74
6.2.3 Option 2B 75
6.2.4 Option 2C 75
6.2.5 Option 3A 76
6.2.6 Option 3B 76
6.2.7 Option 3C 77
6.2.8 Option 3D 77
6.2.9 Option 4A 78
6.2.10 Option 4B 78
6.2.11 Option 4C 79
6.2.12 Option 4D 79
6.2.13 Option 5A 80
6.2.14 Option 5B 80
6.2.15 Option 5C 81
6.2.16 Option 5D 81
6.2.17 Option 6A 82
6.2.18 Option 6B 82
6.2.19 Option 6C 83
6.2.20 Option 6D 83
6.2.21 Option 7A 84
6.2.22 Option 7B 84
6.2.23 Option 7C 85
6.2.24 Option 7D 85
6.2.25 Option 8A 86
6.2.26 Option 8B 86
6.2.27 Option 8C 87
6.2.28 Option 8D 87
6.2.29 Option 9A 88
6.2.30 Option 9B 88
6.2.31 Option 9C 89
6.2.32 Option 9D 89

6.2.33 Option 10A....90
6.2.34 Option 10B....90
6.2.35 Option 10C....91
6.2.36 Option 10D....91
6.2.37 Option 11A....92
6.2.38 Option 11B....92
6.3 Shortlist of Accessibility Options....93
6.4 Infrastructure Options....97
6.4.1 Lansdowne Road....98
6.4.2 Serpentine Avenue....109
6.4.3 Sandymount Avenue....122
6.4.4 Sydney Parade....134
6.4.5 Merrion Gates....145
6.5 Shortlist of Infrastructure Options....156
6.5.1 Lansdowne Road....156
6.5.2 Serpentine Avenue....158
6.5.3 Sandymount Avenue....160
6.5.4 Sydney Parade Avenue....162
6.5.5 Merrion Gates....165
6.6 Option Compatibility Assessment....167
7. MULTI-CRITERIA ANALYSIS....171
7.1 MCA Approach & Methodology....171
7.2 Accessibility MCA....172
7.2.1 Economy....173
7.2.2 Safety....174
7.2.3 Environment....174
7.2.4 Accessibility and Social Inclusion....175
7.2.5 Integration....176
7.2.6 Physical Activity....177
7.2.7 Summary & EPO....177
7.3 Infrastructure MCA 1: Lansdowne Road Pedestrian/Cyclist Only Crossing Options....178
7.3.1 Economy....179
7.3.2 Safety....180
7.3.3 Environment....181
7.3.4 Accessibility and Social Inclusion....183
7.3.5 Integration....184
7.3.6 Physical Activity....184
7.3.7 Summary & EPO....185

7.4 Infrastructure MCA 2: Serpentine Avenue Pedestrian/Cyclist Only Crossing Options 185
7.4.1 Economy.....186
7.4.2 Safety 187
7.4.3 Environment 188
7.4.4 Accessibility and Social Inclusion.....190
7.4.5 Integration.....191
7.4.6 Physical Activity.....192
7.4.7 Summary & EPO 192
7.5 Infrastructure MCA 3: Sandymount Avenue Pedestrian/Cyclist Only Crossing Options 192
7.5.1 Economy.....194
7.5.2 Safety 195
7.5.3 Environment 195
7.5.4 Accessibility and Social Inclusion.....198
7.5.5 Integration.....198
7.5.6 Physical Activity.....199
7.5.7 Summary & EPO 199
7.5.8 Emerging Preferred Option.....199
7.6 Infrastructure MCA 4: Sydney Parade Pedestrian/Cyclist Only Crossing Options 199
7.6.1 Economy.....201
7.6.2 Safety 202
7.6.3 Environment 202
7.6.4 Accessibility and Social Inclusion.....205
7.6.5 Integration.....205
7.6.6 Physical Activity.....206
7.6.7 Summary & EPO 206
7.7 Infrastructure MCA 5: Merrion Gate Pedestrian/Cyclist Only Crossing Options.....207
7.7.1 Economy.....208
7.7.2 Safety 209
7.7.3 Environment 210
7.7.4 Accessibility and Social Inclusion.....213
7.7.5 Integration.....214
7.7.6 Physical Activity.....215
7.7.7 Summary & EPO 215
7.7.8 Emerging Preferred Option.....216
7.8 Infrastructure MCA 6: Merrion Gates North Full Crossing Options 217
7.8.1 Economy.....218
7.8.2 Safety 219
7.8.3 Environment 219

7.8.4 Accessibility and Social Inclusion 222
7.8.5 Integration 222
7.8.6 Physical Activity 222
7.8.7 Summary & EPO 223

8. CONCLUSION AND RECOMMENDATIONS 224

8.1 Emerging Preferred Option 224
8.2 Key Risks / Next Steps 224
8.2.2 Key Risks 225
8.2.3 Next Steps 226

APPENDIX A: ASSESSMENT OF LONGLIST OPTIONS AGAINST PROJECT OBJECTIVES AND REQUIREMENTS 227

Appendix A.1: Longlist Accessibility Options Sift 228
Appendix A.2: Longlist Infrastructure Options Sift – Lansdowne Road 229
Appendix A.3: Longlist Infrastructure Options Sift – Serpentine Avenue 230
Appendix A.4: Longlist Infrastructure Options Sift – Sandymount Avenue 231
Appendix A.5: Longlist Infrastructure Options Sift – Sydney Parade 232
Appendix A.6: Longlist Infrastructure Options Sift – Merrion Gates 233

APPENDIX B: MCA MATRIX 234

Appendix B.1: Accessibility Options 235
Appendix B.2: Lansdowne Road Pedestrian / Cyclist Only Crossing Options 236
Appendix B.3: Serpentine Avenue Pedestrian / Cyclist Only Crossing Options 237
Appendix B.4: Sandymount Avenue Pedestrian / Cyclist Only Crossing Options 238
Appendix B.5: Sydney Parade Pedestrian / Cyclist Only Crossing Options 239
Appendix B.6: Merrion Gates Pedestrian / Cyclist Only Crossing Options 240
Appendix B.7: Merrion Gates Full Crossing Options 241

APPENDIX C: PRELIMINARY PREFERRED OPTION SKETCH 242

Appendix C.1: Lansdowne Road Pedestrian / Cyclist Crossing Option 243
Appendix C.2: Serpentine Avenue Full Crossing Option 244
Appendix C.3: Sandymount Avenue Pedestrian / Cyclist Crossing Option 245
Appendix C.4: Sydney Parade Pedestrian / Cyclist Crossing Option 246
Appendix C.5: Merrion Gates Full Crossing Option 247

APPENDIX D: TRANSPORT ASSESSMENT 248

Appendix D.1: Multi-Modal Transport Assessment 249
Appendix D.2: Option Shortlisting Against Programme Objectives and Requirements 253

APPENDIX E: LEVEL CROSSING ASSESSMENT 254

Appendix E.1: Level Crossings 255

Tables

Table 1-1 List of key documents associated with this report 7
Table 2-1 Railway Stats for the Level Crossings 12
Table 2-2 Structures - Sandymount, Existing 23
Table 2-3 Stations located in the Sandymount area 24
Table 2-4 Census Data Results 25
Table 2-5 Pedestrian / Cyclists Accessibility Modelling 26
Table 2-6 Vehicle Accessibility Modelling 27
Table 2-7 Daily (12-hr) Pedestrian Volumes Crossing each Level Crossing 27
Table 2-8 Daily (12-hr) Cyclists Volumes Crossing each Level Crossing 28
Table 2-9 Traffic Volume Crossing each Level Crossing 28
Table 2-10 Utility Schedule - Lansdowne Road Level Crossing (XR001), Existing 32
Table 2-11 Utility Schedule - Serpentine Avenue Level Crossing (XR002), Existing 33
Table 2-12 Utility Schedule - Sandymount Avenue Level Crossing (XR003), Existing 34
Table 2-13 Utility Schedule - Sydney Parade Avenue Level Crossing (XR004), Existing 35
Table 2-14 Utility Schedule - Merrion Gates Level Crossing (XR005), Existing 36
Table 2-15 Utility Schedule - Merrion Gates North, Existing 37
Table 2-16 Designated surrounding the site under study 45
Table 2-17 Designated surrounding the site under study 46
Table 3-1 DART+ Coastal South Project Specific Requirements 48
Table 3-2 Design Standards 49
Table 5-1 Longlist Options Crossing Type Arrangements 65
Table 5-2 Longlist of Accessibility Concept Options 65
Table 5-3 Typical Road Cross-Section Arrangements 69
Table 5-4 Total Structural Height Considerations 69
Table 5-5 Longitudinal Gradients and impact on Ramp Lengths 70
Table 5-6 Longlist of Full Crossing Concept Options 70
Table 5-7 Longlist of Pedestrian / Cyclist Only Crossing Concept Options 71
Table 6-1 Accessibility Options Longlist Sifting Process Summary 94
Table 6-2 Infrastructure Concept Options at Lansdowne Road Longlist to Shortlist Sifting Process Summary 156
Table 6-3 Infrastructure Concept Options at Serpentine Ave. Longlist to Shortlist Sifting Process Summary 158
Table 6-4 Infrastructure Concept Options at Sandymount Ave. Longlist to Shortlist Sifting Process Summary 160
Table 6-5 Infrastructure Concept Options at Sydney Parade Ave Longlist to Shortlist Sifting Process Summary 163
Table 6-6 Infrastructure Concept Options at Merrion Gates Longlist to Shortlist Sifting Process Summary 165
Table 6-7 Summary for Infrastructure and Accessibility Options 168
Table 7-1 Legend for MCA Summary Tables 171
Table 7-2 Accessibility Option MCA Summary 172
Table 7-3 Overall criteria MCA summary table 173

Table 7-4 Lansdowne Road Pedestrian/Cyclist Only Crossing Options MCA Summary 178
Table 7-5 Overall criteria MCA summary table.....179
Table 7-6 Serpentine Avenue Pedestrian/Cyclist Only Crossing Options MCA Summary.....185
Table 7-7 Overall criteria MCA summary table.....186
Table 7-8 Sandymount Avenue Pedestrian/Cyclist Only Crossing Options MCA Summary.....193
Table 7-9 Overall criteria MCA summary table.....193
Table 7-10 Sydney Parade Avenue Pedestrian/Cyclist Only Crossing Options MCA Summary.....200
Table 7-11 Overall criteria MCA summary table.....200
Table 7-12 Merrion Gates Pedestrian/Cyclist Only Crossing Options MCA Summary.....207
Table 7-13 Overall criteria MCA summary table.....208
Table 7-14 Merrion Gates North Full Crossing Options MCA Summary 217
Table 7-15 Overall criteria MCA summary table.....218
Table 8-1 Accessibility EPO, Infrastructure EPO Combination 224

FIGURES

Figure 1-1 Approach to Optioneering 6
Figure 2-1 Study Area (Source: ESRI) 8
Figure 2-2 Dublin – Rosslare Europort Route Information Extract, Table Seq 13-R04 10
Figure 2-3 Dublin – Rosslare Europort Route Information Extract, Table Seq 13-R03 11
Figure 2-4 Aerial View of Lansdowne Road Level Crossing (XR001) (Source: OSI aerial imagery) 13
Figure 2-5 Lansdowne Road Level Crossing (Looking west) (Source: Arup) 14
Figure 2-6 Lansdowne Road Level Crossing (Looking east) (Source: Arup) 14
Figure 2-7 Aerial View of Serpentine Avenue Level Crossing (XR002) (Source: OSI aerial imagery) 15
Figure 2-8 Serpentine Avenue Level Crossing (Looking southwest) (Source: Arup) 16
Figure 2-9 Serpentine Avenue Level Crossing (Looking northeast) (Source: Arup) 16
Figure 2-10 Aerial View of Sandymount Avenue Level Crossing (XR003) (Source: OSI aerial imagery) 17
Figure 2-11 Sandymount Avenue Level Crossing (Looking southwest) (Source: Arup) 18
Figure 2-12 Sandymount Avenue Level Crossing (Looking northeast) (Source: Arup) 18
Figure 2-13 Aerial View of Sydney Parade Avenue Level Crossing (XR004) (Source: OSI aerial imagery) 19
Figure 2-14 Sydney Parade Avenue Level Crossing (Source: Arup) 20
Figure 2-15 Aerial View of Merrion Gates Level Crossing (XR005) (Source: OSI aerial imagery) 21
Figure 2-16 Merrion Gates Level Crossing (Looking southwest) (Source: Arup) 22
Figure 2-17 Merrion Gates Level Crossing (Looking northeast) (Source: Arup) 22
Figure 2-18 Southern Line Interlockings 23
Figure 2-19 Sandymount Area Bus Routes, Existing 29
Figure 2-20 Sandymount Area Bus Routes, Planned 30
Figure 2-21 Utility Aerial View - Lansdowne Road Level Crossing (XR001), Existing (Source: ESRI) 31
Figure 2-22 Utility Aerial View - Serpentine Avenue Level Crossing (XR002), Existing (Source: ESRI) 32
Figure 2-23 Utility Aerial View - Sandymount Avenue Level Crossing (XR003), Existing (Source: ESRI) 33
Figure 2-24 Utility Aerial View - Sydney Parade Avenue Level Crossing (XR004), Existing (Source: ESRI) 34
Figure 2-25 Utility Aerial View - Merrion Gates Level Crossing (XR005), Existing (Source: ESRI) 35
Figure 2-26 Utility Aerial View - Merrion Gates North, Existing (Source: ESRI) 36
Figure 4-1 DART+ Coastal South Services 51
Figure 4-2 Relays cabling at Booterstown Relay Interlocking Room (Source: IÉ) 52
Figure 4-3 Level Crossing Schematic 53
Figure 4-4 Proposed Utility Corridor Space proofing for Concept Option Feasibility 57
Figure 5-1 Longlisting of Possible Options Approach 64
Figure 6-1 Shortlisting of Possible Options Approach 73
Figure 6-2 Accessibility Option 1, Schematic 74
Figure 6-3 Accessibility Option 2A, Schematic 74
Figure 6-4 Accessibility Option 2B, Schematic 75
Figure 6-5 Accessibility Option 2C, Schematic 75

Figure 6-6 Accessibility Option 3A, Schematic 76
Figure 6-7 Accessibility Option 3B, Schematic 76
Figure 6-8 Accessibility Option 3C, Schematic 77
Figure 6-9 Accessibility Option 3D, Schematic 77
Figure 6-10 Accessibility Option 4A, Schematic 78
Figure 6-11 Accessibility Option 4B, Schematic 78
Figure 6-12 Accessibility Option 4C, Schematic 79
Figure 6-13 Accessibility Option 4D, Schematic 79
Figure 6-14 Accessibility Option 5A, Schematic 80
Figure 6-15 Accessibility Option 5B, Schematic 80
Figure 6-16 Accessibility Option 5C, Schematic 81
Figure 6-17 Accessibility Option 5D, Schematic 81
Figure 6-18 Accessibility Option 6A, Schematic 82
Figure 6-19 Accessibility Option 6B, Schematic 82
Figure 6-20 Accessibility Option 6C, Schematic 83
Figure 6-21 Accessibility Option 6D, Schematic 83
Figure 6-22 Accessibility Option 7A, Schematic 84
Figure 6-23 Accessibility Option 7B, Schematic 84
Figure 6-24 Accessibility Option 7C, Schematic 85
Figure 6-25 Accessibility Option 7D, Schematic 85
Figure 6-26 Accessibility Option 8A, Schematic 86
Figure 6-27 Accessibility Option 8B, Schematic 86
Figure 6-28: Accessibility Option 8C, Schematic 87
Figure 6-29 Accessibility Option 8D, Schematic 87
Figure 6-30 Accessibility Option 9A, Schematic 88
Figure 6-31 Accessibility Option 9B, Schematic 88
Figure 6-32 Accessibility Option 9C, Schematic 89
Figure 6-33 Accessibility Option 9D, Schematic 89
Figure 6-34 Accessibility Option 10A, Schematic 90
Figure 6-35 Accessibility Option 10B, Schematic 90
Figure 6-36 Accessibility Option 10C, Schematic 91
Figure 6-37 Accessibility Option 10D, Schematic 91
Figure 6-38 Accessibility Option 11A, Schematic 92
Figure 6-39 Accessibility Option 11B, Schematic 92
Figure 6-40 Lansdowne Road New Footbridge with Linear Ramp Access, Option LR-P-1a) (Source: ESRI) 100
Figure 6-41 Lansdowne Road New Footbridge with Linear Ramp Access, Option LR-P-1b) (Source: ESRI) 101
Figure 6-42 Lansdowne Road New Footbridge with Compressed Ramp Access, Option LR-P-2a) (Source: ESRI) 101
Figure 6-43 Lansdowne Road New Footbridge with Compressed Ramp Access, Option LR-P-2b) (Source: ESRI) 102

Figure 6-44 Lansdowne Road New Footbridge with Non-Linear Ramp Access, Option LR-P-3a) (Source: ESRI) 103
Figure 6-45 Lansdowne Road New Footbridge with Stair & Lift Access, Option LR-P-4a) (Source: ESRI) 104
Figure 6-46 Lansdowne Road New Footbridge with Stair & Lift Access, Option LR-P-4b) (Source: ESRI) 104
Figure 6-47 Lansdowne Road New Subway with Stair & Lift Access, Option LR-P-5a) (Source: ESRI) 105
Figure 6-48 Lansdowne Road New Subway with Stair & Lift Access, Option LR-P-5b) (Source: ESRI) 106
Figure 6-49 Lansdowne Road New Subway with Stair & Lift Access Option, Option LR-P-6a) (Source: ESRI) 107
Figure 6-50 Lansdowne Road New Subway with Stair & Lift Access Option, Option LR-P-6b) (Source: ESRI) 107
Figure 6-51 Lansdowne Road Modification of Existing Grade Separated Crossing, Option LR-P-7a) (Source: ESRI) 108
Figure 6-52 Lansdowne Road Modification of Existing Grade Separated Crossing, Option LR-P-7b) (Source: ESRI) 109
Figure 6-53 Serpentine Avenue Full Grade Separated Crossing, Option SA-V-3c) (Source: ESRI) ... 111
Figure 6-54 Serpentine Avenue Full Grade Separated Crossing, Option SA-V-4c) (Source: ESRI) ... 112
Figure 6-55 Serpentine Avenue New Alternative Crossing, Option SA-V-5) (Source: ESRI) 112
Figure 6-56 Serpentine Avenue New Footbridge with Linear Ramp Access, Option SA-P-1a) (Source: ESRI) 113
Figure 6-57 Serpentine Avenue New Footbridge with Linear Ramp Access, Option SA-P-1b) (Source: ESRI) 114
Figure 6-58 Serpentine Avenue New Footbridge with Compressed Ramp Access, Option SA-P-2a) (Source: ESRI) 115
Figure 6-59 Serpentine Avenue New Footbridge with Compressed Ramp Access, Option SA-P-2b) 115
Figure 6-60 Serpentine Avenue New Footbridge with Non-Linear Ramp Access, Option SA-P-3a) (Source: ESRI) 116
Figure 6-61 Serpentine Avenue New Footbridge with Non-Linear Ramp Access, Option SA-P-3a) (Source: ESRI) 117
Figure 6-62 Serpentine Avenue New Footbridge with Stair & Lift Access, Option SA-P-4a) (Source: ESRI) 118
Figure 6-63 Serpentine Avenue New Footbridge with Stair & Lift Access, Option SA-P-4b) (Source: ESRI) 118
Figure 6-64 Serpentine Avenue New Subway with Stair & Lift Access, Option SA-P-5a) (Source: ESRI) 119
Figure 6-65 Serpentine Avenue New Subway with Stair & Lift Access, Option SA-P-5b) (Source: ESRI) 120
Figure 6-66 Serpentine Avenue New Subway with Stair & Lift Access Option, Option SA-P-6a) (Source: ESRI) 121
Figure 6-67 Serpentine Avenue New Subway with Stair & Lift Access Option, Option SA-P-6b) (Source: ESRI) 121
Figure 6-68 Sandymount Avenue Full Grade Separated Crossing, Option SM-V-3c) (Source: ESRI) 123
Figure 6-69 Sandymount Avenue Full Grade Separated Crossing, Option SM-V-4c) (Source: ESRI) 125
Figure 6-70 Sandymount Avenue New Alternative Crossing, Option SA-V-5) (Source: ESRI) 125
Figure 6-71 Sandymount Avenue New Footbridge with Linear Ramp Access, Option SM-P-1a) (Source: ESRI) 126

Figure 6-72 Sandymount Avenue New Footbridge with Linear Ramp Access, Option SM-P-1b) (Source: ESRI) 127
Figure 6-73 Sandymount Avenue New Footbridge with Compressed Ramp Access, Option SM-P-2a) (Source: ESRI) 128
Figure 6-74 Sandymount Avenue New Footbridge with Compressed Ramp Access, Option SM-P-2b) (Source: ESRI) 128
Figure 6-75 Sandymount Avenue New Footbridge with Non-Linear Ramp Access, Option SM-P-3a) (Source: ESRI) 129
Figure 6-76 Sandymount Avenue New Footbridge with Non-Linear Ramp Access, Option SM-P-3b) (Source: ESRI) 130
Figure 6-77 Sandymount Avenue New Footbridge with Stair & Lift Access, Option SM-P-4a) (Source: ESRI) 130
Figure 6-78 Sandymount Avenue New Footbridge with Stair & Lift Access, Option SM-P-4b) (Source: ESRI) 131
Figure 6-79 Sandymount Avenue New Subway with Stair & Lift Access, Option SM-P-5a) (Source: ESRI) 132
Figure 6-80 Sandymount Avenue New Subway with Stair & Lift Access, Option SM-P-5b) (Source: ESRI) 132
Figure 6-81 Sandymount Avenue New Subway with Stair & Lift Access Option, Option SM-P-6a) (Source: ESRI) 133
Figure 6-82 Sandymount Avenue New Subway with Stair & Lift Access Option, Option SM-P-6b) (Source: ESRI) 133
Figure 6-83 Sandymount Avenue Modification of Existing Grade Separated Crossing, Option SM-P-7a) (Source: ESRI) 134
Figure 6-84 Sydney Parade Avenue Full Grade Separated Crossing, Option SP-V-3c) (Source: ESRI) 136
Figure 6-85 Sydney Parade Avenue Full Grade Separated Crossing, Option SP-V-4c) (Source: ESRI) 137
Figure 6-86 Sydney Parade Avenue New Alternative Crossing, Option SA-V-5) (Source: ESRI) 138
Figure 6-87 Sydney Parade Avenue New Footbridge with Linear Ramp Access, Option SP-P-1a) (Source: ESRI) 139
Figure 6-88 Sydney Parade Avenue New Footbridge with Linear Ramp Access, Option SP-P-1b) (Source: ESRI) 139
Figure 6-89 Sydney Parade Avenue New Footbridge with Compressed Ramp Access, Option SP-P-2a) (Source: ESRI) 140
Figure 6-90 Sydney Parade Avenue New Footbridge with Compressed Ramp Access, Option SP-P-2b) (Source: ESRI) 141
Figure 6-91 Sydney Parade Avenue New Footbridge with Stair & Lift Access, Option SP-P-4a) (Source: ESRI) 142
Figure 6-92 Sydney Parade Avenue New Footbridge with Stair & Lift Access, Option SP-P-4b) (Source: ESRI) 142
Figure 6-93 Sydney Parade Avenue New Subway with Stair & Lift Access, Option SP-P-5a) (Source: ESRI) 143
Figure 6-94 Sydney Parade Avenue New Subway with Stair & Lift Access, Option SP-P-5b) (Source: ESRI) 143
Figure 6-95 Sydney Parade Avenue New Subway with Stair & Lift Access Option, Option SP-P-6a) (Source: ESRI) 144
Figure 6-96 Sydney Parade Avenue New Subway with Stair & Lift Access Option, Option SP-P-6b) (Source: ESRI) 145

Figure 6-97 Merrion Gates New Alternative Crossing, Option SA-V-5a) (Source: ESRI).....147
Figure 6-98 Merrion Gates New Alternative Crossing, Option SA-V-5b) (Source: ESRI).....147
Figure 6-99 Merrion Gates New Alternative Crossing, Option SA-V-5c) (Source: ESRI).....148
Figure 6-100 Merrion Gates New Footbridge with Linear Ramp Access, Option MG-P-1a) (Source: ESRI).....149
Figure 6-101 Merrion Gates New Footbridge with Linear Ramp Access, Option MG-P-1b) (Source: ESRI).....149
Figure 6-102 Merrion Gates New Footbridge with Compressed Ramp Access, Option MG-P-2a) (Source: ESRI).....150
Figure 6-103 Merrion Gates New Footbridge with Compressed Ramp Access, Option MG-P-2b) (Source: ESRI).....151
Figure 6-104 Merrion Gates New Footbridge with Non-Linear Ramp Access, Option MG-P-3a) (Source: ESRI).....152
Figure 6-105 Merrion Gates New Footbridge with Stair & Lift Access, Option MG-P-4a) (Source: ESRI).....153
Figure 6-106 Merrion Gates New Footbridge with Stair & Lift Access, Option MG-P-4b) (Source: ESRI).....153
Figure 6-107 Merrion Gates New Subway with Stair & Lift Access, Option MG-P-5a) (Source: ESRI)154
Figure 6-108 Merrion Gates New Subway with Stair & Lift Access, Option MG-P-5b) (Source: ESRI)154
Figure 6-109 Sydney Parade Avenue New Subway with Stair & Lift Access Option, Option MG-P-6a) (Source: ESRI).....155
Figure 6-110 Sydney Parade Avenue New Subway with Stair & Lift Access Option, Option MG-P-6b) (Source: ESRI).....155
Figure 7-1 MCA Approach.....171

ABBREVIATIONS & GLOSSARY

Abbreviation	Definition
ABP	An Bord Pleanála
ACA	Architectural Conservation Area
AOD	Above Ordnance Datum
ATP	Automatic Train Protection
C&L	Construction & Logistics
CAF	Common Appraisal Framework
CAPEX	Capital Expenditure
Catenary	The longitudinal wire that supports the contact wire
CBI	Computer Based Interlocking
CCE	Chief Civil Engineers Department of IÉ
CCTV	Closed Circuit Television
CDP	County Development Plan
CIE	Córas Iompair Éireann
Contact wire	Carries the electricity which is supplied to the train by its pantograph
CPO	Compulsory Purchase Order
CRR	Commission for Rail Regulation (formerly RSC – Railway Safety Commission)
CSM	Common Safety Method
CTC	Central Traffic Control
Cutting	A railway in cutting means the rail level is below the surrounding ground level
DART	Dublin Area Rapid Transit
DART+	DART Expansion Programme
DCC	Dublin City Council
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EIS	Environmental Impact Statement
Electrification	Electrification is the term used in supplying electric power to the train fleet without the use of an on-board prime mover or local fuel supply
EN	European Engineering Standard
EPA	Environmental Protection Authority
EPO	Emerging Preferred Option
ESB	Electricity Supply Board
GDA	Greater Dublin Area
GHG	Greenhouse Gases
GI	Ground Investigation

Abbreviation	Definition
GIS	Geological Survey Ireland
HV	High Voltage
IÉ	Iarnród Éireann/Irish Rail
IM	Infrastructure Manager (IÉ)
IEL	Industrial Emissions License
IPC	Integrated Pollution Control
IPPC	Integrated pollution prevention and control
LX	Level Crossing
MCA	Multi-criteria analysis
MDC	Multi-disciplinary Consultant
MV	Medium Voltage
NHA	Natural Heritage Area
NIAH	National Inventory of Architectural Heritage
OHLE	Overhead Line Equipment
OPEX	Operational expenditure
OPW	Office of Public Works
OSi	Ordnance Survey Ireland
Overbridge (OB)	A bridge that allows traffic to pass over a road, river, railway etc.
P&C	Points and Crossings
PAHs	Polycyclic Aromatic Hydrocarbons
Pantograph	The device on top of the train that collects electric current from the contact wire to power the train.
PC	Public Consultation
Permanent Way	A term used to describe the track or railway corridor and includes all ancillary installations such as rails, sleepers,
pNHA	Proposed Natural Heritage Area
RailSys	Railway Network Simulation and Modelling
Re-signalling	Re-signalling of train lines will regulate the sage movement of trains and increase the capacity of train services along the route
RMP	Record of Monuments and Places
RO	Railway Order
RPS	Record of Protected Structures
SAAO	Special Amenity Area Orders
SAC	Special Area of Conservation
SET	Signalling, Electrical and Telecommunications
SPA	Special Protected Area
TCU	Train Capacity Utilisation

Abbreviation	Definition
TII	Transport Infrastructure Ireland
tph	Trains per hour
TPHs	Total petroleum Hydrocarbons
TPS	Train Protection System
Track Alignment	Refers to the direction and position given to the centre line of the railway track on the ground in the horizontal and vertical planes. Horizontal alignment means the direction of the railway track in the plan including the straight path
TSI	Technical Specifications for Interoperability
TSS	Train Service Specification
Underbridge (UB)	A bridge that allows traffic to pass under a road, river, railway etc. The underneath of a bridge
Vertical Clearance	For overbridges, an adequate vertical distance between railway tracks and the underside of the bridge deck (soffit) must be provided in order to safely accommodate the rail vehicles and the OHLE. This distance is known as vertical clearance, and it is measured from the highest rail level
WFD	Water Framework Directive
ZAP	Zone of Archaeological Potential
ZoI	Zone of Influence

1. INTRODUCTION

1.1 Purpose of the Report

The purpose of this report is to provide technical input to the Preliminary Option Selection Report. This report details the options considered as part of the project development and the reasoning behind the choice of the Emerging Preferred Option (EPO).

1.2 Report Structure

The structure of this report is set out as follows:

- Section 1: Introduction
- Section 2: Existing Situation – This section details the study area for the Sandymount Area Level Crossings and describes the existing situation with regard to key criteria of relevance such as Accessibility and Mobility, Railway Infrastructure and Environment.
- Section 3: Project Objectives and Requirements – This section details the Project Specific Objectives and Requirements to be met as part of the option assessment approach.
- Section 4: Constraints – This section provides a summary of the project specific constraints that have been considered as part of the option assessment approach.
- Section 5: Options – This section provides a summary of the Longlisting of Possible Options.
- Section 6: Option Selection Process – This section provides a summary of the Shortlisting Sifting of the Longlist Options against the Project Specific Objectives and Requirements.
- Section 7: Multi-Criteria Analysis – This section provides a summary of the Multi-Criteria Assessment carried out on the Shortlisted Options and recommends an EPO.
- Section 8: Conclusion and Recommendations – This section provides the overall conclusions of the options assessment process and describes the EPO proposal, detailing the 'key risks', 'next steps' and 'construction considerations' in the delivery of the EPO.

1.3 Packages of work

The scope of work for DART+ Coastal South covers a wide range of interventions on the Southern Line needed in order to meet the Train Service Specification (TSS) requirements. To appropriately assess options against each other, the works have been split into separate work packages, as detailed in the separate Annexes.

This report provides the technical assessment of the Sandymount Area Level Crossings. This consists of the interventions required to the 5 existing level crossings on the rail line that extends from Lansdowne Road to Merrion Gates, and the impacts to/from Lansdowne Village, Sandymount, Merrion and neighbouring areas for all accessibility modes, to meet the TSS requirements for an increased number of DART services, from 6 to 12 trains per hour per direction between the city centre and Bray, which is to be delivered as part of the DART+ Programme. This report presents the approach to option development, option assessment and option selection.

1.4 Option Assessment Approach

A clearly defined appraisal methodology has been used in the selection of the Emerging Preferred Option for the project.

The options for intervention works at the five level crossing locations in the Sandymount Area have been split into two categories:

- Accessibility Options – Options that evaluate the wider area network connectivity with consideration of Pedestrian/Cycle movements, Public Transport and Vehicular Circulation, and
- Infrastructure Options – Options that evaluate the targeted infrastructure interventions required at each crossing, based on the Accessibility Options, with consideration of existing site constraints.

The option assessment approach is summarised below, and in Figure 1-1.

- Longlisting of Possible Options – To set out the scope of the assessment, a longlist of conceptual options was developed to identify all reasonable arrangements and interventions required at the crossing locations. Refer to Section 5.
- Shortlisting of Possible Options – The longlist of concept options, outlined in Section 5, were then considered at each location to identify key constraints, and to develop a reasonable number of feasible options and alternatives that could be included on the longlist so that subsequent shortlisting could take place. Refer to Section 6.
- Multi-Criteria Assessment – A detailed multi-disciplinary comparative analysis of those options which passed through the shortlisting of possible options was then undertaken. The options were assessed against the criteria of Economy, Safety, Environment, Accessibility and Social Inclusion, Integration and Physical Activity in line with the criteria required for multi-criteria analysis under the Department of Transport, Tourism and Sport (DTTAS), Common Appraisal Framework (CAF) for Transport Project and Programmes (March 2016). Refer to Section 7. Further details can be found in the option selection process section of the Preliminary Option Selection Report.

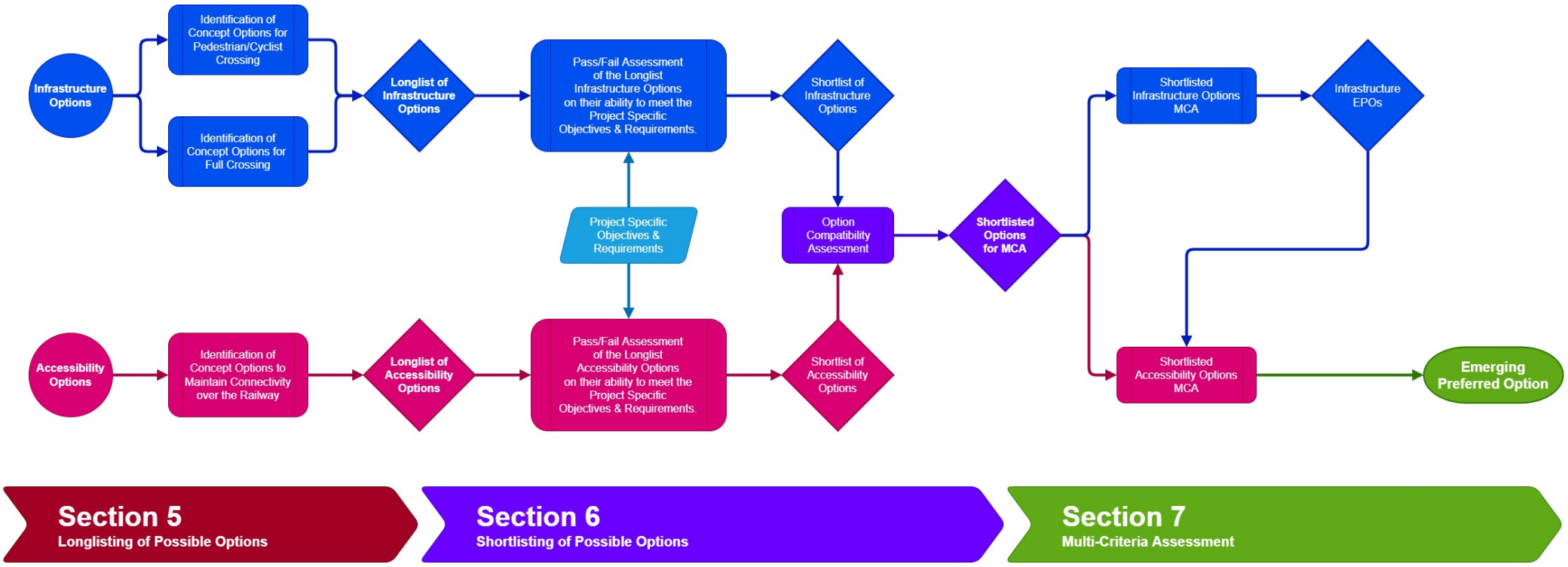


Figure 1-1 Approach to Optioneering

1.5 References

This report should be read in conjunction with the related optioneering reports listed in Table 1-1.

Table 1-1 List of key documents associated with this report

Annex	Title	Description
N/A	DART+ Coastal South Preliminary Option Selection Report	This is the main report which summarises the optioneering process and the different packages of proposed works on the DART+ Coastal South project.
N/A	DART+ Coastal South Preliminary Option Selection Report – Executive Summary	This report summarises the main Preliminary Option Selection Report.
1	Emerging Preferred Option Maps	Includes drawings for each Emerging Preferred Option, to support the Preliminary Option Selection Report.
2.1	Policy Context	This presents a detailed review of the European, National, Regional and Local policy context for the DART+ Programme and the DART+ Coastal South Project
2.2	Useful Links	Useful links to documents/websites relating to the DART+ Coastal South project.
3.1	Constraints Report	This report reviews the DART+ Coastal South constraints
3.2	Technical Optioneering Report: Sandymount Area Level Crossings (this document)	The Technical Optioneering Report for the Sandymount area level crossings. The report addresses the level of accessibility at the level crossings in the area when an increased number of DART services is provided.
3.3	Technical Optioneering Report: Bray to Greystones Capacity Enhancements	The Technical Optioneering Report for the works between Bray and Greystones. The report addresses track and station modifications to allow for the increased number of DART services.
3.4	Technical Optioneering Report: Bray Level Crossing	The Technical Optioneering Report for the Bray level crossing. The report addresses the level of accessibility at the level crossing when an increased number of DART services is provided.
3.5	Technical Optioneering Report: Ennis Lane Level Crossing	The Technical Optioneering Report for the Ennis Lane level crossing. The report addresses the level of accessibility at the level crossing when an increased number of DART services is provided.

2. EXISTING SITUATION

2.1 Overview

The study area, referred to in this report, is shown in Figure 2-1. This consists of the areas that surround the existing rail line that extends from Lansdowne Road to Merrion Gates, including Irishtown, Lansdowne Village, Ballsbridge, Sandymount and Merrion. The study area extents consist of the areas that have been identified as being most directly affected by the proposed DART+ Coastal South Project.

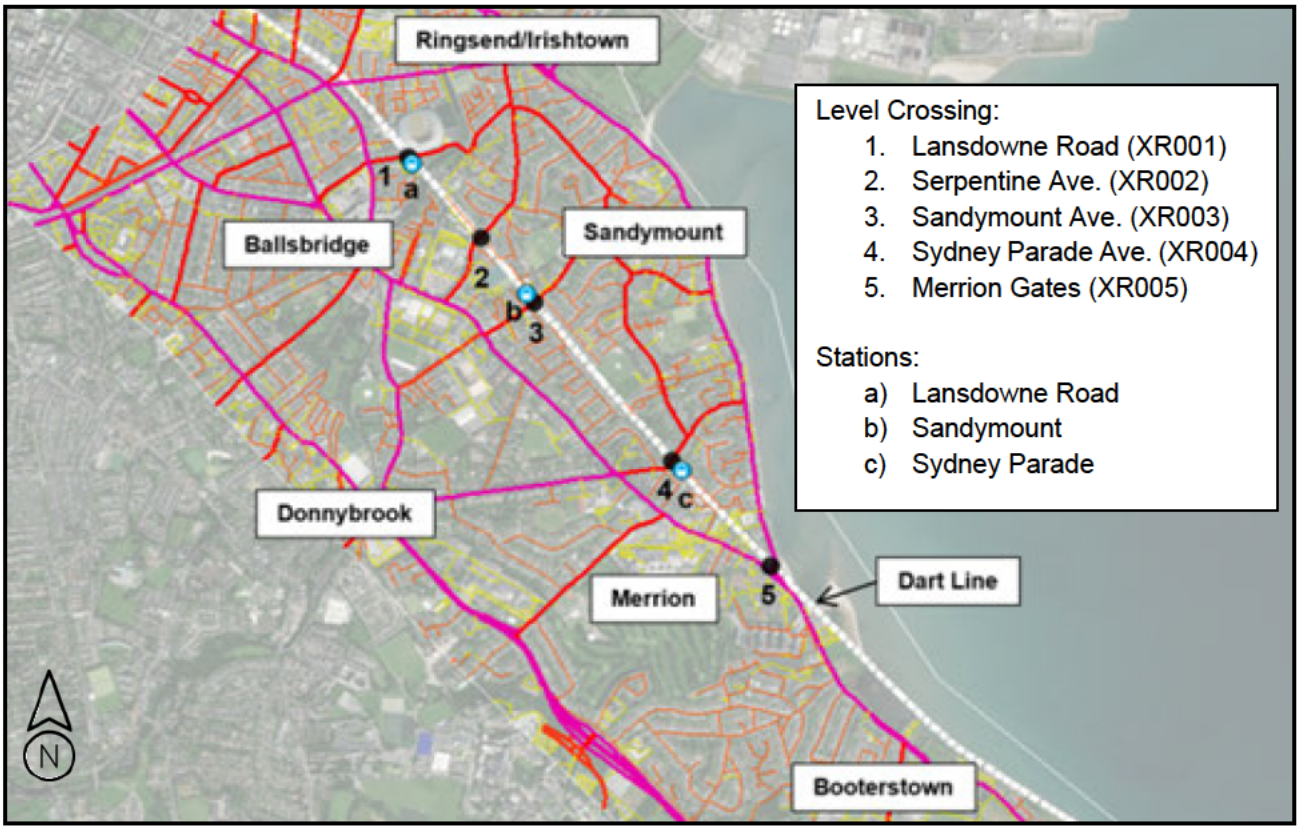


Figure 2-1 Study Area (Source: ESRI)

The railway extends through this area in a southeast direction with level crossings at Lansdowne Road, Serpentine Avenue, Sandymount Avenue, Sydney Parade Avenue and the junction of Strand Road / Merrion Road (Merrion Gates).

The study area is an urban townscape, with Dublin Bay to the east, which is also a European protected site. The area is well developed with a mix of largely residential properties and some commercial businesses in the vicinity of the railway line. There is limited existing space available around the crossing locations. The proximity to the River Dodder between Lansdowne Road and Serpentine Avenue is also a constraint that will impact any potential proposals to lower the rail line.

In some areas, the impact on properties, and impediments to adequate property access in the area around the crossing location, would require either private land acquisition or the creation of alternative access points to these properties.

Some structures also have significant importance such as the Aviva Stadium located near the Lansdowne Road level crossing. There is very little undeveloped or greenfield land available in the vicinity of the crossings.

Key infrastructure within the study area includes:

- The existing DART railway line;
- DART stations at Lansdowne Road, Sandymount and Sydney Parade;
- R118 Merrion Road (to the west);
- R131 Strand Road (to the east);
- N11 and N31 (to the south);
- R131 and East Link (to the north);
- The Aviva Stadium on Lansdowne Road

Key local amenities within the study area include:

- St. Vincent's University Hospital and Private Hospital;
- Donnybrook Tesco;
- Sandymount Tesco;
- Merrion Shopping Centre;
- Pembroke Wanderers Hockey Club;
- Pembroke Cricket Club;
- YMCA Cricket Club;
- Our Lady Queen of Peace Parish Church;
- Merrion Strand;
- Marian College;
- Sandymount Educate Together;
- St. Michael's College; and
- St. Conleth's College.

2.2 Railway Infrastructure

Figure 2-2 and Figure 2-3 show an extract of the section of line from the Dublin – Rosslare Europort Route Information.

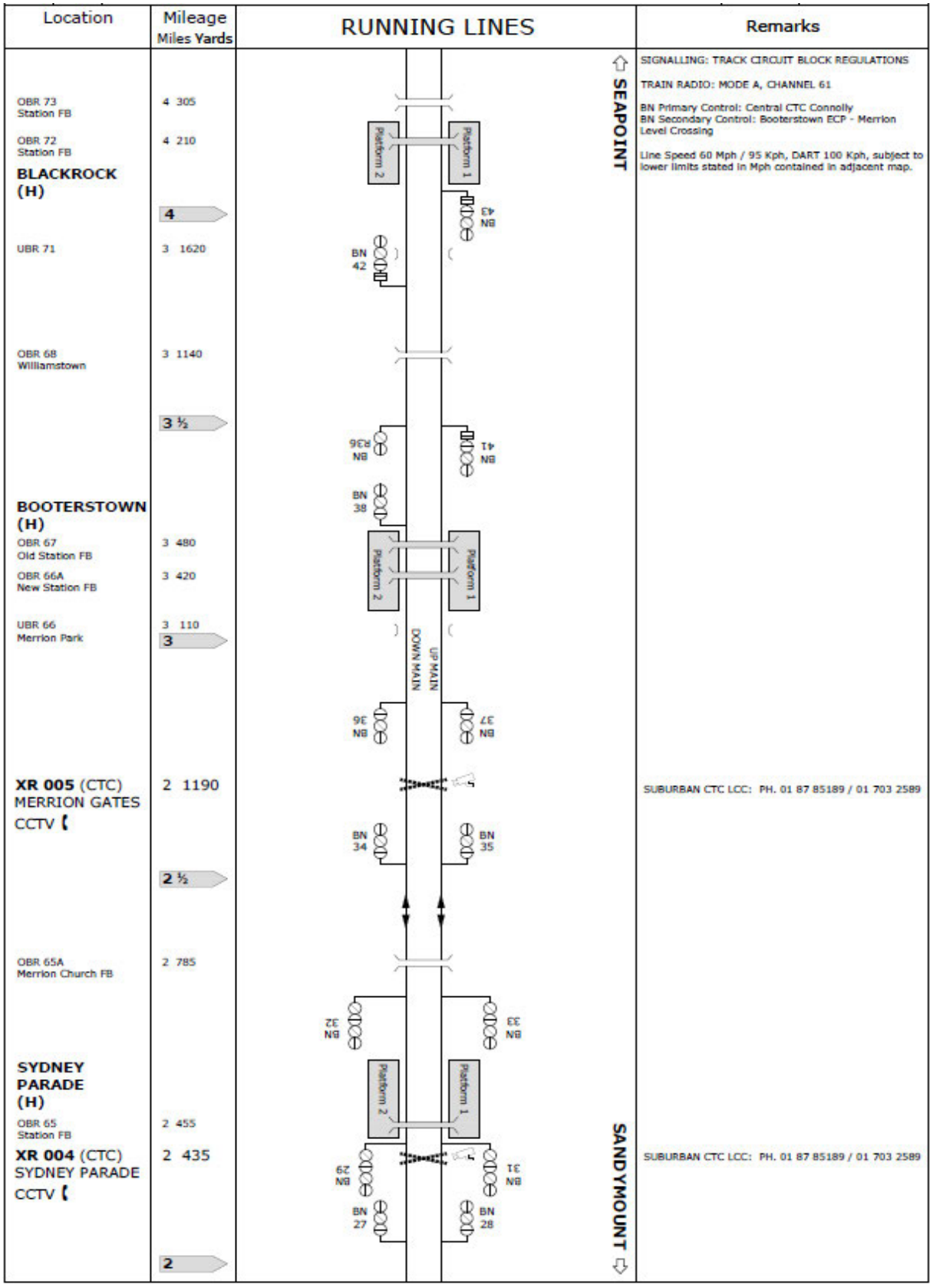


Figure 2-2 Dublin – Rosslare Europort Route Information Extract, Table Seq 13-R04

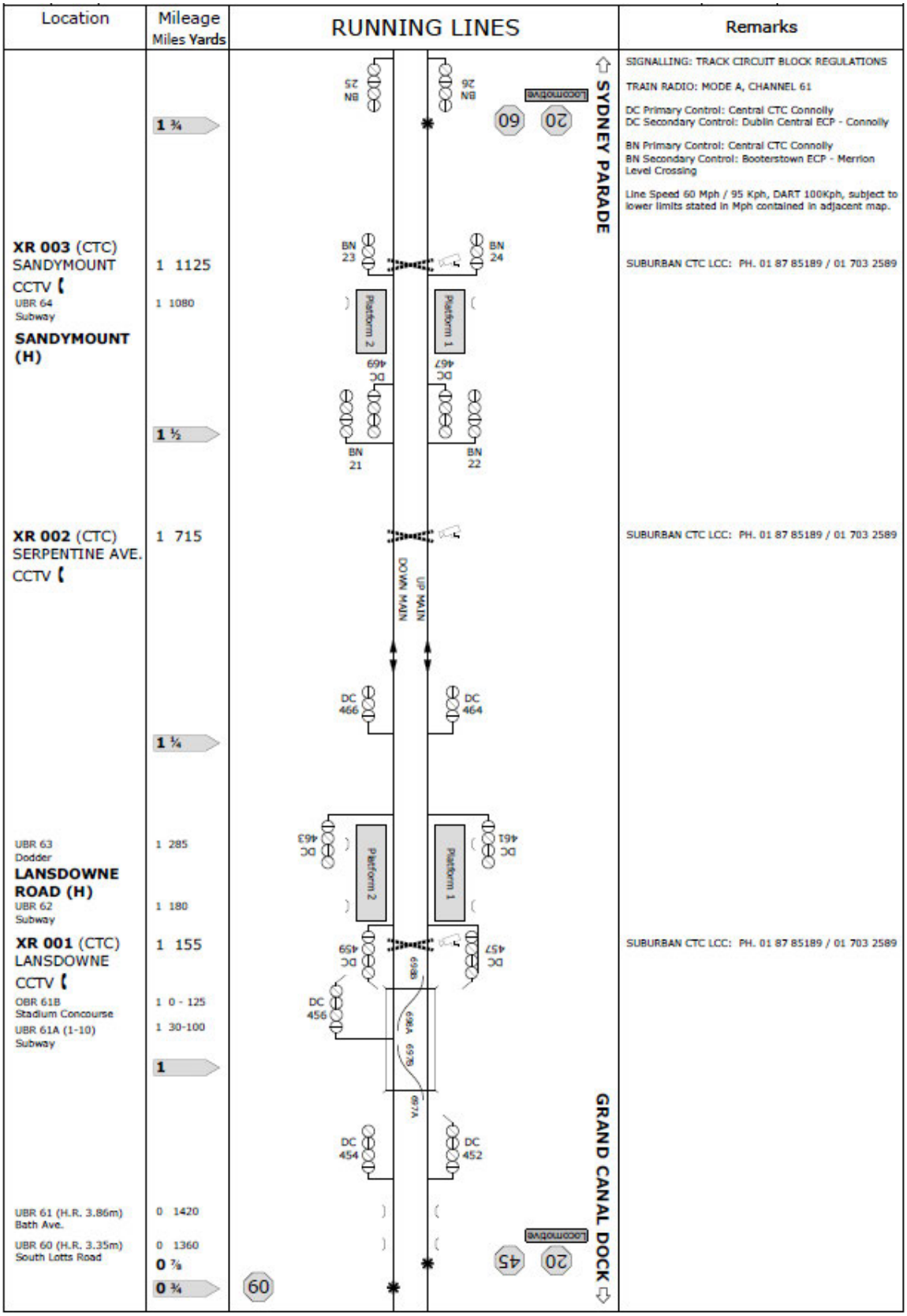


Figure 2-3 Dublin – Rosslare Europort Route Information Extract, Table Seq 13-R03

2.2.1 Existing Operations and Rail Services

The DART, Commuter and InterCity services all operate on the section of the rail line within the study area, with the DART operating the most frequent service. The DART operates between Malahide/Howth and Bray/Greystones. The existing DART service operates every 10 minutes throughout most of the day. This equates to six trains per direction per hour. The DART services travel along the section of track within the study area. These trains stop at all stations on the route including, Grand Canal Dock, Lansdowne Road, Sandymount, Sydney Parade and Booterstown.

The Commuter services on this section of the line run between Bray and Maynooth/ Drogheda/ Dundalk, with a total of four services per direction per day typically in the peak. These services stop at a limited number of stations including, Grand Canal Dock, Lansdowne Road and Sydney Parade.

The InterCity services on this section of the line run between Rosslare and Dublin Connolly, with four trains per direction per day, typically off-peak. The Dublin to Rosslare services do not stop at any of the train stations along this section, apart from the first two trains in the morning travelling from Rosslare to Dublin that stop at Lansdowne Road station.

2.2.2 Level Crossings

All five level crossings are closed circuit television (CCTV) controlled public road level crossings which facilitate the movement of pedestrians, cyclists, and vehicles across the railway corridor. The gate closure process is automatically triggered by signalling and controlled by a signalman observing the CCTV to ensure the level crossing is clear of obstructions (cars, bikes, etc.) and persons. Details of the level crossings are summarised in Table 2-1. IÉ provided information detailing the number of barrier closures per hour and the total time the barrier is closed for the AM Peak.

Table 2-1 Railway Stats for the Level Crossings

Level Crossing	AM Peak (8:00-9:00)		
	Closures (No.)	Total Closure Duration (%)	Total Open Duration (%)
Lansdowne Road (XR001)	12	73%	27%
Serpentine Ave. (XR002)	9	70%	30%
Sandymount Ave. (XR003)	11	72%	28%
Sydney Parade Ave. (XR004)	12	83%	17%
Merrion Gates (XR005)	11	41%	59%

2.2.3 Lansdowne Road (XR001)

XR001 (OS Grid Ref: O 18006 32974), located at 1m 1155y, is currently CCTV controlled and links Lansdowne Road (to the east) to Lansdowne Road (to the west) over the railway corridor. The DART Line runs north to south at this location, and the level crossing is located on a straight section of railway.

The existing road over the level crossing is wide enough for two traffic lanes, with a narrow path provided on either side for pedestrians and cyclists, which is delineated by road markings, but is not a segregated pedestrian facility. The total width of the crossing is approx. 11m.

There is a pedestrian footpath on both sides of the road to the east and west of the level crossing. There are no dedicated cycle facilities. Cyclists must dismount to share the pedestrian footpaths or must share traffic lanes when crossing the railway.

Lansdowne Road Station (OS Grid Ref: O 18018 32943) is located immediately south of the level crossing with Platforms 1 and 2 extending south over the River Dodder. The Aviva Stadium is located on the northeast of the crossing with the podium extending over the railway immediately north of the crossing. Residential properties are located on the northwest and southwest of the crossing. Station access for events is located immediately to the southwest of the crossing. There is an existing underpass to the north of the level crossing that also passes under the Aviva Stadium, however this is only used during events at the stadium. There is also an existing underpass with stair access only within the station, however this is provided to allow rail users access to both platforms. Figure 2-4 shows an aerial view of the level crossing and the surrounding area. Figure 2-5 and Figure 2-6 provide example street views towards Lansdowne Road Level Crossing to demonstrate public perspective.

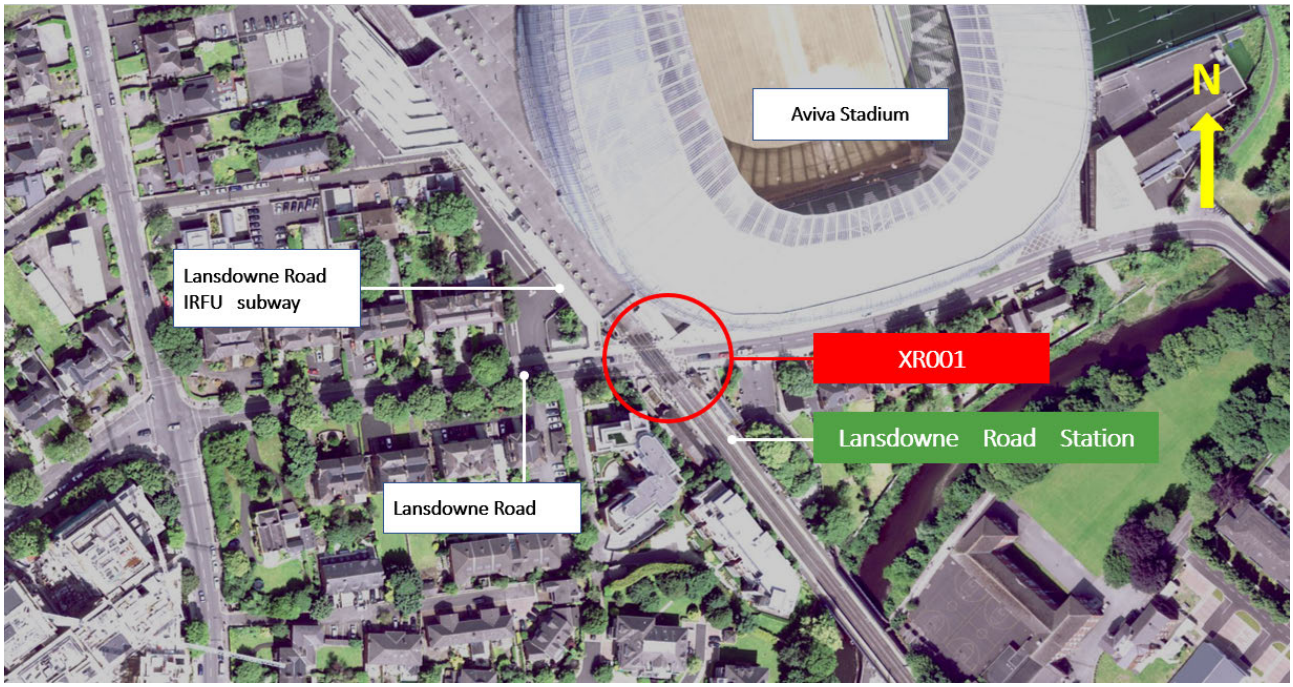


Figure 2-4 Aerial View of Lansdowne Road Level Crossing (XR001) (Source: OSI aerial imagery)

Figure 2-5 Lansdowne Road Level Crossing (Looking west) (Source: Arup)

Figure 2-6 Lansdowne Road Level Crossing (Looking east) (Source: Arup)

2.2.4 Serpentine Avenue (XR002)

XR002 (OS Grid Ref: O 18321 32592) is currently CCTV controlled and links Serpentine Avenue (to the east) to Serpentine Avenue (to the west) over the railway corridor. The DART Line runs north - south at this location, and the level crossing is located on a straight section of railway. The existing road over the level crossing is wide enough for two traffic lanes, with a narrow path provided on either side for pedestrians and cyclists, which is delineated by road markings, but is not a segregated pedestrian facility. The total width of the crossing is approx.10m.

The pedestrian footpath continues on both sides of the road to the east and west of the level crossing. Immediately north of the crossing on the eastern side, pedestrians also need to cross a road (where Oaklands Park meets Serpentine Avenue). There are no dedicated cycle facilities in the vicinity of the level crossing. Cyclists must dismount to share the pedestrian footpaths or must share traffic lanes when crossing the railway.

Business and residential properties are located to the northwest of the crossing. Residential properties are located to the northeast, southeast and southwest of the crossing.

Figure 2-7 shows an aerial view of the level crossing and the surrounding area. Figure 2-8 and Figure 2-9 provide example street views towards Serpentine Avenue Level Crossing to demonstrate public perspective.

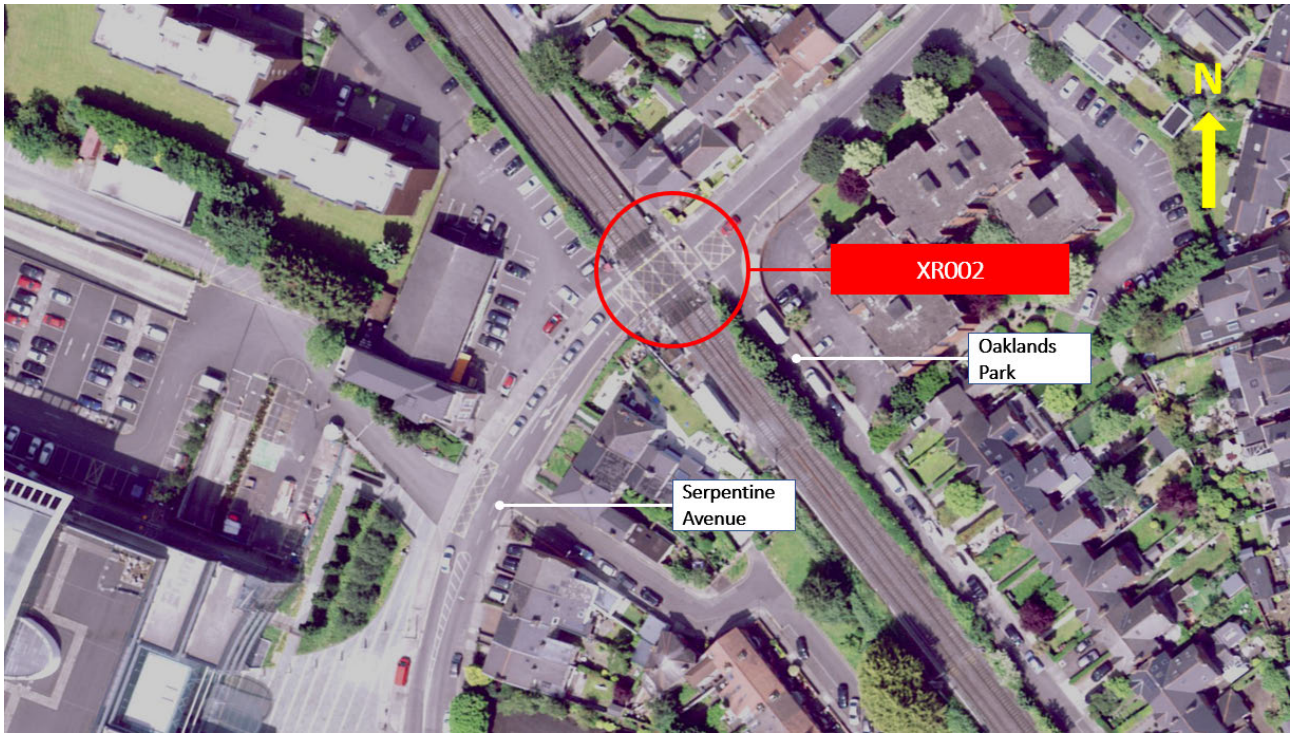


Figure 2-7 Aerial View of Serpentine Avenue Level Crossing (XR002) (Source: OSI aerial imagery)

Figure 2-8 Serpentine Avenue Level Crossing (Looking southwest) (Source: Arup)

Figure 2-9 Serpentine Avenue Level Crossing (Looking northeast) (Source: Arup)

2.2.5 Sandymount Avenue (XR003)

XR003 (OS Grid Ref: O 18573 32287) is currently CCTV controlled and links Sandymount Avenue (to the east) to Sandymount Avenue (to the west) over the railway corridor. The DART Line runs north - south at this location, and the level crossing is located on a straight section of railway. The existing road over the level crossing is wide enough for two traffic lanes, with a narrow path provided on either side for pedestrians and cyclists, which is delineated by road markings, although it is not a segregated pedestrian facility. The total width of the crossing is approx. 10m. There is a pedestrian footpath on both sides of the road to the east and west of the level crossing. There are no dedicated cycle facilities. Cyclists must dismount to share the pedestrian paths or must share traffic lanes when crossing the railway.

Sandymount Station (OS Grid Ref: O 18567 32308) is located immediately north of the level crossing. Station access on the northwest is tight against a residential property, with station access on the northeast adjacent to Holyrood Park Road. Residential properties are located on the southeast and southwest of the crossing. There is an existing underpass with stair access only within the station. This provides rail users with access to both platforms. Figure 2-10 shows an aerial view of the level crossing and the surrounding area. Figure 2-11 and Figure 2-12 provide example street views towards Sandymount Avenue Level Crossing to demonstrate public perspective.

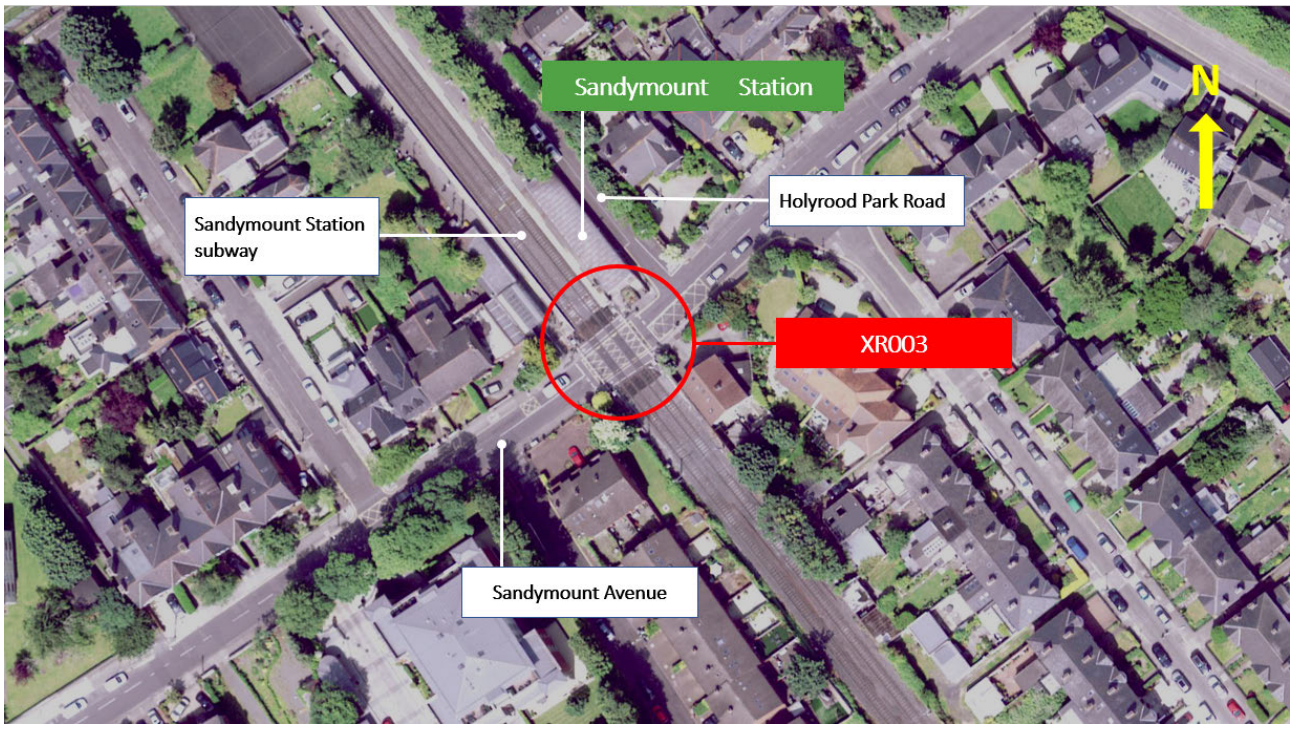


Figure 2-10 Aerial View of Sandymount Avenue Level Crossing (XR003) (Source: OSI aerial imagery)

Figure 2-11 Sandymount Avenue Level Crossing (Looking southwest) (Source: Arup)

Figure 2-12 Sandymount Avenue Level Crossing (Looking northeast) (Source: Arup)

2.2.6 Sydney Parade Avenue (XR004)

XR004 (OS Grid Ref: O 19197 31542) is currently CCTV controlled and links Sydney Parade Avenue (to the east) to Ailesbury Road and Sydney Parade Avenue (to the west) over the railway corridor. The DART Line runs north south at this location, and the level crossing is located on a straight section of railway. The existing road over the level crossing is wide enough for two traffic lanes, with a narrow path provided on either side for pedestrians and cyclists, which is delineated by road markings, although not a segregated pedestrian facility. The total width of the crossing is approx. 8.5m. There is a pedestrian footpath on both sides of the road to the east and west of the level crossing. There are no dedicated cycle facilities. Cyclists must dismount to share the pedestrian paths or must share traffic lanes when crossing the railway.

Sydney Parade Station (OS Grid Ref: O 19223 31526) is located immediately south of the level crossing. Station access on the southwest is tight against a residential property, with station access on the southeast adjacent to Ailesbury Gardens. Residential properties are located on the northeast and northwest of the crossing. There is an existing footbridge with stair access only within the station, however this is provided for rail users access to both platforms. Figure 2-13 shows an aerial view of the level crossing and the surrounding area. Figure 2-14 provides example street views towards Sydney Parade Avenue Level Crossing to demonstrate public perspective.

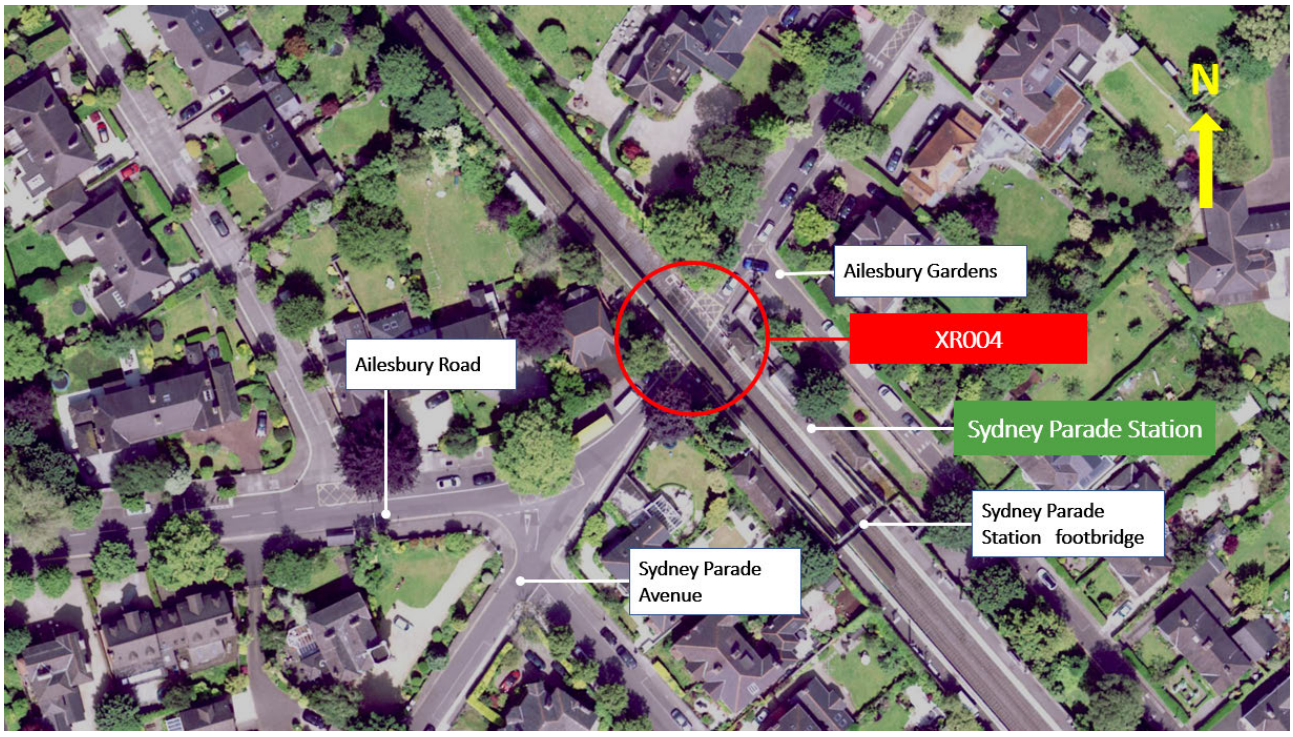


Figure 2-13 Aerial View of Sydney Parade Avenue Level Crossing (XR004) (Source: OSI aerial imagery)

Figure 2-14 Sydney Parade Avenue Level Crossing (Source: Arup)

2.2.7 Merrion Gates (XR005)

XR005 (OS Grid Ref: O 19663 31047) is currently CCTV controlled and links Strand Road – R131 (to the east) to Merrion Road – R118 (to the west) over the railway corridor. The DART Line runs north - south at this location, and the level crossing is located on a straight section of railway. The existing road over the level crossing is wide enough for two traffic lanes, with a narrow path provided on either side for pedestrians and cyclists, which is delineated by road markings, although is not a segregated pedestrian facility. The total width of the crossing is approx. 13.5m. There is a pedestrian footpath on both sides of the road to the east and west of the level crossing. There are no dedicated cycle facilities. Cyclists must dismount to share the pedestrian paths or must share traffic lanes when crossing the railway.

Residential gardens are located on the northeast and northwest of the crossing. Access to Merrion Strand is located on the southeast of the crossing. A left turning lane connecting Strand Road to Merrion Road is located on the southeast corner of the crossing. Figure 2-15 shows an aerial view of the level crossing and the surrounding area. Figure 2-16 and Figure 2-17 provide example street views towards Merrion Gates Level Crossing to demonstrate public perspective.

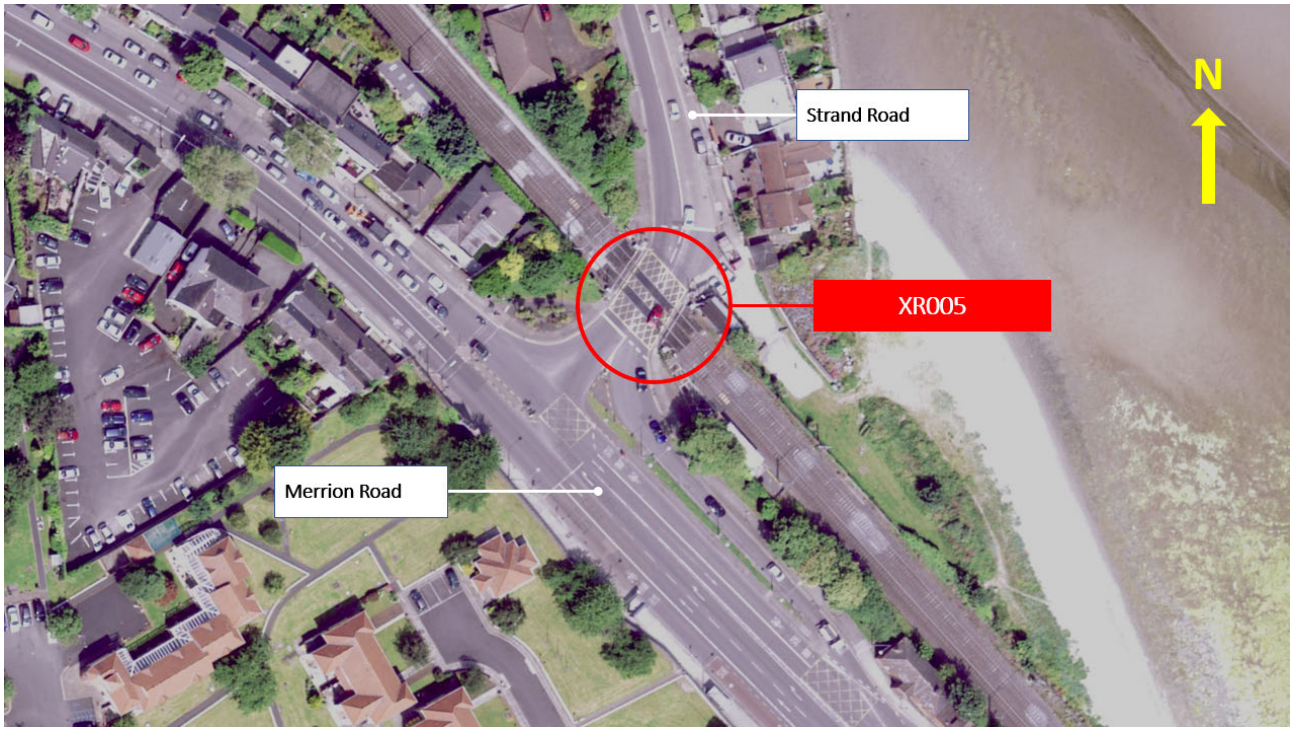


Figure 2-15 Aerial View of Merrion Gates Level Crossing (XR005) (Source: OSI aerial imagery)

Figure 2-16 Merrion Gates Level Crossing (Looking southwest) (Source: Arup)

Figure 2-17 Merrion Gates Level Crossing (Looking northeast) (Source: Arup)

2.2.8 Signalling

The level crossings are automatic full barrier CCTV level crossings controlled by a signaller at the level crossing control panel located at Connolly CTC. Once the level crossings are initiated a video feed is sent to the signaller at Connolly CTC to ensure the level crossing area is clear of pedestrians and cars after the barriers have been lowered. The signaller will confirm the level crossing is clear which will allow the relevant signals to clear.

The level crossings fall into two separate interlocking areas with Lansdowne and Serpentine level crossings falling under Dublin Central TTLD SSI interlocking control area and Sandymount, Sydney Parade, and Merrion Gates falling under Booterstown relay interlocking control area. The level crossings are all station level crossings as opposed to section level crossings as they are interlocked with the adjacent stations. The Dublin Central TTLD SSI is located at Connolly and was commissioned in 2016, while the Booterstown relay interlocking is located at Booterstown and was commissioned in the 1980s.

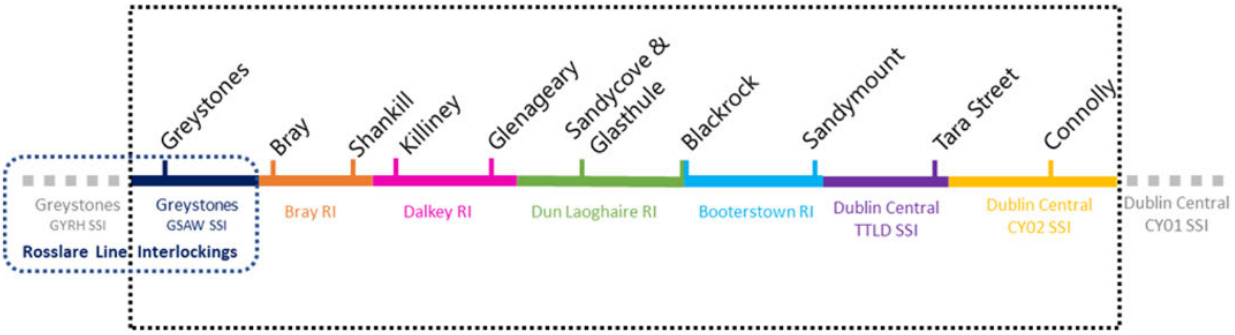


Figure 2-18 Southern Line Interlockings

2.2.9 Permanent Way and Tracks

The railway through the section within the study area between Grand Canal Dock and Booterstown consists of a twin-track electrified rail line with a line speed of 95 kph, DART 100kph, with signalling control from Central CTC at Dublin Connolly.

2.2.10 Structures

The track alignment is constrained by a number of structures on this route as listed in Table 2-2.

Table 2-2 Structures - Sandymount, Existing

Name	Notes
UBR 61A (1-10) Lansdowne Road IRFU Subways	Series of Single Span Precast Box underbridges located between 1m 0030y and 1m 0100y.
OBR 61B Lansdowne Road Stadium Concourse	Single Span Precast Beam Overbridge spanning over the railway located between 1m 0000y and 1m 0125y.
UBR 62 Lansdowne Road Station Subway	Single Span Precast Box Subway located at 1m 0180y.
UBR 63 River Dodder Underbridge	Single Span Steel Truss Underbridge located at 1m 0285y.

Name	Notes
UBR 64 Sandymount Station Subway	2 Span Precast Box Subway located at 1m 1080y.
OBR 65 Sydney Parade Station Footbridge	Single Span Girder Lattice Footbridge located at 2m 0455y.
OBR 65A Merrion Church Footbridge	Single Span Girder Plate Footbridge located at 2m 0785y.

2.2.11 Stations

The track alignment is constrained by a number of stations on this route as listed in Table 2-3.

Table 2-3 Stations located in the Sandymount area

Name	Notes
Grand Canal Dock	Elevated 3 Platform Station with Turnback Facility located at 0m 0955y. Platform 1 is a former terminal platform, which became the Northbound main line on 18 July 2016. Platform 2 is the terminal platform for South Western Commuter trains to Newbridge. Platform 3 is the Southbound main line platform. Platforms 1 and 2 are accessed by a footbridge and platform 3 has level access.
Lansdowne Road	At-grade 2 Platform DART Station located at 1m 0205y, with Level Crossing XR001 adjacent on northern end of platforms on Lansdowne Road. Platform 1 is the Northbound main line and Platform 2 is the Southbound main line. Platforms 1 and 2 are accessed by a subway.
Sandymount	At-grade 2 Platform DART Station located at 1m 1105y, with Level Crossing XR002 adjacent on southern end of platforms on Sandymount Avenue. Platform 1 is the Northbound main line and Platform 2 is the Southbound min line. Platforms 1 and 2 are accessed by a subway.
Sydney Parade	At-grade 2 Platform DART Station located at 2m 0460y, with Level Crossing XR003 adjacent on northern end of platforms on Sydney Parade Avenue. Platform 1 is the Northbound main line and Platform 2 is the Southbound min line. Platforms 1 and 2 are accessed by a footbridge.
Booterstown	At-grade 2 Platform DART Station located at 3m 0395y. Platform 1 is the Northbound main line and Platform 2 is the Southbound min line. Platforms 1 and 2 are accessed by a footbridge.

2.3 Traffic and Transportation

This section of the report identifies and quantifies the current mobility patterns across the DART rail line within the study area. Two data sets have been utilised to understand the volumes of people that move across the rail line on a daily basis to identify and quantify the current mobility patterns within the study area. These are:

- Census Data; and
- Traffic Count Data.

2.3.1 Connectivity to Work, School, or College across the Rail line

Census data collected during the last census in 2016 has been used to evaluate the number of people that move across the rail line on a daily basis. Origin-Destination information has been used to quantify the number of employees, and students that cross the rail line in a single day.

The results are shown in Table 2-4, these trips are two-way movements i.e. an individual travelling to work, school or college and then travelling home.

Table 2-4 Census Data Results

To / From		Where do residents East of DART line go to Work, School, or College?		Where do employees and students East of DART line, come from?	
		#	%	#	%
Study Area West of the DART		5,000	25%	2,600	15%
Study Area East of the DART (Internal / Sandymount Area)		3,600	18%	3,600	21%
Other Areas in Dublin	Dublin City	9,400	47%	5,200	31%
	South Dublin	600	3%	1,000	6%
	Fingal	400	2%	1,400	8%
	Dún-Laoghaire Rathdown	800	4%	1,400	8%
Elsewhere in Ireland		400	2%	1,800	11%
Total		20,200	100%	17,000	100%

The data shows 25% of residents living in Sandymount (east of the rail line) attend work, school, or college in the area to the west of the rail line equating to approximately 5,000 movements across the rail line on a daily basis. Furthermore, a significant number of trips to and from other areas of Dublin would require the crossing of the line. This is most likely the case for most of the trips to and from the Dun Laoghaire-Rathdown area (800 and 1,400, respectively), and a considerable portion of trips to and from Dublin City.

Looking at people that work and study in Sandymount (east of the rail line) the data shows 15% travel from the area to the west of the rail line, this equates to approximately 2,600 multi-modal movements across the rail line on a daily basis.

This totals approximately 7,600 local movements across the rail line in a single day, due to people going to work, school or college and then home again in the evening. However, there are many more trips made across the rail line that do not fall into these categories and are not counted here, such as business trips or trips to the shops or for leisure; or strategic through trips travelling from areas outside the study area to/from other areas outside the study area.

2.3.2 Accessibility to Local Amenities across the Rail Line

Accessibility modelling for local services and amenities has been undertaken, this modelling allows us to understand the number of people that would have to cross the rail line to access a service or amenity. This accessibility modelling also utilises census data to calculate the number of residents within the catchments. A number of locations have been selected for this analysis; they are as follows:

- St. Vincent's University Hospital and Private Hospital;
- Donnybrook Tesco;
- Sandymount Tesco;

- Merrion Shopping Centre;
- Marian College;
- Sandymount Educate Together;
- St. Michael's College;
- St. Conleth's College; and

2.3.2.1 Pedestrian and Cyclists

The number of residents within a 25-minute walking catchment area that reside on the opposite side of the rail line is quantified, as an indication of the demand to utilise the existing level crossings. This is summarised in Table 2-5.

Table 2-5 Pedestrian / Cyclists Accessibility Modelling

Location	Location compared to the rail line	Number of Residents within the 25-minute walking catchment area	Percentage of residents that live on the on the opposite side of the rail line	Number of Residents within the 25-minute walking catchment on the opposite side of the rail line
St. Vincent's Hospital	West	14,100	1%	150
Donnybrook Tesco	West	33,900	2%	700
Sandymount Tesco	East	23,800	21%	5,000
Merrion Shopping Centre	West	15,100	23%	3,400
Marion College	East	29,100	30%	7,700
Sandymount Educate Together	East	17,600	17%	3,000
St. Michael's College	West	15,400	21%	3,300
St. Conleth's College	West	40,400	7%	2,500

2.3.2.2 Vehicles

The number of residents within a 5-minute driving catchment area that reside on the opposite side of the rail line is quantified, as an indication of the demand to utilise the existing level crossings. This is summarised in Table 2-6.

Table 2-6 Vehicle Accessibility Modelling

Location	Location compared to the rail line	Number of Residents within the 5-minute driving catchment area	Percentage of residents that live on the on the opposite side of the rail line	Number of Residents within the 5-minute driving catchment on the opposite side of the rail line
St. Vincent's Hospital	West	81,200	10%	8,400
Donnybrook Tesco	West	149,900	40%	59,900
Sandymount Tesco	East	72,900	20%	14,400
Merrion Shopping Centre	West	96,400	7%	6,400
Marion College	East	130,100	31%	40,300
Sandymount Educate Together	East	85,900	17%	14,600
St. Michael's College	West	105,200	4%	4,300
St. Conleth's College	West	186,000	1%	1,000

Following the opening of the port tunnel in 2007 DCC has prohibited heavy goods vehicles (HGVs) with five axles or more from using Sandymount's' Strand Road and adjoining streets between 7am and 7pm. This restriction has been extended to a 24/7 ban since January 2022.

2.3.3 Pedestrian / Cyclists Volumes across the Rail Line

To understand the number of pedestrians and cyclists moving across the level crossings, available traffic volume data for each of the five links that cross the rail line have been utilised. Traffic count survey data was obtained from surveys carried out in November 2021. This data, summarised in Table 2-7 and Table 2-8, allows us to understand the demand for pedestrians and cyclists crossing the DART line at each of the level crossings in each direction.

Table 2-7 Daily (12-hr) Pedestrian Volumes Crossing each Level Crossing

Level Crossing	West – East	East – West	Total
Lansdowne Road (XR001)	1,071	1,397	2,468
Serpentine Avenue (XR002)	697	657	1,354
Sandymount Avenue (XR003)	739	752	1,491
Sydney Parade Avenue (XR004)	963	1,343	2,306
Merrion Gates (XR005)	325	333	658
Total	3,795	4,482	8,277

It is worth noting that at Lansdowne Road, Sandymount Avenue and Sydney Parade, volumes are likely to include trips associated with the nearby DART stations. This explains the higher numbers at these locations when compared with Serpentine Avenue and Merrion Gates.

Table 2-8 Daily (12-hr) Cyclists Volumes Crossing each Level Crossing

Level Crossing	West – East	East – West	Total
Lansdowne Road (XR001)	189	175	364
Serpentine Avenue (XR002)	152	124	276
Sandymount Avenue (XR003)	214	212	426
Sydney Parade Avenue (XR004)	225	215	440
Merrion Gates (XR005)	116	123	239
Total	896	849	1,745

In total, there are nearly 900 cyclist movements from west to east across the DART line daily (12hr) and a similar volume from east to west. This totals over 1,700 cyclist movements across the DART line in a single day.

2.3.4 Vehicle Volumes across the Rail Line

To understand the number of vehicles moving across the level crossings, available traffic volume data for each of the five level crossings has been analysed. Traffic count survey data was obtained from surveys carried out in November 2021. Using this data, summarised in Table 2-9, allows us to understand the vehicular demand across the DART line at each of the level crossings in each direction.

Table 2-9 Traffic Volume Crossing each Level Crossing

Level Crossing	West – East	East – West	Total
Lansdowne Road (XR001)	1,600	1,600	3,200
Serpentine Avenue (XR002)	2,700	2,200	4,900
Sandymount Avenue (XR003)	1,500	2,400	3,900
Sydney Parade Avenue (XR004)	1,900	2,700	4,600
Merrion Gates (XR005)	5,600	5,800	11,400
Total	13,400	14,600	28,000

In total, there are 13,400 vehicle movements from west to east across the DART line daily as well as 14,600 vehicle movements from east to west. This totals 28,000 vehicle movements across the DART line in a single day.

2.3.4.1 Bus Route Connectivity

Dublin Bus Route 18 between Palmerstown and Sandymount is an orbital east-west bus route south Dublin city centre that currently crosses the railway line at Sandymount Avenue, to serve the centre of Sandymount village, shown in Figure 2-19.

Figure 2-19 Sandymount Area Bus Routes, Existing

The Dublin BusConnects scheme includes proposals for two feeder routes to/from the scheme and the Sandymount area, namely the following:

- Orbital Route S2: Heuston - Kimmage - Ballsbridge – Poolbeg; and
- Local Route L13: Kilternan - Stillorgan Village - UCD – Ringsend.

The S2 service is planned to cross the rail line at Sandymount Avenue. The L13 service is planned to cross the rail line at Sydney Parade. Both will serve the Sandymount area, shown in Figure 2-20.

Figure 2-20 Sandymount Area Bus Routes, Planned

Any alterations to the existing crossings need to maintain the same accessibility with regard to the Sandymount area and therefore, the attractiveness of bus travel to/from the area, so as to avoid large increases in traffic along local roads which could in turn have an impact on the planned bus services, for example B1 and B2 along Merrion Road.

2.3.4.2 Emergency Service Connectivity

The fire station which primarily responds to calls in the Sandymount area is Donnybrook fire station. However, depending on the exact address or availability of resources, it may be responded to by the Dublin fire station located in Townsend St.

The route taken to the incident will depend on a number of variables, e.g., the station responding, if a resource is responding from station or while away from station at the time of call, traffic conditions, traffic restrictions, etc. The response time should be within ten minutes.

The fire station can contact Irish Rail in advance to arrange for the level crossing to be opened to allow the crossing of the rail to tend to an emergency, if required. However, this is not very practical when ensuring the response time is kept below ten minutes and therefore routes taken by the fire service tend to avoid level crossings.

2.4 Utilities

Utility records have been gathered from the utility providers in the area. Lineside cable information was not available at this stage of concept design and as such shall be excluded from these records. Utility surveys will be used to inform the preliminary design at the next stage. The following utility companies have infrastructure within the area of interest:

- ESB Networks;
- Gas Network Ireland;
- Irish Water (watermains and wastewater sewers);
- Dublin City Council (stormwater drainage);
- Eir;
- BT Ireland; and
- Virgin Media.

All utility records should be considered indicative only and must be verified prior to any intrusive works occurring.

2.4.1 Lansdowne Road

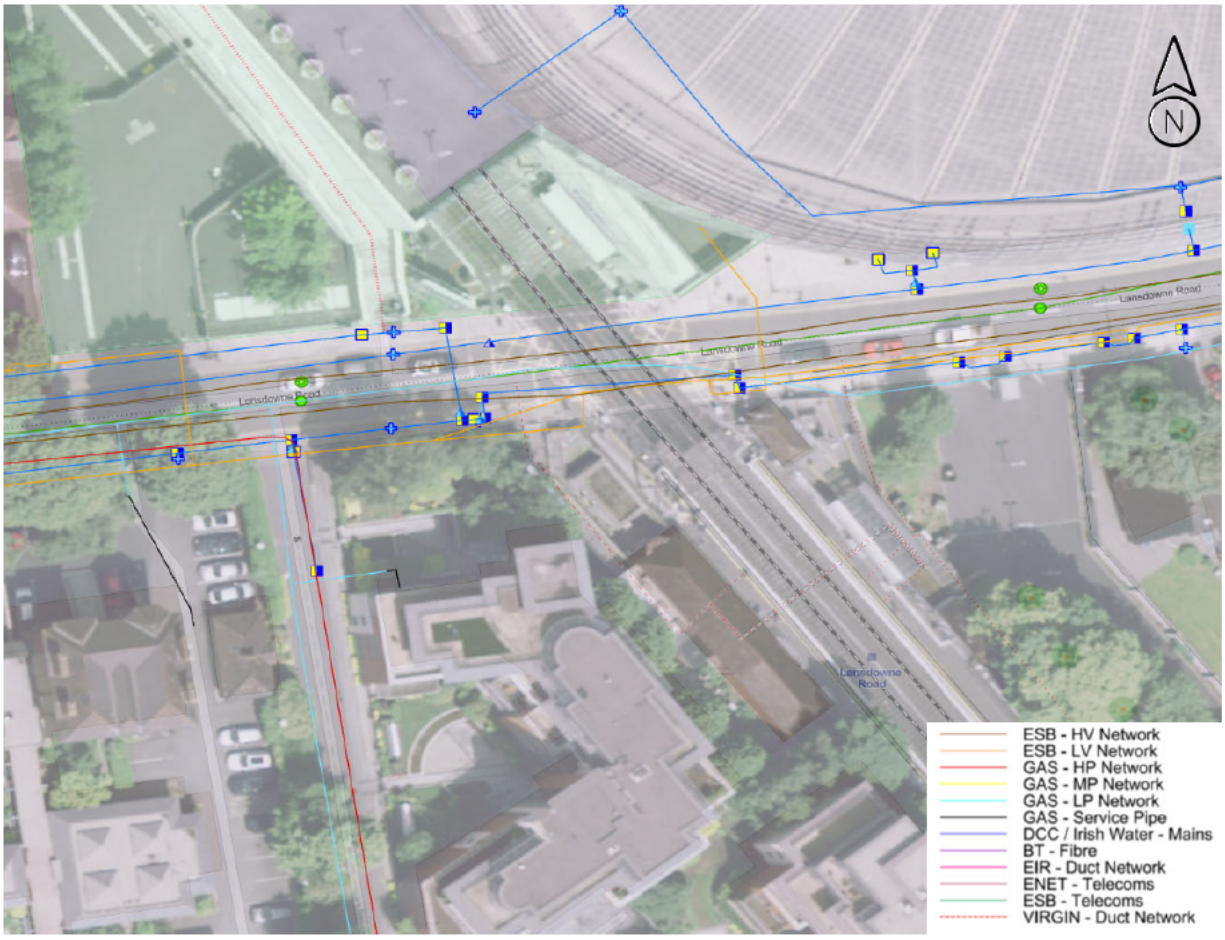


Figure 2-21 Utility Aerial View - Lansdowne Road Level Crossing (XR001), Existing (Source: ESRI)

Table 2-10 Utility Schedule - Lansdowne Road Level Crossing (XR001), Existing

Utility	Type	Notes
Electricity	High Voltage	2x 220KV Underground Electricity Cables
	Medium Voltage	None
	Low Voltage	LV Underground Electricity Cables
Gas	High Pressure	None
	Medium Pressure	None
	Low Pressure	180mm PE-80 - 25 mbar
Water	Watermain	ø304mm (SI) + ø90mm (HPPE) at level crossing ø152mm (AC) to west of level crossing
	Wastewater Sewer	ø300mm combined sewer (Gravity - Vitrified Clay VC)
	Storm Water Drainage	None
Telecoms	n/a	ESB (Dublin Fibre Network) + BT Telecoms (Fibre)
Rail Services	n/a	(TBC)

2.4.2 Serpentine Avenue

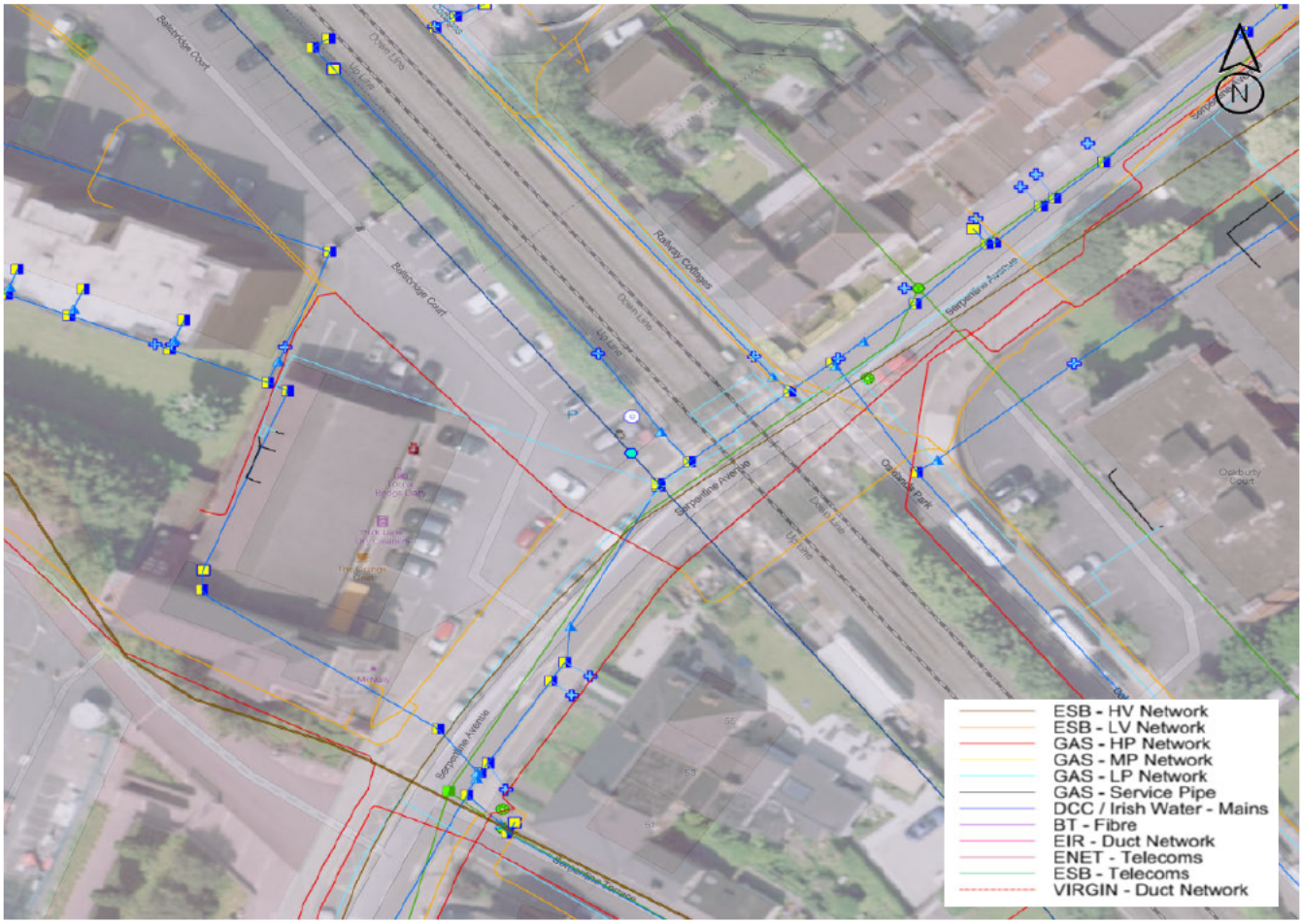


Figure 2-22 Utility Aerial View - Serpentine Avenue Level Crossing (XR002), Existing (Source: ESRI)

Table 2-11 Utility Schedule - Serpentine Avenue Level Crossing (XR002), Existing

Utility	Type	Notes
Electricity	High Voltage	110KV Underground Electricity Cables
	Medium Voltage	MV Underground Electricity Cables
	Low Voltage	LV (proximity) Underground Electricity Cables
Gas	High Pressure	200mm ST 19 bar (proximity)
	Medium Pressure	None
	Low Pressure	180mm PE-80 - 25 mbar + (3x) 90mm PE-80 - 25 mbar (proximity)
Water	Watermain	ø160mm (HPPE) Proximity - ø150mm (DI) + ø90mm (HPPE) + ø101mm (CI)
	Wastewater Sewer	Ø1260mm OD combined sewer (Gravity - Brick)
	Storm Water Drainage	ø1050mm (Pumping - Concrete) in proximity, parallel to railway
Telecoms	n/a	ESB (Dublin Fibre Network + Metro Express Fibre) + BT Telecoms (Fibre)
Rail Services	n/a	(TBC)

2.4.3 Sandymount Avenue

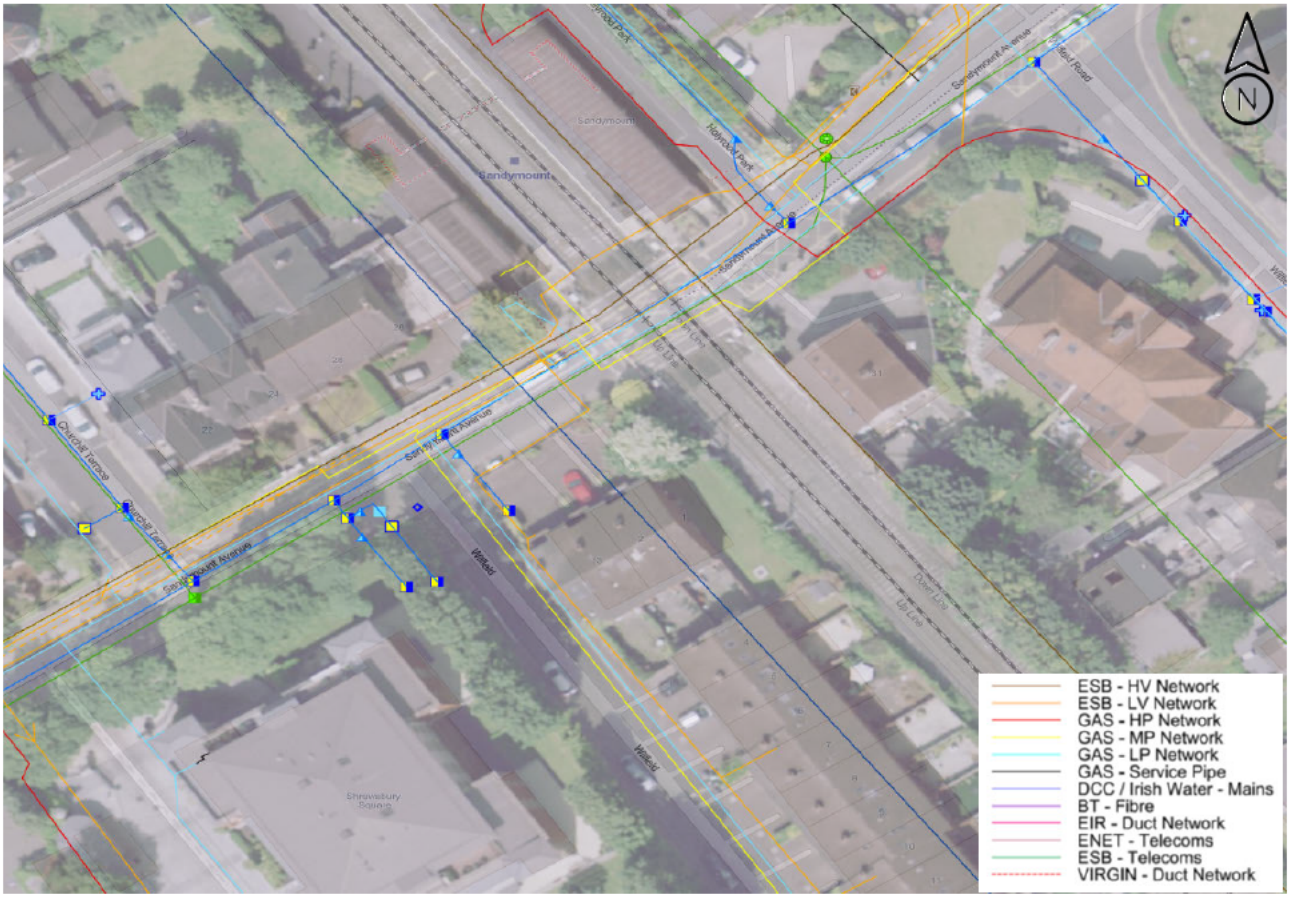


Figure 2-23 Utility Aerial View - Sandymount Avenue Level Crossing (XR003), Existing (Source: ESRI)

Table 2-12 Utility Schedule - Sandymount Avenue Level Crossing (XR003), Existing

Utility	Type	Notes
Electricity	High Voltage	110KV+38KV (Rail line) Underground Electricity Cables
	Medium Voltage	MV (proximity) Underground Electricity Cables
	Low Voltage	LV Underground Electricity Cables (2x)
Gas	High Pressure	None
	Medium Pressure	125mm PE-80 - 4 bar
	Low Pressure	315mm PE-80 -25 mbar + 180mm PE-80 - 25 mbar
Water	Watermain	ø304mm (CI)
	Wastewater Sewer	ø1040mm OD combined sewer (Gravity - Brick)
	Storm Water Drainage	None
Telecoms	n/a	BT Telecoms (Fibre)
Rail Services	n/a	(TBC)

2.4.4 Sydney Parade Avenue

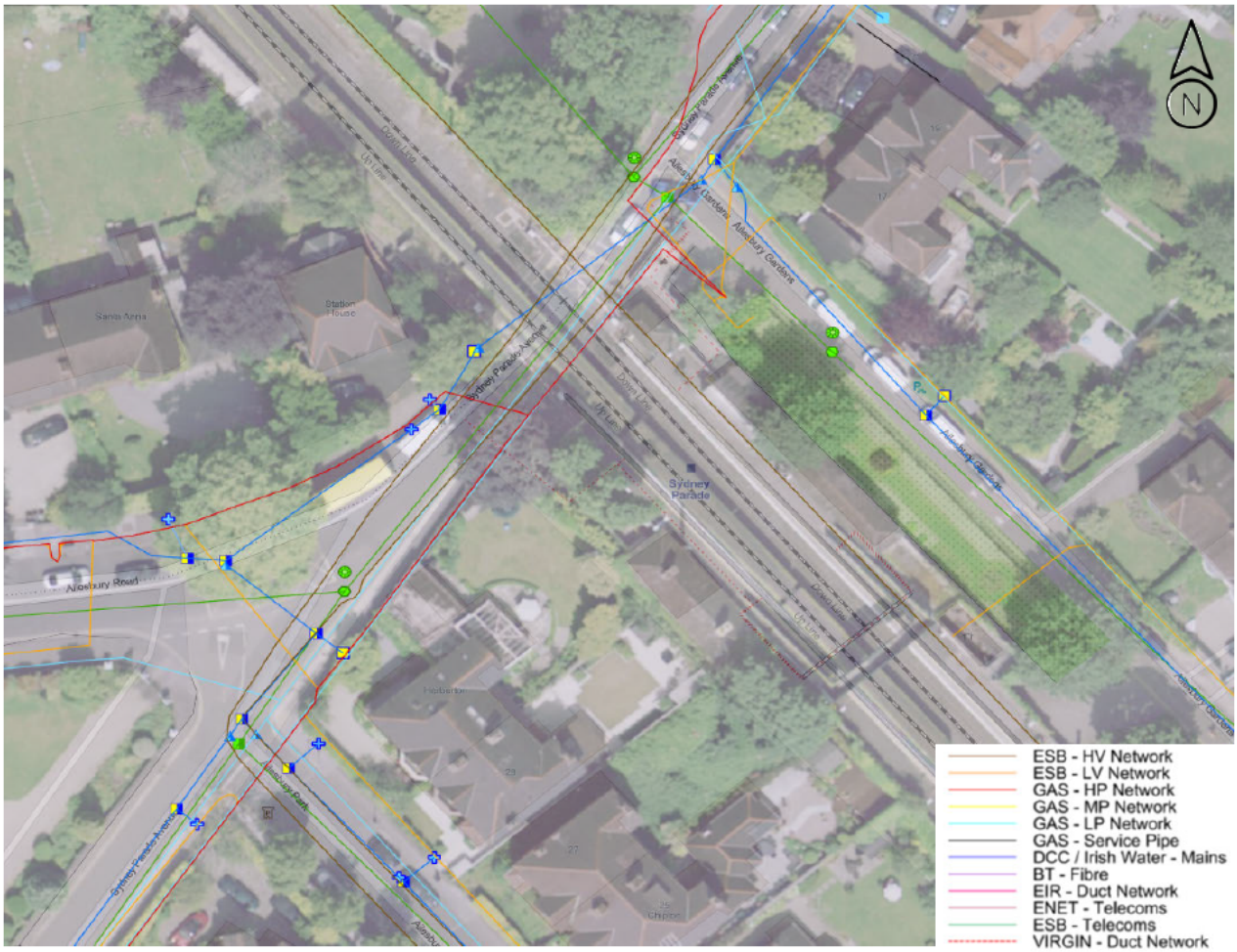


Figure 2-24 Utility Aerial View - Sydney Parade Avenue Level Crossing (XR004), Existing (Source: ESRI)

Table 2-13 Utility Schedule - Sydney Parade Avenue Level Crossing (XR004), Existing

Utility	Type	Notes
Electricity	High Voltage	220KV+110KV+38KV (Rail line) Underground Electricity Cables
	Medium Voltage	None
	Low Voltage	LV Underground Electricity Cables
Gas	High Pressure	None
	Medium Pressure	None
	Low Pressure	250mm PE-80 - 25 mbar + 125mm PE-80 - 25 mbar
Water	Watermain	ø160mm (HPPE)
	Wastewater Sewer	ø1100mm OD combined sewer (Gravity - Brick)
	Storm Water Drainage	None
Telecoms	n/a	ESB (Dublin Fibre Network) + BT Telecoms (Fibre) + Enet Dublin (proximity)
Rail Services	n/a	(TBC)

2.4.5 Merrion Gates

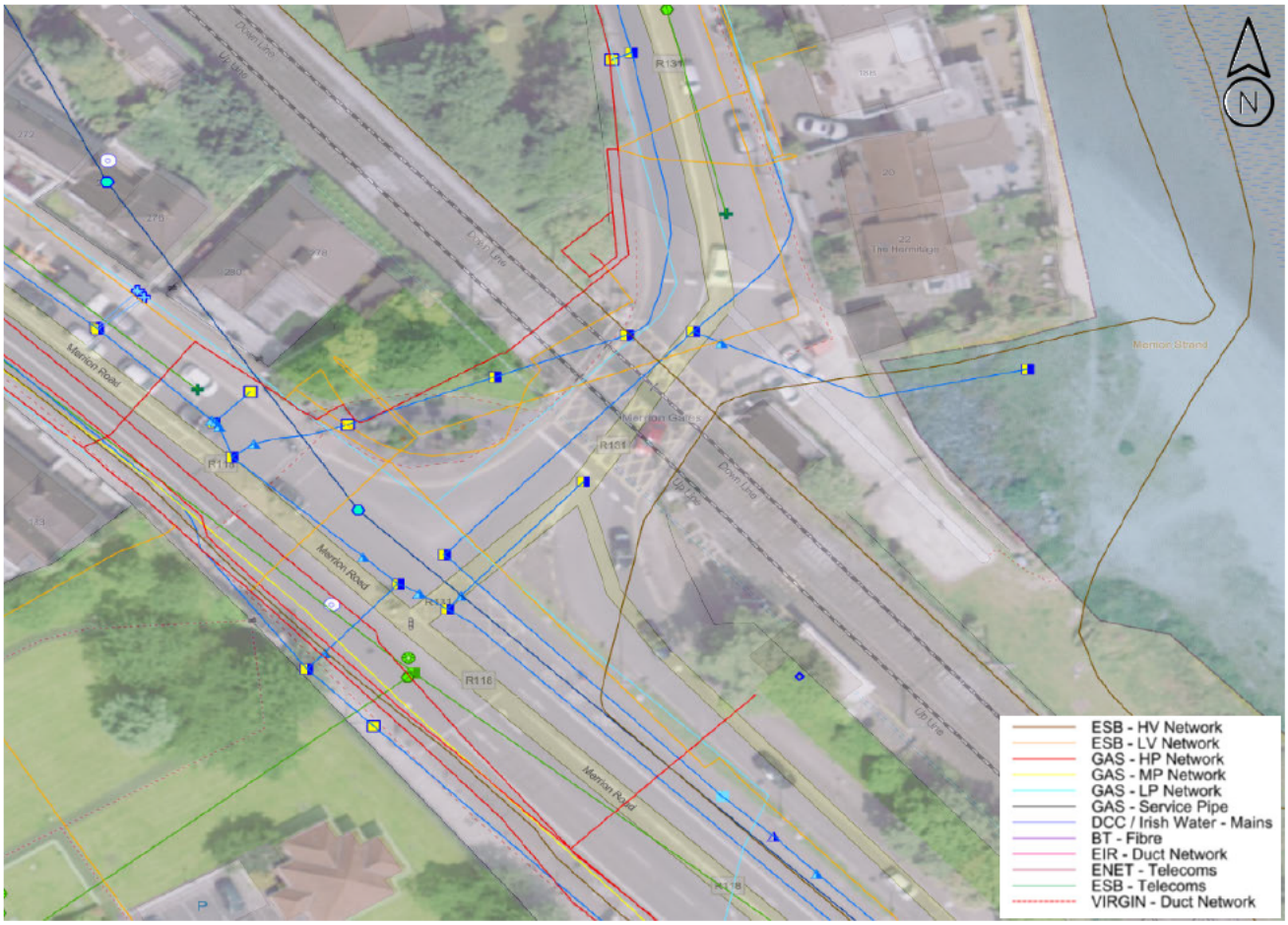


Figure 2-25 Utility Aerial View - Merrion Gates Level Crossing (XR005), Existing (Source: ESRI)

Table 2-14 Utility Schedule - Merrion Gates Level Crossing (XR005), Existing

Utility	Type	Notes
Electricity	High Voltage	110KV+38KV (Rail line) Underground Electricity Cables
	Medium Voltage	MV Underground Electricity Cable
	Low Voltage	LV Underground Electricity Cables (2x)
Gas	High Pressure	None
	Medium Pressure	None
	Low Pressure	125mm PE-80 - 25 mbar
Water	Watermain	ø600mm (CI) + ø150mm (DI) Proximity - ø228mm (CI) + ø609mm (CI)
	Wastewater Sewer	None
	Storm Water Drainage	None
Telecoms	n/a	BT Telecoms (Fibre)
Rail Services	n/a	(TBC)

Figure 2-26 Utility Aerial View - Merrion Gates North, Existing (Source: ESRI)

Table 2-15 Utility Schedule - Merrion Gates North, Existing

Utility	Type	Notes
Electricity	High Voltage	38KV (Rail line) Underground Electricity Cables
	Medium Voltage	None
	Low Voltage	None
Gas	High Pressure	None
	Medium Pressure	None
	Low Pressure	63mm PE-80 - 25mbar
Water	Watermain	None
	Wastewater Sewer	None
	Storm Water Drainage	ø1200mm (Gravity - Concrete – parallel to rail line) ø300mm (Gravity - UPVC), ø300mm (pumping, VC)
Telecoms	n/a	BT Telecoms (Fibre - Rail line)
Rail Services	n/a	(TBC)

2.5 Ground Conditions

2.5.1 Lansdowne Road

A review of the historic mapping and aerial photography indicates the site was originally fields with possible river channels. The river channels may contain made ground placed in an uncontrolled manner or soft/loose deposits. A possible mill race channel which may be infilled was identified to the south-east of the site. From 1832, the presence of the railway line and the construction of a station house to the north-west were noted. The station at Lansdowne was built in the period 1888-1913 and early signs of the original stadium and stands were noted.

The GSI Quaternary sediment and bedrock mapping shows the presence of alluvial deposits and made ground. GSI bedrock mapping indicates that the site is underlain by dark limestone and shale of the Lucan formation. The EPA National Soil map indicates the presence of made ground at the site. Additionally, the historic British Geological Society (BGS) geological map series (Wilson *et al*., 1859) show that the site overlays sandy Hillock (blown sand) and upper limestone bedrock.

The GSI GeoUrban depth to bedrock (Dublin County) mapping shows that the bedrock depth is in the range 5m to10m below ground level.

The Rivers of Dublin Map (Sweeney, 2017) and the EPA waterbodies map (2021) also indicate the presence of historic rivers and mill races across the site. The Swan River network crosses the site while the River Dodder and corresponding millraces are located to the southeast. Therefore, soft alluvial deposits may be present across the site.

The GSI Groundwater wells and springs map indicates two wells categorised as poor and moderate yield class respectively to the north-east.

No active or historic pits, quarries or IPPC, IPC and IEL facilities were identified within 250m from both sides of the railway line at the site.

Based on the available historic ground investigation adjacent to the site, the following ground model is estimated:

Ground Investigation for The Lansdowne Road Stadium Development Company Ltd (LRSDC) by Geotech Specialist Limited (2005):

(i) A downward stratigraphy comprising made ground and recent soft alluvium overlying estuarine deposits and glacial gravels over limestone bedrock; a stiff glacial till is noted in the area.
(ii) Groundwater monitoring results revealed groundwater levels of up to 1mOD. Significant fluctuations were noted in boreholes located close to the site.
(iii) There is no geo-environmental information available.

2.5.2 Serpentine Avenue

A review of various Dublin historic maps shows that the site was undeveloped until the early 1800s. From 1832 onwards, the presence of the railway line, a gravel pit approximately 100m to the south, an old engine house to the north-west, and numerous residential and agricultural areas within the site extent were noted. Aerial photography shows that no major changes at the site occurred in the period 2005-2021 with most recent pictures showing electrical services and overhead wires across the site.

The GSI Quaternary sediment and bedrock mapping shows mainly the presence of alluvial deposits in the area along with, and underlain by, underlying till derived from limestones within 250m from site. The latter is underlain by dark limestone and shale of the Lucan formation. The EPA National Soil map indicates the presence of made ground at the site. The historic British Geological Society (BGS) geological map series (Wilson *et al*., 1859) show that the site sits on alluvium and upper limestone formation.

The GSI GeoUrban depth to bedrock (Dublin County) mapping shows that the bedrock depth is in the range of 5m to15m below ground level.

Both the Rivers of Dublin Map (Sweeney, 2017) and the EPA water bodies map (2021) indicate that no historic rivers/streams or watercourses cross the site. Furthermore, the GSI Groundwater wells and springs map indicates no wells or springs intersecting or within the site extents.

While a gravel pit was noted on the historic mapping, no additional historic pits, quarries, IPPC, IPC and IEL facilities were identified within 250m from both sides of the railway line at the site.

Based on the available historic ground investigation adjacent to the site, the following ground model is estimated:

Allied Irish Banks Headquarters, Report ref 331 (Solmec, April 1994) & AIB Headquarters Ballsbridge, Report ref 5603 (IGSL, April 2004)

(i) The stratigraphy consists of a highly heterogeneous layer of made ground comprising Clay and sand with concrete and brick of about 2.0m deep overlying a 1.0m layer of soft to firm Clay.

The latter is underlain by medium dense Sand and Gravel of thickness 3.0m, followed by stiff Boulder Clay. Also, nearby ground investigations indicate that the anticipated rock level is about 8.5m below ground level.

(ii) It is estimated that the groundwater level at the site is approximately 3.5m below ground level however this requires confirmation

- There is no available geo-environmental information. However, there is a potential for contamination regarding the site history and usage.

2.5.3 Sandymount Avenue

A review of historic mapping and aerial photography shows that the site was undeveloped until the early 1800s. From 1837, the presence of the railway line and a gravel pit to the south were noted. The vicinity of the site was further developed in the late 1800s with dwellings and residential properties. 1760 mapping shows the presence of "Lord Merrion's Brick Field" to the east and marsh land. Aerial photography shows no major changes occurred in the period 2005-2021 with most recent images showing electrical services and overhead wires across the site. As such, a potential for made ground and buried foundations associated with these areas exists.

The GSI Quaternary sediment and bedrock mapping show the presence of alluvial deposits which are underlain by dark limestone and shale of the Lucan formation. The EPA National Soil map indicates the widespread presence of made ground associated with urbanised and developed areas. The historic British Geological Society (BGS) geological map series (Wilson *et al*., 1859) show that the site sits on alluvium, blown sand and upper limestone formation.

The GSI GeoUrban depth to bedrock (Dublin County) mapping shows that the bedrock depth varies over a small distance and is in the range 10m to 20m below ground level.

Both the Rivers of Dublin Map (Sweeney, 2017) and the EPA waterbodies map (2021) indicate that no historic rivers/streams or watercourses crosses the site. Furthermore, the GSI Groundwater wells and springs map indicates no wells or springs intersecting or within the vicinity of the site.

While a gravel pit was noted in the 1837 mapping, no additional historic pits, quarries or IPPC, IPC and IEL facilities were identified within 250m of the level crossing.

Based on the available historic ground investigation, the following considerations of the expected ground conditions were made:

Teagasc Headquarters Sandymount (Report Ref 5600, December 2003)

This investigation was completed adjacent to the southeast corner of the level crossing. The site investigation consisted of four cable tool borehole locations including in-situ tests and soil sampling for laboratory testing. Ground water monitoring installations were installed in select boreholes however no monitoring data is available. Based on the available factual report the following assessment of the expected ground conditions were made:

(i) The stratigraphy consists of widespread made ground comprising brick, concrete and fill of up to approximately 1.2m BGL overlying medium dense to dense Gravel of thickness of approximately 3.5m. This is underlain by thick layer of hard black Clay with cobbles and boulders whose thickness was not proven. Bedrock was not proven.

(ii) Groundwater was observed in the boreholes ranging from 3.9m to 5m BGL.

At an adjacent site, rock levels were estimated to be approximately 8m to 12m BGL.

2.5.4 Sydney Parade Avenue

A review of historic mapping shows that the site was undeveloped until the early 1800s with its surroundings consisting of the "Lord Merrion's Brick Field", marsh land and a lake to the east. From 1832, the presence of the railway line was observed. In the late 1880s, the station at the site and residential properties in the surroundings were built. Additionally, late 1880s maps no longer indicate the existence of the lake mentioned earlier. Aerial photography shows no major changes at the site occurred in the period 2005-2021 with most recent pictures showing electrical services and overhead wires across the site.

The GSI Quaternary sediment and bedrock mapping show the presence of alluvial deposits, marine beach sands which predominate at the site and till derived from limestones at approximately 50m to the south-east. The site is underlain by dark limestone and shale of the Lucan formation. The EPA National Soil map indicates the presence of made ground at the site. The historic British Geological Society (BGS) geological map series (Wilson *et al*., 1859) show that the site sits on alluvium, blown sand and upper limestone formation.

The GSI GeoUrban depth to bedrock (Dublin County) mapping shows that the bedrock depth is in the range 5m to 10m below ground level.

The Rivers of Dublin Map (Sweeney, 2017) indicates the presence of a historic watercourse, Nutley stream, at about 50m to the south-east. The EPA waterbodies map (2021) shows that no current river/stream crosses or is found within the site extent. Furthermore, the GSI Groundwater wells and springs map indicates one well, located approximately 200m to the south, with a depth to hole and rock of 12.4m and 10.2m respectively.

No historic pits, quarries or IPPC, IPC and IEL facilities were identified within 250m from both sides of the railway line at the site.

Based on the available historic ground investigation, the following considerations of the expected ground conditions were made:

Ailesbury Road Dublin, Report ref 921 (IGSL, May 1983), Sydney Parade Avenue, Report Ref 6552 (IGSL, October 2007) & 27 Sydney Parade Dublin, Report Ref 6556 (IGSL, October 2007)

(i) This investigation was completed adjacent to the southeast corner of the level crossing.
(ii) The stratigraphy consists of made ground comprising tarmac, brick, and concrete pieces, tarmac, and clay of about 0.7m deep overlying a 1.3m layer of very soft clay. The latter is underlain by soft clay of thickness 1.9m, followed by hard black clay. Rock level was not proven in any of the available nearby ground investigations.
(iii) There is no available information on groundwater. However, nearby ground investigations indicate artesian groundwater conditions.
(iv) There is no available geo-environmental information. However, there is a potential for contamination regarding the site history and usage.

2.5.5 Merrion Gates

A review of historic mapping shows that the site and its surrounding were not well developed and consisted of residential areas and agricultural lands until the 19th century. In 1832 to 1834, the presence of the railway line was noted. Over the years, considerable development was noted comprising the construction of residential properties and industrial units as well as Our Lady Queen of Peace Church, Merrion Hall building, Merrion Gates and Merrion Station respectively. An assessment of aerial photography indicates that from 1995, Merrion Station is no longer present.

The GSI Quaternary sediment and bedrock mapping shows the presence of mainly marine beach sands with the site underlain by dark limestone and shale of the Lucan formation. The EPA National Soil map indicates the presence of made ground at the site. Additionally, the historic British Geological Society (BGS) geological map series (Wilson *et al*., 1859) show that the site sits on recent deposits of raised beach (marine sands), alluvium, blown sand and upper limestone bedrock (Carboniferous Rocks).

The GSI Rockhead/Rock surface height (Dublin County) mapping indicates the rockhead depth is in the range -20m to– 0m. The GSI GeoUrban depth to bedrock (Dublin County) mapping shows that the bedrock depth is in the range 5m to– 15m below ground level.

The Rivers of Dublin Map (Sweeney, 2017) and the EPA waterbodies map (2021) indicate the presence of a historic river/stream to north-east and Elm Park stream to the east. The GSI Groundwater wells and springs map indicates one well to the northwest of the site.

No historic pits, quarries or IPPC, IPC and IEL/Waste facilities were identified within a distance of 250m from both sides of the railway line at the site.

Based on the available historic ground investigation, the following considerations on the expected ground conditions were made:

Merrion Gate PRV Chamber Replacement (Causeway, 2016)

(i) This investigation was completed approximately 200m south of Merrion Gates level crossing.
(ii) The stratigraphy consists of a layer of made ground of thickness 1.6m, underlain by granular Sand and Gravel layers with a thickness up to 2.6m over a stiff to very stiff Clay. A 1.0m thick layer of soft clay was noted beneath the made ground.
(iii) A medium strong Limestone was recorded were 7 to 8.5m BGL.
(iv) Groundwater levels were noted is in the range 0.5 to 2.5m below ground level based on previous nearby ground investigations.
(v) There is no available geo-environmental information for the site. However, there is a potential for contamination regarding the site history and usage.

Irish Shipping Offices, Report ref 554 (The Cementation Co. Ltd, July 1971)

(i) This investigation was completed adjacent for the Merrion Hall building located on the east side of the line.
(ii) The stratigraphy consists of a highly heterogeneous layer of made ground of thickness 1.5m, underlain by a 2.0m thick layer of soft to firm stony clay with cobbles. The latter overlays a layer of very stiff and hard black stony clay with cobbles of an approximate thickness of 7.0m.
(iii) Based on wagon drilling, bedrock was estimated to be approximately 10 m below ground level.
(iv) Groundwater levels were noted in the range 0.5 to 2.5m below ground level based on previous nearby ground investigations.
(v) There is no available geo-environmental information for the site. However, there is a potential for contamination regarding the site history and usage.

Based on Arup experience in the wider area, bedrock levels can be up to 21m BGL and there is the potential presence of artesian groundwater conditions.

2.6 Environmental

For an overview of the existing environmental constraints for DART+ Coastal South refer to Annex 3.1 Constraints Report. A brief overview of the baseline environment, under key environmental criteria, is provided in the following sections.

2.6.1 Landscape and Visual Quality

The potential works are located within the urban townscape of Dublin City. The study area includes the following key landscape / townscape and visual constraints for Dublin City:

- Dublin City Area (Map E, F and H of Development Plan1):
  - Z1 lands (Residential Amenity);
  - Z2 lands (Residential Conservation Areas Amenity);
  - Z3 lands (Neighbourhood Facilities);
  - Z8 lands (Architectural and Civic Design Character / Conservation Objective); and
  - Z9 lands (Recreational Amenity, Open Space and Green Networks).

Refer also to Section 2.6.2 Archaeology and Cultural Heritage for further detail in relation to recorded monuments; to Section 2.6.3 Architectural Heritage for further detail in relation to protected structures and architectural conservation areas; and to Section 2.6.9 Biodiversity for further detail in relation to natural heritage.

2.6.2 Archaeology and cultural heritage

All environments have an inherent archaeological potential, and this potential is borne out where there are recorded archaeological sites, in addition to more recently discovered sites identified through aerial photography, geophysical survey and archaeological testing.

[1] Dublin City Development Plan 2016 – 2022. Available at: https://www.dublincity.ie/dublin-city-development-plan-2016-2022

- No recorded archaeological sites are within 50m of any potential works.

2.6.3 Architectural heritage

Sensitive receptors identified for the purpose of this study are structures included in the Records of Protected Structures (RPS), in the Development Plans of Dublin City Council (DCC).

- There are no recorded monuments within the study area.
- The potential works areas are outside any DCC Architectural Conservation Areas (ACAs).

2.6.4 Noise and Vibration

The existing noise and vibration levels in areas surrounding potential works are influenced by the surrounding urban environment and the existing railway operations. This includes passenger and freight trains passing, passenger trains stopping at stations, and existing rail infrastructure at stations, including points and level crossings. Existing traffic levels also contribute to the baseline noise levels.

2.6.5 Air quality and climate

In 2021, the EPA reported that Greenhouse gas (GHG) emissions in Ireland decreased 3.6% in 2020. The decrease in emissions is reflected in most sectors with the exception of increases in residential, agriculture and public services. Despite the decrease, Ireland is still not on the pathway required to meet future targets and a climate neutral economy. These targets are set out in the Climate Action and Low Carbon Development Act 2015, as amended, which legally binds Ireland to net-Zero emissions no later than 2050, and to a 51% reduction in emissions by 2030.

As defined in the Air Quality Standards Regulations (SI 180 of 2011), Dublin City is located in Zone A. Based on monitoring completed by the Environmental Protection Agency (EPA) in 2020, pollutant concentrations are in compliance with air quality standards in Zone A.

The main local sources of air pollution in Dublin are traffic and home heating.

2.6.6 Agricultural and non-agricultural

The environs around the potential works are non-agricultural land. Land in this area is pre-dominantly a mix of residential properties and commercial.

2.6.7 Geology and soils

2.6.7.1 Lansdowne Road

The Corine Land Cover 2018 categorises the land use in the area as artificial surfaces with discontinuous urban fabric.

The geological mapping for the area indicates that the soils and geology of the area comprise alluvial deposits and made ground. There is potential for soft deposits across the site. The underlying bedrock is dark limestone and shale of the Lucan formation.

GSI Landslide Susceptibility mappings indicate that there are no landslide events recorded within the vicinity of the site and the latter is classified as a low (inferred) landslide susceptible area. The APM Granular Aggregate Potential map indicates that the site is classed as low potential.

There is no Geological Heritage Area, Special Protection Area, Natural Heritage Area (NHA) and Proposed Natural Heritage Area (pNHA) within the vicinity of the site.

Based on the historic and industrial use of the site as a railway station, there are likely to be sources of contamination within the made ground throughout the study area.

The expected ground conditions are detailed in Section 2.5.

2.6.7.2 Serpentine Avenue

The Corine Land Cover 2018 categorises the land use in the area as mostly artificial surfaces with discontinuous urban fabric. To the west, the land use is classified as artificial surfaces with industrial, commercial and transport units.

The geological mapping for the area indicates that the soils and geology of the area comprise alluvial deposits and made ground. Therefore, there is potential for soft deposits across the site. The underlying bedrock is dark limestone and shale of the Lucan formation.

GSI Landslide Susceptibility mappings indicate that there are no landslide events recorded within the vicinity of the site and the latter is classified as low (inferred) landslide susceptible area. The APM Granular Aggregate Potential map indicates that the site is classified as low potential. Also, the region at approximately 100m to the east is classed as moderate potential.

There is no Geological Heritage Area, National Inventory of Architectural Heritage (NIAH), National Monuments Service, Special Protection Area, Natural Heritage Area (NHA) and Proposed Natural Heritage Area (pNHA) within the site extent.

Based on the historic and industrial use of the site as a railway station, there are likely to be sources of contamination within the made ground throughout the study area. PAHs were found to as the main contaminant in the made ground identified from nearby ground investigations.

The expected ground conditions are detailed in Section 2.5.

2.6.7.3 Sandymount Avenue

The Corine Land Cover 2018 categorises the land use in the area as artificial surfaces with discontinuous urban fabric.

The geological mapping for the area indicates that the soils and geology of the area comprise made ground and alluvial deposits suggesting the potential for soft deposits across the site. The underlying bedrock is dark limestone and shale of the Lucan formation.

GSI Landslide Susceptibility mappings indicate that there are no landslide events recorded within the site extent. The APM Granular Aggregate Potential map indicates that the site is classed as very high potential.

Based on the historic and industrial use of the site as a railway station, there are likely to be sources of contamination within the made ground throughout the study area.

The expected ground conditions are detailed in Section 2.5.

2.6.7.4 Sydney Parade Avenue

The Corine Land Cover 2018 categorises the land use in the area as artificial surfaces with discontinuous urban fabric.

The geological mapping for the area indicates that the soils and geology of the area comprise alluvial deposits, marine beach sand and made ground respectively. Therefore, there is potential for soft deposits across the site. The underlying bedrock is dark limestone and shale of the Lucan formation.

GSI Landslide Susceptibility mappings indicate that there are no landslide events recorded within the site extent and the latter is classified as low (inferred) landslide susceptible area. The APM Granular Aggregate Potential map indicates that the site is classed as very high potential. Also, the region to the east is classed as moderate potential.

Based on the historic and industrial use of the site as a railway station, there are likely to be sources of contamination within the made ground throughout the study area.

At approximately 400m to the east, 1 Special Area of Conservation (SAC), 1 Special Protection Area (SPA) and 1 Proposed Natural Heritage Area (pNHA) were noted with details provided in Table 2-16.

Table 2-16 Designated surrounding the site under study

Site Name	Site Code	Designation	Distance from railway (m)
South Dublin Bay SAC	000210	SAC	~400
South Dublin Bay and River Tolka Estuary SPA	004024	SPA	~400
South Dublin Bay pNHA	000210	pNHA	~400

There is no Geological Heritage Area, National Inventory of Architectural Heritage (NIAH), and National Monuments Service sites within the vicinity of the site.

The expected ground conditions are detailed in Section 2.5.

2.6.7.5 Merrion Gates

Based on the limited historical information at the location, the stratigraphy consists of made ground, underlain by gravel, stiff to very stiff clay and medium strong limestone.

The geological mapping for the area indicates that the soils and geology of the area comprise of marine beach sands and made ground. The underlying bedrock is dark limestone and shale of the Lucan formation.

The Corine Land Cover 2018 categorises the land use in the area as artificial surfaces with discontinuous urban fabric.

GSI Landslide Susceptibility mappings indicate that there are no landslide events recorded within the vicinity of the site and the latter is classified as a low (inferred) landslide susceptible area. The APM Granular Aggregate Potential map indicates that the site is classed as moderate potential.

Based on the existing buildings and the historic and industrial use of the site, there are likely to be sources of contamination within the made ground throughout the study area.

It was found that three Architectural Heritage sites (denoted as Recorded Monuments & Zones of Notifications - Section 12) were located within 250m from the study area. Additionally, a Special Area of Conservation (SAC), a Proposed Natural Heritage Area (pNHA) and a Special Protection Area (SPA) were identified immediately to the east of the site. Some details are provided in Table 2-17.

Table 2-17 Designated surrounding the site under study

Site Name	Site Code	Designation	Distance from railway (m)
South Dublin Bay SAC	000210	SAC	Next to the east of site
South Dublin Bay	000210	pNHA	Next to the east of site
South Dublin Bay and River Tolka Estuary SPA	004024	SPA	Next to the east of site

There is no Geological Heritage Area, National Inventory of Architectural Heritage (NIAH), and National Monuments Service within the vicinity of the site.

The EMODnet geology map indicates that South Dublin Bay, which is located to the east of the study area, is classed as a region with coastal behaviour associated to erosion (coastline retrogradation) based on the coastal migration rate. Additionally, the ICPSS National Coastal Erosion map indicates that the 2050 Coastal Erosion Line is located at approximately 50m to the south-east of the site.

The expected ground conditions are detailed in Section 2.5.

2.6.8 Water resources

2.6.8.1 Surface Water Bodies

The study area primarily lies in the Dodder_050 river sub-basin with 4 of the 5 crossings in this sub-basin. The Merrion Gates Level crossing lies in the Brewery Stream_010 sub-basin. The Dublin Bay Coastal Waterbody (IE_EA_090_0000) is located approximately 100m east of the Merrion Gates Level crossing. The Water Framework Directive (WFD, 2000/60/EC) “Ecological Status” of the Dublin Bay Coastal Waterbody is ‘good’ and the waterbody is “Not at Risk” of failing to reach its objectives.

2.6.8.2 Groundwater

The study area is underlain by visean limestone & calcareous shale located above a locally important aquifer meaning it is on bedrock which is moderately productive only in local zones. There are no significant karst features identified near the site.

The study area is located in the Dublin Ground Waterbody (IE_EA_G_008) which is described as poorly productive bedrock. The Dublin groundwater body is currently at Good WFD Status for achieving its WFD objectives.

There are no high yielding water supply springs and wells i.e., public water supplies or group water scheme supplies within the study area. No Source Protection Zones associated with public, or group groundwater supply schemes are located with the site.

2.6.8.3 Flooding

The study area was assessed based on the CFRAM River and Coastal Flood Extents as provided by the Office of Public Work's (OPW) and falls within Flood Zone A and Flood Zone B. Flood Zone A is defined as a region in which the probability of flooding from rivers and the sea is highest (greater than 1% for river flooding or .5% for coastal flooding). Flood Zone B is where the probability of flooding from rivers and the sea is moderate (between 0.1% and 1% for river flooding or 0.1% and .5% for coastal flooding). The crossings at Serpentine Avenue and Merrion Gates fall within Flood Zone A with the highest risk of flooding while the other three crossings, Lansdowne Road, Sandymount Avenue, and Sydney Parade all fall within Flood Zone B with moderate flood risk.

Historical flooding has been assessed by examining reports and maps from the OPW National Flood Hazard mapping. There have been reports of flood extents in the proximity of all 5 crossings in the study area dating back to 1963 with the most recent flood report being at the Merrion Gates Level Crossing in May of 2000.

2.6.9 Biodiversity

The study area is predominantly urban in nature where any potential works are being considered. The nearest European Sites within the study area are:

- South Dublin Bay SAC;
- South Dublin Bay and River Tolka Estuary SPA.

The nearest National site within the study area is:

- South Dublin Bay pNHA.

These sites lie within 30m of potential works at the nearest point to the options being considered. South Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA, and South Dublin Bay pNHA, are designated for marine and intertidal habitats and overwintering birds. These designated areas are of international and national biodiversity importance.

The River Dodder also flows through the study area. The River Dodder is an important tributary of the River Liffey. Otter and kingfisher (Annex II species on the Habitat's Directive and Annex I species on the Bird's Directive, respectively) are known to be present on the River Dodder.

Wintering bird habitat such as the Pembroke Cricket Club and grounds are also within close proximity to some potential works. These can be used by SCI bird species from nearby European sites and along the coastline.

3. PROGRAMME OBJECTIVES AND REQUIREMENTS

3.1 DART+ Coastal South Project Specific Objectives

The programme objectives are consistent with those used on DART+ Programme as outlined in the DART+ Coastal South Preliminary Option Selection Report.

The following proposed Project Objectives have been developed to align with the DART+ Programme objectives:

(i) To deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre;
(ii) To deliver solutions which improve the passenger experience where passenger infrastructure interventions are required to meet the planned increase in DART service frequency;
(iii) To deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works;
(iv) To identify cost-effective solutions from a capital, operations, and maintenance perspective;
(v) To minimise adverse impacts on the natural and built environment associated with the construction, operation, and maintenance of the project;
(vi) To minimise adverse impacts on existing rail services, road users and landowners associated with the construction, operation, and maintenance of the project;
(vii) To provide efficient and cost-effective integration of systems with the other DART+ Programme projects.

3.2 DART+ Coastal South Specific Requirements

The requirements for the DART+ Coastal South project comprise technical and functional attributes derived from the need for the project. The requirements, relevant to this package of work, are shown in Table 3-1.

Table 3-1 DART+ Coastal South Project Specific Requirements

Requirement	Description
General Requirements	(viii) To design in accordance with IÉ Standards and relevant national and EU standards and guidelines.
	(ix) Designs shall comply with the Minimum Employer's Functional Requirements and meet the Train Service Specification.
Sandymount Level Crossings	(x) Provide an appropriate level of vehicular access across the railway line to/from Sandymount Village and neighbouring areas for all modes.
	(xi) Provide an appropriate level of accessibility at a local level for pedestrians and cyclists.
	(xii) Provide an appropriate level of accessibility for emergency services in terms of catchment and response time.

The proposed Project Objectives to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Dublin City Centre and Bray provide the fundamental challenge of this study.

3.3 Design standards

Table 3-2 contains some of the applicable standards that will be used to develop the design. This list of standards is not exhaustive and other standards may be used. Prior to completing the detailed design, Arup will undertake a fully detailed risk assessment in accordance with The Commission of Railway Regulation (CRR) mandatory requirements as set out within the documents listed below:

- CRR-G-009-G: Guideline for the Process of Authorisation for Placing in Service of Railway Sub Systems; and
- CRR-G-009-G Sections 2.2.3 – 2.2.4: Guideline providing List of Parameters and Requirements for Authorisation for Placing in Service (APIS) of Heavy Rail INF & related OPE/MAI Parameters.

Table 3-2 Design Standards

Source	Description	Comments
European Commission Regulation	EU/1299/2014	Technical Specification for Interoperability for the 'Infrastructure' subsystem
European Commission Regulation	EU/1302/2014	Technical Specification for Interoperability for the "rolling stock subsystem – Locomotives and passenger rolling stock"
Dept. of Transport	DMURS	Design Manual for Urban Roads & Streets
TII	DN-STR-03005	Design Criteria for Footbridges
TII	DN-GEO-03036	Cross Sections and Headroom
TII	DN-GEO-03040	Subways for Pedestrians and Pedal Cyclists Layout and Dimensions
Irish Rail	I-PWY-1101	Requirements for Track and Structures Clearances
Irish Rail	CCE-TMS-300	Track Construction Requirements and Tolerances
Irish Rail	CCE-TMS-340	Horizontal Curvature Design
Irish Rail	CCE-TMS-341	Vertical Curvature Design
Irish Rail	CCE-TMS-344	Requirements for Undertrack Crossings and Pressure Pipelines
Irish Rail	CCE-TMS-345	Engineering Requirements for Passenger Platforms and Barrow Paths
Irish Rail	CCE-TMS-410	Civil Engineering Structures Design Standard
Irish Rail	CCE-TRK-SPN-007	Specification for Track Ballast
Irish Rail	CCE-TRK-SPN-021	Specification for Permanent Way Signs

Source	Description	Comments
Irish Rail	MAY-MDC-ELE-DART-SP-E-0002	Electricity Functional Specifications System-Wide
Irish Rail	MAY-MDC-TEL-DART-SP-Y-0001	Telecommunications Generic Functional Requirement Specification DART Wide
Irish Rail	MAY-MDC-SIG-DART-SP-E-0001	Signalling Functional Requirements Specifications System-Wide
Irish Rail	MAY-MDC-LVP-DART-SP-E-0001	SET Electricity Functional Specifications System-Wide for LV Power

4. CONSTRAINTS

This section describes the constraints that are relevant to this package of work.

The main driver for the capacity enhancements on the DART network is the increased DART train frequency (Train Service Specification) as part of the DART+ programme. As part of the DART+ Coastal programme of service expansion, IÉ intends to increase the number of services on the DART network from 6tph to 12tph. This forms part of the Train Service Specification (TSS), which is the 'desired' number of train services to have on each branch of the DART network (i.e., trains per hour per direction (TPHPD)). This report adopts version TSS1C.

The changes represent a substantial increase in capacity, both in frequency and size of individual services. Changes to the service and operating condition of the line create the need to assess any impact on the barrier opening times and its associated effects on vehicles, pedestrians, and cyclists. The proposed services as part of DART+ Coastal South are shown in Figure 4-1.

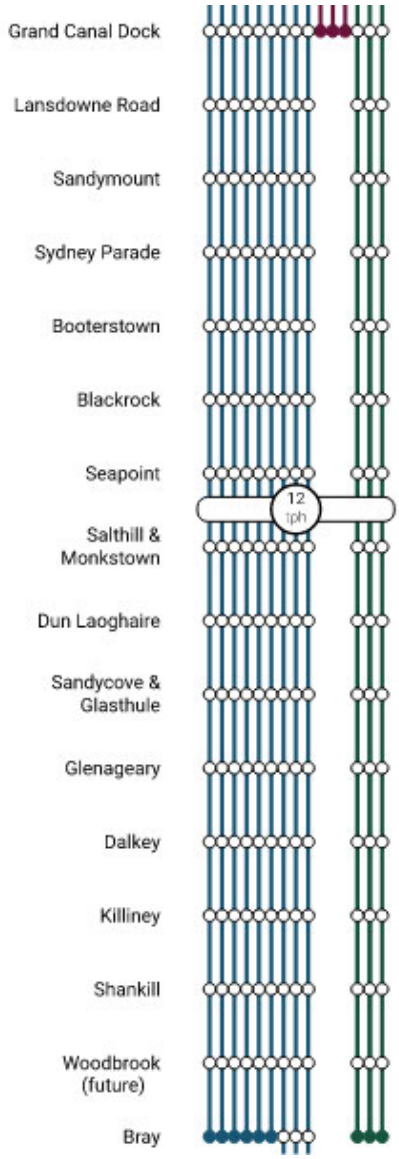


Figure 4-1 DART+ Coastal South Services

4.1 Technical

4.1.1 Railway Infrastructure

4.1.1.1 Signalling

The proximity of the 5 level crossings along this section of the rail line mean that the trigger points overlap, therefore this must be considered as a system rather than 5 individual locations. As a result of the relatively short distance between level crossings, there are no upgrades to the signalling system that would offer the opportunity to improve barrier opening times. Any modifications to the current arrangement that could offer reduced barrier down times would require alterations to the level of train protection which would proportionally increase the risk to the level crossing users due to trains overrunning the crossing. Such an arrangement would not comply with today's safety standards.

The condition of the Booterstown relay interlocking is additionally a constraining factor to accommodating other signalling changes. The interlocking is old and is relay based. The cabling within the interlocking room is old and brittle and poses a risk of the signalling malfunctioning due to cable insulation damage in the course of modifications being carried out. Consequently, changes to the Booterstown interlocking must be contained to an absolute minimum and will be considered as part of the Preliminary Design.

Figure 4-2 Relays cabling at Booterstown Relay Interlocking Room (Source: IÉ)

4.1.1.2 Level Crossings

Arup modelled the five level crossings between Grand Canal Dock and Booterstown on the DART+ Coastal route, as shown in Figure 4-3, in RailSys software using the program's integrated level crossing function. For the purposes of this study, based on the findings in Appendix E, it has been assumed that all crossings will be closed. Due to the increased train frequency, there will be very limited opportunities for users to cross the railway.

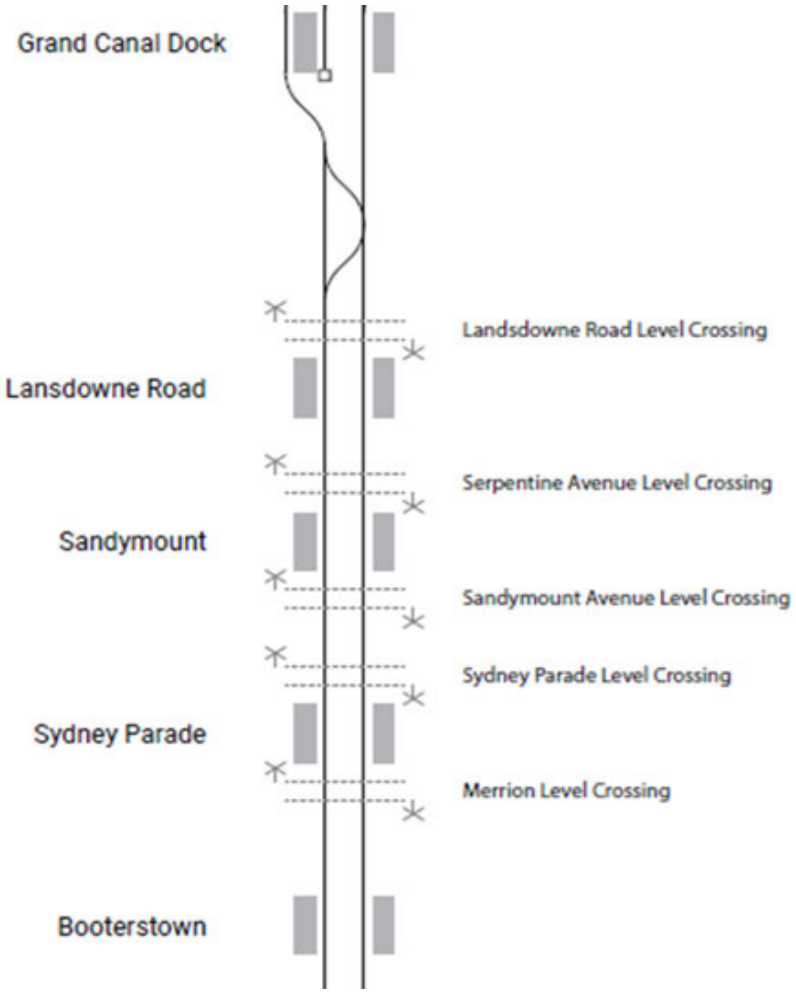


Figure 4-3 Level Crossing Schematic

The proposed increase in train frequency will create several challenges, including but not limited to:

- **Level crossings are located in built up urban residential areas.**

  Due to the proximity of the level crossings to the city centre, all locations have residential properties built up to the existing railway corridor providing little space for significant modifications to the crossings. Land take of properties in the surrounding area of the crossing is likely to be required as part of the option development, largely focused on road frontage, car parking and modifications to access roads. However, acquisition of significant amounts of land in this type of urban environment, is not considered as viable as it would have an unnecessary negative impact on the community in that area.

- **Level crossings will be effectively closed for the full duration of the hour, during both peak and off-peak periods**

  Due to the increased frequency of trains passing through each level crossing, the amount of time left to allow for road, pedestrian, and cycle users to cross the rail line safely is extremely limited, therefore the level crossings would be effectively closed.

- **Risk management of level crossings and safety of users**

  If at grade crossings were to remain in place with the increased frequency, then the reduced amount of time the barriers will be open will create a high-risk situation where individuals are more likely to take risks to cross. Risky behaviour such as trying to cross as the barriers are being lowered would be more common, because people will know that they will have to wait if they do not make it across.

- **Impact of level crossing incidents on operations and schedule of the service**

  In the existing situation, after the barriers have been lowered the signaller will confirm the level crossing is clear. If at grade crossings were to remain in place with the increased frequency, then individuals taking more risks to cross the line because the reduced barrier opening times will lead to an increase in the number of incidents at the level crossing. These incidents, along with the significant increase in frequency of train services, increases the risk that the signaller will not be able to confirm that the crossing is cleared, resulting in delays to services occurring more frequently.

  Any resultant delay will have a knock-on effect on all the other level crossings. The resulting level of service on the route would therefore be reduced because every train along the line will then be delayed. Similarly, the delay could result in the other barriers remaining closed until the timetable is recovered.

- **Safety of vulnerable road users in a constrained cross section at opening of level crossings**

  In the existing situation, the level crossings do not provide compliant space for dedicated pedestrian/cycle paths across the line. In addition, the majority of the level crossings are in areas that are very constrained in terms of available space. It is desirable that each user group, crossing the level crossings, has its own dedicated space to increase safety while crossing. To promote the desirability of active travel routes, the existing level crossings need to provide dedicated pedestrian/cycle crossing opportunities.

- **Increased Journey Times**

  If level crossing barriers are closed more frequently and for longer periods, then the journey times of all road users (i.e. pedestrian, cyclist, public transport users and vehicles) will increase and become harder to predict, as a result of the increased likelihood of having to wait at level crossings.

4.1.2 Traffic and Transportation

This section of the report highlights the key traffic and transportation constraints within the study area. This will allow the design team to make informed developmental and structural decisions based on available desktop information at this stage of the project. This section identifies desktop information on traffic and transportation aspects which will be relevant for the proposed development.

The scheme may require the closure of five level crossings in the Sandymount area, namely Lansdowne Road, Serpentine Avenue, Sandymount Avenue, Sydney Parade, and Merrion Gates. This is a densely populated area, and these crossings are of strategic, as well as local importance. Approximately 14,000 vehicle trips per direction cross the railway at these locations daily. Around 25% of residents in Sandymount go to work, school, or college in the area up to 5km to the west of the DART line, within walking or cycling distance.

Should the level crossings be closed as part of the scheme, there will be the need for improved pedestrian and cycling connectivity at each level crossing location. Additional infrastructure may be required, depending on the crossing location and design solution, to provide for such pedestrian, cycling and vehicular connectivity.

The potential closure of the level crossings, in the absence of suitable mitigation, may have an impact on traffic in terms of connectivity and additional delays or queueing in the wider area. In addition to this potential operational impact, construction activities are expected to generate a temporary increase in traffic to the area. However, this is expected to be a relatively low number of additional vehicular journeys and will have a minor temporary impact on the traffic conditions of the local road network.

In the event of the closure of the level crossings, the main issue to consider from a traffic and transportation point of view is therefore the impact on pedestrians and cyclists as well as operational traffic flow.

The presence of 5 level crossings along the railway line relevant to this project poses specific constraints to transport networks in two different ways.

- The level crossings impact on the capacity of the rail line to increase frequencies without a compromise on safety. There is a limit to which the headways can be reduced while still allowing for movements of pedestrians, cyclists, and motorised vehicles across the line in a safe manner; and
- The level crossings also hinder the seamless connections of pedestrians, cyclists, public transport users and private vehicles across the railway line. The times the barriers are down, in effect, reflect in a temporary severance of the networks. This is especially notable during peak times, when demand for multi-modal journeys across the railway line is at its highest and at the same time, higher frequencies of train services mean longer periods of severance.

The potential closure of the five level crossings in the Sandymount area presents some mobility and accessibility constraints to general traffic. These include reduced east-west accessibility to the strategic road network (for example Strand Road and the connection to Dublin Port).

Pedestrian and cycling accessibility between residential and employment areas to the east and west of the line, as well as accessibility to transport corridors to the west (e.g., Merrion Road and N11) may also be constrained by the closure of the existing level crossings.

Three of the five level crossings (Lansdowne Road, Sandymount Avenue and Sydney Parade) also offer an alternative for access to the DART station platforms. However, the stations are not reliant on the level crossings, as all include grade-separated connections between the two platforms. These are provided within the station and available only to rail patrons.

Access to education, health, and retail facilities is also a constraint. Event management around the Aviva stadium also needs to be considered. The impact on traffic in terms of additional delays or queueing should also be considered. Planned schemes in the area, such as the Dublin BusConnects scheme, should be considered.

It is likely that additional infrastructure will be required to provide improved pedestrian and cycling accessibility across the rail line and to maintain vehicular accessibility to a level that is commensurate with the existing levels of accessibility.

The potential closure of the level crossings along the rail line in Sandymount may lead to accessibility constraints for vehicles, pedestrians, and cyclists. Any potential infrastructure to be provided to improve pedestrian and cycling accessibility or to accommodate vehicle accessibility will be constrained by the physical limitations in terms of existing space availability around the crossing locations, the impact on property access, the environment, and significant structures. Construction activities are expected to generate a relatively low number of additional vehicular journeys.

4.1.3 Utilities

Section 2.4 of this report summarised the existing utility infrastructure identified at or near the level crossings. It is noted that this information is considered indicative only and must be verified by a full topographic and utility survey as part of the preliminary design of the Emerging Preferred Option.

Any infrastructure proposal will likely impact most of the utility services currently crossing the rail line at the level crossings. Therefore, an outline strategy was developed to identify possible utility diversion corridors at each location to ensure the concept options are viable. Figure 4-4 outlines the indicative cross section approach that has been applied to the concept infrastructure options. The proposed utility diversion corridor is shown beneath the road in blue, with the proposed structure (overpass/underpass) shown in relation to the road level in red.

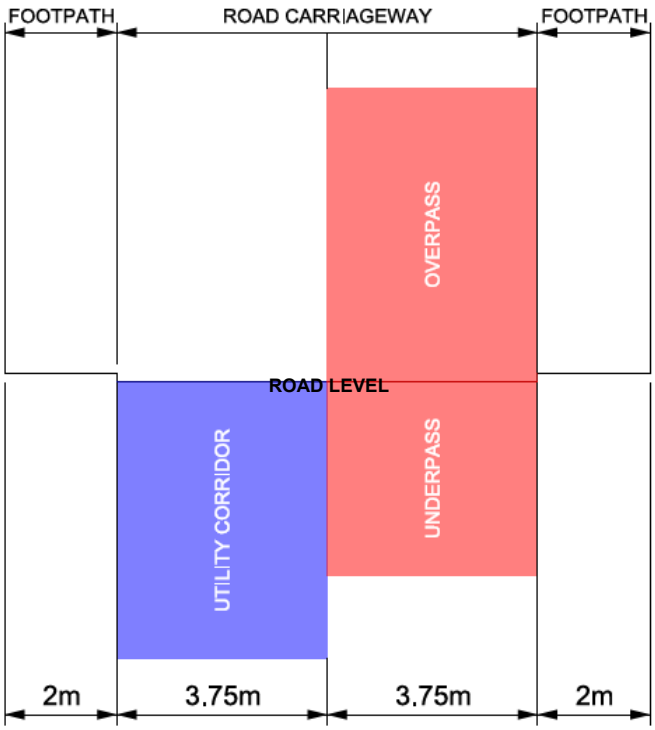


Figure 4-4 Proposed Utility Corridor Space proofing for Concept Option Feasibility

Early stakeholder engagement has been carried out with key utility companies where significant utility infrastructure has been identified as requiring possible diversion. These include:

- Irish Water / DCC:
  - XR002 – ø1260mm OD (Gravity – Brick) combined sewer;
  - XR002 – ø1050mm (Pumping – Concrete) stormwater;
  - XR003 – ø1040mm OD (Gravity – Brick) combined sewer;
  - XR004 – ø1100mm OD (Gravity – Brick) combined sewer;
  - Merrion Gates North – ø1200mm (Gravity – Concrete) stormwater sewer.
- Gas Networks Ireland:
  - XR002 – 200mm (Steel) 19 bar high pressure gas main.

4.1.4 Geotechnical

The following is noted in respect of all locations:

- Site-specific ground investigations are a prerequisite at the location of the proposed works to investigate the current ground and groundwater conditions. Limited information on depth to bedrock, groundwater and geo-environmental are currently available.
- There is a risk of contamination and subsequently, material excavated during the works may not be suitable for reuse on site and subject to testing may require disposal or recovery to a suitably licensed facility.

4.1.4.1 Lansdowne Road

Based on the desk study information retrieved from historic ground investigations, there is the risk of contamination due to the presence of made ground as highlighted in existing ground investigations and with respect to the historic and industrial use of the site as a railway.

Moreover, the additional constraints that should be considered for any proposed works at the site include:

- Possibility of soft ground (alluvial deposits) associated with the Swan River network and based on geological mapping. Some historic ground investigations have highlighted the presence of poor strata of soft marine silt and clay materials.
- Potential for historic rivers and associated mill races within the vicinity of the site.
- Possibility of historic foundations related to the old stadium and mill races across the site.

4.1.4.2 Serpentine Avenue

Based on the desk study information retrieved from historic ground investigations, there is the risk of contamination due to the presence of made ground as highlighted in existing ground investigations and with respect to the historic and industrial use of the site as a railway.

Moreover, another constraint is the possible presence of soft ground (alluvial deposits) at the site based on geological mapping.

4.1.4.3 Sandymount Avenue

Based on the nature of the site usage as a railway station, there is the risk of the presence of contaminated land.

Additional constraints that should be considered for any proposed works at the site include:

- Possibility of soft ground (alluvial deposit and soft marine sediments) based on geological mapping. Historic mappings indicate the existence of brick field at the site which is associated with possible shallow soft clay material.
- Possibility of historic foundations related to historic buildings across the site.

4.1.4.4 Sydney Parade Avenue

Based on the desk study information retrieved from historic ground investigations, there is the risk of contamination due to the presence of made ground as highlighted in existing ground investigations and with respect to the historic and industrial use of the site as a railway.

Moreover, the additional constraints that should considered for any proposed works at the site is enumerated below:

(i) Possibility of soft ground (alluvial deposits and marine beach sands) based on geological mapping and associated to the historic watercourse nearby. Also, some historic mappings indicate the existence of brick field at the site which is associated with possible shallow soft clay material.
(ii) Possibility of historic foundations related to historic buildings across the site.

4.1.4.5 Merrion Gates

Based on the desk study information retrieved from historic ground investigations, there is the risk of contamination due to the presence of made ground as highlighted in existing ground investigations and with respect to the historic and industrial use of the site as a railway.

Moreover, there is the possibility of encountering artesian groundwater conditions as suggested by historic nearby ground investigations.

A culvert located to the east of the site was noted. Since the current route of the culvert is unknown, diversion may be required depending on proposed work at the site.

Additionally, due to proximity with the sea, the site may be influenced by tidal variations.

4.2 Environmental

Section 2.6 above describes the baseline environment for the various options being considered under this package of work. Building on this information, the key constraints associated with the options being considered, under the various environmental criteria, are summarised below.

4.2.1 Landscape and Visual Quality

The key constraints for the project for Landscape & Visual are presented in Annex 3.1 Appendix A – Constraint Mapping: Landscape Constraints. Key landscape and visual constraints include:

- Where sections of the railway are exposed and therefore, more visually prominent in their immediate surrounds;
- Sections of the railway corridor are bounded by mature hedgerows, some with mature trees, which are of landscape and screening value; and
- Sections of the railway corridor are openly visible / viewed from adjoining residential and other properties and from open spaces and amenities.

The key landscape and visual constraints for further consideration relate to:

- Potential widening of the railway corridor;
- Associated earthworks / structures;
- Impact on existing boundaries, and plantings;
- Impact on protected or historic structures; and
- Visibility of interventions / new elements including from residential, open space and / or protected landscape / visual areas.

4.2.2 Archaeology and Cultural Heritage

The key constraints for Archaeology & Cultural Heritage are presented in Annex 3.1 Appendix B – Constraint Mapping: Heritage Constraints. Sensitive receptors identified for the purpose of this study are:

- National Monuments in State care, as listed by National Monuments Service (NMS) of the Department of Housing, Local Government and Heritage;
- Sites with Preservation Orders (PO);

- Sites listed in the Register of Historic Monuments;
- Record of Monuments and Places (RMP) and the Sites and Monuments Record (SMR) from the Archaeological Survey of Ireland;
- Designated Zones of Notification (Areas of Archaeological Potential); and
- General Areas of Archaeological Potential.

There are no National Monuments, sites listed with preservation orders or recorded on the register of historic monuments within the constraints study area. There are no recorded archaeological monuments.

4.2.3 Architectural Heritage

Sensitive receptors for the purpose of this study include:

- Structures included in the Records of Protected Structures, in the Development Plans of Dublin County Council;
- Architectural Conservation Areas included in the Development Plans of Dublin County Council;
- Buildings included in the National Inventory of Architectural Heritage's Building Survey;
- Gardens included in the National Inventory of Architectural Heritage's Garden Survey;
- Designed Landscapes as identified with reference to aerial photographs, Ordnance Survey, and historic mapping; and
- Other Structures of Built-Heritage Interest as identified with reference to aerial photographs, Ordnance Survey, and historic mapping.

There are no identified sensitive receptors within the study area.

4.2.4 Noise and Vibration

The main noise and vibration constraint to development relates to the proximity of sensitive receptors to the works, during both construction and operation. Noise and vibration limits for construction and operation will be in place for nearby sensitive receptors. These will most likely be based on existing measured noise and vibration levels in the vicinity, as well as guidance from local authorities and the Environmental Protection Agency. Noise and vibration monitoring will be undertaken during construction works, and operation to ensure compliance with any limits.

If works result in the redistribution of traffic in local areas this has the potential to impact the noise levels at some sensitive receptors in the vicinity of the redistributed traffic.

4.2.5 Air Quality and Climate

There are several sensitive receptors in the vicinity of the potential works which need to be considered during the options assessment. There are potential impacts on nearby receptors during construction from construction activities. Any redistributed traffic may also impact air quality.

4.2.6 Agricultural and Non-agricultural

There are no agricultural constraints within the study area.

For non-agricultural receptors maintaining access to properties and parking are a constraint. Land take for non-agricultural receptors (both permanent and temporary) is a constraint which should be considered.

4.2.7 Geology and Soils

At all sites, based on the historic and industrial use of the site as a railway, there are likely to be sources of contamination within the made ground throughout the study area.

4.2.7.1 Lansdowne Road

As stated in Section 2.5, soft ground comprising recent sediments such as estuarine and alluvial deposits associated with past waterbodies such as Swan River network may be present in the surrounding site areas.

There are no geological heritage areas within the vicinity of the level crossing.

4.2.7.2 Serpentine Avenue

Soft ground comprising alluvial deposits based on geological mapping may be present in the surrounding site areas.

There is no Geological Heritage Area, National Inventory of Architectural Heritage (NIAH), National Monuments Service, Special Protection Area, Natural Heritage Area (NHA) and Proposed Natural Heritage Area (pNHA) within the vicinity of the site.

4.2.7.3 Sandymount Avenue

Soft ground may be present based on mapping of alluvial deposits as well as soft clay from the old brick field in the surrounding site areas.

There are no geological heritage areas within the vicinity of the site.

4.2.7.4 Sydney Parade Avenue

Soft and loose deposits comprising alluvium and marine beach sand based on geological mapping as well as soft clay from the old brick field may be present in the surrounding site areas.

There is no Geological Heritage Area, National Inventory of Architectural Heritage (NIAH), National Monuments Service, Special Protection Area, Natural Heritage Area (NHA) and Proposed Natural Heritage Area (pNHA) within the vicinity of the site.

4.2.7.5 Merrion Gates

Soft ground comprising alluvial deposits associated with river network located to the south of the site may be encountered at the site.

Another constraint is the location of Architectural (denoted as Recorded Monuments & Zones of Notifications - Section 12), Special Area of Conservation (SAC), Proposed Natural Heritage Area (pNHA) and Special Protection Area (SPA) sites within 250m from the site.

Additionally, the site is in a region considered to be susceptible to erosion.

4.2.8 Water Resources

The constraints to the development in terms of water resources include flood risk across all crossings. The five crossings are located in Flood Zones A and B which potentially require a justification test for new development in Flood Zone A. Flood compensation and protection will be required to not increase the risk of flooding and protect critical infrastructure during flood events.

Additional constraints include the Dodder_050 sub-basin and Brewery Stream_010 sub-basin located in the Dublin Ground Waterbody and adjacent to the Dublin Bay Coastal Waterbody. While both the Dublin Ground Waterbody and the Dublin Bay Coastal Waterbody are currently rated 'good', it is important to maintain water quality for the WFD objectives.

The underlying Locally Important aquifer is also considered to be a constraint, however, as it is considered to be of low importance, any impact on the aquifer is considered to be imperceptible and therefore it will not be considered within the MCA. The constraints identified may be impacted by changes to the hydrogeological and hydrological regime or as a result of changes in water quality.

4.2.9 Biodiversity

There is a potential for impacts at European and National sites as a result of the potential works, these include:

- South Dublin Bay SAC;
- South Dublin Bay pNHA; and
- South Dublin Bay and River Tolka Estuary SPA.

South Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA, and South Dublin Bay pNHA are designated for marine and intertidal habitats and overwintering birds. These designated areas are of international and national biodiversity importance. The works are within the Zone of Influence (ZoI) of these designated sites, with the potential for noise, vibration, and lighting impacts on Special Conservation Interest (SCI) bird species.

Potential ecological constraints also include:

- Vegetation (scrub, hedgerows, or tree) which may provide foraging, nesting, and commuting corridors for fauna species (e.g., birds, bats, small mammals);
- Interactions with the underlying groundwater body which has the potential for impacts on species and habitats that rely on groundwater fed ecosystems; and
- Changes to the hydrological regime as a result of run-off from proposed activities into the receiving environment.

4.3 Planning

The proposed development is located within the Dublin City Development Plan 2016-2022.

The Dublin City Development Plan (2016-2022) sets out policies and objectives to guide how and where development will take place in the city over the lifetime of the plan.

The Development Plan contains several principles to guide the future development of the city, including “Movement”:

- *“Helping to build an integrated transport network and encouraging the provision of greater choice of public transport active travel.”*

The following policies and objectives are relevant:

- *“**MTO1**: To encourage intensification and mixed-use development along existing and planned public transport corridors and at transport nodes where sufficient public transport capacity and accessibility exists to meet the sustainable transport requirements of the development, having regard to conservation policies set out elsewhere in this plan and the need to make best use of urban land. Dublin City Council will seek to prepare SDZs, LAPs or other plans for areas surrounding key transport nodes, where appropriate, in order to guide future sustainable development.*
- ***MT3**: To support and facilitate the development of an integrated public transport network with efficient interchange between transport modes, serving the existing and future needs of the city in association with relevant transport providers, agencies, and stakeholders.*
- ***MT4**: To promote and facilitate the provision of Metro, all heavy elements of the DART Expansion Programme including DART Underground (rail interconnector), the electrification of existing lines, the expansion of Luas, and improvements to the bus network in order to achieve strategic transport objectives.*
- ***MT6**: (i) To work with Iarnród Eireann, the NTA, Transport Infrastructure Ireland (TII) and other operators to progress a coordinated approach to improving the rail network, integrated with other public transport modes to ensure maximum public benefit, and promoting sustainable transport and improved connectivity.*
- ***MTO5**: (i) To facilitate and support measures proposed by transport agencies to enhance capacity on existing public transport lines and services, to provide/ improve interchange facilities and provide new infrastructure.”*

The DART+ Coastal South project aligns with these policies and objectives and the overall vision of enabling the growth of a more sustainable city with enhanced access to public transport facilities.

The proximity of the coastline near Merrion Gates is a constraint. In October 2016, the NTA published plans to tackle lengthy tailbacks on Merrion Road and Rock Road caused by the funnelling of traffic through Merrion Gates into the narrow Strand Road towards Ringsend. The plan proposed the closure of the level crossing, with traffic diverted on to a new flyover road over the rail line further north through the car parks of Merrion Hall on Strand Road and Our Lady Queen of Peace church on Merrion Road.

The National Transport Authority (NTA) shelved plans to close Dublin’s Merrion Gates level crossing to traffic and build a flyover between Strand Road and Merrion Road in Dublin 4, following huge local opposition. By January 2017, the NTA had received 680 submissions, almost half of which opposed the construction of the traffic flyover. The NTA was unable to develop an alternative scheme due to limitations presented by EU protections on the seafront.

5. OPTIONS

5.1 Longlisting of Possible Options Approach & Methodology

The Optioneering Approach is set out in Section 1.4. This section of the report discusses the process of identification of a longlist of concept options under each category. The options for intervention works at the five level crossing locations in the Sandymount Area have been split into two categories:

- Accessibility Options – Options that evaluate the wider area network connectivity with consideration of Pedestrian/Cycle Movements; Public Transport and Vehicular Circulation, and
- Infrastructure Options – Options that evaluate the targeted infrastructure interventions required at each crossing, based on the Accessibility Options, with consideration of existing site constraints.

The identified concept options were then subjected to the shortlist sifting process as outlined in Section 6. The discussion is limited to the development or selection of an option. A more detailed technical description of the works is included in Section 6.

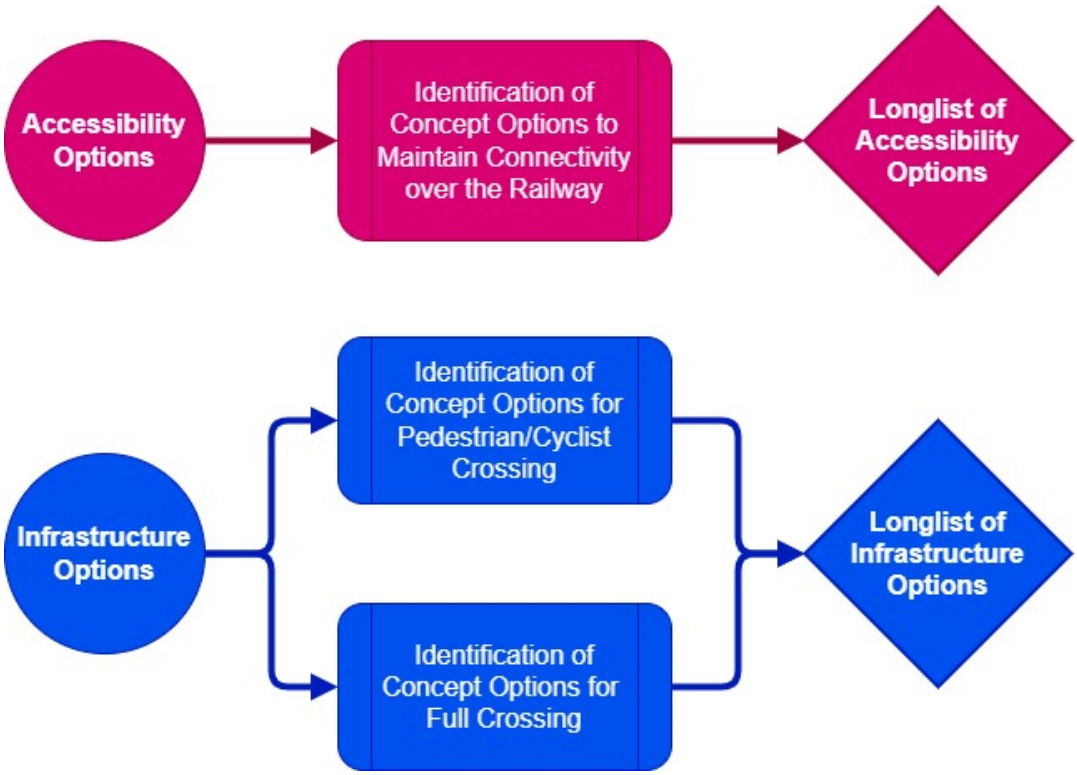


Figure 5-1 Longlisting of Possible Options Approach

5.2 Accessibility Concept Options

This section describes the concept options which have been considered for the provision of a longlist of Accessibility Options for the Sandymount Area, which is considered as a whole, due to the nature of the mobility in the area and the understanding that the five subject level crossings operate in tandem. Table 5-1 explains the naming conventions used.

Table 5-1 Longlist Options Crossing Type Arrangements

Crossing Type	Notes
Barrier	Presence of Barriers at Crossings (Increased train frequency – Do Nothing / Do Minimum Scenario).
Barrier	Presence of Barriers at Crossings
P/C	Pedestrian / Cyclist Grade Separated Crossing
Full	Full Grade Separated Crossing for Vehicular & Pedestrian / Cyclists.
n/a	Not Available – No Crossing

The provision of at least two unrestricted level crossings for vehicles would ensure a similar level of vehicular accessibility is maintained across the railway line, with a reduced impact network wide and in the immediate study area, in terms of queueing and delays (refer to Appendix D).

The provision of only one unrestricted level crossing would reduce connectivity to work, school, college, and local amenities. Bus route connectivity to/from the Sandymount area would reduce, leading to less permeability of the immediate study area. The number of alternative route options to cross into the Sandymount area from either the Donnybrook fire station or the Dublin fire station would be reduced. It could also lead to a more pronounced impact in terms of the increase in volumes along the M50, North Strand Road and local roads such as Merrion Road, Northumberland Road, Shelbourne Road, and Bath Avenue.

Should all five level crossings be closed to pedestrians and cyclists, travel times and distances are expected to double or triple from most points, (refer to Appendix D). The travel time and distance from Sandymount level crossing to Sandymount village would increase from around 550m to 3.6km resulting in a seven-fold increase in travel times and distance.

Table 5-2 reflects a series of permutations in which some crossings are left as a barrier, are fully grade-separated or just partially grade-separated to accommodate pedestrians and cyclists.

Table 5-2 Longlist of Accessibility Concept Options

Option Ref.	Option Description	XR001	XR002	XR003	XR004	XR005	Alt. Xing	Option Ref.
Existing Arrangement.	Do Nothing / Do Minimum	Barrier	Barrier	Barrier	Barrier	Barrier	n/a	1
Minimum Intervention	1 Full Crossing (Grade Separated) + 4 Retained Level Crossings.	Barrier	Barrier	Barrier	Barrier	Full	n/a	2A

Option Ref.	Option Description	XR001	XR002	XR003	XR004	XR005	Alt. Xing	Option Ref.
Full Crossing Combinations.	1 Full Crossing (Grade Separated) + 5 Retained Level Crossings	Barrier	Barrier	Barrier	Barrier	Barrier	Full	2B
	1 Full Crossing (Grade Separated) + 4 Ped/Cycle Crossings	P/C	P/C	P/C	P/C	n/a	Full	2C
Sandymount Ave. Full Crossing Combinations.	2 Full Crossings (Grade Separated) + 3 Retained Level Crossings	Barrier	Barrier	Full	Barrier	Full	n/a	3A
	2 Full Crossings (Grade Separated) + 3 Ped/Cycle Crossings (Grade Separated)	P/C	P/C	Full	P/C	Full	n/a	3B
	2 Full Crossings (Grade Separated) + 4 Retained Level Crossings	Barrier	Barrier	Full	Barrier	Barrier	Full	3C
	2 Full Crossings (Grade Separated) + 3 Ped/Cycle Crossings (Grade Separated)	P/C	P/C	Full	P/C	n/a	Full	3D
Serpentine Ave. Full Crossing Combinations.	2 Full Crossings (Grade Separated) + 3 Retained Level Crossings	Barrier	Full	Barrier	Barrier	Full	n/a	4A
	2 Full Crossings (Grade Separated) + 3 Ped/Cycle Crossings (Grade Separated)	P/C	Full	P/C	P/C	Full	n/a	4B
	2 Full Crossings (Grade Separated) + 4 Retained Level Crossings	Barrier	Full	Barrier	Barrier	Barrier	Full	4C
	2 Full Crossings (Grade Separated) + 3 Ped/Cycle Crossings (Grade Separated)	P/C	Full	P/C	P/C	n/a	Full	4D
Lansdowne Rd. Full Crossing Combinations.	2 Full Crossings (Grade Separated) + 3 Retained Level Crossings	Full	Barrier	Barrier	Barrier	Full	n/a	5A
	2 Full Crossings (Grade Separated) + 3 Ped/Cycle Crossings (Grade Separated)	Full	P/C	P/C	P/C	Full	n/a	5B
	2 Full Crossings (Grade Separated) + 4 Retained Level Crossings	Full	Barrier	Barrier	Barrier	Barrier	Full	5C
	2 Full Crossings (Grade Separated) + 3 Ped/Cycle Crossings (Grade Separated)	Full	P/C	P/C	P/C	n/a	Full	5D
Lansdowne Rd. & Sandymount Ave. Full	3 Full Crossings (Grade Separated) + 2 Retained Level Crossings	Full	Barrier	Full	Barrier	Full	n/a	6A

Option Ref.	Option Description	XR001	XR002	XR003	XR004	XR005	Alt. Xing	Option Ref.
Crossing Combinations.	3 Full Crossings (Grade Separated) + 2 Ped/Cycle Crossings (Grade Separated)	Full	P/C	Full	P/C	Full	n/a	6B
	3 Full Crossings (Grade Separated) + 3 Retained Level Crossings	Full	Barrier	Full	Barrier	Barrier	Full	6C
	3 Full Crossings (Grade Separated) + 2 Ped/Cycle Crossings (Grade Separated)	Full	P/C	Full	P/C	n/a	Full	6D
Sandymount Ave. & Sydney Parade. Full Crossing Combinations.	3 Full Crossings (Grade Separated) + 2 Retained Level Crossings	Barrier	Barrier	Full	Full	Full	n/a	7A
	3 Full Crossings (Grade Separated) + 2 Ped/Cycle Crossings (Grade Separated)	P/C	P/C	Full	Full	Full	n/a	7B
	3 Full Crossings (Grade Separated) + 3 Retained Level Crossings	Barrier	Barrier	Full	Full	Barrier	Full	7C
	3 Full Crossings (Grade Separated) + 2 Ped/Cycle Crossings (Grade Separated)	P/C	P/C	Full	Full	n/a	Full	7D
Serpentine Ave. & Sandymount Ave. & Full Crossing Combinations.	3 Full Crossings (Grade Separated) + 2 Retained Level Crossings	Barrier	Full	Full	Barrier	Full	n/a	8A
	3 Full Crossings (Grade Separated) + 2 Ped/Cycle Crossings (Grade Separated)	P/C	Full	Full	P/C	Full	n/a	8B
	3 Full Crossings (Grade Separated) + 3 Retained Level Crossings	Barrier	Full	Full	Barrier	Barrier	Full	8C
	3 Full Crossings (Grade Separated) + 2 Ped/Cycle Crossings (Grade Separated)	P/C	Full	Full	P/C	n/a	Full	8D
Serpentine Ave. & Sydney Parade. Full Crossing Combinations.	3 Full Crossings (Grade Separated) + 2 Retained Level Crossings	Barrier	Full	Barrier	Full	Full	n/a	9A
	3 Full Crossings (Grade Separated) + 2 Ped/Cycle Crossings (Grade Separated)	P/C	Full	P/C	Full	Full	n/a	9B
	3 Full Crossings (Grade Separated) + 3 Retained Level Crossings	Barrier	Full	Barrier	Full	Barrier	Full	9C
	3 Full Crossings (Grade Separated) + 2 Ped/Cycle Crossings (Grade Separated)	P/C	Full	P/C	Full	n/a	Full	9D

Option Ref.	Option Description	XR001	XR002	XR003	XR004	XR005	Alt. Xing	Option Ref.
Railway Cut & Cover	4 Full Crossings (At-Grade) + 1 Retained Level Crossing	Barrier	Full	Full	Full	Full	n/a	10A
	4 Full Crossings (At-Grade) + 1 Ped/Cycle Crossing (Grade Separated)	P/C	Full	Full	Full	Full	n/a	10B
	4 Full Crossings (At-Grade) + 1 Retained Level Crossing	Barrier	Full	Full	Full	n/a	Full	10C
	4 Full Crossings (At-Grade) + 1 Ped/Cycle Crossing (Grade Separated)	P/C	Full	Full	Full	n/a	Full	10D
Railway Tunnel	5 Full Crossings (At-Grade)	Full	Full	Full	Full	Full	n/a	11A
	6 Full Crossings (At-Grade)	Full	Full	Full	Full	Full	Full	11B

5.3 Infrastructure Concept Options

Additional infrastructure will be required to deliver some of the accessibility options. This section describes the concept options which have been considered for the Infrastructure Intervention Options for the Sandymount Area.

Solutions that consider additional cross-movement infrastructure will need to be provided, in tandem with a full closure of the level crossing, to effectively reduce the challenges and constraints indicated below, while accommodating peak hour crossline movements.

Challenges and constraints associated with the provision of cross-movement infrastructure, in tandem with a full closure of the subject level crossings, will include but not be limited to:

- **Cross rail line movements will need to be accommodated;**
  - If the level crossings are closed a large number of people will still need to cross the rail line. More than 25% of residents east of the rail line work or go to school in the area directly west of the rail line. More than 16% of people that work or go to school east of rail line live to the west of it.
    These movements are made out of necessity and all these individuals will still need to be accommodated, whether it be pedestrian, cyclist, or vehicle movements.
  - Around 14,000 vehicles cross the rail line per direction per day at five level crossings, approximately 40% of these cross at Merrion Gates Level Crossing (XR005). The same volume of traffic will need to be accommodated once the level crossings are closed.
- **Increased traffic and queuing on links that remain open;**
  - The number of vehicle crossing locations will be reduced, thus potentially increasing the demand at the crossings that will remain open. This may have an impact on traffic in terms of additional delays or queueing on other roads.

- **Local physical, environmental, and planning constraints;**
  - It is likely that additional infrastructure will be required to provide improved pedestrian and cycling accessibility across the rail line and to maintain vehicular accessibility to a level that is commensurate with the existing levels of accessibility. Refer to Section 4.
- **Integration with other planned schemes in the area, such as the Dublin BusConnects, will need to be taken into account.**

A longlist of conceptual options, independent of location, was developed to identify all reasonable arrangements for interventions required at the crossings. The full list of crossing concept options is shown in Table 5-6, and the Pedestrian/Cyclist Only Crossings are shown in Table 5-7.

Table 5-3 reflects the permutations of cross-section widths that are considered as part of the identification of the longlist of concept options for infrastructure interventions. These are based on the desirable and minimum widths recommended in the Design Manual for Urban Roads and Streets.

Table 5-3 Typical Road Cross-Section Arrangements

Option Type	Footpath	Cycle Lane	Carriageway	Carriageway	Cycle Lane	Footpath
2-way vehicular crossing with ped/cycle access	1.8m min.	1.5m min.	3.25m	3.25m	1.5m min.	1.8m min.
Min. 2-way vehicular crossing with ped/cycle access	1.8m min.	2.5m	4.8m Shared Motorised User		n/a	
1-way vehicular crossing with ped/cycle access	1.8m min.	1.5m min.	4m		1.5m min.	1.8m min.
Min. 1-way vehicular crossing with ped/cycle access	1.8m min.	2.5m	4m		n/a	
Pedestrian/Cyclist Only	3m Shared Pedestrian/Cyclist Space					

Table 5-4 sets out the vertical clearances and estimated structural depth required to ascertain the total level difference that needs to be achieved at the crossing.

Table 5-4 Total Structural Height Considerations

Structure Type	Vertical Clearance	Structural Depth	Road/Rail Level Difference
Overbridge	5.3m	1.1m	6.4m
Footbridge	5.3m	0.5m	5.8m
Underbridge	5.3m	0.9m	6.2m
Subway	2.4m	0.9m	3.3m

In urban areas, it is likely that the determining factor for desirable maximum longitudinal gradients on streets will be the comfort of vulnerable road users. Part M of the Building Regulations advises that access routes with a gradient of 1:20 or less are preferred. Therefore, a maximum gradient of 5% is desirable on streets where pedestrians are active.

Steeper gradients may be required due to the potential impact to property access off the road. However, regard must be given to the maximum gradient that most wheelchair users can negotiate of 8.3%, although this should be limited to shorter distances. Further mitigation measures may need to be considered, such as intermediate landings, to ensure that pedestrian routes are accessible. For the purpose of this study a maximum gradient of 8% is adopted. Where there could be a large benefit even steeper gradients may be considered but this would be by exception.

Table 5-5 shows the length of ramp required at each side of the crossing to achieve the required vertical clearance over/under the rail line for both desirable and maximum gradients.

Table 5-5 Longitudinal Gradients and impact on Ramp Lengths

Structure Type	Longitudinal Gradient	Total Height	Ramp Length
Overbridge	5%	6.4m	128m
	8%	6.4m	80m
Footbridge	5%	5.8m	116m
	8%	5.8m	72.5m
Underbridge	5%	6.2m	124m
	8%	6.2m	77.5m
Subway	5%	3.3m	66m
	8%	3.3m	41.25m

5.3.1 Full Crossing Concept Options

Table 5-6 reflects a series of permutations of the type of fully grade-separated crossing (overpass or underpass), to accommodate vehicles, pedestrians, and cyclists, that were considered at each level crossing as part of the preliminary assessment in terms of the engineering constraints.

Table 5-6 Longlist of Full Crossing Concept Options

Option Type	Option Description	Option Ref.
Existing Arrangement.	Do Nothing / Do Minimum	0
New Overpass with 2-way vehicular crossing with ped/cycle access.	New Overbridge, with 5.3m clearance to rail level, and 150m long 5% gradient linear ramp. Ramps positioned along the existing Road. 13.1m between barriers (2 x 3.25m lanes + 2 x 1.8m footway + 2 x 1.5m cycleway).	V-1a)
	New Overbridge, with 5.3m clearance to rail level, and 100m long 8% gradient linear ramp. Ramps positioned along the existing Road. 9.1m between barriers (4.8m shared lane + 1.8m footway + 2.5m cycleway).	V-1b)
New Overpass with 1-way vehicular crossing with ped/cycle access.	New Overbridge, with 5.3m clearance to rail level, and 150m long 5% gradient linear ramp. Ramps positioned along the existing Road. 10.6m between barriers (4.0m lane + 2 x 1.8m footway + 2 x 1.5m cycleway).	V-2a)
	New Overbridge, with 5.3m clearance to rail level, and 100m long 8% gradient linear ramp. Ramps positioned along the existing Road. 8.3m between barriers (4.0m shared lane + 1.8m footway + 2.5m cycleway).	V-2b)

Option Type	Option Description	Option Ref.
New Underpass with 2-way vehicular crossing with ped/cycle access.	New Underpass, with 5.3m clearance to road level, and 150m long 5% gradient linear ramp. Ramps positioned along the existing Road. 13.1m between barriers (2 x 3.25m lanes + 2 x 1.8m footway + 2 x 1.5m cycleway).	V-3a)
	New Underpass, with 5.3m clearance to road level, and 100m long 8% gradient linear ramp. Ramps positioned along the existing Road. 9.1m between barriers (4.8m shared lane + 1.8m footway + 2.5m cycleway).	V-3b)
New Underpass with 1-way vehicular crossing with ped/cycle access.	New Underpass, with 5.3m clearance to road level, and 150m long 5% gradient linear ramp. Ramps positioned along the existing Road. 10.6m between barriers (4.0m lane + 2 x 1.8m footway + 2 x 1.5m cycleway).	V-4a)
	New Underpass, with 5.3m clearance to road level, and 100m long 8% gradient linear ramp. Ramps positioned along the existing Road. 8.3m between barriers (4.0m shared lane + 1.8m footway + 2.5m cycleway).	V-4b)
New Alternative Crossing	A full grade-separated solution designed through an alternative road alignment and/or suitable location to minimise impacts on adjacent properties.	V-5

5.3.2 Pedestrian / Cyclist Crossing Concept Options

Table 5-5 reflects a series of permutations of the type of fully grade-separated crossing (overpass or underpass) and associated access combination (stair & lift or ramp) to accommodate pedestrians and cyclists that were considered at each level crossing as part of the preliminary assessment in terms of the engineering constraints.

Table 5-7 Longlist of Pedestrian / Cyclist Only Crossing Concept Options

Option Type	Option Description	Option Ref.
Existing Arrangement.	Do Nothing / Do Minimum	0
New Footbridge with Linear Ramp Access.	New Footbridge, with 5.3m clearance to rail level, and 120m long 1:20 gradient linear ramp access. Ramps positioned along the existing Road. 6.1m between barriers (2 x 1.8m footway + 2.5m cycleway).	P-1a)
	New Footbridge, with 5.3m clearance to rail level, and reduced length of ramps by use of 75m long 1:12 gradient linear ramp access. Ramps positioned along the existing Road. 3.0m between barriers (1.5m footway + 1.5m cycleway).	P-1b)
New Footbridge with Compressed Ramp Access.	New Footbridge, with 5.3m clearance to rail level, and 1:20 gradient compressed ramp access. Ramps can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.	P-2a)
	New Footbridge, with 5.3m clearance to rail level, and reduced length of ramps by use of 1:12 gradient linear ramp access. Ramps can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.	P-2b)
New Footbridge with Non-Linear Ramp Access.	New Footbridge, with 5.3m clearance to rail level, and 1:20 gradient non-linear ramp access. Ramps can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.	P-3a)

Option Type	Option Description	Option Ref.
	Option not developed as no advantages provided over Option P-3a.	P-3b)
New Footbridge with Stair & Lift Access.	New Footbridge, with 5.3m clearance to rail level, 2nb. Lifts at each side of crossing and full width ped/cycleway. 6.0m wide + 2No. Lifts (2 x 1.5m ped. + 2 x 1.5m cycle). Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.	P-4a)
	New Footbridge, with 5.3m clearance to rail level, 1nb. Lifts at each side of crossing and minimum width ped/cycleway. 3.0m wide + 1No. Lift (1.5m ped + 1.5 cycle). Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.	P-4b)
New Subway with Linear Ramp Access.	New Subway, with 2.6m clearance, and 75m long 1:20 gradient linear ramp access. Ramps positioned along the existing Road. 6.6m between walls (2 x 1.8m footpath + 3.0m cycleway).	P-5a)
	New Subway, with 2.6m clearance, and reduced length of ramps by use of 45m long 1:12 gradient linear ramp access. Ramps positioned along the existing Road. 5.0m between walls (2.0m footpath + 2.5m cycleway + 0.5m margin).	P-5b)
New Subway with Stair & Lift Access.	New Subway, with 2.6m clearance, 2nb. Lifts at each side of crossing and full width ped/cycleway. 6.0m wide + 2No. Lifts (2 x 1.5m ped. + 2 x 1.5m cycle). Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.	P-6a)
	New Subway, with 2.6m clearance, 1nb. Lifts at each side of crossing and minimum width ped/cycleway. 3.0 m wide + 1No. Lift (1.5m ped + 1.5 cycle). Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.	P-6b)
Modification of Existing Grade Separated Crossing.	Provision of new ramp access to existing subway, using existing clearances, within the station area. Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.	P-7a)
	Provision of new ramp access to existing stadium subway, using existing clearances, located north of the existing LX. Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.	P-7b)

6. OPTION SELECTION PROCESS

6.1 Shortlisting of Possible Options Approach & Methodology

The Optioneering Approach is set out in Section 1.4. This section of the report discusses the process of sifting the longlist of concept options at each level crossing location. The list identified in Section 5 was subjected to a pass/fail sifting assessment based on each options ability to meet the project specific objectives and requirements, as outlined in Section 3. A full description of performance against the criteria is provided in Appendix A.

A compatibility exercise between the shortlisted Infrastructure and Accessibility Options was carried out to create a set of combined options which were subsequently taken forward to MCA, discussed in Section 7.

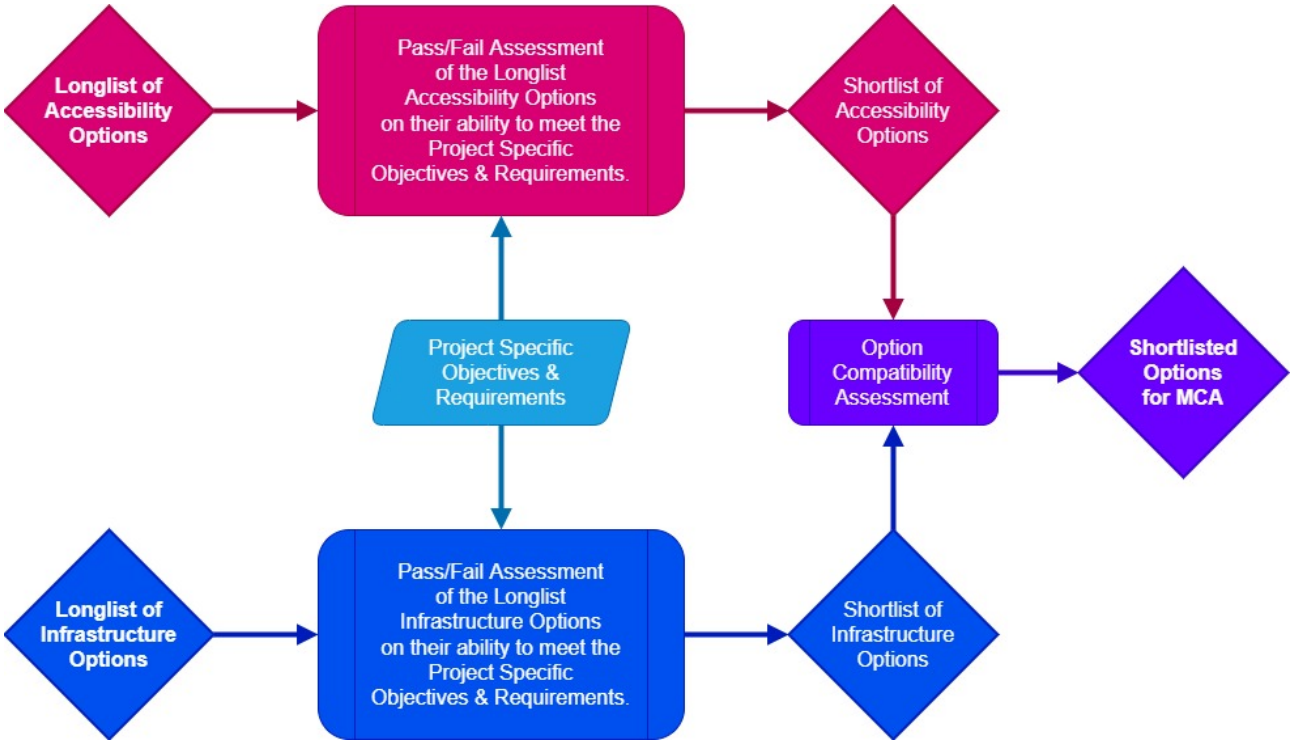


Figure 6-1 Shortlisting of Possible Options Approach

6.2 Accessibility Options

A high-level appraisal and sensitivity analysis of the longlist concept options was carried out with respect to emerging constraints and mobility & accessibility. Refer to Appendix D for further information on the transport assessment.

The options that have undergone the longlist to shortlist options sift are described below. The following colour shading indicates the type of crossing:

- White 'XR' indicates where the existing level crossing is to be maintained;
- Blue 'V' indicates a segregated crossing that incorporates road vehicle, pedestrian and cyclist users;

- Green 'P' indicates a segregated crossing that incorporates pedestrian and cyclist users only;
- Horizontal black lines indicate the existing railway; and
- Red boxes indicate existing stations.

6.2.1 Option 1

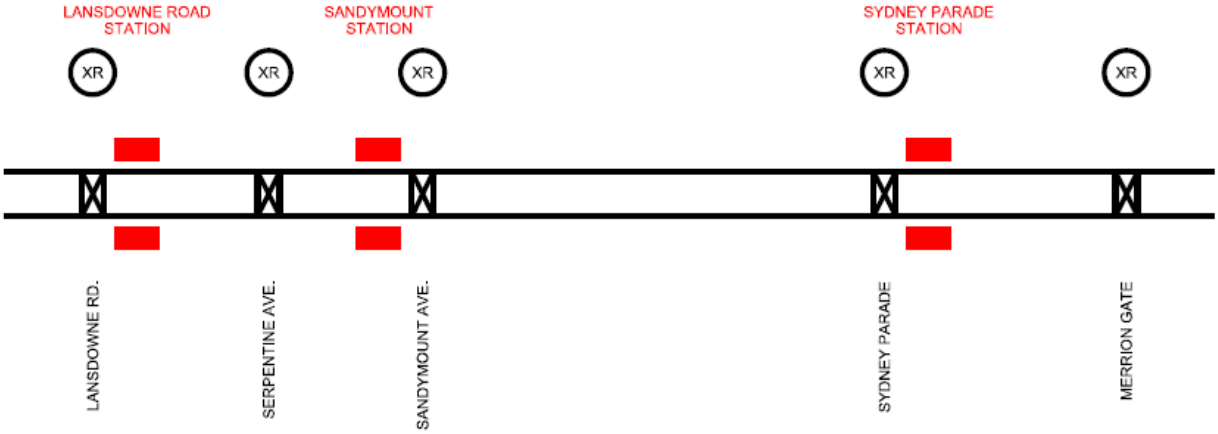


Figure 6-2 Accessibility Option 1, Schematic

Option 1 considers a 'Do Nothing / Do Minimum' scenario. No Infrastructure changes. In the do nothing scenario the level crossings would remain open with the increased train frequency. In the do minimum scenario all of the level crossings would be closed.

6.2.2 Option 2A

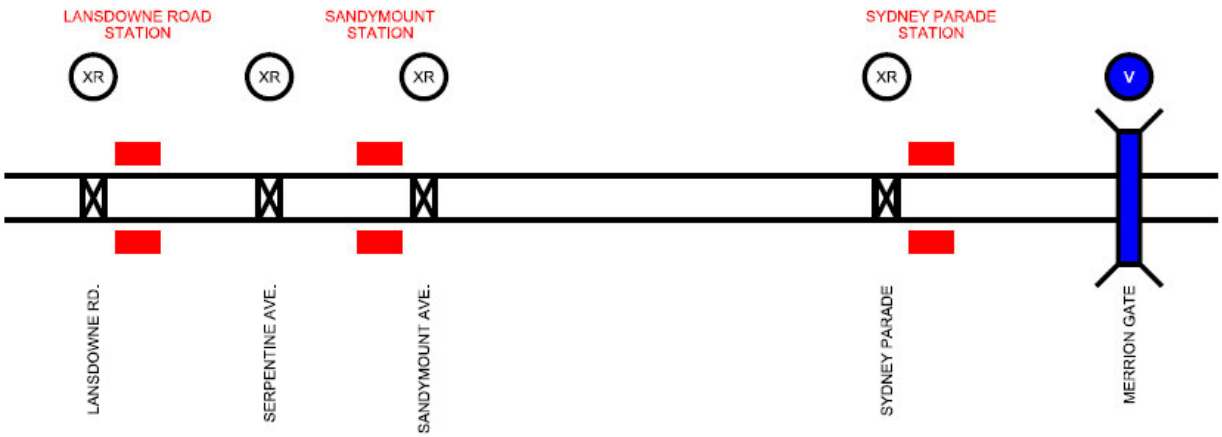


Figure 6-3 Accessibility Option 2A, Schematic

Option 2A considers Vehicle & Ped/Cycle provided at Merrion Gate, crossing over/under the Railway. Level Crossings XR001 (Lansdowne Rd), XR002 (Serpentine Avenue), XR003 (Sandymount Avenue) and XR004 (Sydney Parade) are retained.

6.2.3 Option 2B

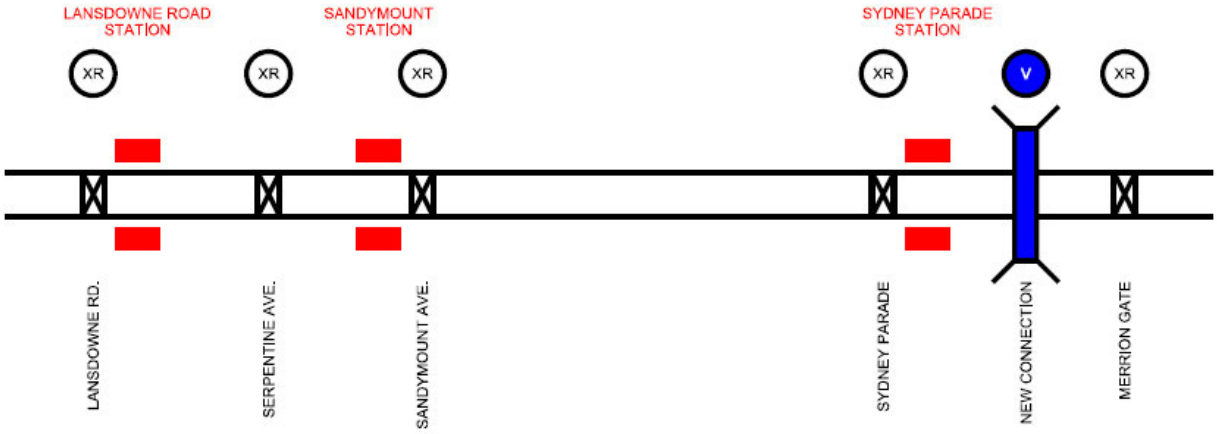


Figure 6-4 Accessibility Option 2B, Schematic

Option 2B considers Vehicle & Ped/Cycle provided on new Merrion Gate North, crossing over/under the Railway. Level Crossings XR001 (Lansdowne Rd), XR002 (Serpentine Avenue), XR003 (Sandymount Avenue), XR004 (Sydney Parade) and XR005 (Merrion Gate) are retained .

6.2.4 Option 2C

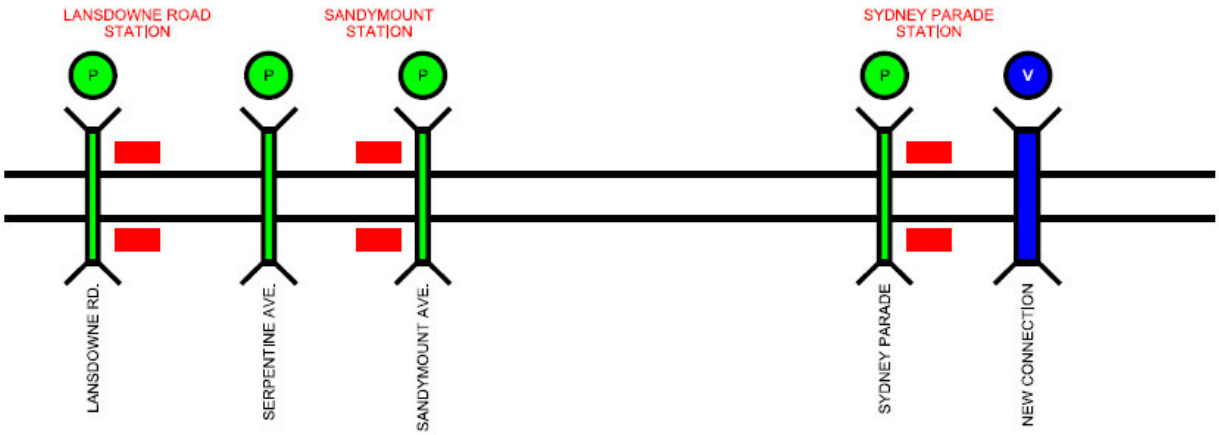


Figure 6-5 Accessibility Option 2C, Schematic

Option 2C considers Vehicle & Ped/Cycle provided on new Merrion Gate North, crossing over/under the Railway. Ped/Cycle only provided at Lansdowne Rd, Serpentine Avenue, Sandymount Avenue and Sydney Parade crossing over/under the Railway.

6.2.5 Option 3A

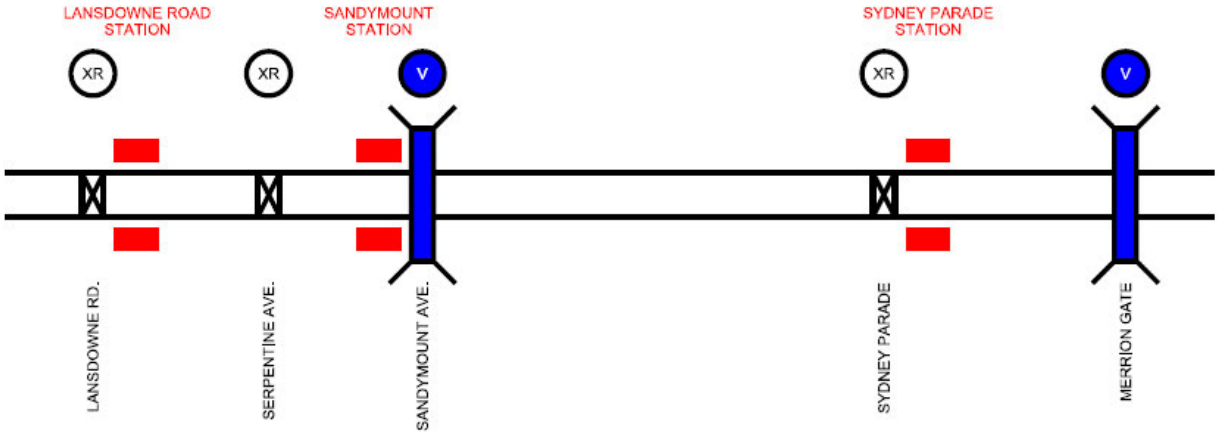


Figure 6-6 Accessibility Option 3A, Schematic

Option 3A considers Vehicle & Ped/Cycle provided on Sandymount Avenue and Merrion Gate, crossing over/under the Railway. Level Crossings XR001 (Lansdowne Rd), XR002 (Serpentine Avenue) and XR004 (Sydney Parade) are retained. The two sole connection points in this option are deemed not sufficient to guarantee adequate connectivity in the wider area.

6.2.6 Option 3B

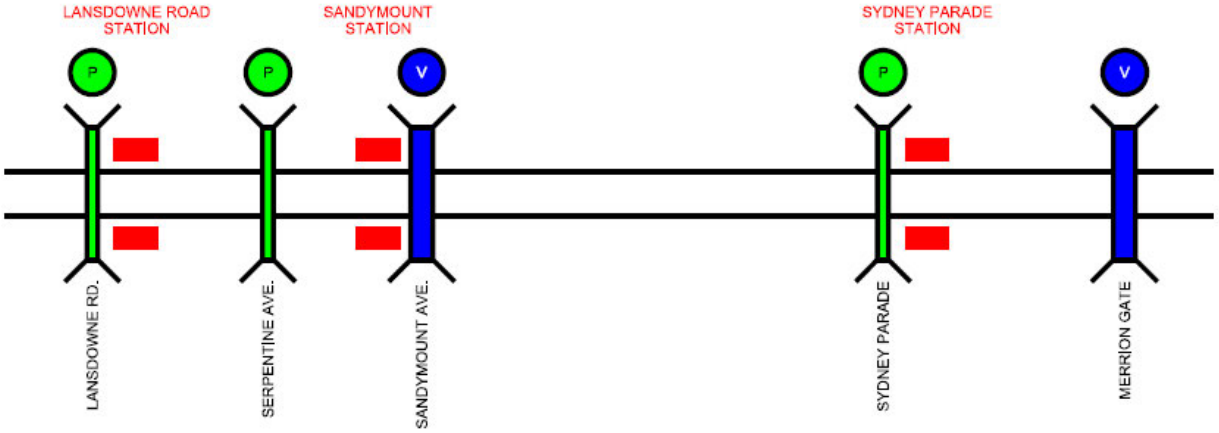


Figure 6-7 Accessibility Option 3B, Schematic

Option 3B considers Vehicle & Ped/Cycle provided on Sandymount Avenue and Merrion Gate, crossing over/under the Railway. Ped/Cycle only provided at Lansdowne Rd, Serpentine Avenue, and Sydney Parade, crossing over/under the Railway.

6.2.7 Option 3C

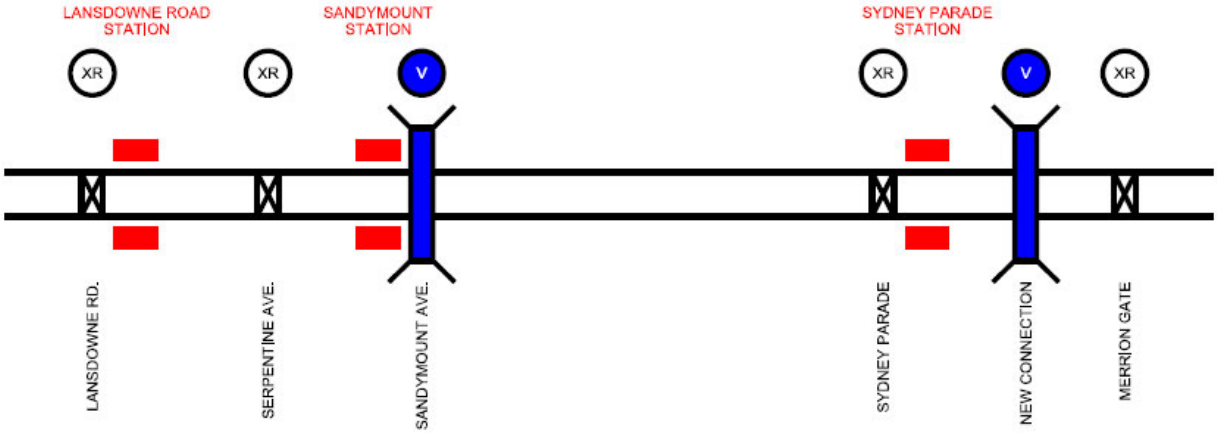


Figure 6-8 Accessibility Option 3C, Schematic

Option 3C considers Vehicle & Ped/Cycle provided on Sandymount Avenue and new Merrion Gate North, crossing over/under the Railway. Level Crossings XR001 (Lansdowne Rd), XR002 (Serpentine Avenue), XR004 (Sydney Parade) and XR005 (Merrion Gate) are retained. The two sole connection points in this option are deemed not sufficient to guarantee adequate connectivity in the wider area.

6.2.8 Option 3D

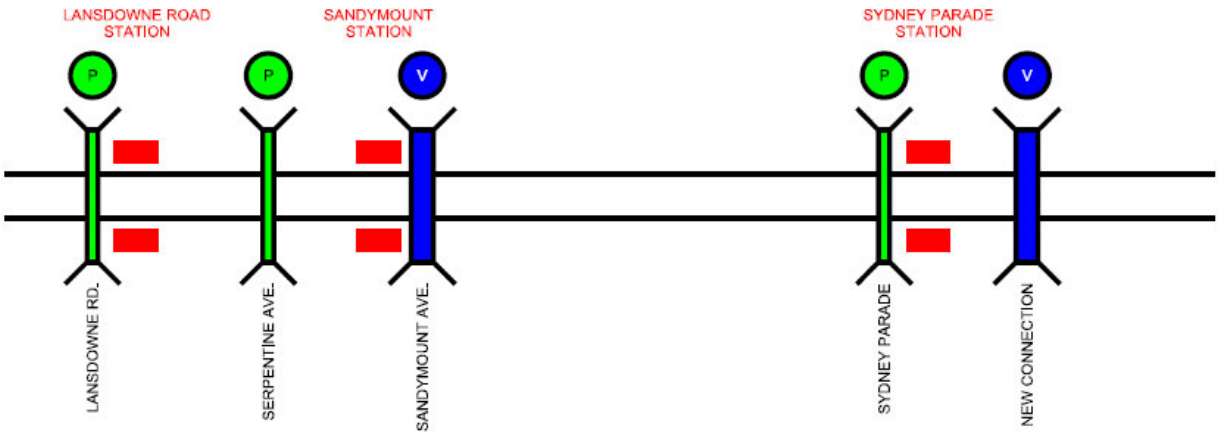


Figure 6-9 Accessibility Option 3D, Schematic

Option 3D considers Vehicle & Ped/Cycle provided on Sandymount Avenue and new Merrion Gate North, crossing over/under the Railway. Ped/Cycle only provided at Lansdowne Rd, Serpentine Avenue and Sydney Parade crossing over/under the Railway.

6.2.9 Option 4A

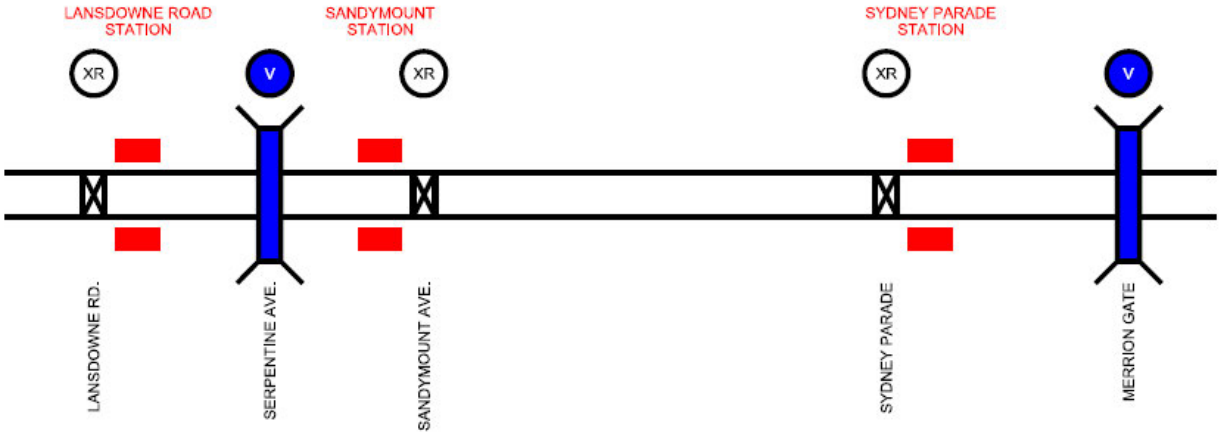


Figure 6-10 Accessibility Option 4A, Schematic

Option 4A considers Vehicle & Ped/Cycle provided on Serpentine Avenue and Merrion Gate, crossing over/under the Railway. Level Crossings XR001 (Lansdowne Rd), XR003 (Sandymount Avenue) and XR004 (Sydney Parade) are retained. The two sole connection points in this option are deemed not sufficient to guarantee adequate connectivity in the wider area.

6.2.10 Option 4B

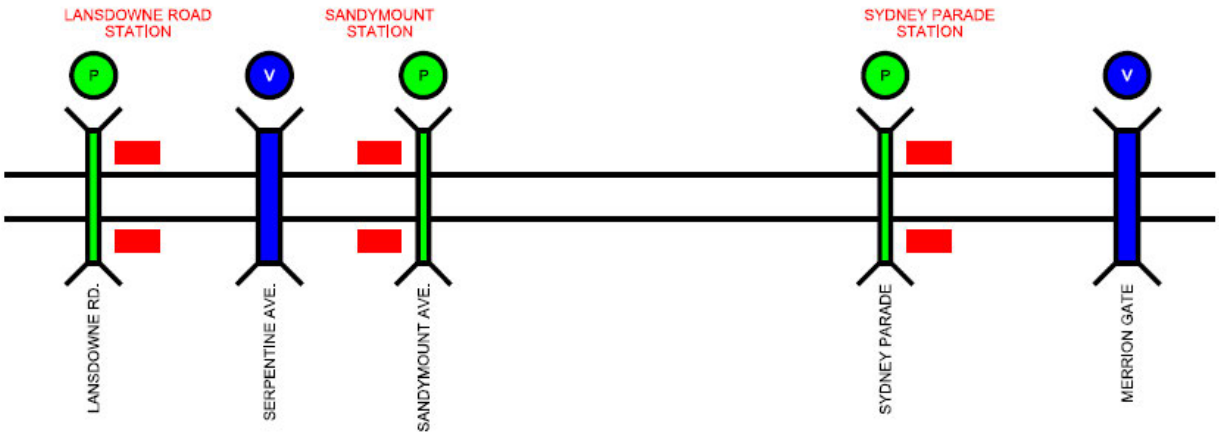


Figure 6-11 Accessibility Option 4B, Schematic

Option 4B considers Vehicle & Ped/Cycle provided on Serpentine Avenue and Merrion Gate, crossing over/under the Railway. Ped/Cycle only provided at Lansdowne Rd, Sandymount Avenue and Sydney Parade, crossing over/under the Railway.

6.2.11 Option 4C

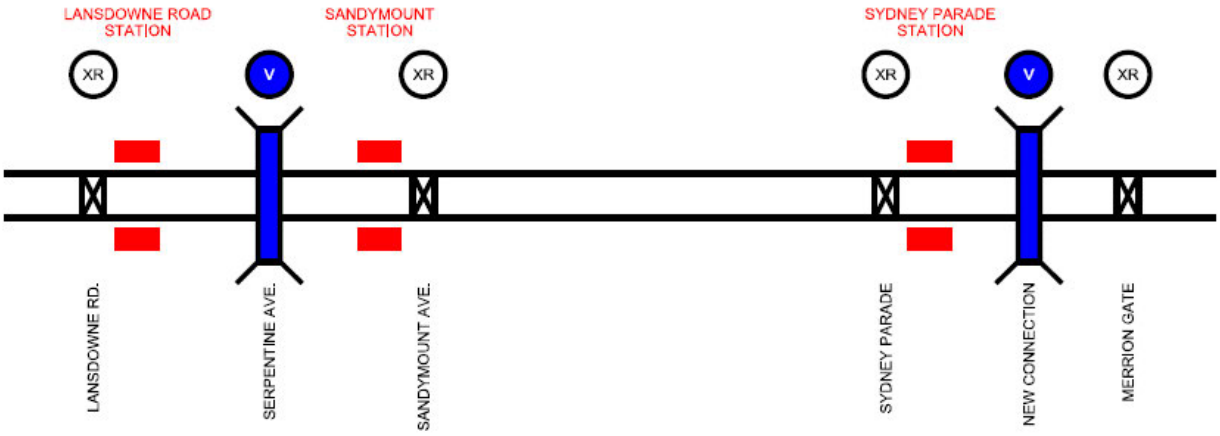


Figure 6-12 Accessibility Option 4C, Schematic

Option 4C considers Vehicle & Ped/Cycle provided on Serpentine Avenue and new Merrion Gate North, crossing over/under the Railway. Level Crossings XR001 (Lansdowne Rd), XR003 (Sandymount Avenue), XR004 (Sydney Parade) and XR005 (Merrion Gate) are retained. The two sole connection points in this option are deemed not sufficient to guarantee adequate connectivity in the wider area.

6.2.12 Option 4D

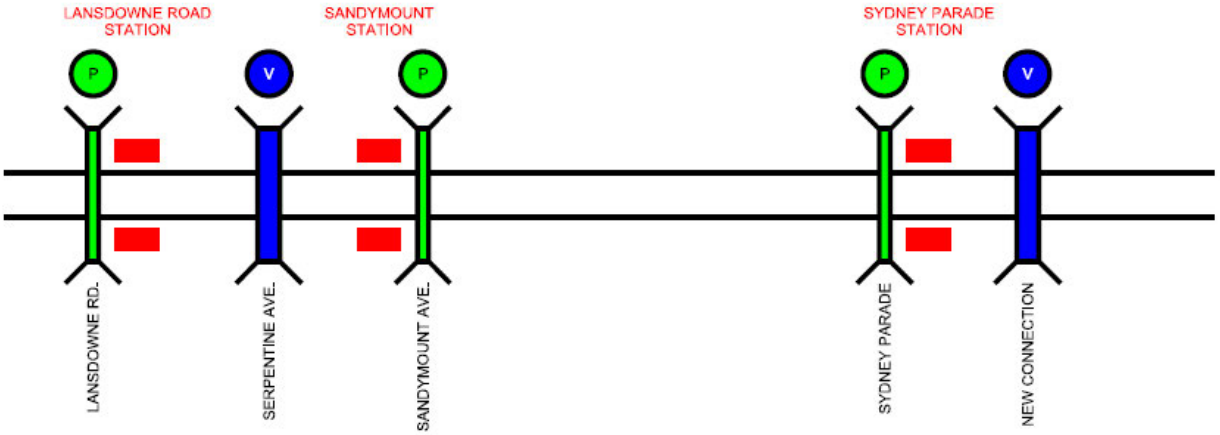


Figure 6-13 Accessibility Option 4D, Schematic

Option 4D considers Vehicle & Ped/Cycle provided on Serpentine Avenue and new Merrion Gate North, crossing over/under the Railway. Ped/Cycle only provided at Lansdowne Rd, Sandymount Avenue and Sydney Parade crossing over/under the Railway.

6.2.13 Option 5A

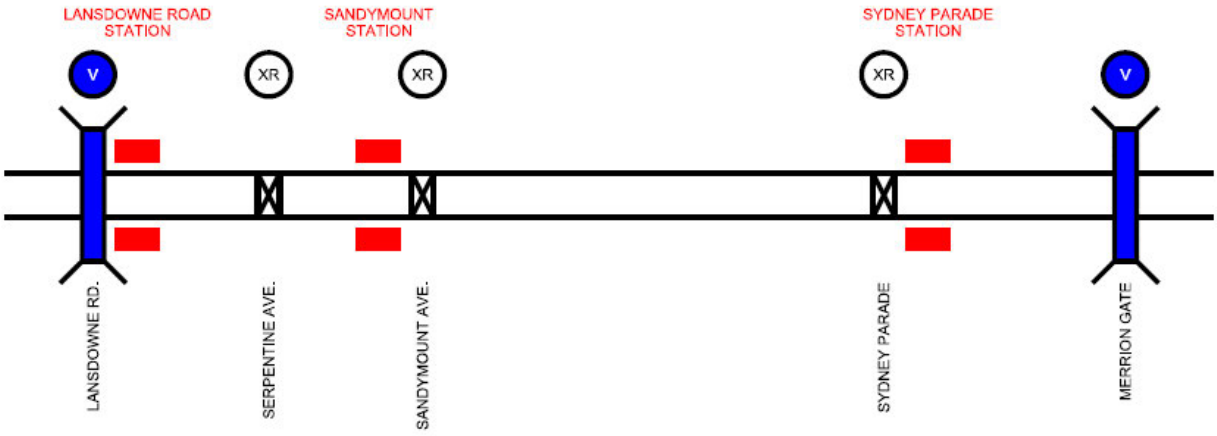


Figure 6-14 Accessibility Option 5A, Schematic

Option 5A considers Vehicle & Ped/Cycle provided on Lansdowne Rd and Merrion Gate, crossing over/under the Railway. Level Crossings XR002 (Serpentine Avenue), XR003 (Sandymount Avenue) and XR004 (Sydney Parade) are retained. Generally, the option of 'opening to fully vehicular' Lansdowne Road means dealing with noticeable constraints due to the presence of the Aviva Stadium. Major impediments are identified when considering proximity to these structures. The two sole connection points in this option are deemed not sufficient to guarantee adequate connectivity in the wider area.

6.2.14 Option 5B

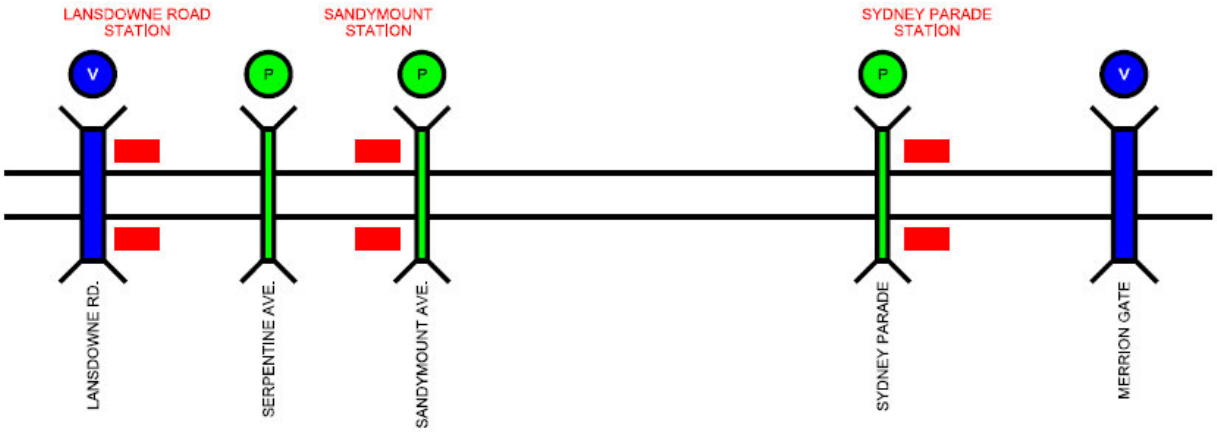


Figure 6-15 Accessibility Option 5B, Schematic

Option 5B considers Vehicle & Ped/Cycle provided on Lansdowne Rd and Merrion Gate, crossing over/under the Railway. Ped/Cycle only provided at Serpentine Avenue, Sandymount Avenue and Sydney Parade, crossing over/under the Railway.

6.2.15 Option 5C

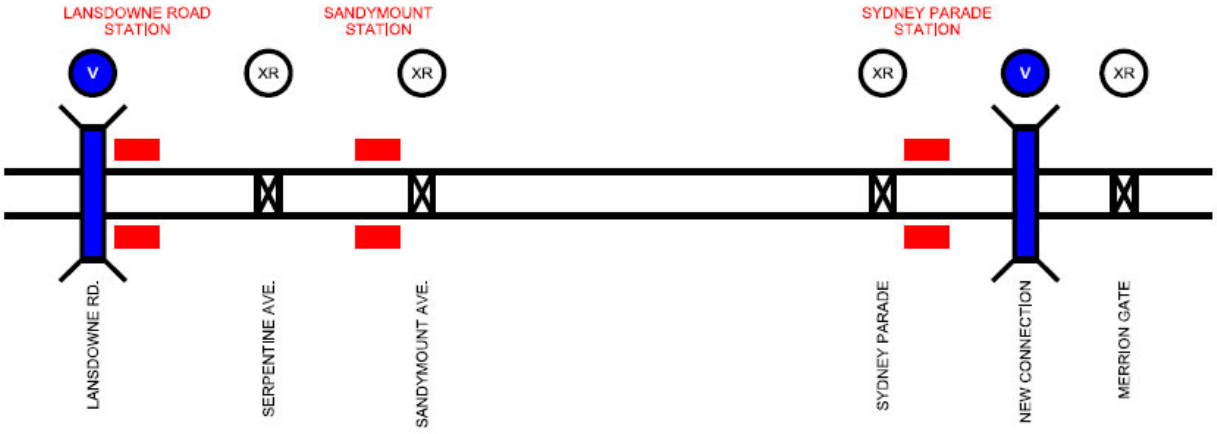


Figure 6-16 Accessibility Option 5C, Schematic

Option 5C considers Vehicle & Ped/Cycle provided on Lansdowne Rd and new Merrion Gate North, crossing over/under the Railway. Level Crossings XR002 (Serpentine Avenue), XR003 (Sandymount Avenue), XR004 (Sydney Parade) and XR005 (Merrion Gate) are retained. The two sole connection points in this option are deemed not sufficient to guarantee adequate connectivity in the wider area.

6.2.16 Option 5D

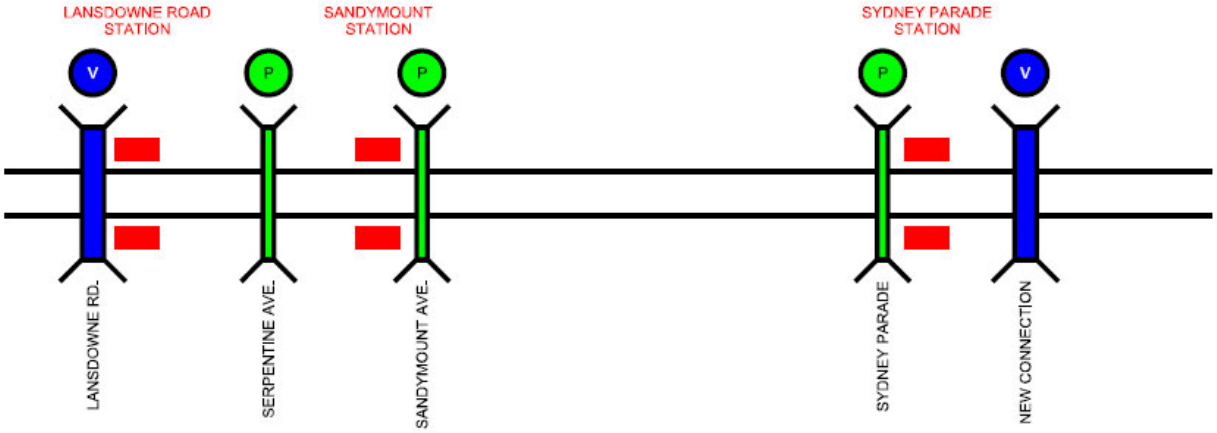


Figure 6-17 Accessibility Option 5D, Schematic

Option 5D considers Vehicle & Ped/Cycle provided on Lansdowne Rd and new Merrion Gate North, crossing over/under the Railway. Ped/Cycle only provided at Serpentine Avenue, Sandymount Avenue and Sydney Parade crossing over/under the Railway.

6.2.17 Option 6A

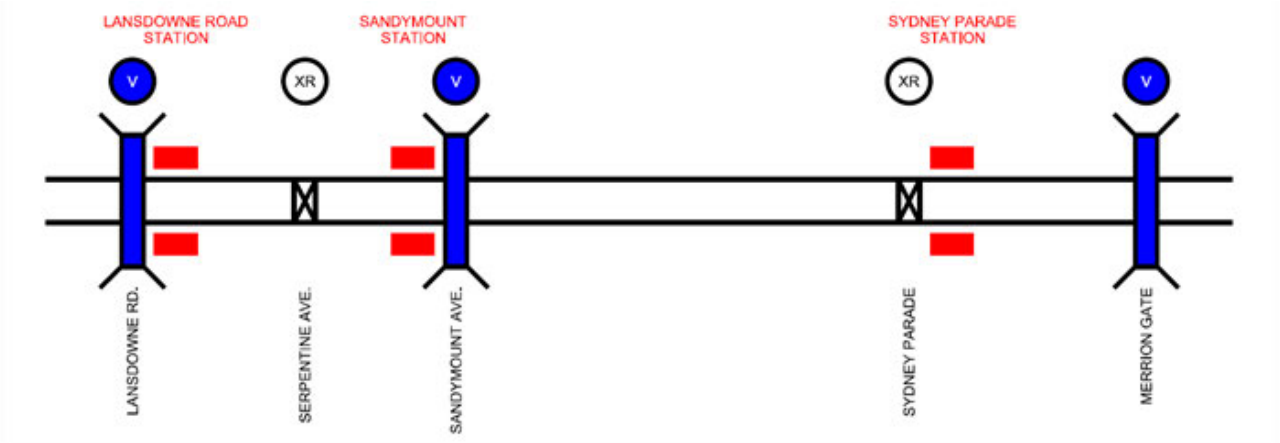


Figure 6-18 Accessibility Option 6A, Schematic

Option 6A considers Vehicle & Ped/Cycle provided on Lansdowne Rd, Sandymount Avenue and Merrion Gate, crossing over/under the Railway. Level Crossings XR002 (Serpentine Avenue) and XR004 (Sydney Parade) are retained. Generally, the option of 'opening to fully vehicular' Lansdowne Road means dealing with noticeable constraints due to the presence of the Aviva Stadium. Major impediments are identified when considering proximity to these structures. The two sole connection points in this option are deemed not sufficient to guarantee adequate connectivity in the wider area.

6.2.18 Option 6B

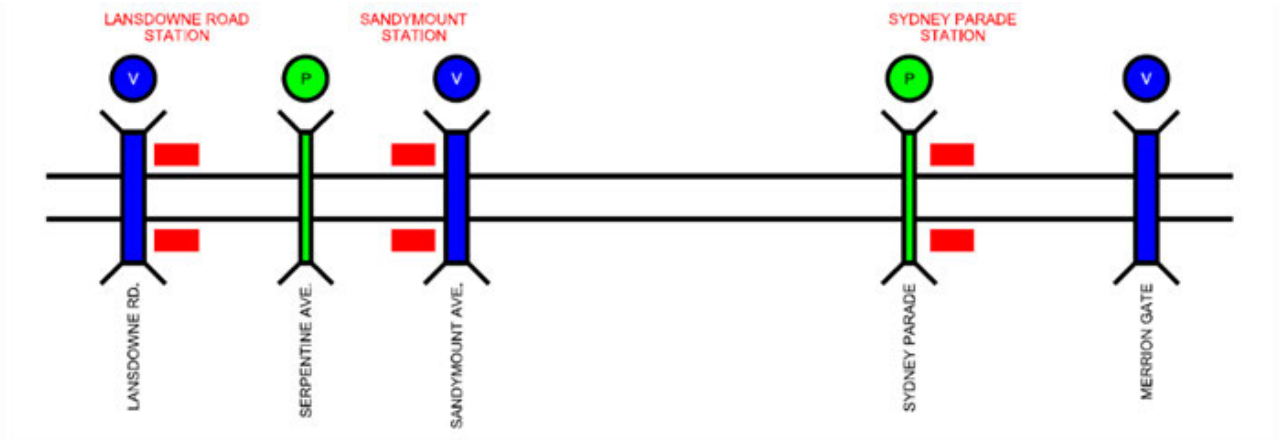


Figure 6-19 Accessibility Option 6B, Schematic

Option 6B considers Vehicle & Ped/Cycle provided on Lansdowne Rd, Sandymount Avenue and Merrion Gate, crossing over/under the Railway. Ped/Cycle only provided at Serpentine Avenue and Sydney Parade, crossing over/under the Railway.

6.2.19 Option 6C

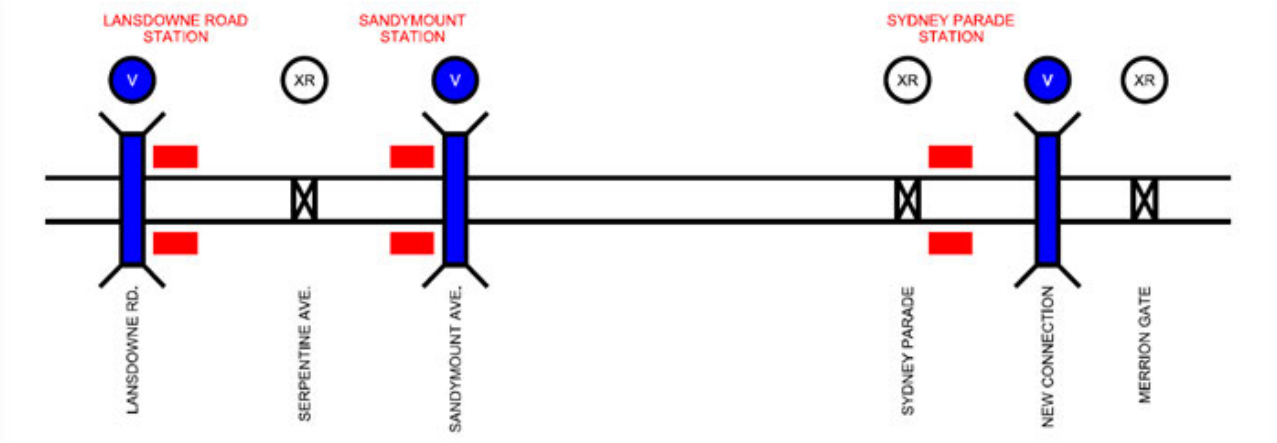


Figure 6-20 Accessibility Option 6C, Schematic

Option 6C considers Vehicle & Ped/Cycle provided on Lansdowne Rd, Sandymount Avenue and new Merrion Gate North, crossing over/under the Railway. Level Crossings XR002 (Serpentine Avenue), XR004 (Sydney Parade) and XR005 (Merrion Gate) are retained. The three connection points in this option are deemed not sufficient to guarantee adequate connectivity in the wider area.

6.2.20 Option 6D

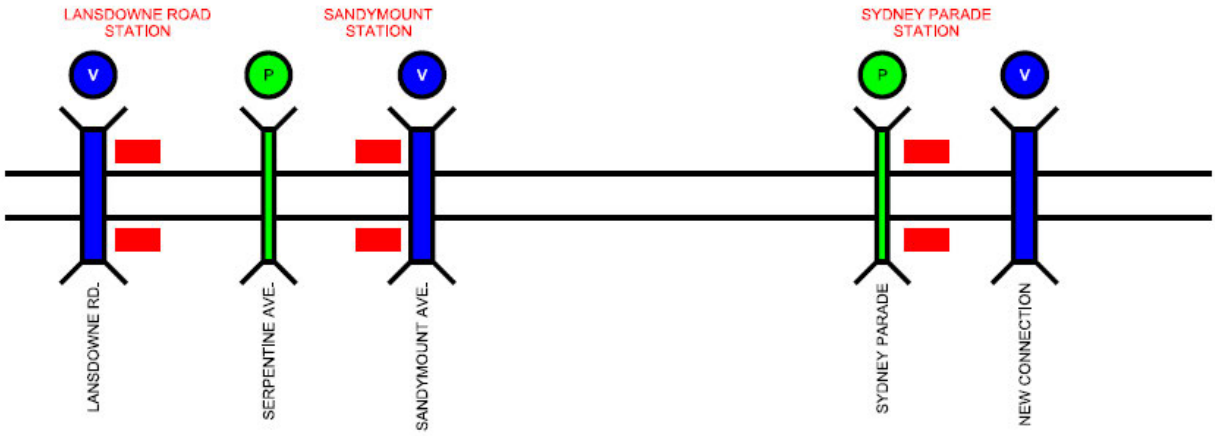


Figure 6-21 Accessibility Option 6D, Schematic

Option 6D considers Vehicle & Ped/Cycle provided on Lansdowne Rd, Sandymount Avenue and new Merrion Gate North, crossing over/under the Railway. Ped/Cycle only provided at Serpentine Avenue and Sydney Parade crossing over/under the Railway.

6.2.21 Option 7A

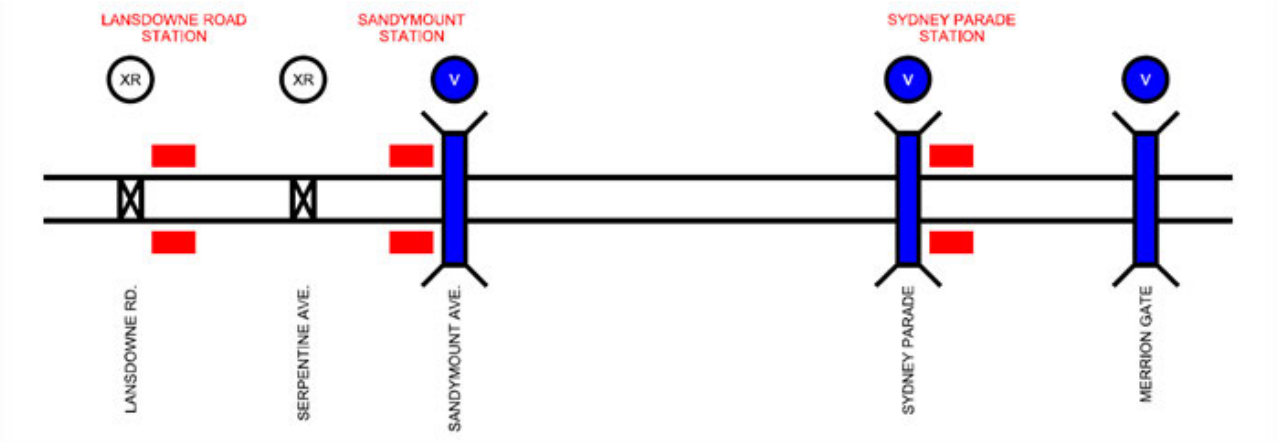


Figure 6-22 Accessibility Option 7A, Schematic

Option 7A considers Vehicle & Ped/Cycle provided on Sandymount Avenue, Sydney Parade and Merrion Gate, crossing over/under the Railway. Level Crossings XR001 (Lansdowne Rd) and XR002 (Serpentine Avenue) are retained. The three connection points in this option are deemed not sufficient to guarantee adequate connectivity in the wider area.

6.2.22 Option 7B

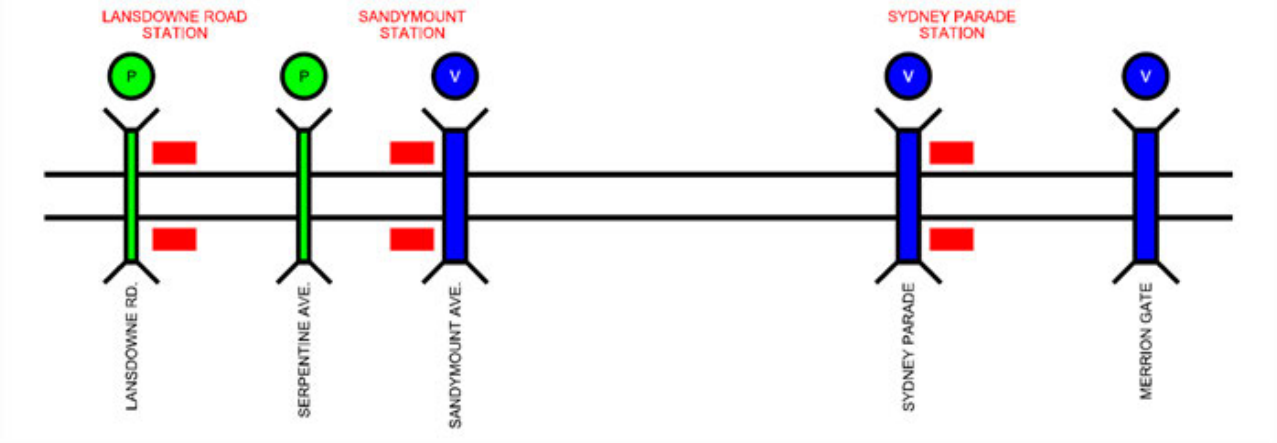


Figure 6-23 Accessibility Option 7B, Schematic

Option 7B considers Vehicle & Ped/Cycle provided on Sandymount Avenue, Sydney Parade and Merrion Gate, crossing over/under the Railway. Ped/Cycle only provided at Lansdowne Rd and Serpentine Avenue, crossing over/under the Railway.

6.2.23 Option 7C

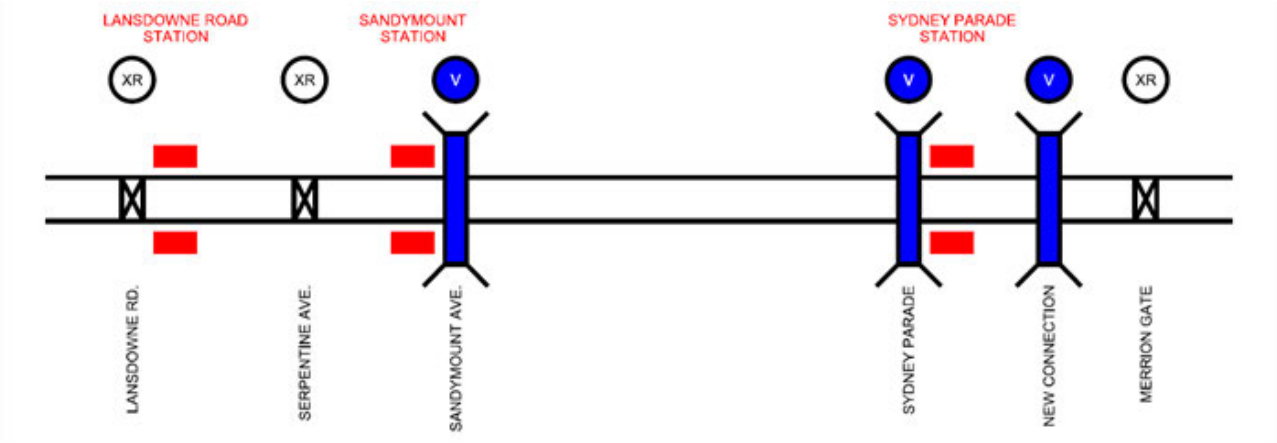


Figure 6-24 Accessibility Option 7C, Schematic

Option 7C considers Vehicle & Ped/Cycle provided on Sandymount Avenue, Sydney Parade and new Merrion Gate North, crossing over/under the Railway. Level Crossings XR001 (Lansdowne Rd), XR002 (Serpentine Avenue) and XR005 (Merrion Gate) are retained. The three connection points in this option are deemed not sufficient to guarantee adequate connectivity in the wider area.

6.2.24 Option 7D

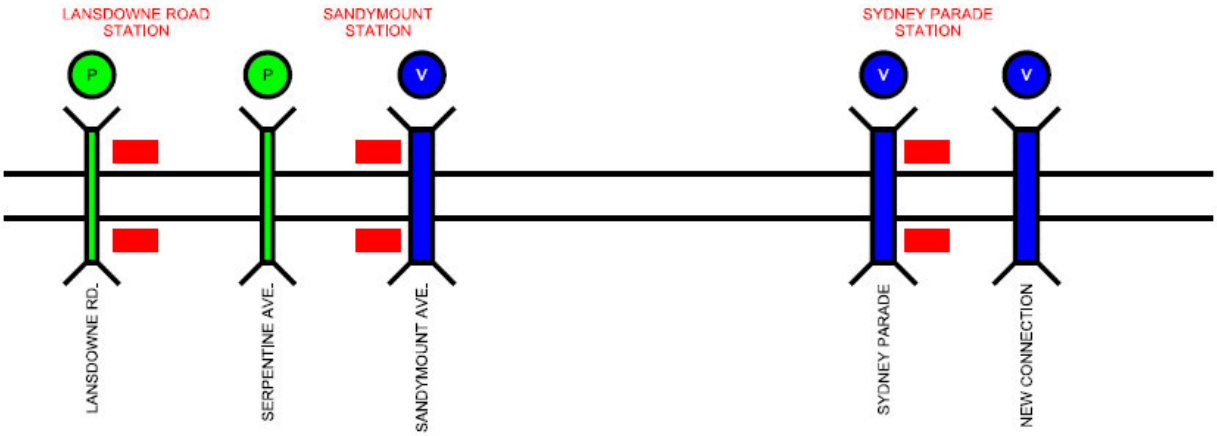


Figure 6-25 Accessibility Option 7D, Schematic

Option 7D considers Vehicle & Ped/Cycle provided on Sandymount Avenue, Sydney Parade and new Merrion Gate North, crossing over/under the Railway. Ped/Cycle only provided at Lansdowne Rd and Serpentine Avenue crossing over/under the Railway.

6.2.25 Option 8A

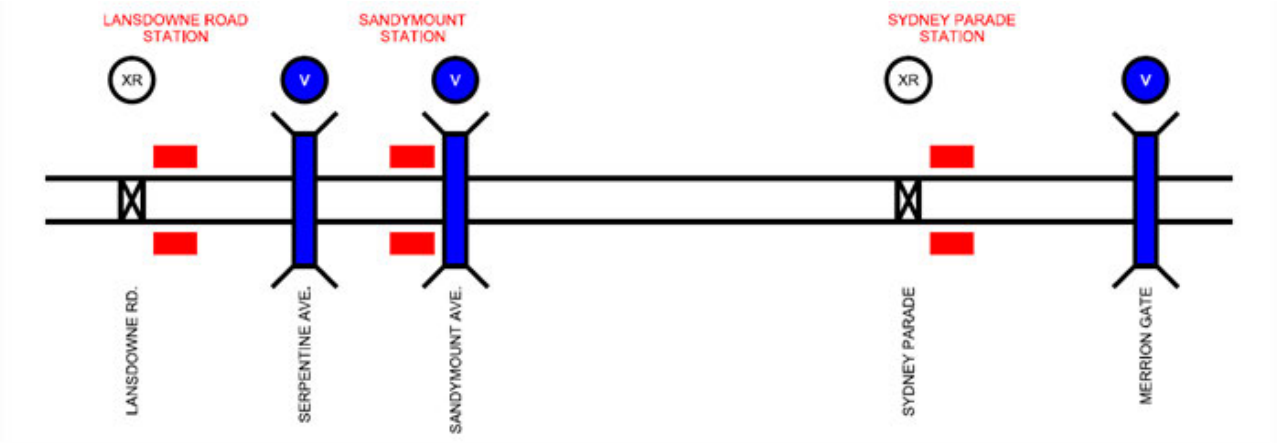


Figure 6-26 Accessibility Option 8A, Schematic

Option 8A considers Vehicle & Ped/Cycle provided on Serpentine Avenue, Sandymount Avenue and Merrion Gate, crossing over/under the Railway. Level Crossings XR001 (Lansdowne Rd) and XR004 (Sydney Parade) are retained. The three connection points in this option are deemed not sufficient to guarantee adequate connectivity in the wider area.

6.2.26 Option 8B

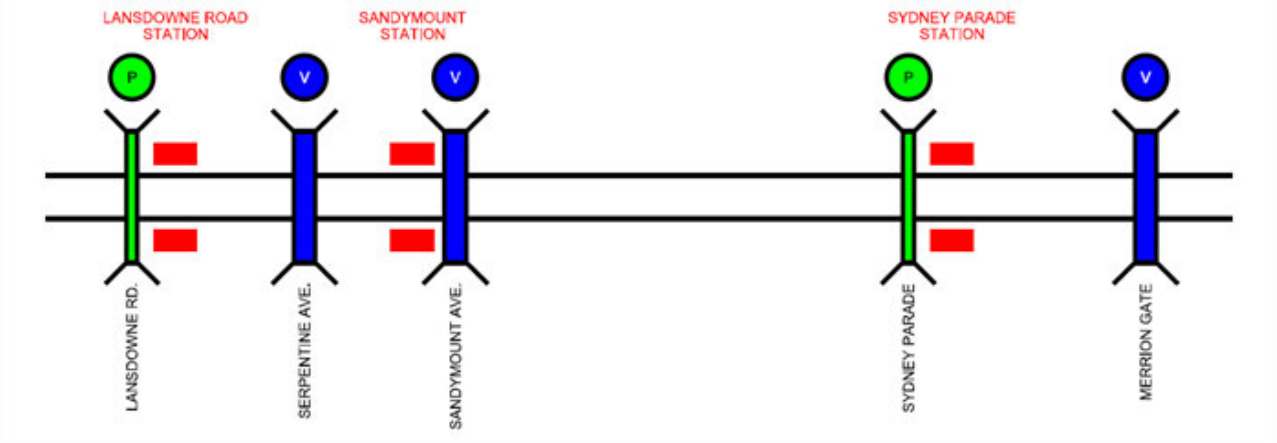


Figure 6-27 Accessibility Option 8B, Schematic

Option 8B considers Vehicle & Ped/Cycle provided on Serpentine Avenue, Sandymount Avenue and Merrion Gate, crossing over/under the Railway. Ped/Cycle only provided at Lansdowne Rd and Sydney Parade, crossing over/under the Railway.

6.2.27 Option 8C

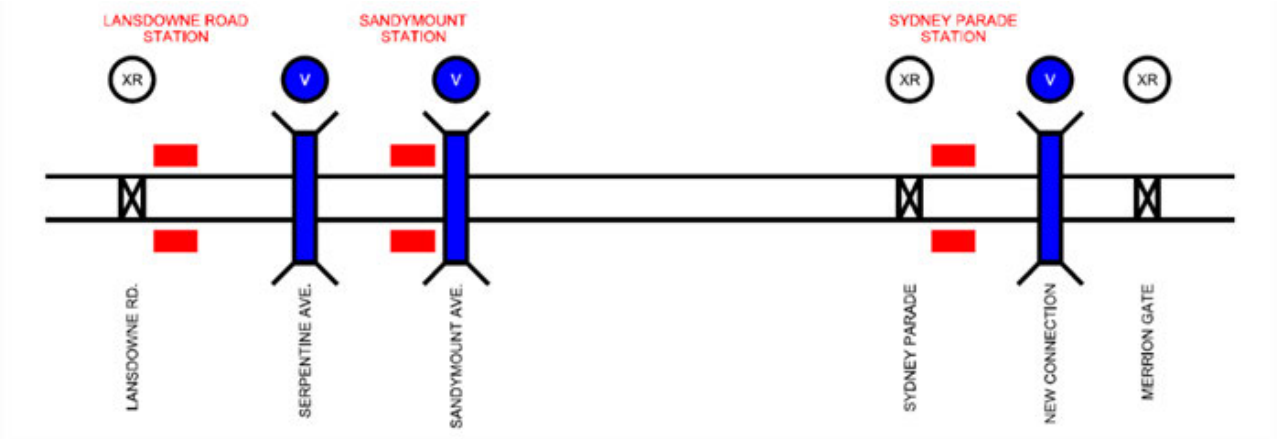


Figure 6-28: Accessibility Option 8C, Schematic

Option 8C considers Vehicle & Ped/Cycle provided on Serpentine Avenue, Sandymount Avenue and new Merrion Gate North, crossing over/under the Railway. Level Crossings XR001 (Lansdowne Rd), XR004 (Sydney Parade) and XR005 (Merrion Gate) are retained. The three connection points in this option are deemed not sufficient to guarantee adequate connectivity in the wider area.

6.2.28 Option 8D

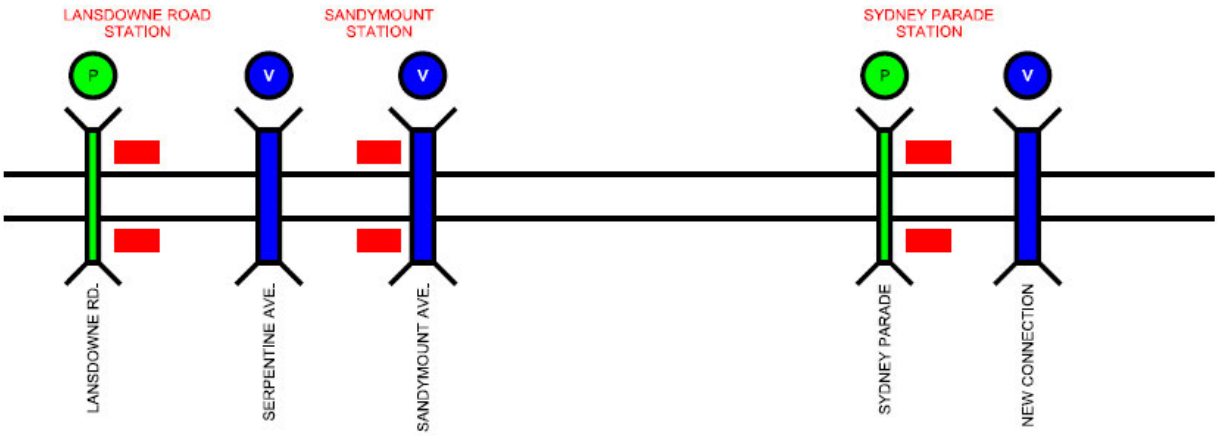


Figure 6-29 Accessibility Option 8D, Schematic

Option 8D considers Vehicle & Ped/Cycle provided on Serpentine Avenue, Sandymount Avenue and new Merrion Gate North, crossing over/under the Railway. Ped/Cycle only provided at Lansdowne Rd and Sydney Parade crossing over/under the Railway.

6.2.29 Option 9A

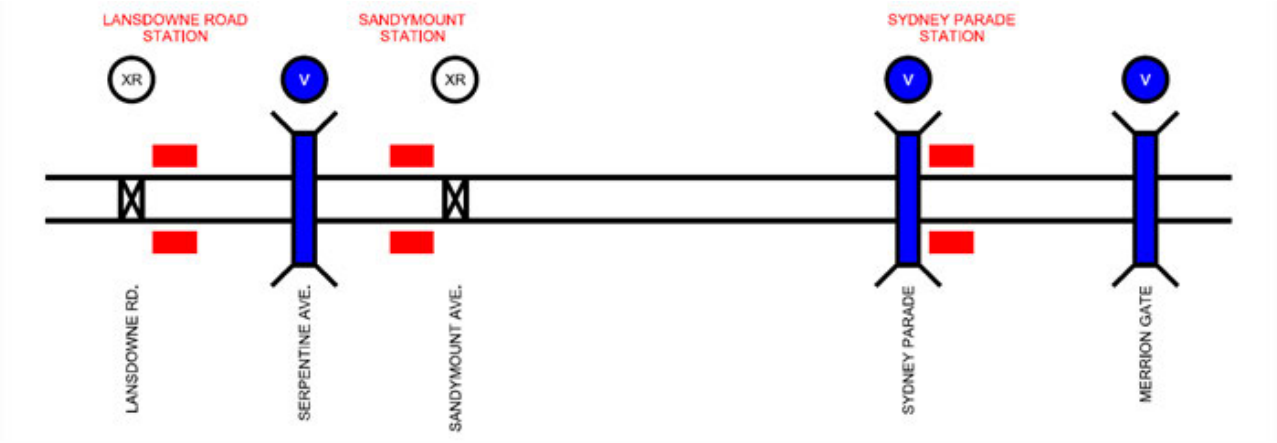


Figure 6-30 Accessibility Option 9A, Schematic

Option 9A considers Vehicle & Ped/Cycle provided on Serpentine Avenue, Sydney Parade and Merrion Gate, crossing over/under the Railway. Level Crossings XR001 (Lansdowne Rd) and XR003 (Sandymount Avenue) are retained. The three connection points in this option are deemed not sufficient to guarantee adequate connectivity in the wider area.

6.2.30 Option 9B

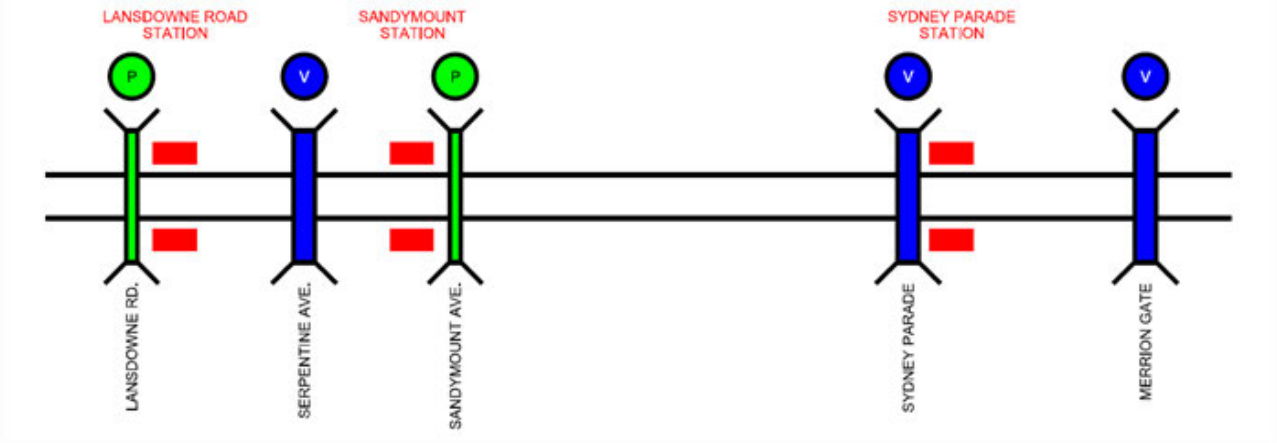


Figure 6-31 Accessibility Option 9B, Schematic

Option 9B considers Vehicle & Ped/Cycle provided on Serpentine Avenue, Sydney Parade and Merrion Gate, crossing over/under the Railway. Ped/Cycle only provided at Lansdowne Rd and Sandymount Avenue, crossing over/under the Railway.

6.2.31 Option 9C

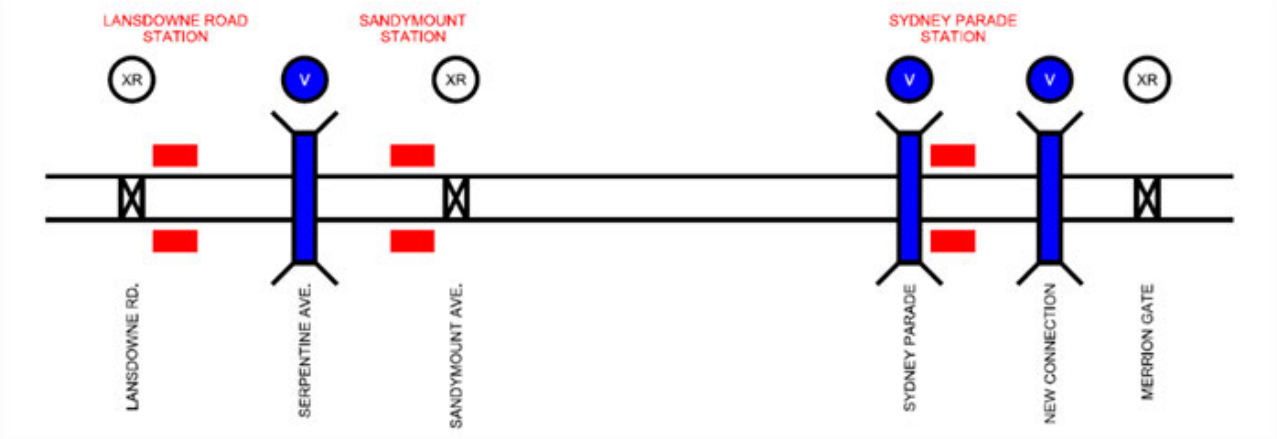


Figure 6-32 Accessibility Option 9C, Schematic

Option 9C considers Vehicle & Ped/Cycle provided on Serpentine Avenue, Sydney Parade, and new Merrion Gate North, crossing over/under the Railway. Level Crossings XR001 (Lansdowne Rd), XR003 (Sandymount Avenue) and XR005 (Merrion Gate) are retained. The three connection points in this option are deemed not sufficient to guarantee adequate connectivity in the wider area.

6.2.32 Option 9D

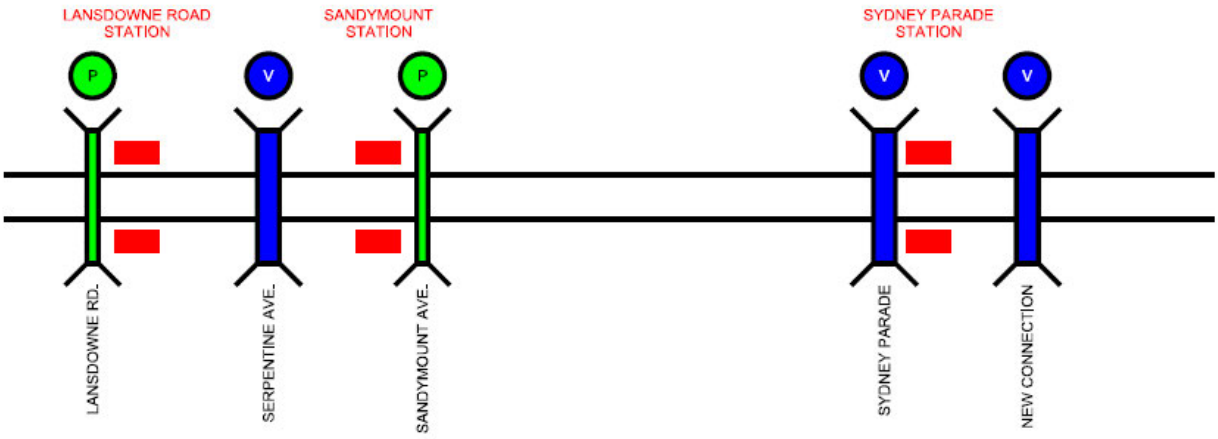


Figure 6-33 Accessibility Option 9D, Schematic

Option 9D considers Vehicle & Ped/Cycle provided on Serpentine Avenue, Sydney Parade, and new Merrion Gate North, crossing over/under the Railway. Ped/Cycle only provided at Lansdowne Rd and Sandymount Avenue crossing over/under the Railway.

6.2.33 Option 10A

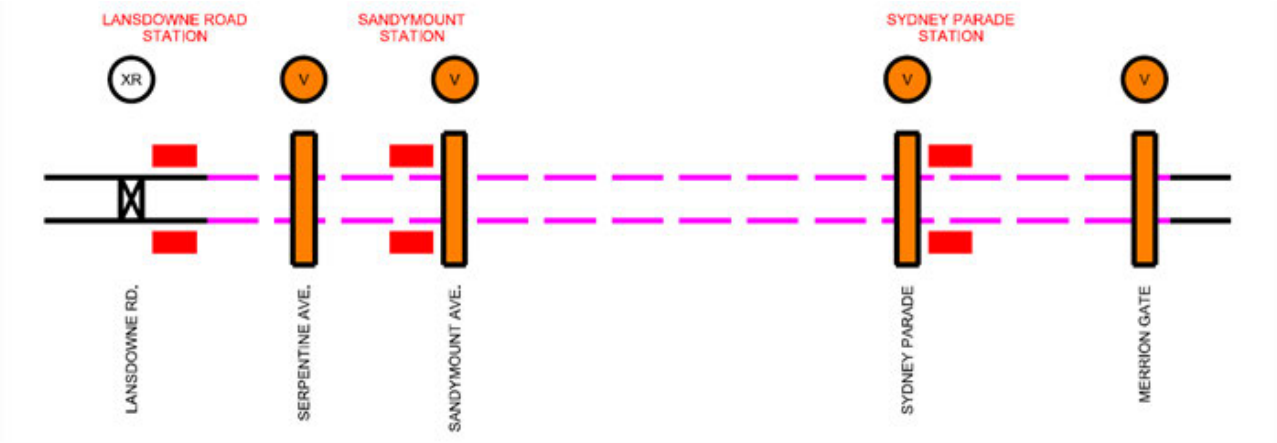


Figure 6-34 Accessibility Option 10A, Schematic

Option 10A considers grade separation by lowering the railway, Sandymount and Sydney Parade Stations into a cut & cover infrastructure solution. Vehicle & Ped/Cycle provided on Serpentine Avenue, Sandymount Avenue, Sydney Parade and Merrion Gate, crossings at-grade. Level Crossing XR001 retained at Lansdowne Rd. Generally, the option of 'opening to fully vehicular at grade' may have constraints in terms of length and the feasibility of a potential railway tunnel or cut and cover in proximity of the crossing. This might mean dealing with major impediments on the technical side.

6.2.34 Option 10B

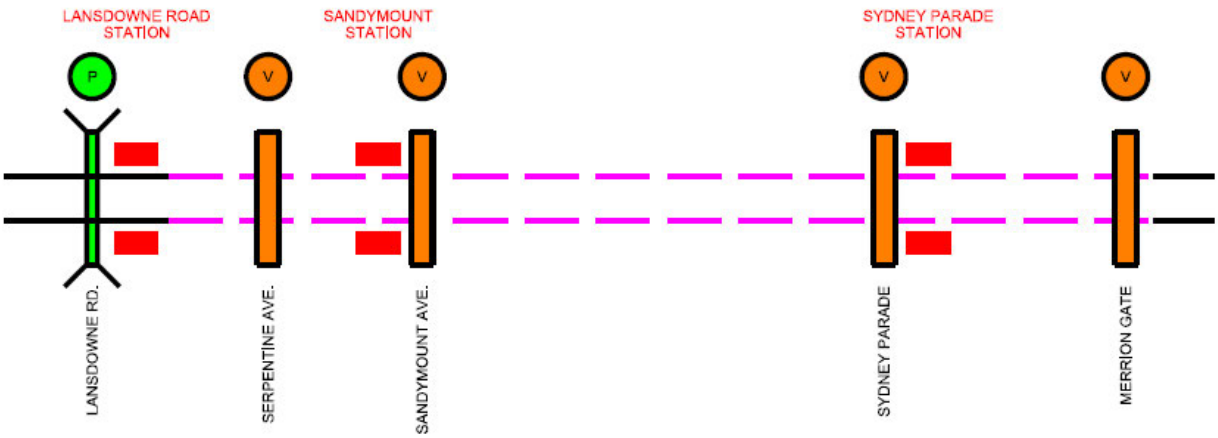


Figure 6-35 Accessibility Option 10B, Schematic

Option 10B considers grade separation by lowering the railway, Sandymount and Sydney Parade Stations into a cut & cover infrastructure solution. Vehicle & Ped/Cycle provided on Serpentine Avenue, Sandymount Avenue, Sydney Parade and Merrion Gate, crossings at-grade. Ped/Cycle only provided at Lansdowne Rd, crossing over/under the Railway.

6.2.35 Option 10C

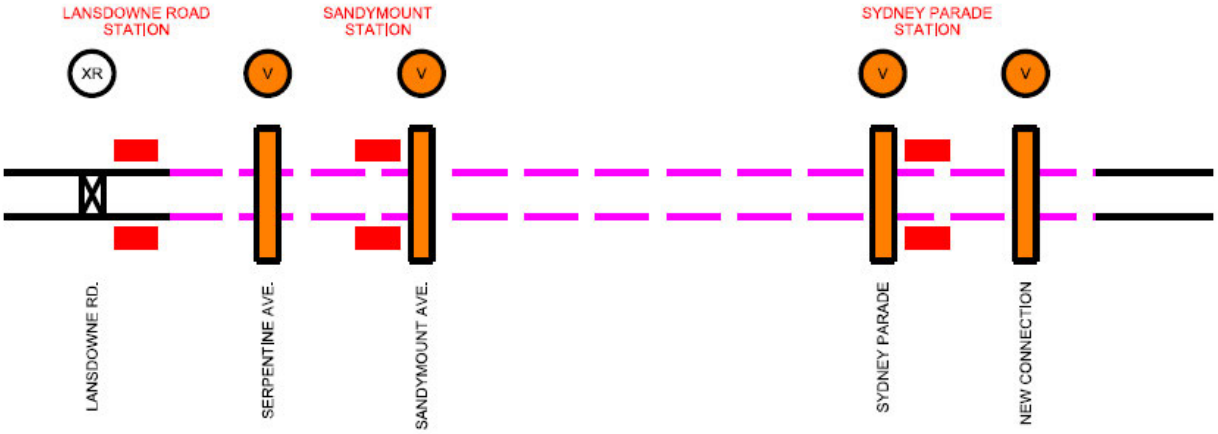


Figure 6-36 Accessibility Option 10C, Schematic

Option 10C considers grade separation by lowering the railway, Sandymount and Sydney Parade Stations into a cut & cover infrastructure solution. Vehicle & Ped/Cycle provided on Serpentine Avenue, Sandymount Avenue, Sydney Parade and Merrion Gate North, crossings at-grade. Level Crossing XR001 retained at Lansdowne Rd.

6.2.36 Option 10D

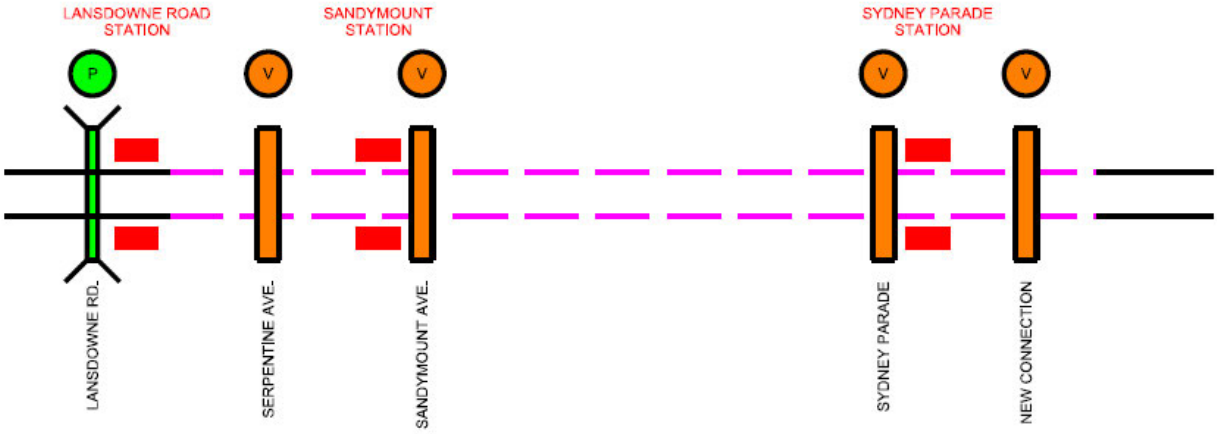


Figure 6-37 Accessibility Option 10D, Schematic

Option 10D considers grade separation by lowering the railway, Sandymount and Sydney Parade Stations into a cut & cover infrastructure solution. Vehicle & Ped/Cycle provided on Serpentine Avenue, Sandymount Avenue, Sydney Parade and Merrion Gate North, crossings at-grade. Ped/Cycle only provided at Lansdowne Rd, crossing over/under the Railway.

6.2.37 Option 11A

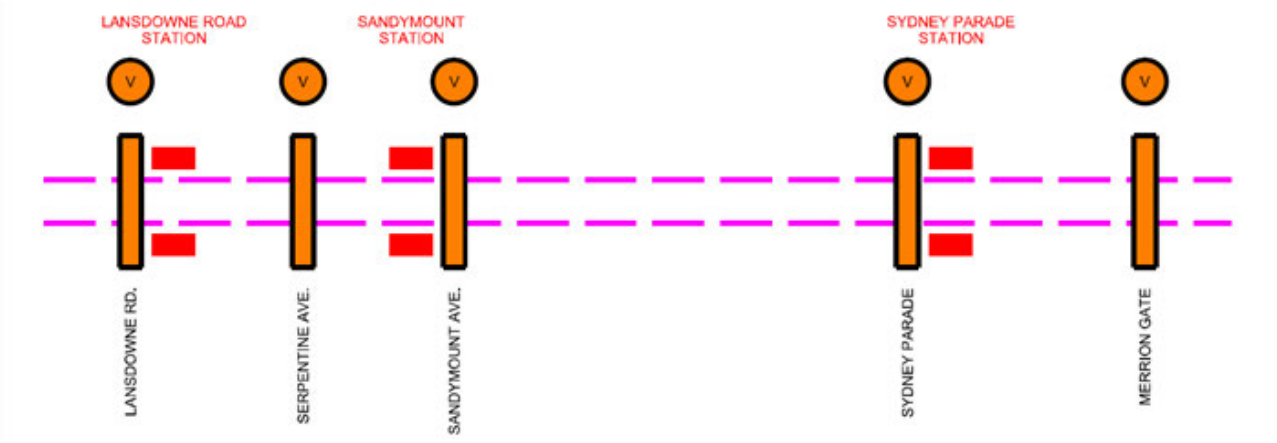


Figure 6-38 Accessibility Option 11A, Schematic

Option 11A considers grade separation by lowering the railway, Lansdowne Rd, Sandymount and Sydney Parade Stations into a tunnel / cut & cover infrastructure solution. Vehicle & Ped/Cycle provided on Lansdowne Rd, Serpentine Avenue, Sandymount Avenue, Sydney Parade and Merrion Gate, crossings at-grade. Generally, the option of 'opening to fully vehicular at grade' may have constraints in terms of length and the feasibility of a potential railway tunnel or cut and cover in proximity of the crossing. This might mean dealing with major impediments on the technical side.

6.2.38 Option 11B

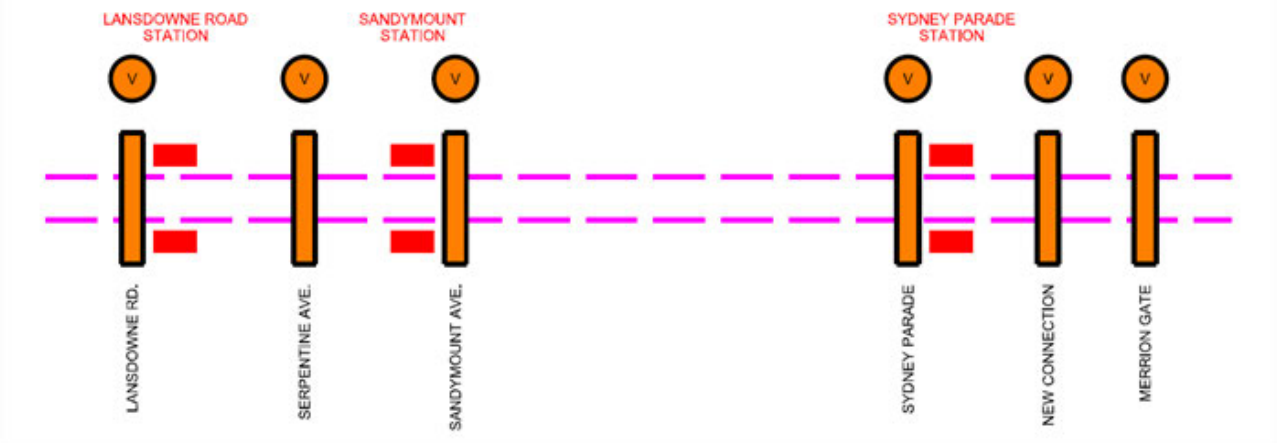


Figure 6-39 Accessibility Option 11B, Schematic

Option 11B considers grade separation by lowering the railway, Lansdowne Rd, Sandymount and Sydney Parade Stations into a tunnel / cut & cover infrastructure solution. Vehicle & Ped/Cycle provided on Lansdowne Rd, Serpentine Avenue, Sandymount Avenue, Sydney Parade, Merrion Gate North and Merrion Gate, crossings at-grade.

6.3 Shortlist of Accessibility Options

The following observations were made as part of the assessment of the longlist options:

- The provision of pedestrian and cycle connectivity across the rail line is essential for local connectivity but also to enable links to existing and future bus-based public transport along the Merrion Road corridor.
- Serpentine Avenue and Merrion Gates crossing locations were identified as having the most impact from a strategic function point of view.
- The provision of only one full crossing was only deemed feasible in the vicinity of Merrion Gates, due to the strategic nature and capacity of Merrion Gates. The crossing currently accommodates around 40% of the vehicular traffic across the rail line and allows connection with the wider regional road network and the East Link Toll Bridge. It is considered as a limit case but was included in the longlist of possible options.
- In general, a full connection at the existing Merrion Gates location only is deemed not sufficient to guarantee adequate connectivity in the wider area with respect to pedestrians and cyclists. Therefore, an alternative crossing location at Merrion Gates must be considered, in addition to the five level crossings, as part of the possible permutations.

The accessibility options were assessed against the programme objectives and requirements set out in Section 3; as follows:

- Options considering a potential cut-and cover or railway tunnel solution (Options 10 and 11) failed against two objectives. These options do not deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works (Objective 3). These options also do not minimise adverse impact on existing rail services, road users and landowners associated with the construction, operation, and maintenance of the project (Objective 6).
- Options considering keeping level crossings open (Option 1) failed as these options did not provide an appropriate level of vehicular access across the railway line to/from Sandymount village and neighbouring areas for all modes (Requirement 3).
- Options that present a significant requirement for additional land failed as these options did not minimise adverse impact on the natural and built environment associated with the construction, operation, and maintenance of the project (Objective 5). These included options considering Lansdowne Road (Options 5 and 6) and options considering a potential cut-and-cover or railway tunnel solution (Options 10 and 11).
- Options that provide only one non-strategic vehicular crossing failed as these options did not provide an appropriate level of vehicular access across the railway line to/from Sandymount village and neighbouring areas for all modes (Requirement 3). This included Option 2A.
- Options that do not provide pedestrian and cyclist crossings failed as these options do not provide an appropriate level of accessibility at local level for pedestrians and cyclists (Requirement 4). These included Options 1, 2A, 2B, 3A, 3C, 4A, 4C, 5A, 5C, 6A, 6C, 7A, 7C, 8A, 8C, 9A and 9C.

Table 6-1 provides a summary of the Longlist Sifting Process for the Accessibility Options.

Table 6-1 Accessibility Options Longlist Sifting Process Summary

Option	Sifting Outcome	Description
1	Fail	This option fails as it does not provide an appropriate level of accessibility at local level for pedestrians and cyclists, and it does not provide an appropriate level of vehicular access across the railway line to/from Sandymount village and neighbouring areas for all modes. The option also does not minimise adverse impacts on existing rail services, road users and landowners associated with the construction, operation, and maintenance of the project.
2A	Fail	This option fails as it does not provide an appropriate level of accessibility at local level for pedestrians and cyclists.
2B	Fail	This option fails as it does not provide an appropriate level of accessibility at local level for pedestrians and cyclists.
2C	Pass	This option meets all project objectives and requirements; therefore, it passes the assessment.
3A	Fail	This option fails as it does not provide an appropriate level of accessibility at local level for pedestrians and cyclists.
3B	Pass	This option meets all project objectives and requirements; therefore, it passes the assessment.
3C	Fail	This option fails as it does not provide an appropriate level of accessibility at local level for pedestrians and cyclists.
3D	Pass	This option meets all project objectives and requirements; therefore, it passes the assessment.
4A	Fail	This option fails as it does not provide an appropriate level of accessibility at local level for pedestrians and cyclists.
4B	Pass	This option meets all project objectives and requirements; therefore, it passes the assessment.
4C	Fail	This option fails as it does not provide an appropriate level of accessibility at local level for pedestrians and cyclists.
4D	Pass	This option meets all project objectives and requirements; therefore, it passes the assessment.
5A	Fail	This option fails as it does not provide an appropriate level of accessibility at local level for pedestrians and cyclists, and it does not minimise adverse impact on the natural and built environment associated with the construction, operation, and maintenance of the project.
5B	Fail	This option fails as it does not minimise adverse impact on the natural and built environment associated with the construction, operation, and maintenance of the project.
5C	Fail	This option fails as it does not provide an appropriate level of accessibility at local level for pedestrians and cyclists, and it does not minimise adverse impact on the natural and built environment associated with the construction, operation, and maintenance of the project.
5D	Fail	This option fails as it does not minimise adverse impact on the natural and built environment associated with the construction, operation, and maintenance of the project.

Option	Sifting Outcome	Description
6A	Fail	This option fails as it does not provide an appropriate level of accessibility at local level for pedestrians and cyclists, and it does not minimise adverse impact on the natural and built environment associated with the construction, operation, and maintenance of the project.
6B	Fail	This option fails as it does not minimise adverse impact on the natural and built environment associated with the construction, operation, and maintenance of the project.
6C	Fail	This option fails as it does not provide an appropriate level of accessibility at local level for pedestrians and cyclists, and it does not minimise adverse impact on the natural and built environment associated with the construction, operation, and maintenance of the project.
6D	Fail	This option fails as it does not minimise adverse impact on the natural and built environment associated with the construction, operation, and maintenance of the project.
7A	Fail	This option fails as it does not provide an appropriate level of accessibility at local level for pedestrians and cyclists.
7B	Pass	This option meets all project objectives and requirements; therefore, it passes the assessment.
7C	Fail	This option fails as it does not provide an appropriate level of accessibility at local level for pedestrians and cyclists.
7D	Pass	This option meets all project objectives and requirements; therefore, it passes the assessment.
8A	Fail	This option fails as it does not provide an appropriate level of accessibility at local level for pedestrians and cyclists.
8B	Pass	This option meets all project objectives and requirements; therefore, it passes the assessment.
8C	Fail	This option fails as it does not provide an appropriate level of accessibility at local level for pedestrians and cyclists.
8D	Pass	This option meets all project objectives and requirements; therefore, it passes the assessment.
9A	Fail	This option fails as it does not provide an appropriate level of accessibility at local level for pedestrians and cyclists.
9B	Pass	This option meets all project objectives and requirements; therefore, it passes the assessment.
9C	Fail	This option fails as it does not provide an appropriate level of accessibility at local level for pedestrians and cyclists.
9D	Pass	This option meets all project objectives and requirements; therefore, it passes the assessment.
10A	Fail	This option fails as it does not minimise adverse impact on the natural and built environment associated with the construction, operation and maintenance of the project and it does not deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works; and it does not minimise adverse impact on existing rail services, road users and landowners associated with the construction, operation and maintenance of the project.

Option	Sifting Outcome	Description
10B	Fail	This option fails as it does not minimise adverse impact on the natural and built environment associated with the construction, operation and maintenance of the project and it does not deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works; and it does not minimise adverse impact on existing rail services, road users and landowners associated with the construction, operation and maintenance of the project.
10C	Fail	This option fails as it does not minimise adverse impact on the natural and built environment associated with the construction, operation and maintenance of the project and it does not deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works; and it does not minimise adverse impact on existing rail services, road users and landowners associated with the construction, operation and maintenance of the project.
10D	Fail	This option fails as it does not minimise adverse impact on the natural and built environment associated with the construction, operation and maintenance of the project and it does not deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works; and it does not minimise adverse impact on existing rail services, road users and landowners associated with the construction, operation and maintenance of the project.
11A	Fail	This option fails as it does not minimise adverse impact on the natural and built environment associated with the construction, operation and maintenance of the project and it does not deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works; and it does not minimise adverse impact on existing rail services, road users and landowners associated with the construction, operation and maintenance of the project.
11B	Fail	This option fails as it does not minimise adverse impact on the natural and built environment associated with the construction, operation and maintenance of the project and it does not deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works; and it does not minimise adverse impact on existing rail services, road users and landowners associated with the construction, operation and maintenance of the project.
10C	Fail	This option fails as it does not minimise adverse impact on the natural and built environment associated with the construction, operation and maintenance of the project and it does not deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works; and it does not minimise adverse impact on existing rail services, road users and landowners associated with the construction, operation and maintenance of the project.
10D	Fail	This option fails as it does not minimise adverse impact on the natural and built environment associated with the construction, operation and maintenance of the project and it does not deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works; and it does not minimise adverse impact on existing rail services, road users and landowners associated with the construction, operation and maintenance of the project.

11 Options were shortlisted to be brought forward to MCA, from a Longlist of 39 options identified in Section 5, as they met all the project objectives and requirements. The shortlisted options were:

- **Option 2C**: 1 Full Crossing (Merrion Gates North) + 4 Ped/Cycle Crossings;
- **Option 3B**: 2 Full Crossings (Sandymount & Merrion Gates) + 3 Ped/Cycle Crossings;
- **Option 3D**: 2 Full Crossings (Sandymount & Merrion Gates North) + 3 Ped/Cycle Crossings;
- **Option 4B**: 2 Full Crossings (Serpentine & Merrion Gates) + 3 Ped/Cycle Crossings;
- **Option 4D**: 2 Full Crossings (Serpentine & Merrion Gates North) + 3 Ped/Cycle Crossings;
- **Option 7B**: 3 Full Crossings (Sandymount, Sydney Parade & Merrion Gates) + 2 Ped/Cycle Crossings;
- **Option 7D**: 3 Full Crossings (Sandymount, Sydney Parade & Merrion Gate North) + 2 Ped/Cycle Crossings;
- **Option 8B**: 3 Full Crossings (Serpentine, Sandymount & Merrion Gates) + 2 Ped/Cycle Crossings;
- **Option 8D**: 3 Full Crossings (Serpentine, Sandymount & Merrion Gate North) + 2 Ped/Cycle Crossings;
- **Option 9B**: 3 Full Crossings (Serpentine, Sydney Parade & Merrion Gates) + 2 Ped/Cycle Crossings;
- **Option 9D**: 3 Full Crossings (Serpentine, Sydney Parade & Merrion Gate North) + 2 Ped/Cycle Crossings.

6.4 Infrastructure Options

A high-level appraisal of engineering feasibility associated with the provision of full grade-separated crossings, and pedestrian/cyclist only crossings, was carried out.

The longlist of concept options, outlined in Section 5.2, was applied to each location to identify key constraints and high-level feasibility of the proposals. This formed the long list of options which would be sifted to select the shortlist. The figures show an indicative illustration of how the arrangement of the options may be provided; however, they do not represent a final option design. The Emerging Preferred Option will be developed further at Preliminary Design Stage.

Additional land take of properties in the surrounding area of the crossing may be required as part of the options, but would largely be focused on road frontage, car parking and modifications to access roads. Where feasible alternatives have already been identified, Options that require a significant amount of land take are not considered as viable given the sensitivity of the urban environment and the associated unnecessary impact on the community in that area. Options have only considered compulsory acquisition (CPO) of properties where no viable alternatives exist.

Where options, that have both desirable and minimum design parameters sub-options, are shortlisted as part of the sifting, these will be brought forward to the MCA as a single option. The purpose of the design parameter sub-options is to identify constraints that would have to be considered as part of the MCA.

In the images below, the proposed scale of the new infrastructure is shown for context on the existing surroundings. The following colour shading indicates the type of structure:

- Green indicates elevated structures, such as footbridges and ramps;
- Blue indicates road alignment;
- Orange indicates underground structures, such as underpass and ramps;
- Cyan dash indicates stair structures; and
- Magenta indicates lift structures.

6.4.1 Lansdowne Road

6.4.1.1 Full Crossing Options

Any grade-separated full crossing solution at Lansdowne Road, within the existing road corridor, would not be preferred due to the Impact on Sensitive Land Acquisition and Designated Use / Venue, namely the Aviva Stadium.

Option LR -0 – Existing Arrangement

This option proposes to retain the Level Crossing (XR001) at Lansdowne Road. No significant infrastructure interventions are considered.

Option LR-V-1a) / LR-V-1b) – New Overpass with 2-way vehicular crossing with ped/cycle access

Option LR-V-1a) considers a new overpass, with 5.3m clearance to rail level, allowing bi-directional traffic movements and desirable approach gradients of 5% on the road either side of the crossing. Option LR-V-1b) considers a new overpass, with 5.3m clearance to rail level, allowing bi-directional traffic movements and minimum approach gradients of 8% on the road either side of the crossing.

Option LR-V-1a) and LR-V-1b) would require ramps, between 80 and 128m approx. which will create a barrier effect along the road, blocking off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Lansdowne Road on both sides of the crossing. Up to approx. 12 properties, including 2 apartment blocks, would be potentially impacted with significant compulsory purchase of land likely required as a result.

Option LR-V-2a) / LR-V-2b) – New Overpass with 1-way vehicular crossing with ped/cycle access

Option LR-V-2a) considers a new overpass, with 5.3m clearance to rail level, restricted to uni-directional traffic movements and desirable approach gradients of 5% on the road either side of the crossing. Option LR-V-2b) considers a new overpass, with 5.3m clearance to rail level, restricted to uni-directional traffic movements and minimum approach gradients of 8% on the road either side of the crossing.

Option LR-V-2a) and LR-V-2b) will require ramps, between 80 and 128m approx. which will create a barrier effect along the road, blocking off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Lansdowne Road on both sides of the crossing. Up to approx. 12 properties, including 2 apartment blocks, would be potentially impacted with significant compulsory purchase of land likely required as a result. Significant utility diversions would be required to relocate the utility infrastructure currently within the existing road corridor.

Option LR-V-3a) / LR-V-3b) – New Underpass with 2-way vehicular crossing with ped/cycle access

Option LR-V-3a) considers a new underpass, with 5.3m clearance, allowing bi-directional traffic movements and desirable approach gradients of 5% on the road either side of the crossing.

Option LR-V-3b) considers a new underpass, with 5.3m clearance, allowing bi-directional traffic movements and minimum approach gradients of 8% on the road either side of the crossing.

Option LR-V-3a) and LR-V-3b) will require ramps, between 77.5 and 124m approx. which will create a barrier effect along the road, blocking off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Lansdowne Road on both sides of the crossing. Up to approx. 12 properties, including 2 apartment blocks, would be potentially impacted with significant compulsory purchase of land likely required as a result. Significant utility diversions would be required to relocate the utility infrastructure currently within the existing road corridor which may not be feasible due to width required for the crossing.

Option LR-V-4a) / LR-V-4b) – New Underpass with 1-way vehicular crossing with ped/cycle access

Option LR-V-4a) considers a new underpass, with 5.3m clearance, restricted to uni-directional traffic movements and desirable approach gradients of 5% on the road either side of the crossing. Option LR-V-4b) considers a new underpass, with 5.3m clearance, restricted to uni-directional traffic movements and minimum approach gradients of 8% on the road either side of the crossing.

Option LR-V-4a) and LR-V-4b) will require ramps, between 77.5 and 124m approx. which will create a barrier effect along the road, blocking off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Lansdowne Road on both sides of the crossing. Up to approx. 12 properties, including 2 apartment blocks, would be potentially impacted with significant compulsory purchase of land likely required as a result. Significant utility diversions would be required to relocate the utility infrastructure currently within the existing road corridor, however, due to the reduced cross section this may not be feasible.

Option LR-V-5 – New Alternative Crossing

No alternative alignment options were identified due the impact on properties and impediments to property access in the area around the level crossing location which may lead to Sensitive Land Acquisition. Realignment options limited by impacts to Designated Use / Venue, namely the Aviva Stadium, to the north of the crossing and the Rover Dodder to the south. No viable solution has been identified as any solution would require significantly more compulsory purchase of land than options along the existing road corridor.

6.4.1.2 Pedestrian/Cyclist Crossing Options

Option LR-P-0 – Existing Arrangement

This option proposes to retain the Level Crossing (XR001) at Lansdowne Road. No significant infrastructure interventions are considered.

Option LR-P-1a) / LR-P-1b) – New Footbridge with Linear Ramp Access

Option LR-P-1a), shown in Figure 6-40, considers a new footbridge, with 5.3m clearance to rail level, and 5% gradient linear ramp access. Ramps positioned along the existing road.

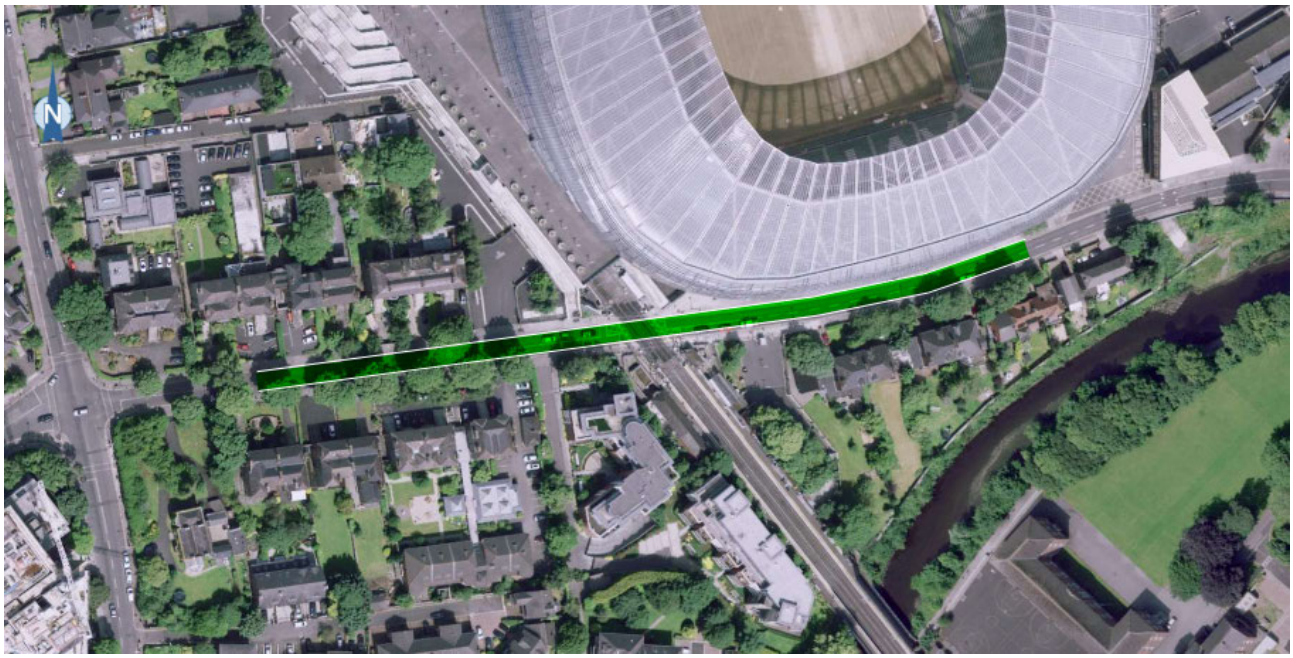


Figure 6-40 Lansdowne Road New Footbridge with Linear Ramp Access, Option LR-P-1a) (Source: ESRI)

Option LR-P-1b), shown in Figure 6-41, considers a new footbridge, with 5.3m clearance to rail level, and reduced length of ramps by use of 8% gradient linear ramp access. Ramps positioned along the existing road.

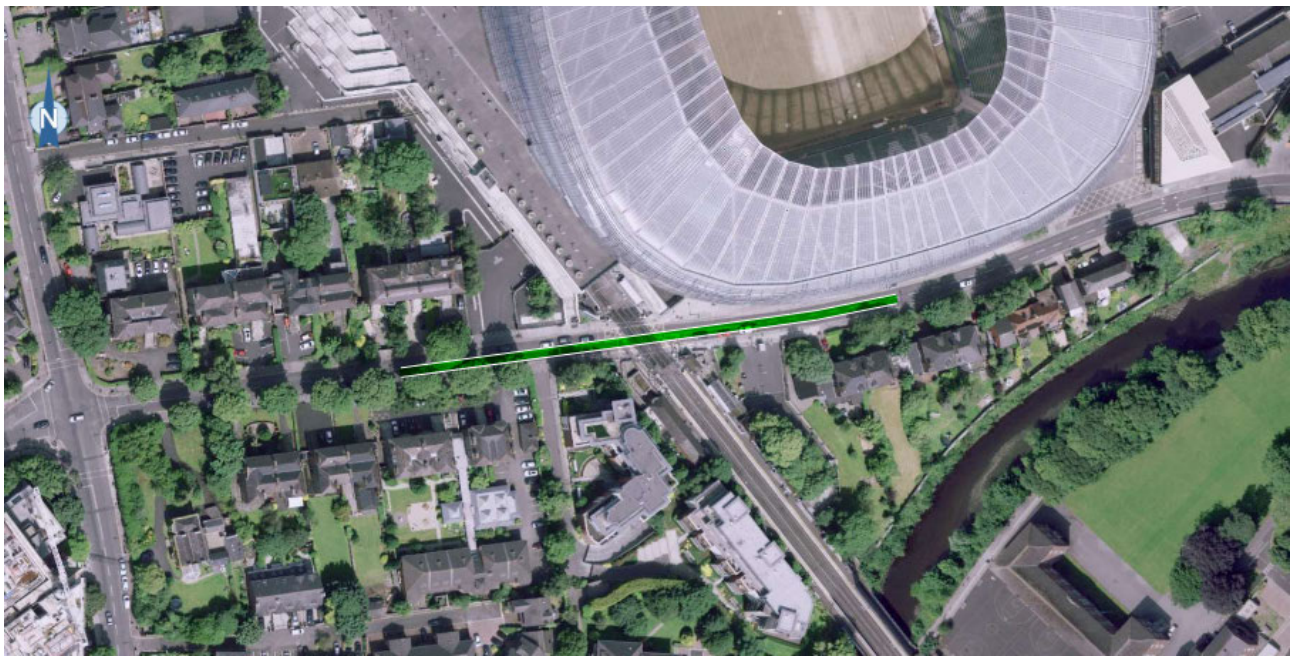


Figure 6-41 Lansdowne Road New Footbridge with Linear Ramp Access, Option LR-P-1b) (Source: ESRI)

Each option will have significant impacts on the surrounding residential and commercial properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Lansdowne Road on both sides of the crossing, potentially requiring extensive CPO of lands.

The proposed options also create a significant restriction for access to Aviva Stadium. In addition, the options will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked. Other solutions may lead to the removal of access to residential properties during construction. The large volumes of pedestrians in this constrained area during events would be severely impacted by further physical constraints to the public realm.

Option LR-P -2a) / LR-P -2b) – New Footbridge with Compressed Ramp Access

Option LR-P-2a), shown in Figure 6-5, considers a new footbridge, with 5.3m clearance to rail level, and a 5% gradient compressed ramp access. Ramps can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.

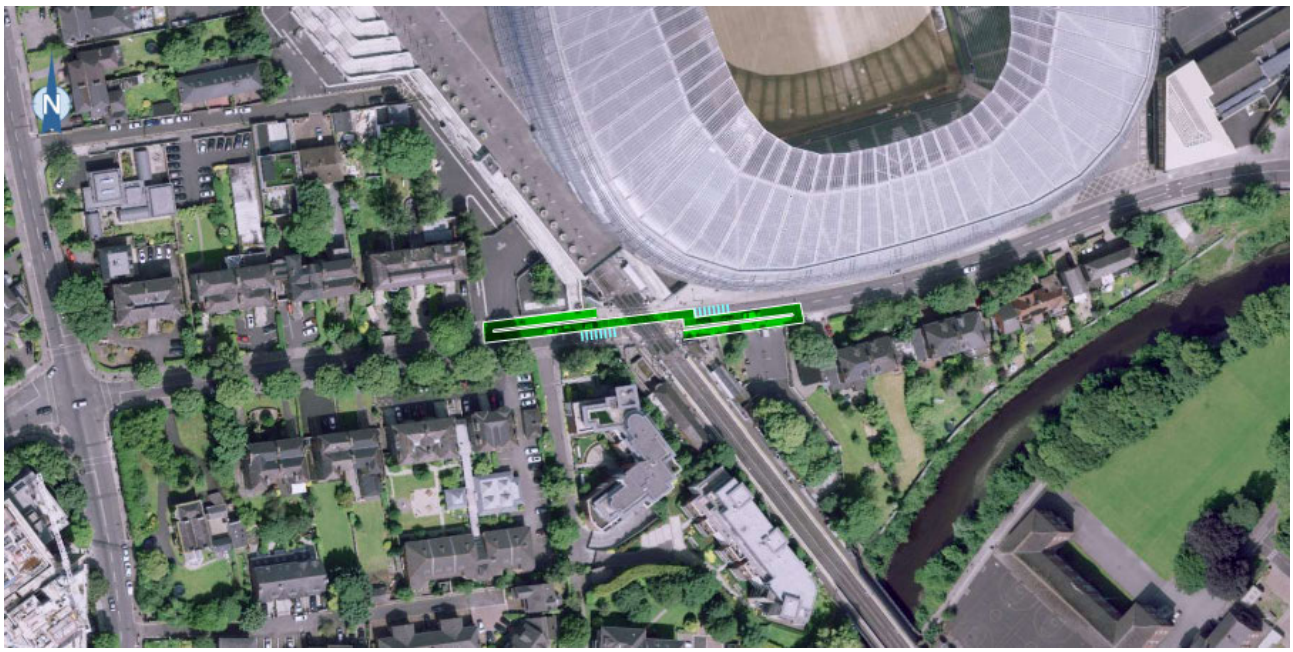


Figure 6-42 Lansdowne Road New Footbridge with Compressed Ramp Access, Option LR-P-2a) (Source: ESRI)

This option will have significant impacts on the surrounding commercial property and access to the station as a result of the space required to implement this solution. In particular, this option significantly restricts access to Aviva Stadium to the west of the crossing, restricting access to the existing underpass and requiring a reconfiguration of the stairs. Access to the station on the eastern side is blocked off, including the overflow area for large crowds. In addition, this option will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.

Option LR-P-2b), shown in Figure 6-43, considers a new footbridge, with 5.3m clearance to rail level, and reduced length of ramps by use of an 8% gradient linear ramp access. Ramps can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.

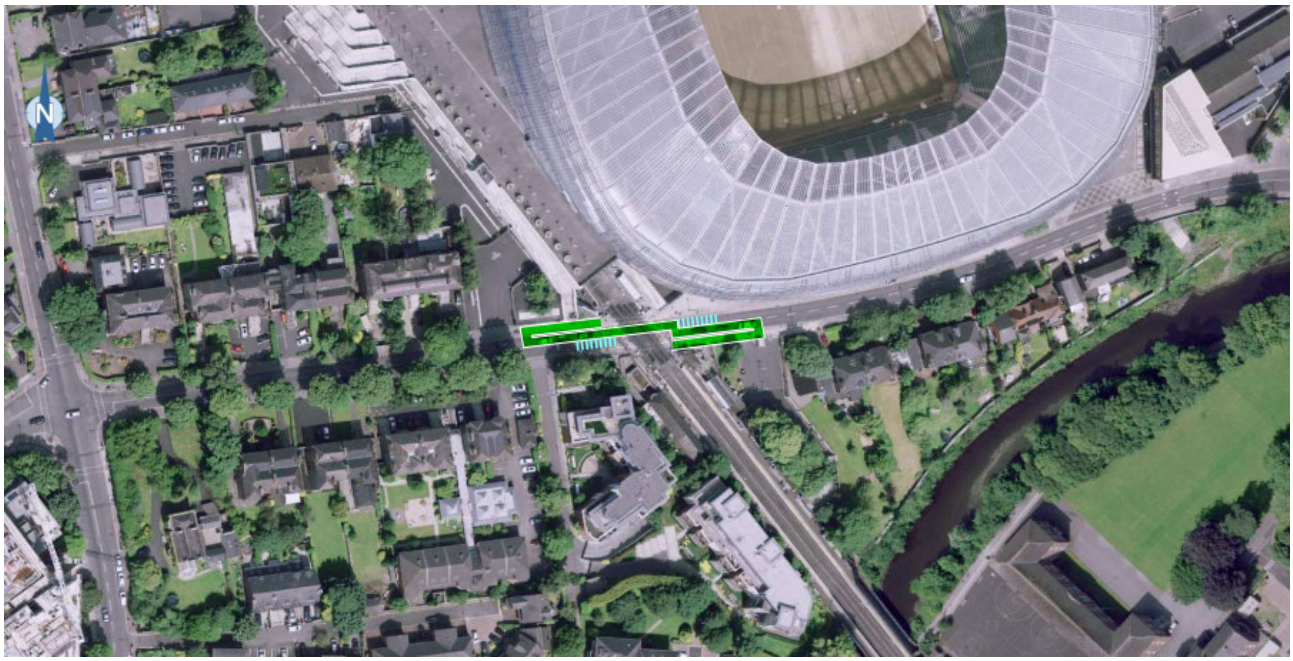


Figure 6-43 Lansdowne Road New Footbridge with Compressed Ramp Access, Option LR-P-2b) (Source: ESRI)

This Option reduces the potential impacts on the surrounding commercial property and access to the station because of the reduced space required as a result of adopting minimum design parameters. However, this option significantly restricts access to the overflow area for large crowds on the eastern side of the station. Other solutions may lead to the removal of access to residential properties during construction. The large volumes of pedestrians in this constrained area during events would be severely impacted by further physical constraints to the public realm.

Option LR-P -3a) / LR-P -3b) – New Footbridge with Non-Linear Ramp Access

Option LR-P-3a), shown in Figure 6-44, considers a new footbridge, with 5.3m clearance to rail level, and a 5% gradient non-linear ramp access. Ramps can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.

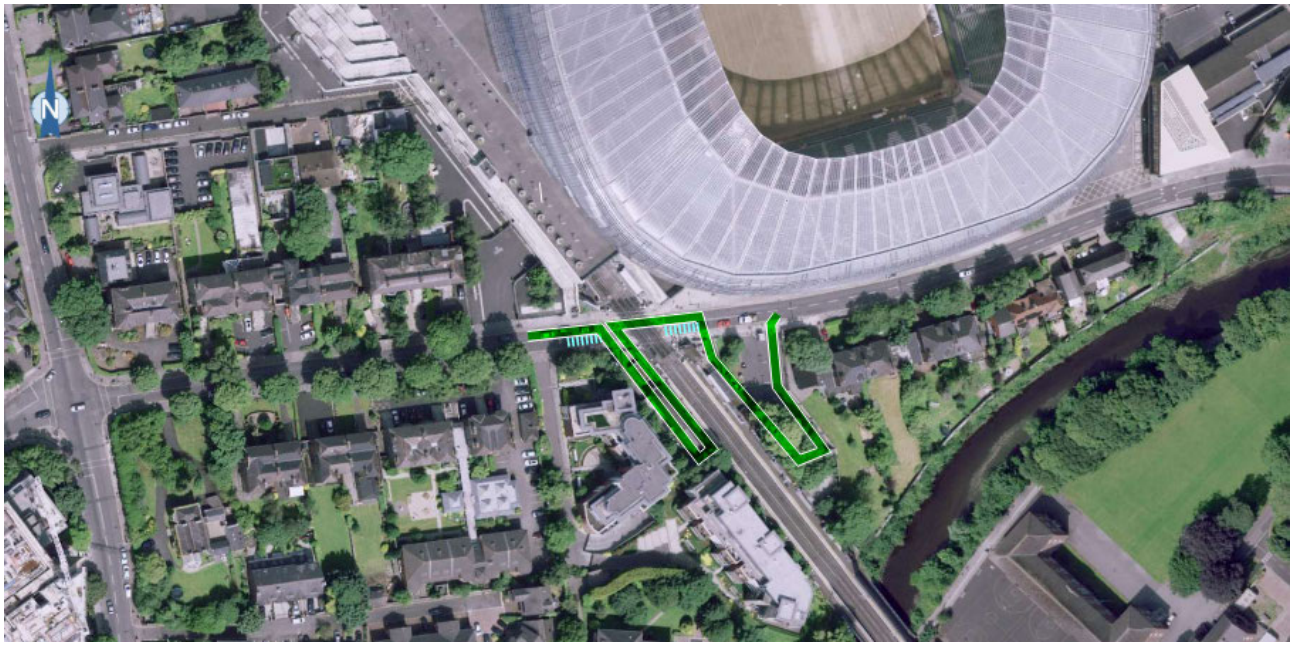


Figure 6-44 Lansdowne Road New Footbridge with Non-Linear Ramp Access, Option LR-P-3a) (Source: ESRI)

This Option will require demolition and re-construction of the station on the western side. This option also requires an elevated structure to be placed adjacent to and in close proximity to an apartment building, with the associated overshadowing and privacy issues. The station on the western side will need to be demolished and rebuilt, resulting in prolonged disruption to rail users at this station during construction. Option LR-P-3b) has not been considered as the reduction in design parameters offers no benefit above Option LR-P-3a).

Option LR-P -4a) / LR-P -4b) – New Footbridge with Stair & Lift Access

Option LR-P-4a), shown in Figure 6-8, considers a new footbridge, with 5.3m clearance to rail level, 2nb, lifts at each side of the crossing and full width ped/cycleway. Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.

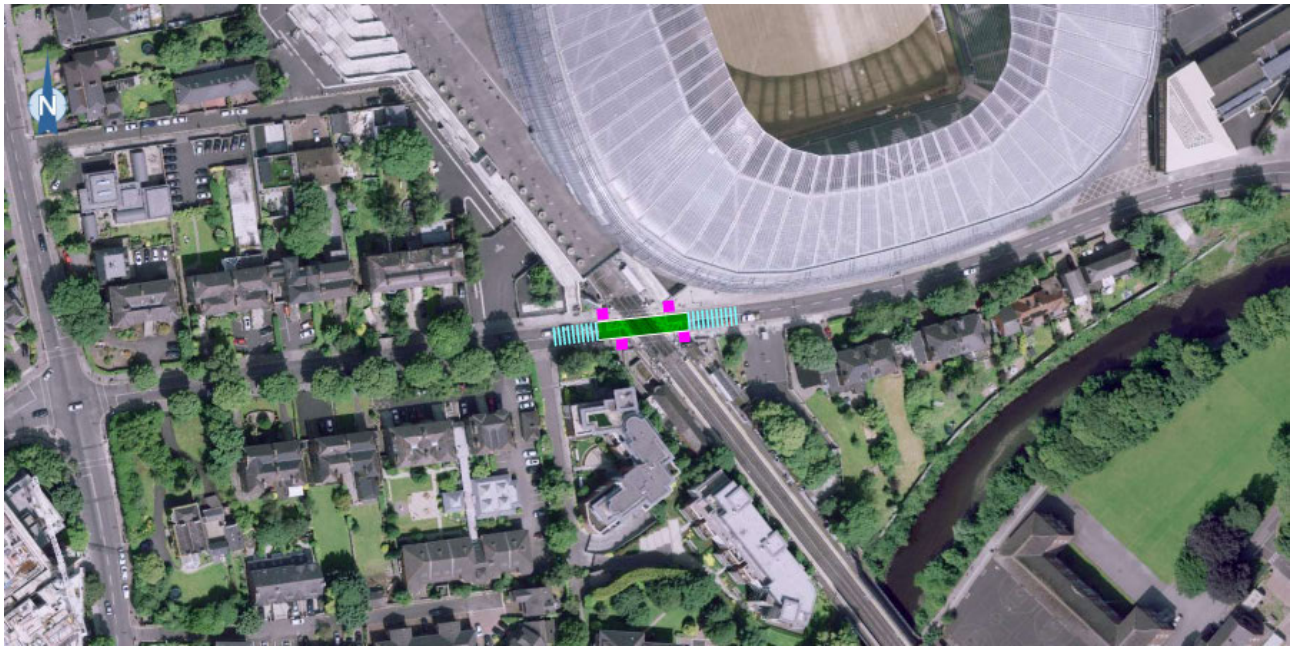


Figure 6-45 Lansdowne Road New Footbridge with Stair & Lift Access, Option LR-P-4a) (Source: ESRI)

Option LR-P-4b), shown in Figure 6-46, considers a new footbridge, with 5.3m clearance to rail level, 1nb., lifts at each side of the crossing and minimum width ped/cycleway. Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.

Figure 6-46 Lansdowne Road New Footbridge with Stair & Lift Access, Option LR-P-4b) (Source: ESRI)

The reduced width of Option LR-P-4b) may not be adequate to cater for the required pedestrian/cyclist flows in the area, in addition to the flows from events at the Aviva Stadium. Redundancy is also reduced by provision of only one lift access either side of the crossing.

It is noted that some land acquisition may be required as part of the development of this option to protect private and station access. This will be optimised through the preliminary design if selected as the Emerging Preferred Option.

Option LR-P -5a) / LR-P -5b) – New Subway with Linear Ramp Access

Option LR-P-5a), shown in Figure 6-47, considers a new subway, with 2.6m clearance, and a 5% gradient linear ramp access. The ramps would be positioned along the existing road.

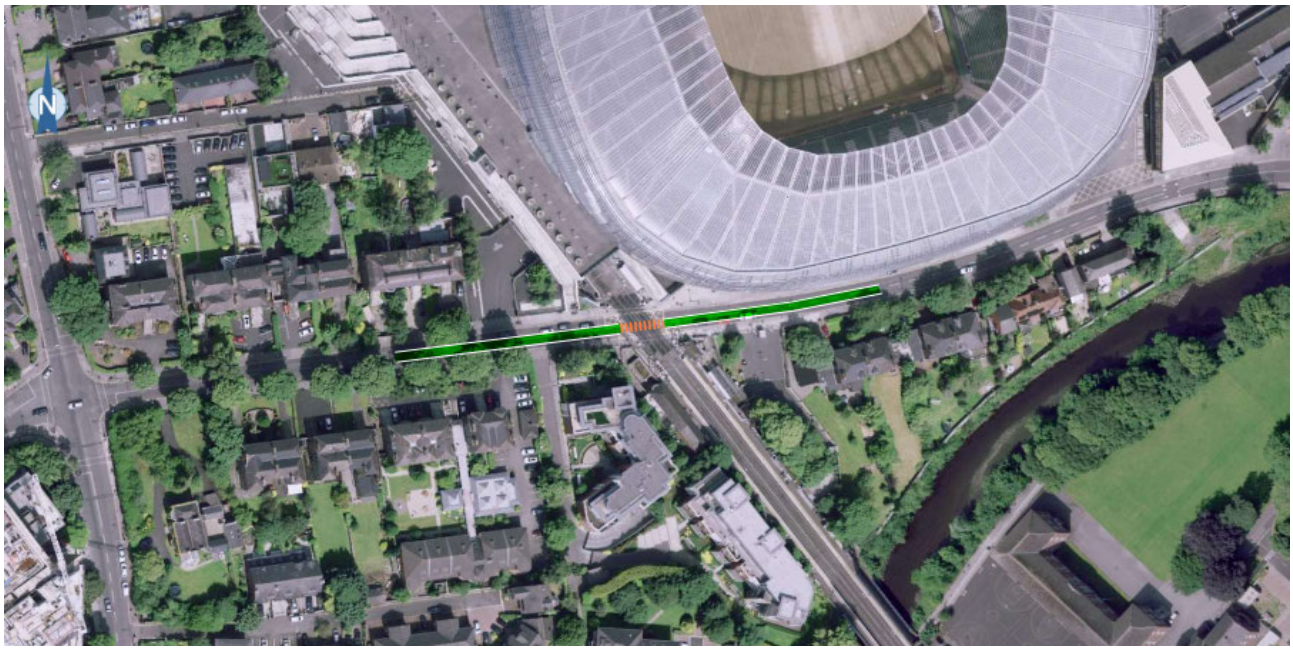


Figure 6-47 Lansdowne Road New Subway with Stair & Lift Access, Option LR-P-5a) (Source: ESRI)

Option LR-P-5b), shown in Figure 6-48, considers a new subway, with 2.6m clearance, and reduced length of ramps by use of an 8% gradient linear ramp access. Ramps will be positioned along the existing road.

Figure 6-48 Lansdowne Road New Subway with Stair & Lift Access, Option LR-P-5b) (Source: ESRI)

Each option will have unacceptable impacts on the surrounding residential and commercial properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Lansdowne Road on both sides of the crossing. The options also create a significant restriction for access to Aviva Stadium. Each option will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked. Other solutions may lead to the removal of access to residential properties during construction. The large volumes of pedestrians in this constrained area during events would be severely impacted by further physical constraints to the public realm.

Option LR-P -6a) / LR-P -6b) – New Subway with Stair & Lift Access

Option LR-P-6a), shown in Figure 6-49, considers a new subway, with 2.6m clearance to rail level, 2nb, lifts at each side of the crossing and full width ped/cycleway. Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.

Figure 6-49 Lansdowne Road New Subway with Stair & Lift Access Option, Option LR-P-6a) (Source: ESRI)

Option LR-P-6b), shown in Figure 6-50, considers a new subway, with 2.6m clearance, 1nb, lifts at each side of the crossing and minimum width ped/cycleway. Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.

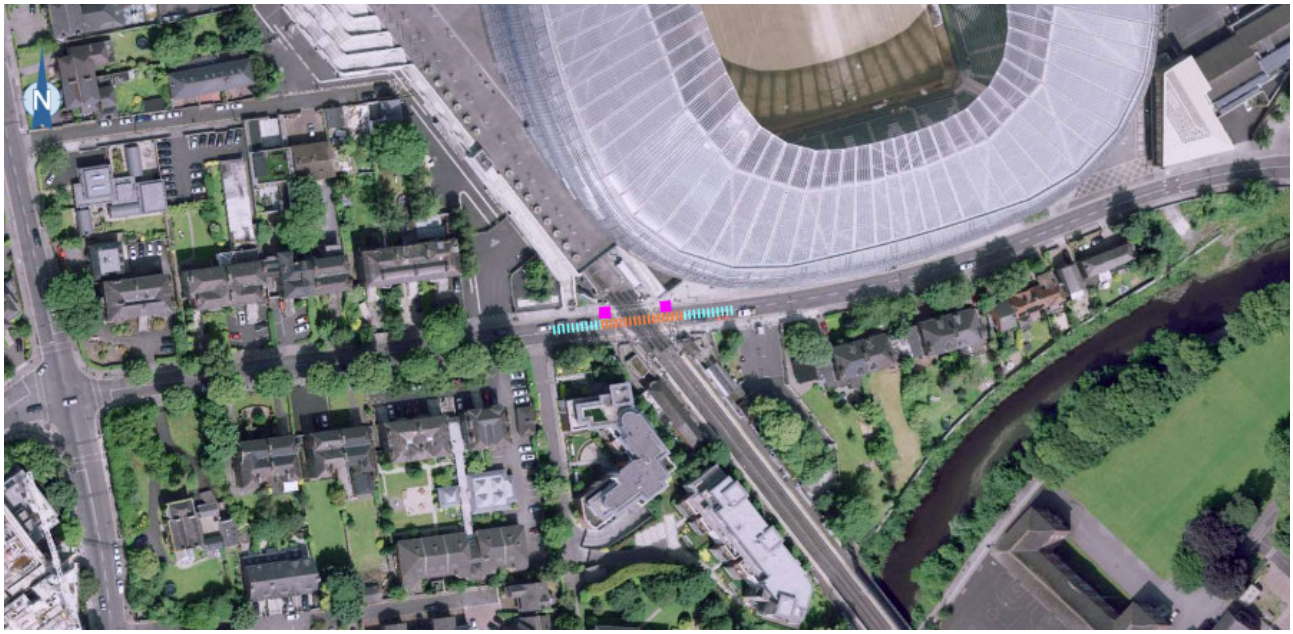


Figure 6-50 Lansdowne Road New Subway with Stair & Lift Access Option, Option LR-P-6b) (Source: ESRI)

The reduced width of Option LR-P-6b) may not be adequate to cater for the required pedestrian/cyclist flows in the area, in addition to the flows from events at the Aviva Stadium. Redundancy is also reduced by provision of only one lift access either side of the crossing.

As both options meet all project specific objectives and requirements, Option LR-P-6a) should be considered as the best performing option for this concept option. It is noted that some land acquisition may be required as part of the development of this option to protect private and station access. This will be optimised through the preliminary design if selected as the Emerging Preferred Option.

Option LR-P -7a) / LR-P -7b) – Modification of Existing Grade Separated Crossing

Option LR-P-7a), shown in Figure 6-51, considers provision of new ramp access to the existing subway, using existing clearances, within the station area. Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.

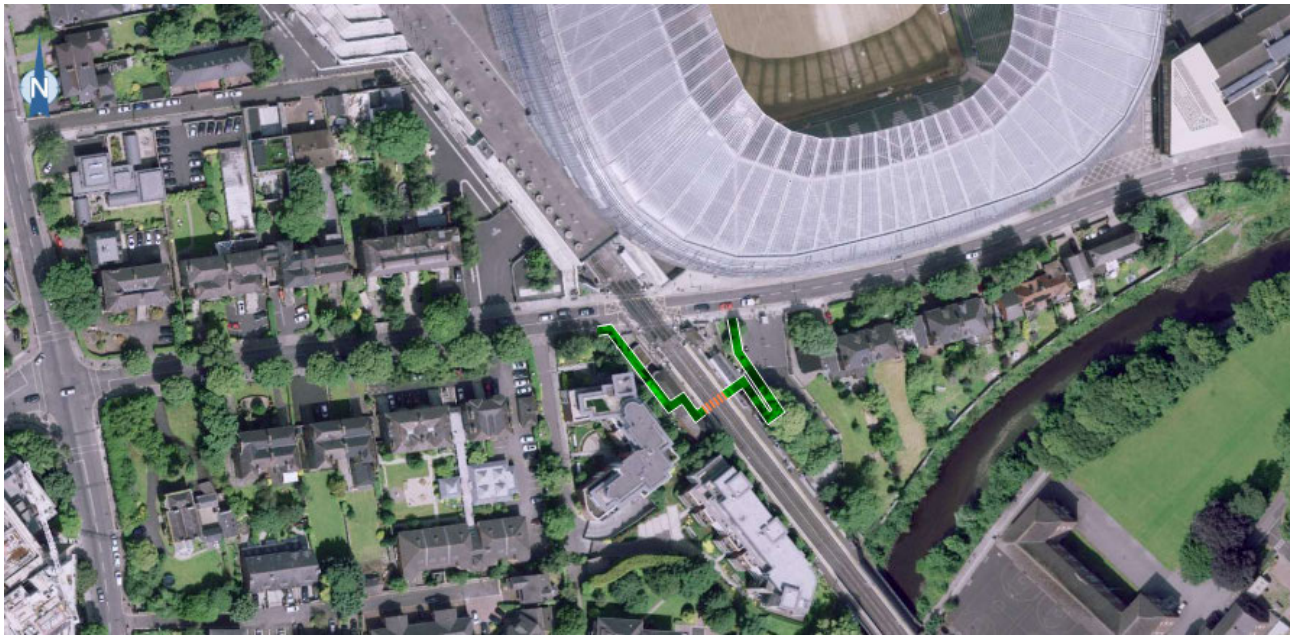


Figure 6-51 Lansdowne Road Modification of Existing Grade Separated Crossing, Option LR-P-7a) (Source: ESRI)

This option will require demolition and re-construction of the station on the western side. The option results in ramps down to an existing subway crossing with blind bends along the access route, creating an unsafe user environment and adversely impacting on the user. The station on the western side will need to be demolished and rebuilt, resulting in a prolonged time of disruption to rail users at this station during construction. This option proposes to retain the existing subway crossing, which has a vertical clearance of 2.05 m. This is below the minimum (current design standard) requirement of 2.4m.

Option LR-P-7b), shown in Figure 6-52, considers provision of new ramp access to the existing stadium subway, using existing clearances, located north of the existing level crossing. Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.

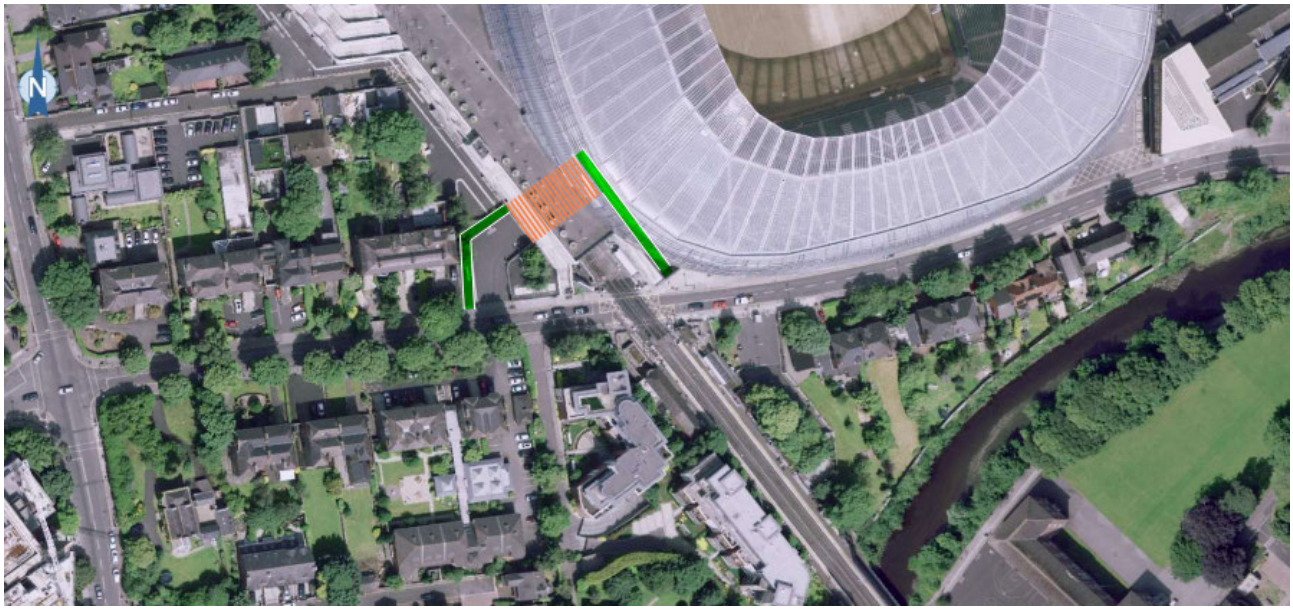


Figure 6-52 Lansdowne Road Modification of Existing Grade Separated Crossing, Option LR-P-7b) (Source: ESRI)

This Option will result in ramps down to an existing subway crossing with blind bends along the access route, creating an unsafe user environment and adversely impacting on the user. The existing subway is used by the Aviva and the introduction of public pedestrian/cyclist flows may be limited, especially during events. Evacuation of the Aviva would seek to provide an additional crossing to the existing subway so as to not hinder or reduce the existing emergency arrangements. This option proposes to retain the existing subway crossing, which has a vertical clearance of 2.1 m. This is below the minimum (current design standard) requirement of 2.4m.

6.4.2 Serpentine Avenue

6.4.2.1 Full Crossing Options

A grade-separated solution at Serpentine Avenue could potentially be designed through the alignment of the road through a nearby car park, resulting in limited impact on adjacent properties, compared to other options.

Option SA -0 – Existing Arrangement

This option proposes to retain the Level Crossing (XR002) at Serpentine Avenue. No significant infrastructure interventions are considered.

Option SA-V-1a) / SA-V-1b) – New Overpass with 2-way vehicular crossing with ped/cycle access

Option SA-V-1a) considers a new overpass, with 5.3m clearance to rail level, allowing bi-directional traffic movements and desirable approach gradients of 5% on the road either side of the crossing. Option SA-V-1b) considers a new overpass, with 5.3m clearance to rail level, allowing bi-directional traffic movements and minimum approach gradients of 8% on the road either side of the crossing.

Option SA-V-1a) and SA-V-1b) would require ramps, between 80 and 128m approx. which will create a barrier effect along the road, blocking off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Serpentine Avenue on both sides of the crossing. Up to approx. 55 properties, including 7 apartment blocks, would be potentially impacted with significant compulsory purchase of land likely required as a result.

Option SA-V-2a) / SA-V-2b) – New Overpass with 1-way vehicular crossing with ped/cycle access

Option SA-V-2a) considers a new overpass, with 5.3m clearance to rail level, restricted to uni-directional traffic movements and desirable approach gradients of 5% on the road either side of the crossing. Option SA-V-2b) considers a new overpass, with 5.3m clearance to rail level, restricted to uni-directional traffic movements and minimum approach gradients of 8% on the road either side of the crossing.

Option SA-V-2a) and SA-V-2b) will require ramps, between 80 and 128m approx. which will create a barrier effect along the road, blocking off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Serpentine Avenue on both sides of the crossing. Up to approx. 55 properties, including 7 apartment blocks, would be potentially impacted with significant compulsory purchase of land likely required as a result. Significant utility diversions would be required to relocate the utility infrastructure currently within the existing road corridor.

Option SA-V-3a) / SA-V-3b) / SA-V-3c – New Underpass with 2-way vehicular crossing with ped/cycle access

Option SA-V-3a) considers a new underpass, with 5.3m clearance, allowing bi-directional traffic movements and desirable approach gradients of 5% on the road either side of the crossing. Option SA-V-3b) considers a new underpass, with 5.3m clearance, allowing bi-directional traffic movements and minimum approach gradients of 8% on the road either side of the crossing. Option SA-V-3c) considers a new underpass, with 5.3m clearance, allowing bi-directional traffic movements and limiting approach gradients on the road either side of the crossing.

Option SA-V-3a) and SA-V-3b) will require ramps, between 77.5 and 124m approx. which will create a barrier effect along the road, blocking off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Serpentine Avenue on both sides of the crossing. Up to approx. 55 properties, including 7 apartment blocks, would be potentially impacted with significant compulsory purchase of land likely required as a result. Significant utility diversions would be required to relocate the utility infrastructure currently within the existing road corridor which may not be feasible due to the width required for the crossing.

Options SA-V-3c), shown in Figure 6-53, would require a deviation from the normal highway standards (particularly in terms of gradient and radii) and require restrictions on some larger vehicle types but would allow for emergency services. Such a solution is likely to have a considerably lower impact on adjacent properties. It would provide for vehicular connectivity, albeit on a limited functionality, which would not be attractive to strategic journeys or access of larger vehicles.

Figure 6-53 Serpentine Avenue Full Grade Separated Crossing, Option SA-V-3c) (Source: ESRI)

Option SA-V-4a) / SA-V-4b) / SA-V-4c) – New Underpass with 1-way vehicular crossing with ped/cycle access

Option SA-V-4a) considers a new underpass, with 5.3m clearance, restricted to uni-directional traffic movements and with desirable approach gradients of 5% on the road either side of the crossing. Option SA-V-4b) considers a new underpass, with 5.3m clearance, restricted to uni-directional traffic movements and with minimum approach gradients of 8% on the road either side of the crossing. SA-V-4c) considers a new underpass, with 5.3m clearance, restricted uni-directional traffic movements and limiting approach gradients on the road either side of the crossing.

Option SA-V-4a) and SA-V-4b) will require ramps, between 77.5 and 124m approx. which will create a barrier effect along the road, blocking off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Serpentine Avenue on both sides of the crossing. Up to approx. 55 properties, including 7 apartment blocks, would be potentially impacted with significant compulsory purchase of land likely required as a result. Significant utility diversions would be required to relocate the utility infrastructure currently within the existing road corridor, however, due to the reduced cross section this may not be feasible.

Options SA-V-4c), shown in Figure 6-54, would require a deviation from the normal highway standards (particularly in terms of gradient and radii) and require restrictions on some larger vehicle types but would allow for emergency services. Such a solution is likely to have a considerably lower impact on adjacent properties. It would provide for vehicular connectivity, albeit on a limited functionality, which would not be attractive to strategic journeys or access for larger vehicles.

Figure 6-54 Serpentine Avenue Full Grade Separated Crossing, Option SA-V-4c) (Source: ESRI)

Option SA-V-5 – New Alternative Crossing

Option SA-V-5, shown in , considers a new connection between Serpentine Avenue (west of Railway) and Sandymount Avenue (east of Railway) crossing under the railway at the north end of Sandymount Station.

Figure 6-55 Serpentine Avenue New Alternative Crossing, Option SA-V-5) (Source: ESRI)

The option would require the compulsory acquisition of residential properties to the east to allow the route to connect with Sandymount Ave, in addition to a portion of the sports club, demolishing and reconstructing the club house and removing one of the pitches. Ramps will create a barrier effect along the new alignment, blocking entrances to a number of residential and commercial properties. Overall, this solution will have a significant impact on local residents, the sports club, and its users.

6.4.2.2 Pedestrian/Cyclist Crossing Options

Option SA-P-0 – Existing Arrangement

This option proposes to retain the Level Crossing (XR002) at Serpentine Avenue. No significant infrastructure interventions are considered.

Option SA-P-1a) / SA-P-1b) – New Footbridge with Linear Ramp Access

Option SA-P-1a), shown in Figure 6-56, considers a new footbridge, with 5.3m clearance to rail level, and a 5% gradient linear ramp access. Ramps are positioned along the existing Road.

Figure 6-56 Serpentine Avenue New Footbridge with Linear Ramp Access, Option SA-P-1a) (Source: ESRI)

Option SA-P-1b), shown in Figure 6-57, considers a new footbridge, with 5.3m clearance to rail level, and reduced length of ramps by use of an 8% gradient linear ramp access. Ramps are positioned along the existing Road.

Figure 6-57 Serpentine Avenue New Footbridge with Linear Ramp Access, Option SA-P-1b) (Source: ESRI)

Each option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Serpentine Avenue on both sides of the crossing, potentially requiring extensive compulsive acquisition of lands. The proposed option also blocks off access to commercial properties to the west of the crossing. In addition, each option will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.

Option SA-P -2a) / SA-P -2b) – New Footbridge with Compressed Ramp Access

Option SA-P-2a), shown in Figure 6-58, considers a new footbridge, with 5.3m clearance to rail level, and a 5% gradient compressed ramp access. Ramps can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.

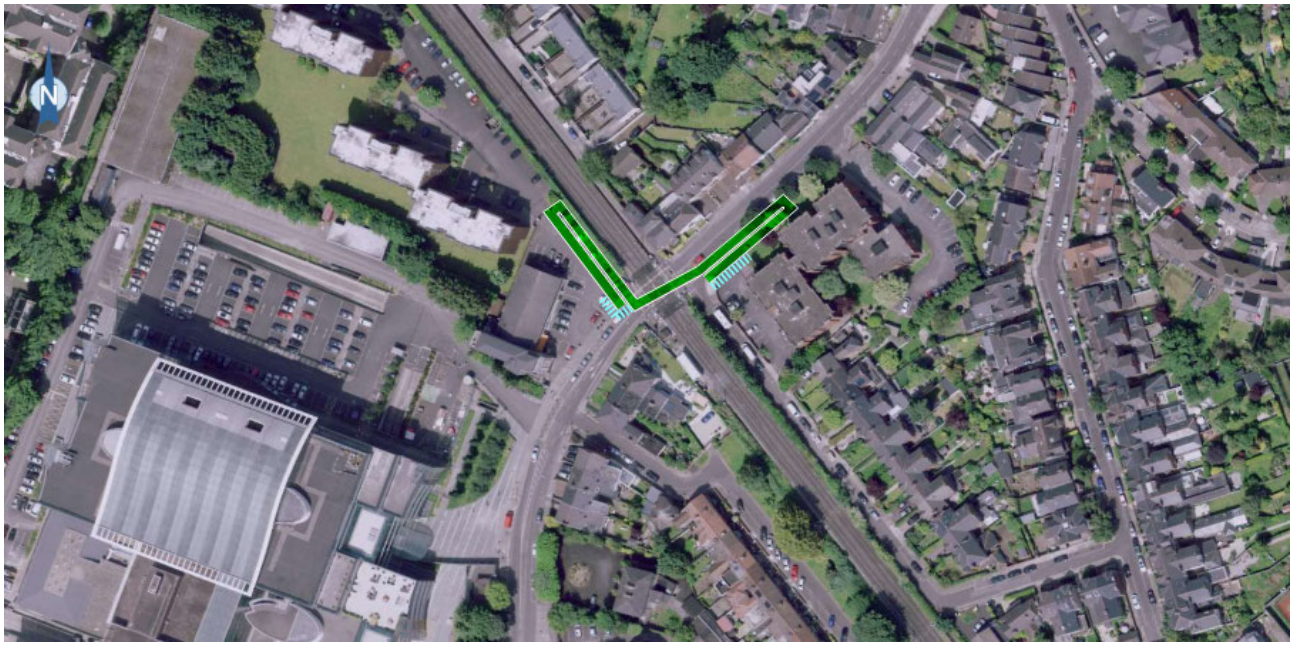


Figure 6-58 Serpentine Avenue New Footbridge with Compressed Ramp Access, Option SA-P-2a) (Source: ESRI)

Option SA-P-2b), shown in Figure 6-59, considers a new footbridge, with 5.3m clearance to rail level, and reduced length of ramps by use of an 8% gradient linear ramp access. Ramps can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.

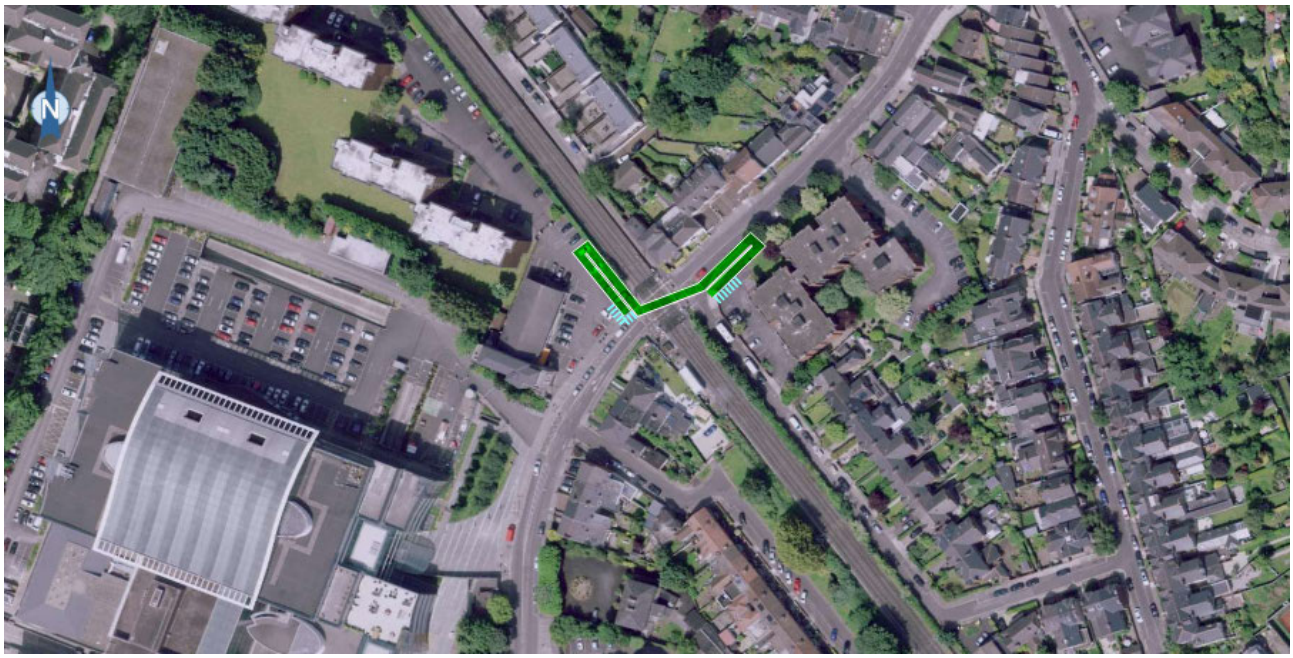


Figure 6-59 Serpentine Avenue New Footbridge with Compressed Ramp Access, Option SA-P-2b)

Each option will have significant impacts on a number of existing landowners adjacent to the proposed solution, in particular emergency access to 4 apartment blocks, since access to these properties will be blocked. In addition, each option will require compulsory acquisition of car-parking space and garden frontage to the apartment plot to the east of the crossing.

Option SA-P -3a) / SA-P -3b) – New Footbridge with Non-Linear Ramp Access

Option SA-P-3a), shown in Figure 6-60, considers a new footbridge, with 5.3m clearance to rail level, and a 5% gradient non-linear ramp access. Ramps can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.

Figure 6-60 Serpentine Avenue New Footbridge with Non-Linear Ramp Access, Option SA-P-3a) (Source: ESRI)

Option SA-P-3b) shown in Figure 6-61, considers a new footbridge, with 5.3m clearance to rail level, and an 8% gradient non-linear ramp access. Ramps can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.

Figure 6-61 Serpentine Avenue New Footbridge with Non-Linear Ramp Access, Option SA-P-3a) (Source: ESRI)

Each option requires additional compulsory land acquisition and demolition of commercial and residential properties to the west of the railway and will require compulsory acquisition of car-parking space and garden frontage to the apartment plot to the east of the crossing. In addition, each option impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked during construction.

Option SA-P -4a) / SA-P -4b) – New Footbridge with Stair & Lift Access

Option SA-P-4a), shown in Figure 6-62, considers a new footbridge, with 5.3m clearance to rail level, 2nb, lifts at each side of the crossing and full width ped/cycleway. Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.

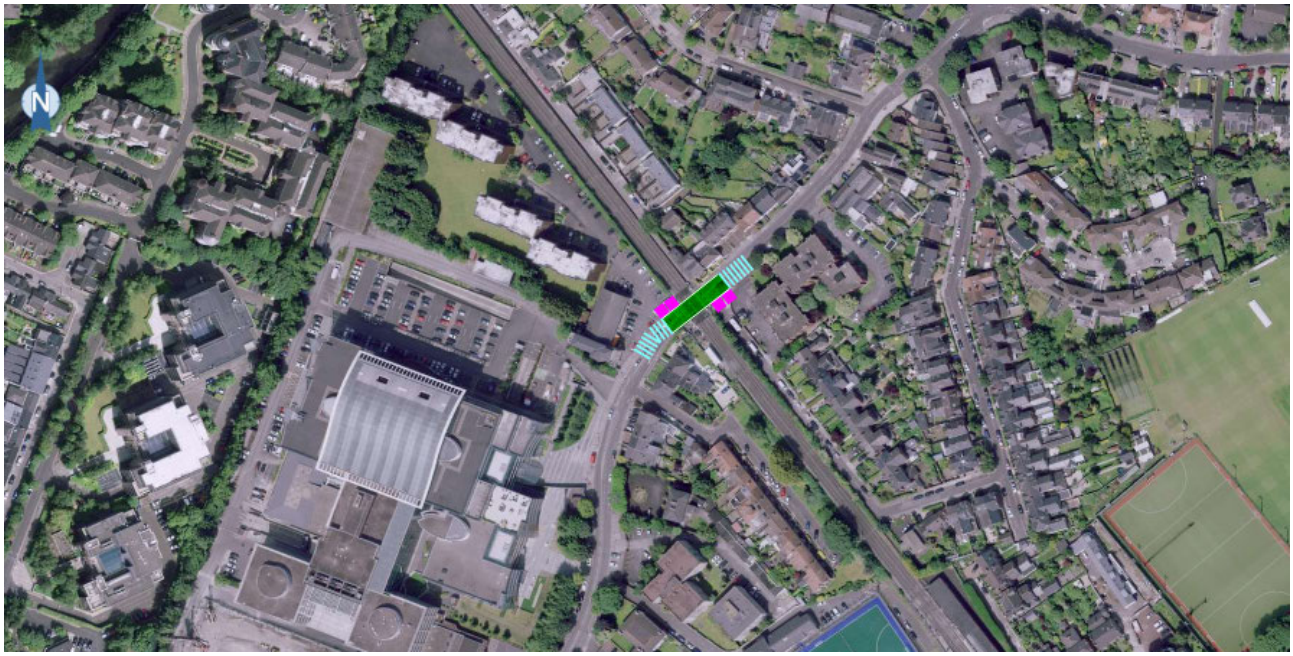


Figure 6-62 Serpentine Avenue New Footbridge with Stair & Lift Access, Option SA-P-4a) (Source: ESRI)

Option SA-P-4b), shown in Figure 6-63, considers a new footbridge, with 5.3m clearance to rail level, 1nb, lifts at each side of the crossing and minimum width ped/cycleway. Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.

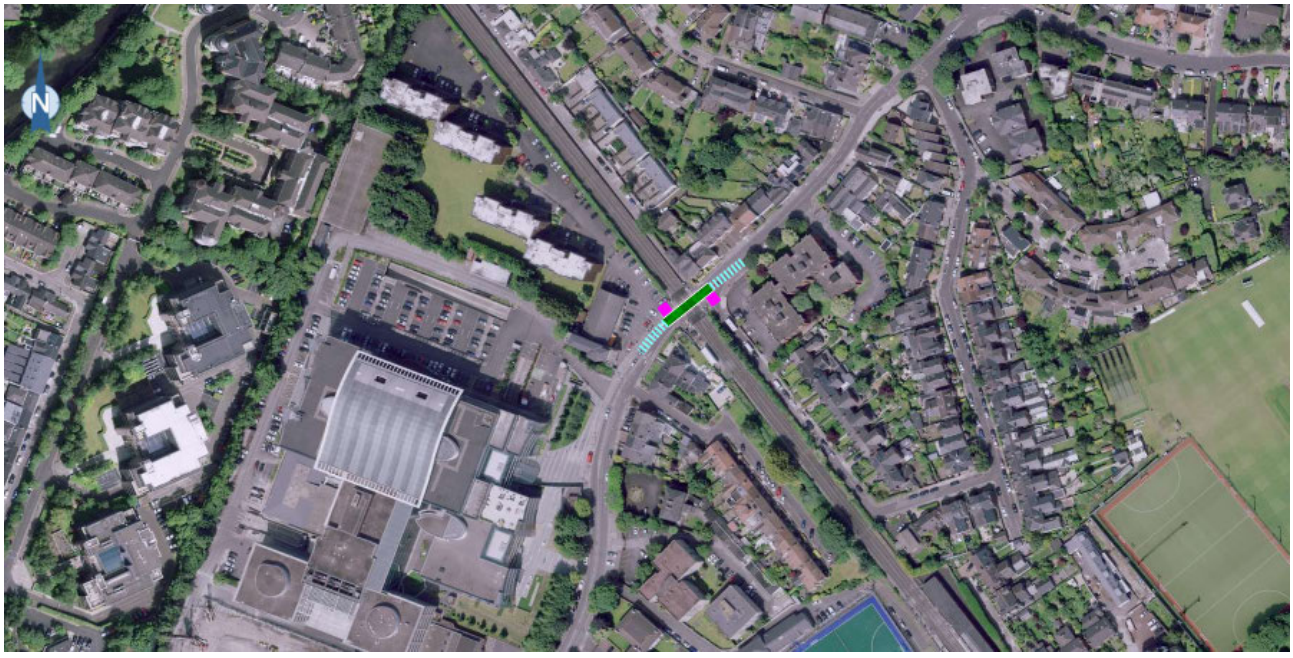


Figure 6-63 Serpentine Avenue New Footbridge with Stair & Lift Access, Option SA-P-4b) (Source: ESRI)

As both options meet all project specific objectives and requirements, Option SA-P-4a) should be considered as the best performing option for this concept option. It is noted that some compulsory land acquisition may be required as part of the development of this option to protect private and station accesses. This will be optimised through the preliminary design if selected as the Emerging Preferred Option.

Option SA-P -5a) / SA-P -5b) – New Subway with Linear Ramp Access

Option SA-P-5a), shown in Figure 6-64, considers a new subway, with 2.6m clearance, and a 5% gradient linear ramp access. Ramps would be positioned along the existing road.

Figure 6-64 Serpentine Avenue New Subway with Stair & Lift Access, Option SA-P-5a) (Source: ESRI)

Option SA-P-5b), shown in Figure 6-65, considers a new subway, with 2.6m clearance, and reduced length of ramps by use of an 8% gradient linear ramp access. Ramps would be positioned along the existing road.

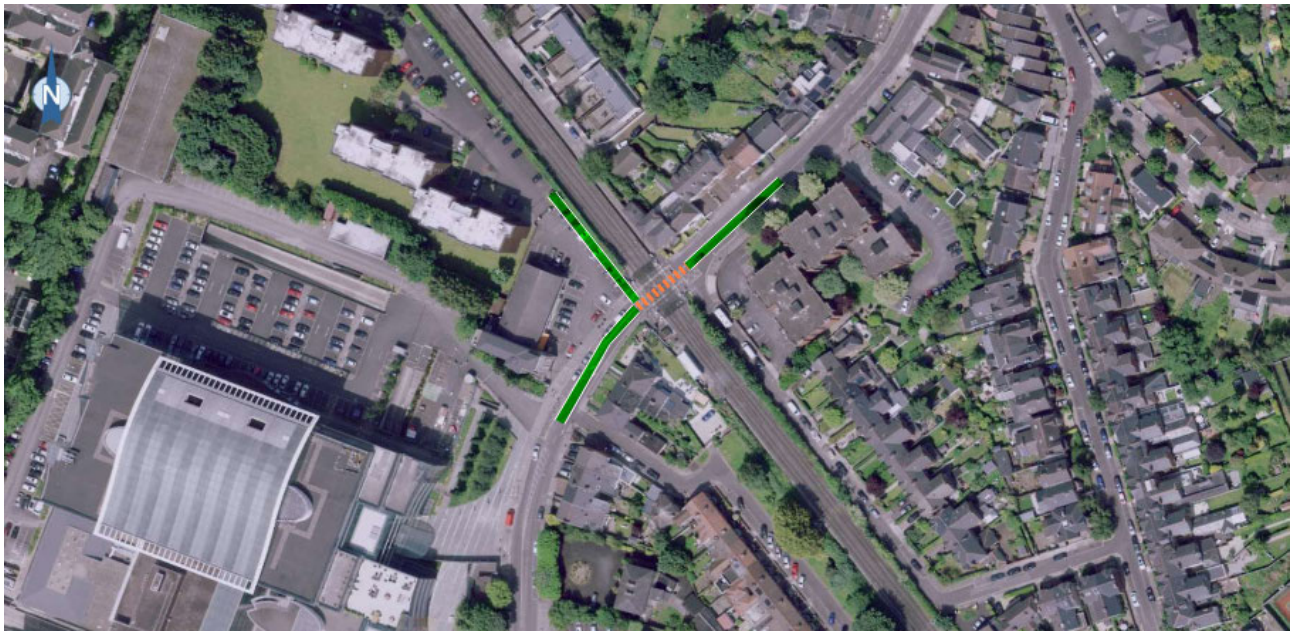


Figure 6-65 Serpentine Avenue New Subway with Stair & Lift Access, Option SA-P-5b) (Source: ESRI)

Each option will have unacceptable impacts on the surrounding residential and commercial properties. In particular, these options block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Serpentine Avenue on both sides of the crossing.

Option SA-P -6a) / SA-P -6b) – New Subway with Stair & Lift Access

Option SA-P-6a), shown in Figure 6-66, considers a new subway, with 2.6m clearance to rail level, 2nb, lifts at each side of the crossing and full width ped/cycleway. Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.

Figure 6-66 Serpentine Avenue New Subway with Stair & Lift Access Option, Option SA-P-6a) (Source: ESRI)

Option SA-P-6b), shown in Figure 6-67, considers a new subway, with 2.6m clearance, 1nb, lifts at each side of the crossing and a minimum width ped/cycleway. Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.

Figure 6-67 Serpentine Avenue New Subway with Stair & Lift Access Option, Option SA-P-6b) (Source: ESRI)

As both options meet all project specific objectives and requirements, Option SA-P-6a) should be considered as the best performing option for this concept option.

It is noted that some compulsory land acquisition may be required as part of the development of this option to protect private and station access. This will be optimised through the preliminary design if selected as the Emerging Preferred Option.

Option SA-P -7a) / SA-P -7b) – Modification of Existing Grade Separated Crossing

Options SA-P-7a) / 7b) have not been developed as there is no existing infrastructure crossing the rail at this location.

6.4.3 Sandymount Avenue

6.4.3.1 Full Crossing Options

Any grade-separated full crossing solution at Sandymount Avenue, within the existing road corridor, would not be preferred due to the impact on properties and impediments to property access in the area around the level crossing which may lead to Sensitive Land Acquisition.

Option SA -0 – Existing Arrangement

This option proposes to retain the Level Crossing (XR003) at Sandymount Avenue. No significant infrastructure interventions are considered.

Option SM-V-1a) / SM-V-1b) – New Overpass with 2-way vehicular crossing with ped/cycle access

Option SM-V-1a) considers a new overpass, with 5.3m clearance to rail level, allowing bi-directional traffic movements and desirable approach gradients of 5% on the road either side of the crossing. Option SA-V-1b) considers a new overpass, with 5.3m clearance to rail level, allowing bi-directional traffic movements and minimum approach gradients of 8% on the road either side of the crossing.

Option SM-V-1a) and SM-V-1b) would require ramps, between 80 and 128m approx. which will create a barrier effect along the road, blocking off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sandymount Avenue on both sides of the crossing. Up to approx. 55 properties, including 5 apartment blocks, would be potentially impacted with significant compulsory purchase of land likely required as a result.

Option SM-V-2a) / SM-V-2b) – New Overpass with 1-way vehicular crossing with ped/cycle access

Option SM-V-2a) considers a new overpass, with 5.3m clearance to rail level, restricted to uni-directional traffic movements and desirable approach gradients of 5% on the road either side of the crossing. Option SM-V-2b) considers a new overpass, with 5.3m clearance to rail level, restricted to uni-directional traffic movements and minimum approach gradients of 8% on the road either side of the crossing.

Option SM-V-2a) and SM-V-2b) will require ramps, between 80 and 128m approx. which will create a barrier effect along the road, blocking off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sandymount Avenue on both sides of the crossing.

Up to approx. 55 properties, including 5 apartment blocks, would be potentially impacted with significant compulsory purchase of land likely required as a result. Significant utility diversions would be required to relocate the utility infrastructure currently within the existing road corridor.

Option SM-V-3a) / SM-V-3b) / SM-V-3c – New Underpass with 2-way vehicular crossing with ped/cycle access

Option SM-V-3a) considers a new underpass, with 5.3m clearance, allowing bi-directional traffic movements and desirable approach gradients of 5% on the road either side of the crossing. Option SM-V-3b) considers a new underpass, with 5.3m clearance, allowing bi-directional traffic movements and minimum approach gradients of 8% on the road either side of the crossing. Option SM-V-3c) considers a new underpass, with 5.3m clearance, allowing bi-directional traffic movements and limiting approach gradients on the road either side of the crossing.

Option SM-V-3a) and SM-V-3b) will require ramps, between 77.5 and 124m approx. which will create a barrier effect along the road, blocking off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Serpentine Avenue on both sides of the crossing. Up to approx. 55 properties, including 5 apartment blocks, would be potentially impacted with significant compulsory purchase of land likely required as a result. Significant utility diversions would be required to relocate the utility infrastructure currently within the existing road corridor which may not be feasible due to width required for the crossing.

Options SM-V-3c), shown in Figure 6-68, would require a deviation from the normal highway standards (particularly in terms of gradient and radii) and require restrictions on some larger vehicle types but would allow for emergency services. Such a solution is likely to have a considerably lower impact on adjacent properties. It would provide for vehicular connectivity, albeit on a limited functionality, which would not be attractive to strategic journeys or access for larger vehicles.

Figure 6-68 Sandymount Avenue Full Grade Separated Crossing, Option SM-V-3c) (Source: ESRI)

This option will impact on the properties and impediments to property access in the area around the level crossing which may lead to Sensitive Land Acquisition. Ramps will create a barrier effect along the road, blocking entrances to a number of residential properties. Approximately 8 properties would be potentially impacted with significant compulsory purchase of land likely required as a result.

It is worth noting that any solution would require a derogation from the highway standards (particularly in terms of gradient and radii). Such a solution is highly unlikely to be acceptable. It would provide for vehicular connectivity, albeit on a very limited functionality, which would not be attractive to strategic journeys or access of larger vehicles.

Option SA-V-4a) / SA-V-4b) / SA-V-4c) – New Underpass with 1-way vehicular crossing with ped/cycle access

Option SM-V-4a) considers a new underpass, with 5.3m clearance, restricted to uni-directional traffic movements and desirable approach gradients of 5% on the road either side of the crossing. Option SM-V-4b) considers a new underpass, with 5.3m clearance, restricted to uni-directional traffic movements and minimum approach gradients of 8% on the road either side of the crossing. SM-V-4c) considers a new underpass, with 5.3m clearance, restricted uni-directional traffic movements and limiting approach gradients on the road either side of the crossing.

Option SM-V-4a) and SM-V-4b) will require ramps, between 77.5 and 124m approx. which will create a barrier effect along the road, blocking off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sandymount Avenue on both sides of the crossing. Up to approx. 55 properties, including 5 apartment blocks, would be potentially impacted with significant compulsory purchase of land likely required as a result.

Significant utility diversions would be required to relocate the utility infrastructure currently within the existing road corridor, however, due to the reduced cross section this may not be feasible.

Options SM-V-4c), shown in Figure 6-69, will impact on the properties and impediments to property access in the area around the level crossing which may lead to Sensitive Land Acquisition. Ramps will create a barrier effect along the road, blocking entrances to a number of residential properties. Approximately 8 properties would be potentially impacted with significant compulsory purchase of land likely required as a result. It is worth noting that any solution would require a derogation from the highway standards (particularly in terms of gradient and radii). Such a solution is highly unlikely to be acceptable. It would provide for vehicular connectivity, albeit on a very limited functionality, which would not be attractive to strategic journeys or access of larger vehicles.

Figure 6-69 Sandymount Avenue Full Grade Separated Crossing, Option SM-V-4c) (Source: ESRI)

Option SM-V-5 – New Alternative Crossing

Option SM-V-5, shown in Figure 6-70, considers a new connection between Serpentine Avenue (west of Railway) and Sandymount Avenue (east of Railway) crossing under the railway at the north end of Sandymount Station.

Figure 6-70 Sandymount Avenue New Alternative Crossing, Option SA-V-5) (Source: ESRI)

The option would require the compulsory acquisition of residential properties to the east to allow the route to connect with Sandymount Ave, in addition to a portion of the sports club, demolishing and reconstructing the club house and removing one of the pitches.

Ramps will create a barrier effect along the new alignment, blocking entrances to a number of residential and commercial properties. Overall, this solution will have a significant impact on local residents, the sports club, and its users.

6.4.3.2 Pedestrian/Cyclist Crossing Options

Option SM-P-0 – Existing Arrangement

This option proposes to retain the Level Crossing (XR003) at Sandymount Avenue. No significant infrastructure interventions are considered.

Option SM-P-1a) / SM-P-1b) – New Footbridge with Linear Ramp Access

Option SM-P-1a), shown in Figure 6-71, considers a new footbridge, with 5.3m clearance to rail level, and a 5% gradient linear ramp access. Ramps would be positioned along the existing road.

Figure 6-71 Sandymount Avenue New Footbridge with Linear Ramp Access, Option SM-P-1a) (Source: ESRI)

Option SM-P-1b), shown in Figure 6-72, considers a new footbridge, with 5.3m clearance to rail level, and reduced length of ramps by use of an 8% gradient linear ramp access. Ramps would be positioned along the existing road.

Figure 6-72 Sandymount Avenue New Footbridge with Linear Ramp Access, Option SM-P-1b) (Source: ESRI)

Each option will have unacceptable impacts on the surrounding residential and commercial properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sandymount Avenue on both sides of the crossing, potentially requiring extensive compulsory acquisition of lands. Other solutions may lead to the removal of access to residential properties during construction.

Option SM-P -2a) / SM-P -2b) – New Footbridge with Compressed Ramp Access

Option SM-P-2a), shown in Figure 6-73, considers a new footbridge, with 5.3m clearance to rail level, and a 5% gradient compressed ramp access. Ramps can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.

Figure 6-73 Sandymount Avenue New Footbridge with Compressed Ramp Access, Option SM-P-2a) (Source: ESRI)

Option SM-P-2b), shown in Figure 6-74, considers a new footbridge, with 5.3m clearance to rail level, and reduced length of ramps by use of an 8% gradient linear ramp access. Ramps can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.

Figure 6-74 Sandymount Avenue New Footbridge with Compressed Ramp Access, Option SM-P-2b) (Source: ESRI)

Each option requires additional compulsory acquisition of residential property to the west of the railway and will require the relocation of the station building on the eastern platform. The station on the eastern side will need to be demolished and rebuilt, resulting in prolonged disruption to rail users at this station during construction. Other solutions may lead to the removal of access to residential properties during construction.

Option SM-P -3a) / SM-P -3b) – New Footbridge with Non-Linear Ramp Access

Option SM-P-3a), shown in Figure 6-75, considers a new footbridge, with 5.3m clearance to rail level, and a 5% gradient non-linear ramp access. Ramps can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.

Figure 6-75 Sandymount Avenue New Footbridge with Non-Linear Ramp Access, Option SM-P-3a) (Source: ESRI)

Option SM-P-3b) shown in Figure 6-76, considers a new footbridge, with 5.3m clearance to rail level, and an 8% gradient non-linear ramp access. Ramps can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.

Figure 6-76 Sandymount Avenue New Footbridge with Non-Linear Ramp Access, Option SM-P-3b) (Source: ESRI)

Each option will have unacceptable impacts on the surrounding residential and commercial properties. In particular, the options require additional compulsory land acquisition and demolition of residential property on both sides of the railway. Other solutions may lead to the removal of access to residential properties during construction.

Option SM-P -4a) / SM-P -4b) – New Footbridge with Stair & Lift Access

Option SM-P-4a), shown in Figure 6-77, considers a new footbridge, with 5.3m clearance to rail level, 2nb, lifts at each side of the crossing and full width ped/cycleway. Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.

Figure 6-77 Sandymount Avenue New Footbridge with Stair & Lift Access, Option SM-P-4a) (Source: ESRI)

Option SM-P-4b), shown in Figure 6-78, considers a new footbridge, with 5.3m clearance to rail level, 1nb, lifts at each side of the crossing and minimum width ped/cycleway. Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.

Figure 6-78 Sandymount Avenue New Footbridge with Stair & Lift Access, Option SM-P-4b) (Source: ESRI)

As both options meet all project specific objectives and requirements, Option SM-P-4a) should be considered as the best performing option for this concept option. It is noted that some compulsory land acquisition may be required as part of the development of this option to protect private and station accesses. This will be optimised through the preliminary design if selected as the Emerging Preferred Option.

Option SM-P -5a) / SM-P -5b) – New Subway with Linear Ramp Access

Option SM-P-5a), shown in Figure 6-79, considers a new subway, with 2.6m clearance, and a 5% gradient linear ramp access. Ramps can be positioned along the existing road.

Figure 6-79 Sandymount Avenue New Subway with Stair & Lift Access, Option SM-P-5a) (Source: ESRI)

Option SM-P-5b), shown in Figure 6-80, considers a new subway, with 2.6m clearance, and reduced length of ramps by use of an 8% gradient linear ramp access. Ramps can be positioned along the existing road.

Figure 6-80 Sandymount Avenue New Subway with Stair & Lift Access, Option SM-P-5b) (Source: ESRI)

Each option will have unacceptable impacts on the surrounding residential and commercial properties. This option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sandymount Avenue on both sides of the crossing, potentially requiring extensive compulsory acquisition of lands. Other solutions may lead to the removal of access to residential properties during construction.

Option SM-P -6a) / SM-P -6b) – New Subway with Stair & Lift Access

Option SM-P-6a), shown in Figure 6-81, considers a new subway, with 2.6m clearance to rail level, 2nb, lifts at each side of crossing and full width ped/cycleway. Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.

Figure 6-81 Sandymount Avenue New Subway with Stair & Lift Access Option, Option SM-P-6a) (Source: ESRI)

Option SM-P-6b), shown in Figure 6-82, considers a new subway, with 2.6m clearance, 1nb, lifts at each side of the crossing and minimum width ped/cycleway. Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.

Figure 6-82 Sandymount Avenue New Subway with Stair & Lift Access Option, Option SM-P-6b) (Source: ESRI)

As both options meet all project specific objectives and requirements, Option SM-P-6a) should be considered as the best performing option for this concept option. It is noted that some compulsory land acquisition may be required as part of the development of this option to protect private and station accesses. This will be optimised through the preliminary design if selected as the Emerging Preferred Option.

Option SM-P -7a) / SM-P -7b) – Modification of Existing Grade Separated Crossing

Option SM-P-7a), shown in Figure 6-83, considers provision of new ramp access to the existing subway, using existing clearances, within the station area. Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.

Figure 6-83 Sandymount Avenue Modification of Existing Grade Separated Crossing, Option SM-P-7a) (Source: ESRI)

This option will require demolition and re-construction of the station on the western side. The option results in ramps down to an existing subway crossing with blind bends along the access route, creating an unsafe user environment and adversely impacting on the user. The station on the western side will need to be demolished and rebuilt, resulting in prolonged disruption to rail users at this station during construction. This option proposes to retain the existing subway crossing, which has a vertical clearance of 2.05 m. This is below the minimum (current design standard) requirement of 2.4m. Option SM-P-7b) has not been developed as there is no existing infrastructure crossing the rail line at this location.

6.4.4 Sydney Parade

6.4.4.1 Full Crossing Options

Any grade-separated full crossing solution at Sydney Parade Avenue, within the existing road corridor, would not be preferred due to the impact on properties and impediments to property access in the area around the level crossing which may lead to Sensitive Land Acquisition.

Option SA -0 – Existing Arrangement

This option proposes to retain the Level Crossing (XR004) at Sydney Parade Avenue. No significant infrastructure interventions are considered.

Option SP-V-1a) / SP-V-1b) – New Overpass with 2-way vehicular crossing with ped/cycle access

Option SP-V-1a) considers a new overpass, with 5.3m clearance to rail level, allowing bi-directional traffic movements and desirable approach gradients of 5% on the road either side of the crossing. Option SA-V-1b) considers a new overpass, with 5.3m clearance to rail level, allowing bi-directional traffic movements and minimum approach gradients of 8% on the road either side of the crossing.

Option SP-V-1a) and SP-V-1b) would require ramps, between 80 and 128m approx. which will create a barrier effect along the road, blocking off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sydney Parade Avenue on both sides of the crossing. Up to approx. 27 properties would be potentially impacted with significant compulsory purchase of land likely required as a result.

Option SP-V-2a) / SP-V-2b) – New Overpass with 1-way vehicular crossing with ped/cycle access

Option SP-V-2a) considers a new overpass, with 5.3m clearance to rail level, restricted to uni-directional traffic movements and desirable approach gradients of 5% on the road either side of the crossing. Option SP-V-2b) considers a new overpass, with 5.3m clearance to rail level, restricted to uni-directional traffic movements and minimum approach gradients of 8% on the road either side of the crossing.

Option SP-V-2a) and SP-V-2b) will require ramps, between 80 and 128m approx. which will create a barrier effect along the road, blocking off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sydney Parade Avenue on both sides of the crossing. Up to approximately 27 properties would be potentially impacted with significant compulsory purchase of land likely required as a result. Significant utility diversions would be required to relocate the utility infrastructure currently within the existing road corridor.

Option SP-V-3a) / SP-V-3b) / SP-V-3c – New Underpass with 2-way vehicular crossing with ped/cycle access

Option SP-V-3a) considers a new underpass, with 5.3m clearance, allowing bi-directional traffic movements and desirable approach gradients of 5% on the road either side of the crossing. Option SP-V-3b) considers a new underpass, with 5.3m clearance, allowing bi-directional traffic movements and minimum approach gradients of 8% on the road either side of the crossing. Option SP-V-3c) considers a new underpass, with 5.3m clearance, allowing bi-directional traffic movements and limiting approach gradients on the road either side of the crossing.

Option SP-V-3a) and SP-V-3b) will require ramps, between 77.5 and 124m approx. which will create a barrier effect along the road, blocking off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sydney Parade Avenue on both sides of the crossing.

Up to approximately 27 would be potentially impacted with significant compulsory purchase of land likely required as a result. Significant utility diversions would be required to relocate the utility infrastructure currently within the existing road corridor which may not be feasible due to width required for the crossing.

Options SP-V-3c), shown in Figure 6-84, would require a deviation from the normal highway standards (particularly in terms of gradient and radii) and require restrictions on some larger vehicle types but would allow for emergency services.

Such a solution is likely to have a considerably lower impact on adjacent properties. It would provide for vehicular connectivity, albeit on a limited functionality, which would not be attractive to strategic journeys or access for larger vehicles.

Figure 6-84 Sydney Parade Avenue Full Grade Separated Crossing, Option SP-V-3c) (Source: ESRI)

This option will impact on properties and introduce impediments to property access in the area around the level crossing which may lead to Sensitive Land Acquisition. Ramps will create a barrier effect along the road, blocking entrances to a number of residential properties. Approximately 6 properties would be potentially impacted with significant compulsory purchase of land likely required as a result.

It is worth noting that any solution would require a derogation from the highway standards (particularly in terms of gradient and radii). Such a solution is highly unlikely to be acceptable. It would provide for vehicular connectivity, albeit on a very limited functionality, which would not be attractive to strategic journeys or access for larger vehicles.

Option SA-V-4a) / SA-V-4b) / SA-V-4c) – New Underpass with 1-way vehicular crossing with ped/cycle access

Option SP-V-4a) considers a new underpass, with 5.3m clearance, restricted to uni-directional traffic movements and desirable approach gradients of 5% on the road either side of the crossing. Option SP-V-4b) considers a new underpass, with 5.3m clearance, restricted to uni-directional traffic movements and minimum approach gradients of 8% on the road either side of the crossing. SP-V-4c) considers a new underpass, with 5.3m clearance, restricted uni-directional traffic movements and limiting approach gradients on the road either side of the crossing.

Option SP-V-4a) and SP-V-4b) will require ramps, between 77.5 and 124m approx. which will create a barrier effect along the road, blocking off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sydney Parade Avenue on both sides of the crossing. Up to approximately 27 would be potentially impacted with significant compulsory purchase of land likely required as a result. Significant utility diversions would be required to relocate the utility infrastructure currently within the existing road corridor, however, due to the reduced cross section this may be feasible.

Options SP-V-4c), shown in Figure 6-85, will impact on properties and introduce impediments to property access in the area around the level crossing which may lead to Sensitive Land Acquisition. Ramps will create a barrier effect along the road, blocking entrances to a number of residential properties. Approximately 6 properties would be potentially impacted with significant compulsory purchase of land likely required as a result. It is worth noting that any solution would require a derogation from the highway standards (particularly in terms of gradient and radii). Such a solution is highly unlikely to be acceptable. It would provide for vehicular connectivity, albeit on a very limited functionality, which would not be attractive to strategic journeys or access of larger vehicles.

Figure 6-85 Sydney Parade Avenue Full Grade Separated Crossing, Option SP-V-4c) (Source: ESRI)

Option SP-V-5 – New Alternative Crossing

Option SP-V-5, shown in Figure 6-86, considers a new connection between Ailesbury Gardens (east of Railway) and Merrion Road (west of Railway, north of Herbert Avenue Jnc.) crossing under the railway south of Sydney Parade Station.

Figure 6-86 Sydney Parade Avenue New Alternative Crossing, Option SA-V-5) (Source: ESRI)

This option will cause significant disruption to access to the apartments and houses off Merrion Village during construction, potentially restricting vehicular access for a prolonged period of time. This option will also result in the removal of several mature trees along the eastern side.

6.4.4.2 Pedestrian/Cyclist Crossing Options

Option SP-P-0 – Existing Arrangement

This option proposes to retain the Level Crossing (XR004) at Sydney Parade Avenue. No significant infrastructure interventions are considered.

Option SP-P-1a) / SP-P-1b) – New Footbridge with Linear Ramp Access

Option SP-P-1a), shown in Figure 6-87, considers a new footbridge, with 5.3m clearance to rail level, and a 5% gradient linear ramp access. Ramps can be positioned along the existing road.

Figure 6-87 Sydney Parade Avenue New Footbridge with Linear Ramp Access, Option SP-P-1a) (Source: ESRI)

Option SP-P-1b), shown in Figure 6-88, considers a new footbridge, with 5.3m clearance to rail level, and reduced length of ramps by use of an 8% gradient linear ramp access. Ramps can be positioned along the existing road.

Figure 6-88 Sydney Parade Avenue New Footbridge with Linear Ramp Access, Option SP-P-1b) (Source: ESRI)

Each option will have unacceptable impacts on the surrounding residential and commercial properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sydney Parade Avenue on both sides of the crossing, potentially requiring extensive compulsory acquisition of lands. Other solutions may lead to the removal of access to residential properties during construction.

Option SP-P -2a) / SP-P -2b) – New Footbridge with Compressed Ramp Access

Option SP-P-2a), shown in Figure 6-89, considers a new footbridge, with 5.3m clearance to rail level, and a 5% gradient compressed ramp access. Ramps can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.

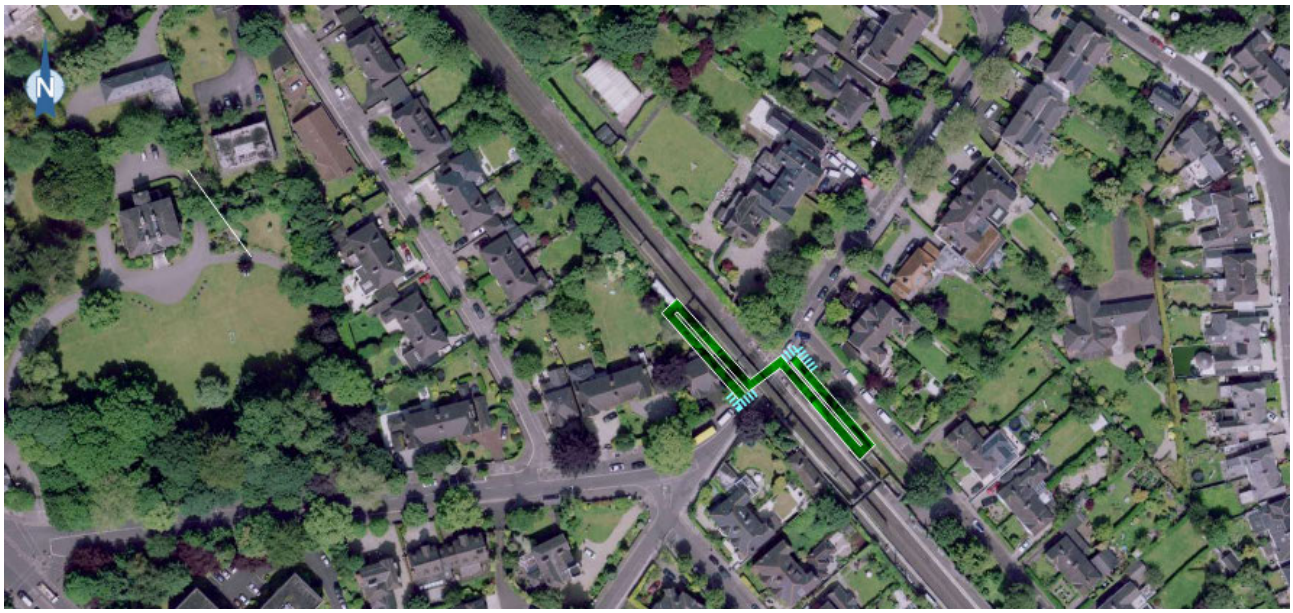


Figure 6-89 Sydney Parade Avenue New Footbridge with Compressed Ramp Access, Option SP-P-2a) (Source: ESRI)

Option SP-P-2b), shown in Figure 6-90, considers a new footbridge, with 5.3m clearance to rail level, and reduced length of ramps by use of an 8% gradient linear ramp access. Ramps can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.

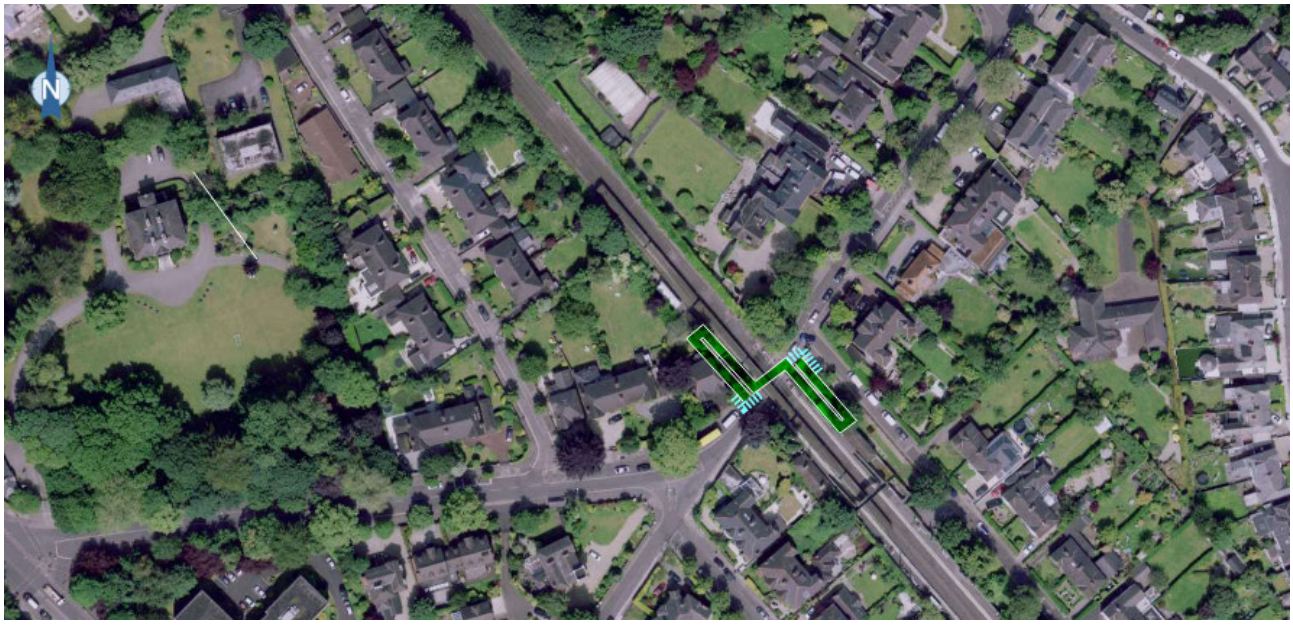


Figure 6-90 Sydney Parade Avenue New Footbridge with Compressed Ramp Access, Option SP-P-2b) (Source: ESRI)

Each option requires compulsory acquisition of residential property to the west of the railway and will require the relocation of the station building on the eastern platform. The station on the eastern side will need to be demolished and rebuilt, resulting in a prolonged time of disruption to rail users at this station during construction. It will also have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.

Option SP-P -3a) / SP-P -3b) – New Footbridge with Non-Linear Ramp Access

Options SP-P-3a) /3b) have not been developed as the configuration of this structure is not suitable for public desire lines and unreasonable land take is required. No advantages are provided over Option |SP-P-2a) / 2b).

Option SP-P -4a) / SP-P -4b) – New Footbridge with Stair & Lift Access

Option SP-P-4a), shown in Figure 6-91, considers a new footbridge, with 5.3m clearance to rail level, 2nb, lifts at each side of the crossing and full width ped/cycleway. Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.

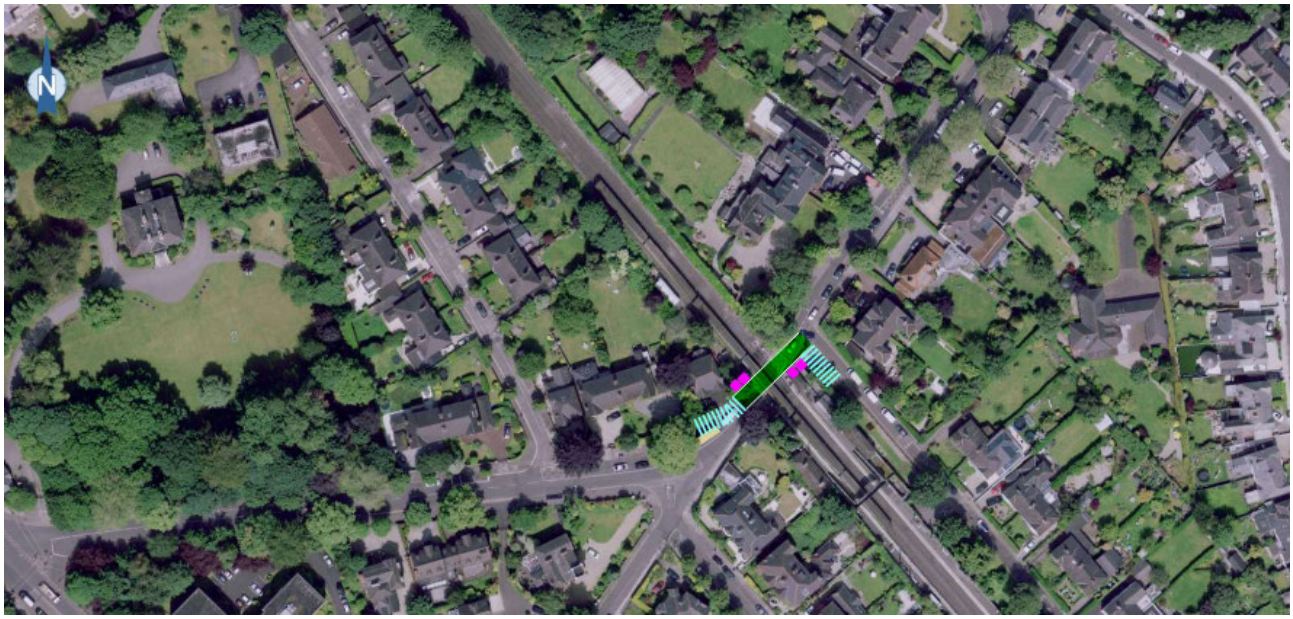


Figure 6-91 Sydney Parade Avenue New Footbridge with Stair & Lift Access, Option SP-P-4a) (Source: ESRI)

Option SP-P-4b), shown in Figure 6-92, considers a new footbridge, with 5.3m clearance to rail level, 1nb, lifts at each side of the crossing and minimum width ped/cycleway. Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.

Figure 6-92 Sydney Parade Avenue New Footbridge with Stair & Lift Access, Option SP-P-4b) (Source: ESRI)

As both options meet all project specific objectives and requirements, Option SP-P-4a) should be considered as the best performing option for this concept option. It is noted that some compulsory land acquisition may be required as part of the development of this option to protect private and station access. This will be optimised through the preliminary design if selected as the Emerging Preferred Option.

Option SP-P -5a) / SP-P -5b) – New Subway with Linear Ramp Access

Option SP-P-5a), shown in Figure 6-93, considers a new subway, with 2.6m clearance, and a 5% gradient linear ramp access. Ramps can be positioned along the existing road.

Figure 6-93 Sydney Parade Avenue New Subway with Stair & Lift Access, Option SP-P-5a) (Source: ESRI)

Option SP-P-5b), shown in Figure 6-94, considers a new subway, with 2.6m clearance, and reduced length of ramps by use of an 8% gradient linear ramp access. Ramps can be positioned along the existing road.

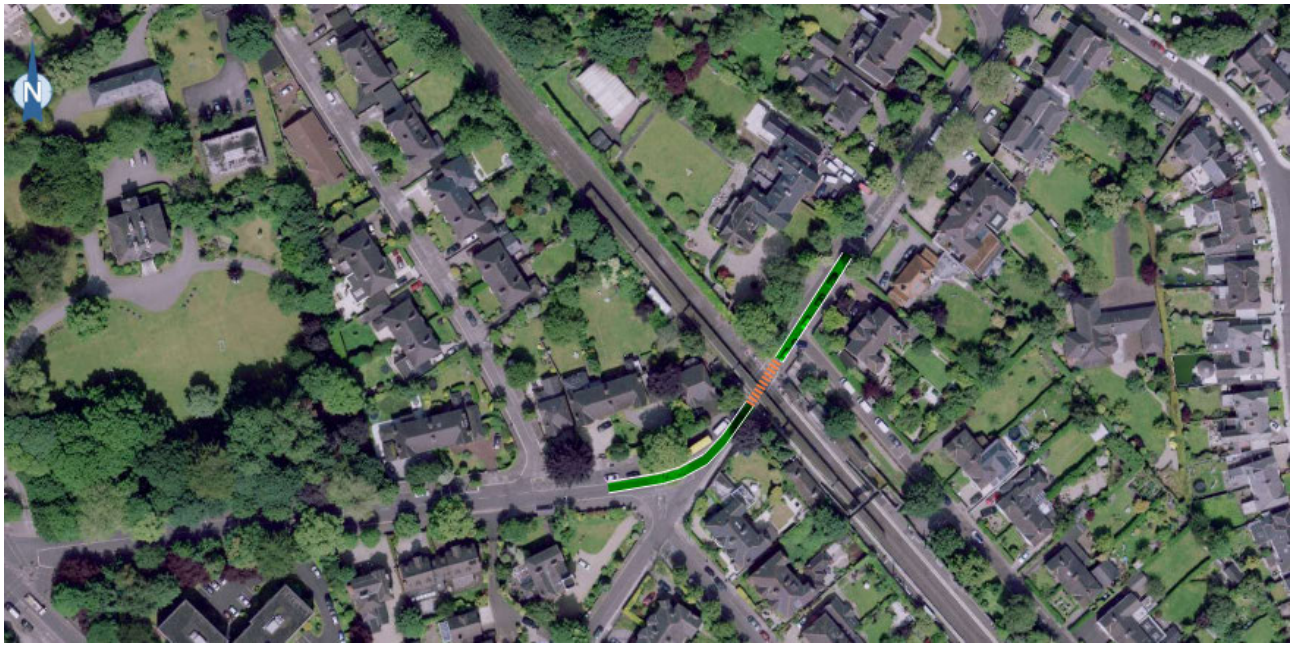


Figure 6-94 Sydney Parade Avenue New Subway with Stair & Lift Access, Option SP-P-5b) (Source: ESRI)

Each option will have unacceptable impacts on the surrounding residential and commercial properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sydney Parade Avenue on both sides of the crossing. Other solutions may lead to the removal of access to residential properties during construction.

Option SP-P -6a) / SP-P -6b) – New Subway with Stair & Lift Access

Option SP-P-6a), shown in Figure 6-95, considers a new subway, with 2.6m clearance to rail level, 2nb, lifts at each side of the crossing and full width ped/cycleway. Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.

Figure 6-95 Sydney Parade Avenue New Subway with Stair & Lift Access Option, Option SP-P-6a) (Source: ESRI)

Option SP-P-6b), shown in Figure 6-96, considers a new subway, with 2.6m clearance, 1nb, lifts at each side of the crossing and minimum width ped/cycleway. Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.

Figure 6-96 Sydney Parade Avenue New Subway with Stair & Lift Access Option, Option SP-P-6b) (Source: ESRI)

As both options meet all project specific objectives and requirements, Option SP-P-6a) should be considered as the best performing option for this concept option. It is noted that some compulsory land acquisition may be required as part of the development of this option to protect private and station access. This will be optimised through the preliminary design if selected as the Emerging Preferred Option.

Option SP-P -7a) / SP-P -7b) – Modification of Existing Grade Separated Crossing

Option SP-P-7a) has not been developed as the configuration of this structure is not suitable for compliant passage. The bridge would need replacement of the superstructure to provide for a level crossing over the tracks. Option SP-P-7b) has not been developed as there is no existing infrastructure crossing the rail at this location.

6.4.5 Merrion Gates

6.4.5.1 Full Crossing Options

Option SA -0 – Existing Arrangement

This option proposes to retain the Level Crossing (XR005) at Merrion Gates. No significant infrastructure interventions are considered.

Option MG-V-1a) / MG-V-1b) – New Overpass with 2-way vehicular crossing with ped/cycle access

Option MG-V-1a) considers a new overpass, with 5.3m clearance to rail level, allowing bi-directional traffic movements and desirable approach gradients of 5% on the road either side of the crossing. Option SA-V-1b) considers a new overpass, with 5.3m clearance to rail level, allowing bi-directional traffic movements and minimum approach gradients of 8% on the road either side of the crossing.

Option MG-V-1a) and MG-V-1b) would require ramps, between 80 and 128m approx. which will create a barrier effect along the road, blocking off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Merrion Road and Strand Road on both sides of the crossing. Up to approximately 32 properties would be potentially impacted with significant compulsory purchase of land likely required as a result.

Option MG-V-2a) / MG-V-2b) – New Overpass with 1-way vehicular crossing with ped/cycle access

Option MG-V-2a) considers a new overpass, with 5.3m clearance to rail level, restricted to uni-directional traffic movements and desirable approach gradients of 5% on the road either side of the crossing. Option MG-V-2b) considers a new overpass, with 5.3m clearance to rail level, restricted to uni-directional traffic movements and minimum approach gradients of 8% on the road either side of the crossing.

Option MG-V-2a) and MG-V-2b) will require ramps, between 80 and 128m approx. which will create a barrier effect along the road, blocking off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Merrion Road and Strand Road on both sides of the crossing. Up to approximately 32 properties would be potentially impacted with significant compulsory purchase of land likely required as a result.

Option MG-V-3a) / MG-V-3b) – New Underpass with 2-way vehicular crossing with ped/cycle access

Option MG-V-3a) considers a new underpass, with 5.3m clearance, allowing bi-directional traffic movements and desirable approach gradients of 5% on the road either side of the crossing. Option MG-V-3b) considers a new underpass, with 5.3m clearance, allowing bi-directional traffic movements and minimum approach gradients of 8% on the road either side of the crossing.

Option MG-V-3a) and MG-V-3b) will require ramps, between 77.5 and 124m approx. which will create a barrier effect along the road, blocking off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Merrion Road and Strand Road on both sides of the crossing. Up to approximately 32 properties would be potentially impacted with significant compulsory purchase of land likely required as a result.

Option SA-V-4a) / SA-V-4b) – New Underpass with 1-way vehicular crossing with ped/cycle access

Option MG-V-4a) considers a new underpass, with 5.3m clearance, restricted to uni-directional traffic movements and desirable approach gradients of 5% on the road either side of the crossing. Option MG-V-4b) considers a new underpass, with 5.3m clearance, restricted to uni-directional traffic movements and minimum approach gradients of 8% on the road either side of the crossing.

Option MG-V-4a) and MG-V-4b) will require ramps, between 77.5 and 124m approx. which will create a barrier effect along the road, blocking off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Merrion Road and Strand Road on both sides of the crossing. Up to approximately 32 properties would be potentially impacted with significant compulsory purchase of land likely required as a result.

Option MG-V-5a) / MG-V-5b) / MG-V-5c) – New Alternative Crossing

Option MG-V-5a), shown in Figure 6-97, considers a new connection between Strand Road (east of Railway, south of St. Albans Park Jnc.) and Merrion Road (west of Railway, north of Herbert Park Jnc.) crossing over the railway south of the footbridge (OBR65A).

Figure 6-97 Merrion Gates New Alternative Crossing, Option SA-V-5a) (Source: ESRI)

Option MG-V-5b), shown in Figure 6-98, considers a new connection between Strand Road (east of Railway, south of St. Albans Park Jnc.) and Merrion Road (west of Railway, north of Herbert Park Jnc.) crossing under the railway south of the footbridge (OBR65A).

Figure 6-98 Merrion Gates New Alternative Crossing, Option SA-V-5b) (Source: ESRI)

Each option meets all project specific objectives and requirements. It is noted that some compulsory land acquisition may be required as part of the development of this option to protect private, public, and commercial access. This will be optimised through the preliminary design if selected as the Emerging Preferred Option.

Option MG-V-5c), shown in Figure 6-99, considers a new connection between Strand Road (east of Railway, south of St. Albans Park Jnc.) and Merrion Road (west of Railway, north of Herbert Park Jnc.) crossing under the railway south of the footbridge (OBR65A).

Figure 6-99 Merrion Gates New Alternative Crossing, Option SA-V-5c) (Source: ESRI)

This option will have unacceptable impacts on the natural and built environment. In particular, this option would require compulsory acquisition of property associated with a garage and St Mary's care facility and would also impact on access to this property. This option would also require extensive temporary and permanent works within the Merrion Strand seafront to accommodate the approach ramp on the eastern side. In addition, this option will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.

6.4.5.2 Pedestrian/Cyclist Crossing Options

Option MG-P-0 – Existing Arrangement

This option proposes to retain the Level Crossing (XR005) at Merrion Gates. No significant infrastructure interventions are considered.

Option MG-P-1a) / MG-P-1b) – New Footbridge with Linear Ramp Access

Option MG-P-1a), shown in Figure 6-100, considers a new footbridge, with 5.3m clearance to rail level, and a 5% gradient linear ramp access. Ramps would be positioned along the existing road.

Figure 6-100 Merrion Gates New Footbridge with Linear Ramp Access, Option MG-P-1a) (Source: ESRI)

Option MG-P-1b), shown in Figure 6-101, considers a new footbridge, with 5.3m clearance to rail level, and reduced length of ramps by use of an 8% gradient linear ramp access. Ramps would be positioned along the existing road.

Figure 6-101 Merrion Gates New Footbridge with Linear Ramp Access, Option MG-P-1b) (Source: ESRI)

Each option will have unacceptable impacts on the surrounding residential and commercial properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Strand Road, potentially requiring extensive compulsory acquisition of lands. Other solutions may lead to the removal of access to residential properties during construction.

Option MG-P -2a) / MG-P -2b) – New Footbridge with Compressed Ramp Access

Option MG-P-2a), shown in Figure 6-102, considers a new footbridge, with 5.3m clearance to rail level, and a 5% gradient compressed ramp access. Ramps can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.

Figure 6-102 Merrion Gates New Footbridge with Compressed Ramp Access, Option MG-P-2a) (Source: ESRI)

Option MG-P-2b), shown in Figure 6-103, considers a new footbridge, with 5.3m clearance to rail level, and reduced length of ramps by use of an 8% gradient linear ramp access. Ramps can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.

Figure 6-103 Merrion Gates New Footbridge with Compressed Ramp Access, Option MG-P-2b) (Source: ESRI)

As both options meet all project specific objectives and requirements, Option MG-P-2a) should be considered as the best performing option for this concept option. It is noted that some compulsory land acquisition may be required as part of the development of this option to protect private and station access. This will be optimised through the preliminary design if selected as the Emerging Preferred Option.

Option MG-P -3a) / MG-P -3b) – New Footbridge with Non-Linear Ramp Access

Option MG-P-3a), shown in Figure 6-104, considers a new footbridge, with 5.3m clearance to rail level, and a 5% gradient non-linear ramp access. Ramps can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.

Figure 6-104 Merrion Gates New Footbridge with Non-Linear Ramp Access, Option MG-P-3a) (Source: ESRI)

This option meets all project specific objectives and requirements. It is noted that some compulsory land acquisition may be required as part of the development of this option to protect private and station access. This will be optimised through the preliminary design if selected as the Emerging Preferred Option. Option MG-P-3b) not developed as no advantages provided over Option P-3a.

Option MG-P -4a) / MG-P -4b) – New Footbridge with Stair & Lift Access

Option MG-P-4a), shown in Figure 6-105, considers a new footbridge, with 5.3m clearance to rail level, 2nb, lifts at each side of the crossing and full width ped/cycleway. Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.

Figure 6-105 Merrion Gates New Footbridge with Stair & Lift Access, Option MG-P-4a) (Source: ESRI)

Option MG-P-4b), shown in Figure 6-106, considers a new footbridge, with 5.3m clearance to rail level, 1nb, lifts at each side of the crossing and minimum width ped/cycleway. Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.

Figure 6-106 Merrion Gates New Footbridge with Stair & Lift Access, Option MG-P-4b) (Source: ESRI)

As both options meet all project specific objectives and requirements, Option MG-P-4a) should be considered as the best performing option for this concept option. It is noted that some CPO may be required as part of the development of this option to protect private and station access. This will be optimised through the preliminary design if selected as the Emerging Preferred Option.

Option MG-P -5a) / MG-P -5b) – New Subway with Linear Ramp Access

Option MG-P-5a), shown in Figure 6-107, considers a new subway, with 2.6m clearance, and a 5% gradient linear ramp access. Ramps would be positioned along the existing road.

Figure 6-107 Merrion Gates New Subway with Stair & Lift Access, Option MG-P-5a) (Source: ESRI)

Option MG-P-5b), shown in Figure 6-108, considers a new subway, with 2.6m clearance, and reduced length of ramps by use of an 8% gradient linear ramp access. Ramps would be positioned along the existing road.

Figure 6-108 Merrion Gates New Subway with Stair & Lift Access, Option MG-P-5b) (Source: ESRI)

In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Strand Road, potentially requiring extensive CPO of lands. The options result in ramps down to a new subway crossing with blind bends along the access route, creating an unsafe user environment and adversely impacting on the user. Other solutions may lead to the removal of access to residential properties during construction.

Option MG-P -6a) / MG-P -6b) – New Subway with Stair & Lift Access

Option MG-P-6a), shown in Figure 6-109, considers a new subway, with 2.6m clearance to rail level, 2nb, lifts at each side of the crossing and full width ped/cycleway. Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.

Figure 6-109 Sydney Parade Avenue New Subway with Stair & Lift Access Option, Option MG-P-6a) (Source: ESRI)

Option MG-P-6b), shown in Figure 6-110, considers a new subway, with 2.6m clearance, 1nb, lifts at each side of the crossing and minimum width ped/cycleway. Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.

Figure 6-110 Sydney Parade Avenue New Subway with Stair & Lift Access Option, Option MG-P-6b) (Source: ESRI)

As both options meet all project specific objectives and requirements, Option MG-P-6a) should be considered as the best performing option for this concept option. It is noted that some CPO may be required as part of the development of this option to protect private and station access. This will be optimised through the preliminary design if selected as the Emerging Preferred Option.

Option MG-P -7a) / MG-P -7b) – Modification of Existing Grade Separated Crossing

Option MG-P-7 has not been developed as there is no existing infrastructure crossing the rail at this location.

6.5 Shortlist of Infrastructure Options

6.5.1 Lansdowne Road

Table 6-2 provides a summary of the Longlist Sifting Process for Lansdowne Road for both vehicle and pedestrian/cyclist options.

Table 6-2 Infrastructure Concept Options at Lansdowne Road Longlist to Shortlist Sifting Process Summary

Option	Sifting Outcome	Description
LR-0	FAIL	This option fails to meet the following project specific objectives and requirements: Deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre; Deliver solutions which improve the passenger experience where passenger infrastructure interventions are required to meet the planned increase in DART service frequency; Provide efficient & cost-effective integration of systems with the DART+ Programme projects; Provide an appropriate level of vehicular access across the railway line to/from Sandymount Village and neighbouring areas for all modes; Provide an appropriate level of accessibility at a local level for pedestrians and cyclists.
LR-V-1a	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
LR-V-1b	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
LR-V-2a	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
LR-V-2b	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
LR-V-3a	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.

Option	Sifting Outcome	Description
LR-V-3b	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
LR-V-4a	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
LR-V-4b	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
LR-V-5	FAIL	A viable full grade-separated solution designed through an alternative road alignment and/or suitable location to minimise impacts on adjacent properties was not identified due to the restrictions of the Aviva Stadium and the River Dodder.
LR-P-1a	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
LR-P-1b	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
LR-P-2a	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
LR-P-2b	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on existing rail services, road users and landowners.
LR-P-3a	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
LR-P-3b	FAIL	Option not developed as no advantages provided over Option P-3a.
LR-P-4a	PASS	This option meets all project specific objectives and requirements; therefore, it passes the assessment.
LR-P-4b	PASS	This option meets all project specific objectives and requirements; therefore, it passes the assessment.
LR-P-5a	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
LR-P-5b	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
LR-P-6a	PASS	This option meets all project specific objectives and requirements; therefore, it passes the assessment.
LR-P-6b	PASS	This option meets all project specific objectives and requirements; therefore, it passes the assessment.

Option	Sifting Outcome	Description
LR-P-7a	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on existing rail services, road users and landowners; Comply with the relevant standards and design guidelines.
LR-P-7b	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on existing rail services, road users and landowners; Comply with the relevant standards and design guidelines.

4 options were shortlisted to be brought forward to MCA, from a longlist of 24 options identified in Section 5, as they met all the project objectives and requirements. All 4 shortlisted options (grouped into 2 types) were for the provision of a pedestrian/cyclist crossing only. No solution was identified for a full crossing at Lansdowne Road. The shortlisted options were:

- **LR-P-4a/b**: New Footbridge with Stair & Lift Access; and
- **LR-P-6a/b**: New Subway with Stair & Lift Access.

6.5.2 Serpentine Avenue

Table 6-3 provides a summary of the Longlist Sifting Process for Serpentine Avenue for both vehicle and pedestrian/cyclist options.

Table 6-3 Infrastructure Concept Options at Serpentine Ave. Longlist to Shortlist Sifting Process Summary

Option	Sifting Outcome	Description
SA-0	FAIL	This option fails to meet the following project specific objectives and requirements: Deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre; Deliver solutions which improve the passenger experience where passenger infrastructure interventions are required to meet the planned increase in DART service frequency; Provide efficient & cost-effective integration of systems with the DART+ Programme projects; Provide an appropriate level of vehicular access across the railway line to/from Sandymount Village and neighbouring areas for all modes; Provide an appropriate level of accessibility at a local level for pedestrians and cyclists.
SA-V-1a	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
SA-V-1b	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
SA-V-2a	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
SA-V-2b	FAIL	This option fails to meet the following project specific objectives and requirements:

Option	Sifting Outcome	Description
		Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
SA-V-3a	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
SA-V-3b	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
SA-V-3c	PASS	This option meets all project specific objectives and requirements; therefore, it passes the assessment.
SA-V-4a	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
SA-V-4b	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
SA-V-4c	PASS	This option meets all project specific objectives and requirements; therefore, it passes the assessment.
SA-V-5	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
SA-P-1a	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
SA-P-1b	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
SA-P-2a	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on existing rail services, road users and landowners.
SA-P-2b	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on existing rail services, road users and landowners.
SA-P-3a	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
SA-P-3b	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
SA-P-4a	PASS	This option meets all project specific objectives and requirements; therefore, it passes the assessment.
SA-P-4b	PASS	This option meets all project specific objectives and requirements; therefore, it passes the assessment.

Option	Sifting Outcome	Description
SA-P-5a	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
SA-P-5b	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
SA-P-6a	PASS	This option meets all project specific objectives and requirements; therefore, it passes the assessment.
SA-P-6b	PASS	This option meets all project specific objectives and requirements; therefore, it passes the assessment.
SA-P-7a	FAIL	Option not developed as there is no existing infrastructure crossing the rail at this location.
SA-P-7b	FAIL	Option not developed as there is no existing infrastructure crossing the rail at this location.

6 options were shortlisted to be brought forward to MCA, from a longlist of 26 options identified in Section 5, as they met all the project objectives and requirements. Of the 6 shortlisted options, 4 options (grouped into 2 types) were for the provision of a pedestrian/cyclist crossing only, and 2 options (grouped as 1 type) were for the provision of a full crossing at Serpentine Avenue. The shortlisted options were:

- **SA-P-4a/b**: New Footbridge with Stair & Lift Access;
- **SA-P-6a/b**: New Subway with Stair & Lift Access; and
- **SA-V-3c/4c**: New Underpass (using Limiting Design Parameters) with Bi/Uni-directional Traffic System.

6.5.3 Sandymount Avenue

Table 6-4 provides a summary of the Longlist Sifting Process for Sandymount Avenue for both vehicle and pedestrian/cyclist options.

Table 6-4 Infrastructure Concept Options at Sandymount Ave. Longlist to Shortlist Sifting Process Summary

Option	Sifting Outcome	Description
SM-0	FAIL	This option fails to meet the following project specific objectives and requirements: Deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre; Deliver solutions which improve the passenger experience where passenger infrastructure interventions are required to meet the planned increase in DART service frequency; Provide efficient & cost-effective integration of systems with the DART+ Programme projects; Provide an appropriate level of vehicular access across the railway line to/from Sandymount Village and neighbouring areas for all modes; Provide an appropriate level of accessibility at a local level for pedestrians and cyclists.

Option	Sifting Outcome	Description
SM-V-1a	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
SM-V-1b	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
SM-V-2a	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
SM-V-2b	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
SM-V-3a	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
SM-V-3b	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
SM-V-3c	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment.
SM-V-4a	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
SM-V-4b	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
SM-V-4c	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment.
SM-V-5	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
SM-P-1a	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
SM-P-1b	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
SM-P-2a	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.

Option	Sifting Outcome	Description
SM-P-2b	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
SM-P-3a	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
SM-P-3b	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
SM-P-4a	PASS	This option meets all project specific objectives and requirements; therefore, it passes the assessment.
SM-P-4b	PASS	This option meets all project specific objectives and requirements; therefore, it passes the assessment.
SM-P-5a	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
SM-P-5b	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
SM-P-6a	PASS	This option meets all project specific objectives and requirements; therefore, it passes the assessment.
SM-P-6b	PASS	This option meets all project specific objectives and requirements; therefore, it passes the assessment.
SM-P-7a	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on existing rail services, road users and landowners; Comply with the relevant standards and design guidelines.
SM-P-7b	FAIL	Option not developed as there is no existing infrastructure crossing the rail at this location.

4 Options were shortlisted to be brought forward to MCA, from a Longlist of 26 options identified in Section 5, as they met all the project objectives and requirements. All 4 shortlisted options (grouped into 2 types) were for the provision of a pedestrian/cyclist crossing only. No solution was identified for a full crossing at Sandymount Avenue. The shortlisted options were:

- **SM-P-4a/b**: New Footbridge with Stair & Lift Access; and
- **SM-P-6a/b**: New Subway with Stair & Lift Access.

6.5.4 Sydney Parade Avenue

Table 6-5 provides a summary of the Longlist Sifting Process for Sydney Parade Avenue for both vehicle and pedestrian/cyclist options.

Table 6-5 Infrastructure Concept Options at Sydney Parade Ave Longlist to Shortlist Sifting Process Summary

Option	Sifting Outcome	Description
SP-0	FAIL	This option fails to meet the following project specific objectives and requirements: Deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre; Deliver solutions which improve the passenger experience where passenger infrastructure interventions are required to meet the planned increase in DART service frequency; Provide efficient & cost-effective integration of systems with the DART+ Programme projects; Provide an appropriate level of vehicular access across the railway line to/from Sandymount Village and neighbouring areas for all modes; Provide an appropriate level of accessibility at a local level for pedestrians and cyclists.
SP-V-1a	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
SP-V-1b	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
SP-V-2a	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
SP-V-2b	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
SP-V-3a	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
SP-V-3b	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
SP-V-3c	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment.
SP-V-4a	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
SP-V-4b	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
SP-V-4c	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment.
SP-V-5	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment;

Option	Sifting Outcome	Description
		Minimise adverse impacts on existing rail services, road users and landowners.
SP-P-1a	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
SP-P-1b	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
SP-P-2a	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
SP-P-2b	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
SP-P-3a	FAIL	Option not developed as the configuration of this structure is not suitable for public desire lines and unreasonable land take required. No advantages provided over Option P-2a.
SP-P-3b	FAIL	Option not developed as the configuration of this structure is not suitable for public desire lines and unreasonable land take required. No advantages provided over Option P-2b.
SP-P-4a	PASS	This option meets all project specific objectives and requirements; therefore, it passes the assessment.
SP-P-4b	PASS	This option meets all project specific objectives and requirements; therefore, it passes the assessment.
SP-P-5a	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
SP-P-5b	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
SP-P-6a	PASS	This option meets all project specific objectives and requirements; therefore, it passes the assessment.
SP-P-6b	PASS	This option meets all project specific objectives and requirements; therefore, it passes the assessment.
SP-P-7a	FAIL	Option not developed as the configuration of this structure is not suitable for compliant passage. The bridge would need replacement of the superstructure to provide for level crossing over the tracks.
SP-P-7b	FAIL	Option not developed as there is no existing infrastructure crossing the rail at this location.

4 Options were shortlisted be brought forward to MCA, from a Longlist of 26 options identified in Section 5, as they met all the project objectives and requirements. All 4 shortlisted options (grouped into 2 types) were for the provision of a pedestrian/cyclist crossing only. No solution was identified for a full crossing at Sydney Parade Avenue. The shortlisted options were:

- **SP-P-4a/b**: New Footbridge with Stair & Lift Access; and
- **SP-P-6a/b**: New Subway with Stair & Lift Access.

6.5.5 Merrion Gates

Table 6-6 provides a summary of the Longlist Sifting Process for Merrion Gates for both vehicle and pedestrian/cyclist options.

Table 6-6 Infrastructure Concept Options at Merrion Gates Longlist to Shortlist Sifting Process Summary

Option	Sifting Outcome	Description
MG-0	FAIL	This option fails to meet the following project specific objectives and requirements: Deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre; Deliver solutions which improve the passenger experience where passenger infrastructure interventions are required to meet the planned increase in DART service frequency; Provide efficient and cost-effective integration of systems with the other DART+ Programme projects; Provide an appropriate level of vehicular access across the railway line to/from Sandymount Village and neighbouring areas for all modes; Provide an appropriate level of accessibility at a local level for pedestrians and cyclists.
MG-V-1a	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
MG-V-1b	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
MG-V-2a	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
MG-V-2b	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
MG-V-3a	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
MG-V-3b	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
MG-V-4a	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
MG-V-4b	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.

Option	Sifting Outcome	Description
MG-V-5a	PASS	This option meets all project specific objectives and requirements; therefore, it passes the assessment.
MG-V-5b	PASS	This option meets all project specific objectives and requirements; therefore, it passes the assessment.
MG-V-5c	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
MG-P-1a	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
MG-P-1b	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
MG-P-2a	PASS	This option meets all project specific objectives and requirements; therefore, it passes the assessment.
MG-P-2b	PASS	This option meets all project specific objectives and requirements; therefore, it passes the assessment.
MG-P-3a	PASS	This option meets all project specific objectives and requirements; therefore, it passes the assessment.
MG-P-3b	FAIL	Option not developed as no advantages provided over Option P-3a.
MG-P-4a	PASS	This option meets all project specific objectives and requirements; therefore, it passes the assessment.
MG-P-4b	PASS	This option meets all project specific objectives and requirements; therefore, it passes the assessment.
MG-P-5a	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
MG-P-5b	FAIL	This option fails to meet the following project specific objectives and requirements: Minimise adverse impacts on the natural and built environment; Minimise adverse impacts on existing rail services, road users and landowners.
MG-P-6a	PASS	This option meets all project specific objectives and requirements; therefore, it passes the assessment.
MG-P-6b	PASS	This option meets all project specific objectives and requirements; therefore, it passes the assessment.
MG-P-7a	FAIL	Option not developed as there is no existing infrastructure crossing the rail at this location.
MG-P-7b	FAIL	Option not developed as there is no existing infrastructure crossing the rail at this location.

9 options were shortlisted to be brought forward to MCA, from a longlist of 26 options identified in Section 5, as they met all the project objectives and requirements. Of the 9 shortlisted options, 7 options (grouped into 4 types) were for the provision of a pedestrian/cyclist crossing only, and 2 options (separate types) were for the provision of a full crossing at Merrion Gates. The shortlisted options were:

- **MG-P-2a/b**: New Footbridge with Compressed Ramp Access;
- **MG-P-3a**: New Footbridge with Non-linear Ramp Access;
  MG-P-4a/b: New Footbridge with Stair & Lift Access;
- **MG-P-6a/b**: New Subway with Stair & Lift Access;
- **MG-V-5a**: New Overpass at an Alternative Location – Merrion Gates North; and
- **MG-V-5b**: New Underpass at an Alternative Location – Merrion Gates North.

6.6 Option Compatibility Assessment

The options which passed the sifting process (as summarised in Table 6-1 to Table 6-6) or both Infrastructure and Accessibility options have been combined in Table 6-7. Since not all Accessibility options taken forward to shortlisting are compatible with all Infrastructure options, the compatibility exercise generates a list of feasible combined options to be taken forward to MCA.

From Section 6.5 the shortlisted Infrastructure options, that will inform the feasibility of the implementation of the shortlisted Accessibility options were deemed to be as follows:

- **Lansdowne Road (Pedestrian/Cyclist Crossing Only):**
  - Option LR-P-4: New Footbridge - Stair & lift access; and
  - Option LR-P-6: New Subway - Stair & lift access.
- **Serpentine Avenue (Pedestrian/Cyclist Crossing Only):**
  - Option SA-P-4: New Footbridge - Stair & lift access; and
  - Option SA-P-6: New Subway - Stair & lift access.
- **Serpentine Avenue (Full Crossing) – No MCA required, only one option passed:**
  - Option V-3c + Option P-4a/b: New Underpass – 2-way vehicular crossing (Lim. Design Values). New Subway – Stair & lift access.
- **Sandymount Avenue (Pedestrian/Cyclist Crossing Only):**
  - Option SM-P-4: New Footbridge – Stair & lift access; and
  - Option SM-P-6: New Subway – Stair & lift access.
- **Sydney Parade (Pedestrian/Cyclist Crossing Only):**
  - Option SP-P-4: New Footbridge – Stair & lift access; and
  - Option SP-P-6: New Subway – Stair & lift access.
- **Merrion Gates (Pedestrian/Cyclist Crossing Only):**
  - Option MG-P-2a: New Footbridge – Compressed ramps;
  - Option MG-P-3a: New Footbridge – Non-linear ramped access;
  - Option MG-P-4: New Footbridge – Stair & lift access; and
  - Option MG-P-6: New Subway – Stair & lift access.
- **Merrion Gates (Full Crossing):**
  - Option MG-V-5a: New Overbridge with ped & cycle access; and
  - Option MG-V-5b: New Underpass with ped & cycle access.

These shortlisted infrastructure options were evaluated against the 11 accessibility options from Section 6.3. Accessibility options with no Infrastructure option passing to a shortlist were failed, as explained in Table 6-7. The outputs from this process determined that the shortlisted Accessibility options taken forward to MCA are as follows:

- Option 2C: 1 Full Crossing (Merrion Gate North) + 4 Ped/Cycle Crossings; and
- Option 4D: 2 Full Crossings (Serpentine & Merrion Gate North) + 3 Ped/Cycle Crossings.

Table 6-7 Summary for Infrastructure and Accessibility Options

Shortlisted Concept Options (Accessibility)	Shortlisted Concept Options (Infrastructure)					Pass/Fail
	Lansdowne Road (LR)	Serpentine Avenue (SA)	Sandymount Avenue (SM)	Sydney Parade (SP)	Merrion Gates (MG)	
Option 2C: 1 Full Crossing (Merrion Gate North) + 4 Ped/Cycle Crossings	Option P-4a/b: New Footbridge - Stair & lift access. Option P-6a/b: New Subway - Stair & lift access.	Option P-4a/b: New Footbridge - Stair & lift access. Option P-6a/b: New Subway - Stair & lift access.	Option P-4a/b: New Footbridge - Stair & lift access. Option P-6a/b: New Subway - Stair & lift access.	Option P-4a/b: New Footbridge - Stair & lift access. Option P-6a/b: New Subway - Stair & lift access.	Option V-5a: New Overbridge with ped & cycle access. Option V-5b: New Underpass with ped & cycle access.	Pass
Option 3B: 2 Full Crossings (Sandymount & Merrion Gates) + 3 Ped/Cycle Crossings.	Option P-4a/b: New Footbridge - Stair & lift access. Option P-6a/b: New Subway - Stair & lift access.	Option P-4a/b: New Footbridge - Stair & lift access. Option P-6a/b: New Subway - Stair & lift access.	No Shortlisted Full Crossing Option. ✕	Option P-4a/b: New Footbridge - Stair & lift access. Option P-6a/b: New Subway - Stair & lift access.	No Shortlisted Full Crossing Option. ✕	Fail
Option 3D: 2 Full Crossings (Sandymount & Merrion Gate North) + 3 Ped/Cycle Crossings.	Option P-4a/b: New Footbridge - Stair & lift access. Option P-6a/b: New Subway - Stair & lift access.	Option P-4a/b: New Footbridge - Stair & lift access. Option P-6a/b: New Subway - Stair & lift access.	No Shortlisted Full Crossing Option. ✕	Option P-4a/b: New Footbridge - Stair & lift access. Option P-6a/b: New Subway - Stair & lift access.	Option V-5a: New Overbridge with ped & cycle access. Option V-5b: New Underpass with ped & cycle access.	Fail
Option 4B: 2 Full Crossings (Serpentine & Merrion Gates) + 3 Ped/Cycle Crossings.	Option P-4a/b: New Footbridge - Stair & lift access. Option P-6a/b: New Subway - Stair & lift access.	Option V-3c/4c + Option P-4a/b: New Underpass - 2-way vehicular crossing (Lim. Design Values). New Subway - Stair & lift access.	Option P-4a/b: New Footbridge - Stair & lift access. Option P-6a/b: New Subway - Stair & lift access.	Option P-4a/b: New Footbridge - Stair & lift access. Option P-6a/b: New Subway - Stair & lift access.	No Shortlisted Full Crossing Option. ✕	Fail

Shortlisted Concept Options (Accessibility)	Shortlisted Concept Options (Infrastructure)					Pass/Fail
	Lansdowne Road (LR)	Serpentine Avenue (SA)	Sandymount Avenue (SM)	Sydney Parade (SP)	Merrion Gates (MG)	
Option 4D: 2 Full Crossings (Serpentine & Merrion Gate North) + 3 Ped/Cycle Crossings.	Option P-4a/b: New Footbridge - Stair & lift access. Option P-6a/b: New Subway - Stair & lift access.	Option V-3c/4c + Option P-4a/b: New Underpass - 2-way vehicular crossing (Lim. Design Values). New Subway - Stair & lift access.	Option P-4a/b: New Footbridge - Stair & lift access. Option P-6a/b: New Subway - Stair & lift access.	Option P-4a/b: New Footbridge - Stair & lift access. Option P-6a/b: New Subway - Stair & lift access.	Option V-5a: New Overbridge with ped & cycle access. Option V-5b: New Underpass with ped & cycle access.	Pass
Option 7B: 3 Full Crossings (Sandymount, Sydney Parade & Merrion Gates) + 2 Ped/Cycle Crossings.	Option P-4a/b: New Footbridge - Stair & lift access. Option P-6a/b: New Subway - Stair & lift access.	Option P-4a/b: New Footbridge - Stair & lift access. Option P-6a/b: New Subway - Stair & lift access.	No Shortlisted Full Crossing Option. ✕	No Shortlisted Full Crossing Option. ✕	No Shortlisted Full Crossing Option. ✕	Fail
Option 7D: 3 Full Crossings (Sandymount, Sydney Parade & Merrion Gate North) + 2 Ped/Cycle Crossings.	Option P-4a/b: New Footbridge - Stair & lift access. Option P-6a/b: New Subway - Stair & lift access.	Option P-4a/b: New Footbridge - Stair & lift access. Option P-6a/b: New Subway - Stair & lift access.	No Shortlisted Full Crossing Option. ✕	No Shortlisted Full Crossing Option. ✕	Option V-5a: New Overbridge with ped & cycle access. Option V-5b: New Underpass with ped & cycle access.	Fail
Option 8B: 3 Full Crossings (Serpentine, Sandymount & Merrion Gates) + 2 Ped/Cycle Crossings.	Option P-4a/b: New Footbridge - Stair & lift access. Option P-6a/b: New Subway - Stair & lift access.	Option V-3c/4c + Option P-4a/b: New Underpass - 2-way vehicular crossing (Lim. Design Values). New Subway - Stair & lift access.	No Shortlisted Full Crossing Option. ✕	Option P-4a/b: New Footbridge - Stair & lift access. Option P-6a/b: New Subway - Stair & lift access.	No Shortlisted Full Crossing Option. ✕	Fail

Shortlisted Concept Options (Accessibility)	Shortlisted Concept Options (Infrastructure)					Pass/Fail
	Lansdowne Road (LR)	Serpentine Avenue (SA)	Sandymount Avenue (SM)	Sydney Parade (SP)	Merrion Gates (MG)	
Option 8D: 3 Full Crossings (Serpentine, Sandymount & Merrion Gate North) + 2 Ped/Cycle Crossings.	Option P-4a/b: New Footbridge - Stair & lift access. Option P-6a/b: New Subway - Stair & lift access.	Option V-3c/4c + Option P-4a/b: New Underpass - 2-way vehicular crossing (Lim. Design Values). New Subway - Stair & lift access.	No Shortlisted Full Crossing Option. ✕	Option P-4a/b: New Footbridge - Stair & lift access. Option P-6a/b: New Subway - Stair & lift access.	Option V-5a: New Overbridge with ped & cycle access. Option V-5b: New Underpass with ped & cycle access.	Fail
Option 9B: 3 Full Crossings (Serpentine, Sydney Parade & Merrion Gates) + 2 Ped/Cycle Crossings.	Option P-4a/b: New Footbridge - Stair & lift access. Option P-6a/b: New Subway - Stair & lift access.	Option V-3c/4c + Option P-4a/b: New Underpass - 2-way vehicular crossing (Lim. Design Values). New Subway - Stair & lift access.	Option P-4a/b: New Footbridge - Stair & lift access. Option P-6a/b: New Subway - Stair & lift access.	No Shortlisted Full Crossing Option. ✕	No Shortlisted Full Crossing Option. ✕	Fail
Option 9D: 3 Full Crossings (Serpentine, Sydney Parade & Merrion Gate North) + 2 Ped/Cycle Crossings.	Option P-4a/b: New Footbridge - Stair & lift access. Option P-6a/b: New Subway - Stair & lift access.	Option V-3c/4c + Option P-4a/b: New Underpass - 2-way vehicular crossing (Lim. Design Values). New Subway - Stair & lift access.	Option P-4a/b: New Footbridge - Stair & lift access. Option P-6a/b: New Subway - Stair & lift access.	No Shortlisted Full Crossing Option. ✕	Option V-5a: New Overbridge with ped & cycle access. Option V-5b: New Underpass with ped & cycle access.	Fail

7. MULTI-CRITERIA ANALYSIS

7.1 MCA Approach & Methodology

The Optioneering Approach is set out in Section 1.4. This section of the report discusses the process of the detailed multi-disciplinary comparative analysis of those options which passed through the shortlisting of possible options. The options are assessed against the criteria of Economy, Safety, Environment, Accessibility and Social Inclusion, Integration and Physical Activity in line with the criteria required for multi-criteria analysis under the Department of Transport, Tourism and Sport (DTTAS), Common Appraisal Framework (CAF) for Transport Project and Programmes (March 2016).

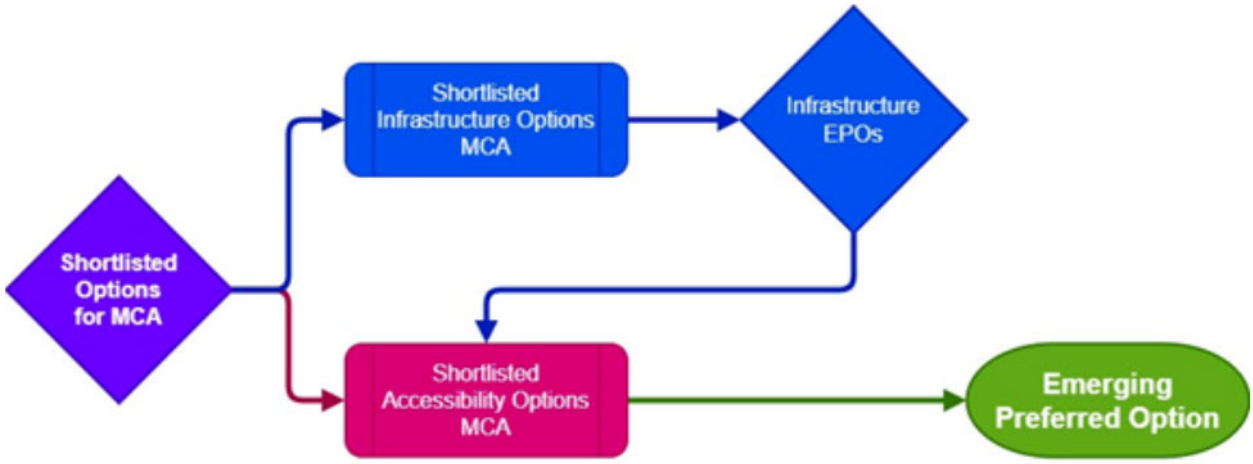


Figure 7-1 MCA Approach

For each shortlisted option, an assessment against the MCA criteria has been carried out. Each option has been relatively compared against each other based on the five-point colour coded ranking scale shown in Table 7-1. There are 7 MCAs carried out in total: 1 to cover the accessibility shortlist and 6 to cover each infrastructure option at each crossing location.

Table 7-1 Legend for MCA Summary Tables

Significant comparative advantage over other options
Some comparative advantage over other options
Comparable to other options / neutral
Some comparative disadvantage over other options
Significant comparative disadvantage over other options

7.2 Accessibility MCA

The results of the Multi-Criteria Assessment for the Accessibility Options, which constitute the combinations of the Infrastructure Options and therefore the EPO, are presented in Table 7-2. This has been developed to reflect the relative rankings for all sub-criteria assessed for each of the options and is presented as a summary of the key issues considered.

Table 7-2 Accessibility Option MCA Summary

Criteria	Sub-Criteria	2C	4D
		Railway At-Grade, All Level Crossings Closed, 1 New Full Crossing at Merrion Gate North + 4 Ped/Cycle Crossings.	**Railway At-Grade, All Level Crossings Closed, 2 Full Crossings at Serpentine Avenue and Merrion Gate North + 3 Ped/Cycle Crossings.**
Economy	CAPEX		
	OPEX		
	Train Operations Functionality / Economic Benefit		
	Traffic functionality and associated economic activities and opportunities		
Safety	Employer's Safety		
	Public Safety		
Environment	Landscape and Visual Quality		
	Biodiversity		
	Noise and Vibration		
	Water Resources		
	Archaeology, Architectural and Cultural Heritage		
	Geology and Soils		
	Agricultural and Non-agricultural		
	Air Quality & Climate Change		
Accessibility & Social Inclusion	Accessibility		
	Social Inclusion		
Integration	Adaptability in the Future		
	Transport Integration		
	Land Use Integration		
	Government Policy Integration		
	Geographical Integration		
Physical Activity	Walking/Cycling Opportunities		

Table 7-3 Overall criteria MCA summary table

Criteria	2C Railway At-Grade, All Level Crossings Closed, 1 Full Crossing at Merrion Gate North + 4 Ped/Cycle Crossings.	4D Railway At-Grade, All Level Crossings Closed, 2 Full Crossings at Serpentine Avenue and Merrion Gate North + 3 Ped/Cycle Crossings.
Economy		
Safety		
Environmental		
Accessibility & Social Inclusion		
Integration		
Physical Activity		

A more detailed table is provided in Appendix B with the full detailed rationale behind the scoring of each criterion and option.

7.2.1 Economy

Economy has been divided into four sub-criteria which are considered below.

7.2.1.1 CAPEX

Option 2C has a comparative advantage over Option 4D under the 'CAPEX' sub-criteria.

The cost difference between the options is approximately 25%, with the most expensive option being 4D which is driven by the provision of the additional vehicle crossing at Serpentine Avenue, the associated civil works and the requirement to acquire and demolish 6 no. commercial properties.

7.2.1.2 OPEX

Option 2C has a comparative advantage over Option 4D under the 'OPEX' sub-criteria.

The provision of an additional grade separated vehicle underpass doubles the significant new vehicle crossing assets that will require ongoing maintenance in relation to pumping and drainage, and at Serpentine Avenue in particular, ongoing maintenance and management of restricted vehicle movements.

7.2.1.3 Train Operations Functionality/Economic Benefits

All Options are comparable under the 'Train Operations' sub-criteria. All options meet the Train Service Specification.

7.2.1.4 Traffic Functionality and associated Economic Activities and Opportunities

Option 4D has a comparative advantage over Option 2C under the 'Traffic' sub-criteria.

Both options will result in a more pronounced impact in terms of the increase in volumes along the M50, North Strand Road and local roads such as Merrion Road, Northumberland Road, Shelbourne Road, and Bath Avenue.

The assessment of traffic functionality shows that the provision of one unrestricted crossing is sufficient. However, clearly, the provision of two unrestricted crossings is advantageous in this regard.

7.2.2 Safety

Safety has been divided into two sub-criteria which are considered below. It should be noted that all options are safe, but some will have the potential for greater residual risks to remain. This criterion considers relative advantages of each option on the criteria of safety.

7.2.2.1 Employer's Safety

All Options are comparable under the 'Employer's Safety' sub-criteria. It is not envisaged that IÉ staff will be responsible for carrying out activities in relation to maintaining, inspecting, or monitoring the new assets.

7.2.2.2 Public Safety

All Options are comparable under the 'Public Safety' sub-criteria. Closure of the level crossings and provision of unrestricted crossings for pedestrians/cyclists eliminates the risks associated with level crossings and shared road users. Although requiring a deviation from the normal highway standards (particularly in terms of gradient and radii), Option 4D at Serpentine Avenue would be designed to ensure public safety.

7.2.3 Environment

Section 2.6 sets out a description of the existing environment, under key environmental criteria, while the key constraints associated with this study area are outlined in Section 4.2. This is further supported by Annex 3.1 Constraints Report. Below is a summary of the key findings of the MCA under the various environmental criteria, with an emphasis on differentiating aspects for the options considered.

7.2.3.1 Landscape and Visual Quality

All Options are comparable under the 'Landscape and Visual' sub-criteria. It is unlikely that the difference between the two options will be enough to create a significant effect. The impacts are more significant at a Local Level.

7.2.3.2 Biodiversity

All Options are comparable under the 'Biodiversity' sub-criteria. It is unlikely that the difference between the two options will be enough to create a significant effect. The impacts are more significant at a Local Level.

7.2.3.3 Noise and Vibration

All Options are comparable under the 'Noise and Vibration' sub-criteria.

It is unlikely that the difference in traffic flow between the two options will be enough to create a significant effect. Traffic noise modelling would be required to ascertain whether there is a significant increase/decrease in traffic noise, which is not available at this stage.

During the construction stage it is expected that, in relation to noise & vibration, Option 2C would have a reduced impact over Option 4D. This is due to the shorter construction duration as a result of the provision of only 1 vehicular crossing at Merrion Gates North.

While each of the options will produce a slightly different level of traffic noise in both construction and operational stages, it is unlikely to be of a scale to show a significant differential effect between the options.

7.2.3.4 Water Resources

Option 2C has a comparative advantage over Option 4D under the 'Water Resource' sub-criteria.

Construction at Serpentine Avenue of both a vehicle underpass and ped/cycle subway require more excavation which has the potential to impact the groundwater and possible intervention to avoid flooding would need to be considered.

7.2.3.5 Archaeology, Architectural and Cultural Heritage

Option 2C has a comparative advantage over Option 4D under the 'Archaeology, Architectural and Cultural Heritage' sub-criteria.

Construction at Serpentine Avenue of both a vehicle underpass and ped/cycle subway require more excavation, when compared to that of a ped/cycle only subway, and therefore there is more potential for Option 4D to reveal previously undisturbed archaeological deposits.

7.2.3.6 Geology and Soils

Option 2C has a comparative advantage over Option 4D under the 'Geology & Soils' sub-criteria.

The proposed works for Option 2C do not include a vehicular crossing at Serpentine Avenue. Therefore, the required excavation works will generate comparatively less significant surplus earthworks materials, both made ground and natural materials.

7.2.3.7 Agricultural and Non-agricultural

All Options are comparable under the 'Agricultural and Non-agricultural' sub-criteria.

7.2.3.8 Air Quality and Climate

All options are comparable under the 'Air Quality & Climate Change' sub-criteria. Each option will result in some increases and decreases in air quality at a local level, so can be considered comparable.

7.2.4 Accessibility and Social Inclusion

Accessibility and Social Inclusion has been assessed using the two sub-criteria described below.

7.2.4.1 Accessibility

Option 4D has a comparative advantage over Option 2C under the 'Accessibility' sub-criteria.

For both options unrestricted connectivity for pedestrians and cyclists is provided.

While the provision of only one unrestricted crossing would reduce local connectivity for vehicles to work, school, college, and local amenities it is deemed sufficient from a vehicle connectivity perspective. In terms of emergency vehicle access, the number of alternative route options to cross into the Sandymount area from either the Donnybrook fire station or the Dublin fire station would also be reduced for Option 2C, although consultation with the fire services has indicated this would not be a significant issue.

The provision of two unrestricted crossings at Serpentine Avenue and Merrion Gates would ensure a similar level of vehicular accessibility is maintained across the railway line, with a reduced impact network wide and in the immediate study area in terms of queueing and delays.

7.2.4.2 Social Inclusion

All Options are comparable under the 'Social Inclusion' sub-criteria. All options provide unrestricted movements for pedestrians and cyclists

7.2.5 Integration

Integration has been assessed using the five sub-criteria described below.

7.2.5.1 Adaptability in the Future

All Options are comparable under the 'Adaptability in the Future' sub-criteria. All options have the same impacts to vehicle crossing closure and provide unrestricted pedestrian/cycle crossings.

7.2.5.2 Transport Integration

All options are comparable under the ‘Transport Integration’ sub-criteria as they both provide good integration with other forms of public transport, in particular the bus network in the Sandymount area through the full crossing at Merrion Gates North for all modes.

7.2.5.3 Land Use Integration

All Options are comparable under the 'Land Use Integration' sub-criteria. All options comply with policies to increase use of public transport.

7.2.5.4 Geographical Integration

All Options are comparable under the 'Geographical Integration' sub-criteria. All options comply with policies to increased use of public transport.

7.2.5.5 Government Policy Integration

Under the Climate Action Plan 2023, the policy direction in terms of active mobility and modal shift from the private car is strengthened considerably, such that there is an argument that Option 2C with only one unrestricted vehicular crossing has a comparative advantage over Option 4D, which provides two vehicular crossings.

7.2.6 Physical Activity

7.2.6.1 Walking/Cycling Opportunities

Option 2C has a comparative advantage over Option 4D under the 'Walking/Cycling Opportunities' sub-criteria.

The provision of only one unrestricted level crossing offers significant opportunity to enhance the active travel corridor at Serpentine Avenue due to the footprint saving in not having to provide a vehicle crossing in this area. Therefore, the subway can be maximised to provide a more attractive ped/cycle crossing than when provided adjacent to the vehicle crossing due to the horizontal space constraints.

7.2.7 Summary & EPO

7.2.7.1 Non-preferred option

Option 4D is not preferred due to:

- The negative impacts under the economy criteria, including an increased CAPEX and OPEX, in addition to requiring the acquisition and demolition of 6 no. existing commercial premises;
- The negative impacts under the environment criteria, which are largely driven by the increased risks associated with the significant comparative excavation required; and
- The negative impacts under the physical activity criteria, which restricts the opportunities to enhance the ped/cycle connectivity within the community as a result of the shared space restrictions in providing an additional vehicle connection.

7.2.7.2 Emerging Preferred Option

Option 2C is identified as the Emerging Preferred Option. It is preferred due to:

- Less adverse impacts on local business and the surrounding area at Serpentine. This option avoids the need to acquire and demolish 6 no. local business premises;
- The provision of only one unrestricted crossing offers opportunity to enhance the active travel corridor at Serpentine Avenue due to the footprint saving in not having to provide a vehicle crossing in this area;
- This option has lesser environmental impacts associated with large excavations and noise and vibration during construction; and
- The option is more in line with the Climate Action Plan 2023.

It is acknowledged that the provision of just one unrestricted vehicular crossing in Option 2C does lead to a reduced level of vehicular accessibility in comparison to the existing provision across the railway line, which may result in slight impacts network wide and in the immediate study area in terms of queueing and delays.

However, the provision of a second unrestricted vehicular crossing at Serpentine Avenue largely provides a vehicle connection for accessibility within the local community, and this is not considered justifiable based on accessibility alone, when considered against the advantages identified under economy, environment, and physical activity.

7.3 Infrastructure MCA 1: Lansdowne Road Pedestrian/Cyclist Only Crossing Options

The results of the Multi-Criteria Assessment for the Infrastructure Pedestrian/Cyclist Only Crossing at Lansdowne Road are presented in Table 7-4. This has been developed to reflect the relative rankings for all sub-criteria assessed for each of the options and is presented as a summary of the key issues considered.

Table 7-4 Lansdowne Road Pedestrian/Cyclist Only Crossing Options MCA Summary

Criteria	Sub-Criteria	LR-P-4	LR-P-6
		New Footbridge with Stair & Lift Access	New Subway with Stair & Lift Access
Economy	CAPEX		
	OPEX		
	Train Operations Functionality/Economic Benefit		
	Traffic functionality and associated economic activities and opportunities		
Safety	Employer's Safety		
	Public Safety		
Environment	Landscape and Visual Quality		
	Biodiversity		
	Noise and Vibration		
	Water Resources		
	Archaeology, Architectural and Cultural Heritage		
	Geology and Soils		
	Agricultural and Non-agricultural		
	Air Quality & Climate Change		
Accessibility & Social Inclusion	Accessibility		
	Social Inclusion		
Integration	Adaptability in the Future		
	Transport Integration		
	Land Use Integration		
	Government Policy Integration		
	Geographical Integration		

Criteria	Sub-Criteria	LR-P-4	LR-P-6
		New Footbridge with Stair & Lift Access	New Subway with Stair & Lift Access
Physical Activity	Walking/Cycling Opportunities		

Table 7-5 Overall criteria MCA summary table

Criteria	LR-P-4	LR-P-6
	New Footbridge with Stair & Lift Access	New Subway with Stairs & Lift Access
Economy		
Safety		
Environmental		
Accessibility & Social Inclusion		
Integration		
Physical Activity		

A more detailed table is provided in Appendix B with the full detailed rationale behind the scoring of each criterion and option.

7.3.1 Economy

Economy has been divided into four sub-criteria which are considered below.

7.3.1.1 CAPEX

All Options are comparable under the 'CAPEX' sub-criteria. The differences between the options are approx. 2% so are therefore not considered as a comparative difference based on the high level of the cost estimate.

7.3.1.2 OPEX

Option LR-P-6 has a comparative advantage over Option LR-P-4 under the 'Operational Costs (OPEX)' sub-criteria. Subways tend to have a lower maintenance cost when compared to footbridges due to the nature of the crossing having minimal interface with the live railway. Therefore, structural inspections and maintenance can be carried out without requiring isolation of the lines. Footbridges tend to have a higher maintenance cost when compared to subways. This is due to maintenance on footbridges having a higher interface with the live railway, which require isolation of the lines for some activities. Use of non-conductive materials should be used, and all materials should be adequately bonded to help mitigate the risks in undertaking maintenance activities. Should glass be considered as part of the solid parapet to provide visibility for user comfort, a safe methodology should be in place for glass cleaning which will require the isolation of the lines.

Footbridges do not require the same level of drainage and prevention of flooding as subways do and can be further protected through provision of a roof structure overhead. Subways require more maintenance of drainage and prevention of flooding than a footbridge due to the sub-surface crossing.

Water ingress should be managed so that it is drained away safely and should be concealed behind ceiling finishes or wall panels. Panels should be opened at regular intervals in order to allow access for inspection, monitoring, and maintenance. Pumps to manage and remove water ingress should be considered where necessary.

Services integration for footbridges should be carefully considered as part of the cable management system. Services should be combined into CMS where possible and run above the structure and behind finishes. Service integration for subways should be contained within wall panels for ease of access.

7.3.1.3 Train Operations Functionality/Economic Benefits

All Options are comparable under the 'Train Operations' sub-criteria. All options meet the Train Service Specification.

7.3.1.4 Traffic Functionality and associated Economic Activities and Opportunities

All Options are comparable under the 'Traffic' sub-criteria. The impacts of closing the level crossing are the same for all options. The diversion of general traffic to other crossing locations in addition to the modification of the directional system will disrupt traffic flow during the construction and operational stage.

7.3.2 Safety

Safety has been divided into two sub-criteria which are considered below. It should be noted that all options are safe, but some will have the potential for greater residual risks. This criterion considers relative advantages of each option on the criteria of safety.

7.3.2.1 Employer's Safety

All Options are comparable under the 'Employer's Safety' sub-criteria. It is not envisaged that IÉ staff will be responsible for carrying out activities in relation to maintaining, inspecting, or monitoring the new assets.

7.3.2.2 Public Safety

All Options are comparable under the 'Public Safety' sub-criteria. Both options eliminate the level crossing risk by completely closing the crossing. A common perception of subways is that these spaces are dark and oppressive. Maximising visibility by providing clear lines of sight, avoiding corners and changes in direction, wide passageways and keeping ceilings as high as possible create a more expansive feel that improves the perception of security. Good lighting is crucial in subway spaces. Artificial lighting should have good colour rendering, and provide uniform intensity and coverage, at all times of day. Natural lighting should be used wherever possible, and this helps to improve the perception of security and creates a connection with the outside. When natural light is maximised at routes in and out of subways such as over a stair, natural light can assist with intuitive wayfinding.

While footbridges do not have the common perceptions on security that subways do, they have similarities that need to be considered. Areas should feel open and be well lit, avoiding corners and changes in direction where possible in order to open up clear lines of sight, and avoid blind spots.

They should be at least partially transparent from 1m above floor level, and enclosed passageways on footbridges should be minimised. The use of glazing on decks and stairs can open up visual connectivity, reduce the feeling of claustrophobia and increase passive surveillance and the perception of security. Lighting should provide uniform intensity and coverage and allow all passengers to read information and signage clearly at all times of day.

The existing emergency arrangements for the Aviva Stadium include the temporary closure of the rail lines and use of the level crossing to be used in evacuation. Option LR-P-6 provides the opportunity for minimal obstacles at surface level, which may hinder pedestrian flow, during this operation.

7.3.3 Environment

Section 2.6 sets out a description of the existing environment, under key environmental criteria, while the key constraints associated with this study area are outlined in Section 4.2. This is further supported by Annex 3.1 Constraints Report. Below is a summary of the key findings of the MCA under the various environmental criteria, with an emphasis on differentiating aspects for the options considered.

7.3.3.1 Landscape and Visual Quality

Option LR-P-4 has a significant comparative disadvantage over Option LR-P-6 under the 'Landscape and Visual' sub-criteria. There is a considerable visual impact to Lansdowne Road Station due to the close proximity of the footbridge which will represent a prominent visual element. The higher lift shafts will also create overshadowing of the existing signal box. The most prominent visual element in this area will remain the Aviva Stadium, however, the footbridge will likely introduce a visual barrier of the stadium which could be considered to have cultural importance.

Option LR-P-6 has a significantly comparative advantage over Option LR-P-4 under the 'Landscape and Visual' sub-criteria. Due to the underground connection, there is minimal visual impact to Lansdowne Road Station. The most prominent visual element in this area will remain the Aviva Stadium, with minimal visual barrier introduced by the subway with only the lift shafts extending above street level.

7.3.3.2 Biodiversity

The Dodder River is located c. 110m from the level crossing. [redacted]

Option LR-P-4 has a comparative advantage over Option LR-P-6 under the 'Biodiversity' sub-criteria. Foundation works will be required to construct the footbridge; however, less excavation is required when compared to constructing the subway, thereby requiring a shorter construction duration. The construction of the footbridge is likely to impact less on biodiversity in the area. The reduced construction duration will also reduce the amount of disturbance, and noise or vibration impacts on local wildlife.

Option LR-P-6 has a comparative disadvantage over Option LR-P-4 under the 'Biodiversity' sub-criteria. A greater amount of excavation is required to construct the subway, compared to constructing the footbridge, thereby requiring a longer construction duration. Potential impacts on the groundwater body would also be a consideration, with the underground construction required for the subway, and subsequently potential impacts on groundwater dependent habitats and species in the surrounding habitat and within European sites nearby.

7.3.3.3 Noise and Vibration

All Options are comparable under the 'Noise and Vibration' sub-criteria at this options assessment stage. During the construction stage it is expected that Option LR-P-4 should have a reduced impact in relation to noise & vibration, due to the shorter construction duration. During the operational stage, it is expected that Option LR-P-4 would result in higher noise impacts due to the elevated crossing, however it is not considered that this will be to the extent as to significantly differentiate between the options.

During the construction stage it is expected that Option LR-P-6 should have an increased impact in relation to noise & vibration, due to the longer construction duration. During the operational stage, it is expected that Option LR-P-6 would result in lower noise impacts due to the sub-surface crossing.

7.3.3.4 Water Resources

All Options are comparable under the 'Water Resource' sub-criteria. Opportunities to enhance the quality of surface waters and associated floodplains could be considered in the design of the subway water management system if necessary.

7.3.3.5 Archaeology, Architectural and Cultural Heritage

Option LR-P-4 has a comparative advantage over Option LR-P-6 under the 'Archaeology, Architectural and Cultural Heritage' sub-criteria. Construction of a footbridge requires less excavation, when compared to that of a subway, and therefore has less potential to reveal previously undisturbed archaeological deposits. There are no recorded monuments located at the proposed works.

Option LR-P-6 has a comparative disadvantage over Option LR-P-4 under the 'Archaeology, Architectural and Cultural Heritage' sub-criteria. Construction of a subway requires more excavation, when compared to that of a footbridge, and therefore there is a greater potential to reveal previously undisturbed archaeological deposits. There are no recorded monuments located at the proposed works. The proposed eastern lift is located very close to the Signal box which is part of the Lansdowne Road station complex so there is potential for damage here during construction.

7.3.3.6 Geology and Soils

Option LR-P-4 has a comparative advantage over Option LR-P-6 under the 'Geology & Soils' sub-criteria. The proposed works for Option LR-P-4 consist of the construction of a footbridge with both stair and lift access. Pile foundations will likely be required to support the structure overhead, which should be less intrusive to the existing geology and soils than the extent of excavation required for a subway. Additionally, the reduced excavation of made ground and natural materials decreases the potential for management of contaminated materials.

Option LR-P-6 has a comparative disadvantage over Option LR-P-4 under the 'Geology & Soils' sub-criteria. The proposed works for Option LR-P-6 consist of the construction of a subway with both stair and lift access. Excavation works will be required, thereby generating comparatively significant surplus earthworks materials, both made ground and natural materials. Due to the limited reuse options, these materials would require recovery or offsite disposal.

Additionally, the stability of the railway, roads, structures (in particular that associated with the stadium) and services adjacent to the subway may be impacted due to the presence of made ground, soft ground (alluvial deposits) present at and within the vicinity of the site, some of which are associated with nearby rivers and historic streams.

7.3.3.7 Agricultural and Non-agricultural

All Options are comparable under the 'Agricultural and Non-agricultural' sub-criteria.

7.3.3.8 Air Quality and Climate

All Options are comparable under the 'Air Quality & Climate Change' sub-criteria. The impacts of closing the level crossing are the same for all options, including reduction in operational traffic in the area and the type of rolling stock used on the line. Option LR-P-6 is expected to have a longer construction duration which will increase construction traffic; however, this is not considered significant enough to be considered a comparative advantage over Option LR-P-4.

7.3.4 Accessibility and Social Inclusion

Accessibility and Social Inclusion has been assessed using the two sub-criteria described below.

7.3.4.1 Accessibility

Option LR-P-6 has a comparative advantage over Option LR-P-4 under the 'Accessibility' sub-criteria. The design of stairs is very important. Poorly designed stairs can create a barrier for a large proportion of passengers including the frail, elderly and those with cognitive, sensory and mobility disabilities. The subway offers greater benefits to the passenger flow and accessibility as the vertical displacement (2.85m) is reduced by 60%, in comparison with a footbridge (7.05m). This results in a reduced stair length of 66% (12.6m), in comparison with a footbridge (37.8m).

7.3.4.2 Social Inclusion

All Options are comparable under the 'Social Inclusion' sub-criteria. All options provide unrestricted movements for pedestrians and cyclists. Lifts are an essential feature for people who are unable to negotiate steps, including wheelchair users and some ambulant disabled people where the change in level is greater than 2m and where there is no space to provide a suitable ramp. Lifts are also helpful for older people and families with young children. Passengers with luggage should always have the option to use lifts rather than stairs and escalators, for safety reasons.

Consideration should be given to providing two lifts either side of the crossing to ensure sufficient redundancy is provided in the event of a lift failing.

7.3.5 Integration

Integration has been assessed using the five sub-criteria described below.

7.3.5.1 Adaptability in the Future

All Options are comparable under the 'Adaptability in the Future' sub-criteria. All options have the same impacts to vehicle crossing closure and provide unrestricted pedestrian/cycle crossings.

7.3.5.2 Transport Integration

All Options are comparable under the 'Transport Integration' sub-criteria. All options provide the same integration with other transport systems.

7.3.5.3 Land Use Integration

Option LR-P-6 has a comparative advantage over Option LR-P-4 under the 'Land Use Integration' sub-criteria. All options comply with policies to increase use of public transport. Option LR-P-6 has a footprint approx. 40% smaller than that of Option LR-P-4. With the exception of the openings for the stairs to the subway, there are minimal obstacles introduced on the site which offers greater potential for future land use adaptability.

7.3.5.4 Geographical Integration

All Options are comparable under the 'Geographical Integration' sub-criteria. All options comply with policies to increased use of public transport.

7.3.5.5 Government Policy Integration

All Options are comparable under the 'Government Policy Integration' sub-criteria. All options comply with policies to increase use of public transport.

7.3.6 Physical Activity

7.3.6.1 Walking/Cycling Opportunities

All Options are comparable under the 'Walking/Cycling Opportunities' sub-criteria. An unrestricted connection will be provided for pedestrians and cyclists across the rail line.

Provision of bicycle wheeling ramps will make stairs accessible to cyclists by enabling them to go up or down staircases without having to physically carry their bike. While it may be less desirable for cyclists to dismount when using the stairs, this benefits vulnerable users which may be hindered by fast moving mounted cyclists using the crossing, thereby creating a healthy environment conducive to active travel for all users.

7.3.7 Summary & EPO

7.3.7.1 Non-preferred option

Option LR-P-4 is not preferred due to:

- Higher maintenance costs due to the footbridge having a higher interface with the live railway, which requires isolation of the lines for some activities;
- There are disadvantages when it comes to accessibility and land use integration as a footbridge creates a further distance for pedestrians and cyclist to travel and in turn takes up a greater percentage of land; and
- There is a considerable visual impact to the area with a footbridge, which will represent a prominent visual element.

7.3.7.2 Emerging Preferred Option

Option LR-P-6 has been identified as the Emerging Preferred Option. It has a number of advantages over the other options, such as:

- It has advantages when it comes to land use integration as it has a smaller footprint than the other option (approx. 40%);
- It offers greater benefits to the passenger flow and accessibility as the vertical displacement is reduced by 60%, resulting in a reduced stair length of 66%;
- This option has advantages when it comes to having a lower maintenance cost when compared to footbridges due to nature of the crossing having minimal interface with the live railway; and
- Due to the underground connection, there is minimal visual impact to the area.

7.4 Infrastructure MCA 2: Serpentine Avenue Pedestrian/Cyclist Only Crossing Options

The results of the Multi-Criteria Assessment for the Infrastructure Pedestrian/Cyclist Only Crossing at Serpentine Avenue are presented in Table 7-6. This has been developed to reflect the relative rankings for all sub-criteria assessed for each of the options and is presented as a summary of the key issues considered.

Table 7-6 Serpentine Avenue Pedestrian/Cyclist Only Crossing Options MCA Summary

Criteria	Sub-Criteria	SA-P-4	SA-P-6
		New Footbridge with Stair & Lift Access	New Subway with Stair & Lift Access
Economy	CAPEX		
	OPEX		
	Train Operations Functionality/Economic Benefit		
	Traffic functionality and associated economic activities and opportunities		
Safety	Employer's Safety		

Criteria	Sub-Criteria	SA-P-4	SA-P-6
		New Footbridge with Stair & Lift Access	New Subway with Stair & Lift Access
	Public Safety		
Environment	Landscape and Visual Quality		
	Biodiversity		
	Noise and Vibration		
	Water Resources		
	Archaeology, Architectural and Cultural Heritage		
	Geology and Soils		
	Agricultural and Non-agricultural		
	Air Quality & Climate Change		
Accessibility & Social Inclusion	Accessibility		
	Social Inclusion		
Integration	Adaptability in the Future		
	Transport Integration		
	Land Use Integration		
	Government Policy Integration		
	Geographical Integration		
Physical Activity	Walking/Cycling Opportunities		

Table 7-7 Overall criteria MCA summary table

Criteria	SA-P-4	SA-P-6
	New Footbridge with Stair & Lift Access	New Subway with Stairs & Lift Access
Economy		
Safety		
Environmental		
Accessibility & Social Inclusion		
Integration		
Physical Activity		

A more detailed table is provided in Appendix B with the full detailed rationale behind the scoring of each criterion and option.

7.4.1 Economy

Economy has been divided into four sub-criteria which are considered below.

7.4.1.1 CAPEX

All Options are comparable under the 'CAPEX' sub-criteria. The differences between the options are less than 25% so therefore are not considered as a comparative difference based on the high level of the cost estimate.

7.4.1.2 OPEX

Option SA-P-6 has a comparative advantage over Option SA-P-4 under the 'Operational Costs (OPEX)' sub-criteria. Subways tend to have a lower maintenance cost when compared to footbridges due to nature of the crossing having minimal interface with the live railway.

Therefore, structural inspections and maintenance can be conducted without requiring isolation of the lines. Footbridges tend to have a higher maintenance cost when compared to subways. This is adequate due to maintenance on footbridges having a higher interface with the live railway, which require isolation of the lines for some activities. Use of non-conductive materials should be used, and all materials should be adequately bonded to help mitigate the risks in undertaking maintenance activities. Should glass be considered as part of the solid parapet to provide visibility for user comfort, a safe methodology should be in place for glass cleaning which will require the isolation of the lines.

Footbridges do not require the same level of drainage and prevention of flooding as subways do and can be further protected through provision of a roof structure overhead. Subways require more maintenance of drainage and prevention of flooding than a footbridge due to the sub-surface crossing. Water ingress should be managed so that it is drained away safely and should be concealed behind ceiling finishes or wall panels. Panels should be opened at regular intervals in order to allow access for inspection, monitoring, and maintenance. Pumps to manage and remove water ingress should be considered where necessary.

Services integration for footbridges should be carefully considered as part of the cable management system. Services should be combined into CMS where possible and run above structure and behind finishes. Service integration for subways should be contained within wall panels for ease of access.

7.4.1.3 Train Operations Functionality/Economic Benefits

All Options are comparable under the 'Train Operations' sub-criteria. All options meet the Train Service Specification.

7.4.1.4 Traffic Functionality and associated Economic Activities and Opportunities

All Options are comparable under the 'Traffic' sub-criteria. The impacts of closing the level crossing are the same for all options. The diversion of general traffic to other crossing locations in addition to the modification of the directional system will disrupt traffic flow during the construction and operational stage.

7.4.2 Safety

Safety has been divided into two sub-criteria which are considered below. It should be noted that all options are safe, but some will have the potential for greater residual risks. This criterion considers the relative advantages of each option on the criteria of safety.

7.4.2.1 Employer's Safety

All Options are comparable under the 'Employer's Safety' sub-criteria. It is not envisaged that IÉ staff will be responsible for conducting activities in relation to maintaining, inspecting, or monitoring the new assets.

7.4.2.2 Public Safety

All Options are comparable under the 'Public Safety' sub-criteria. Both options eliminate the level crossing risk by completely closing the crossing. A common perception of subways is that these spaces are dark and oppressive. Maximising visibility by providing clear lines of sight, avoiding corners and changes in direction, wide passageways and keeping ceilings as high as possible create a more expansive feel that improves the perception of security. Good lighting is crucial in subway spaces. Artificial lighting should have good colour rendering, and provide uniform intensity and coverage, at all times of day. Natural lighting should be used wherever possible, and this helps to improve the perception of security and creates a connection with the outside. When natural light is maximised at routes in and out of subways such as over a stair, natural light can assist with intuitive wayfinding.

While footbridges do not have the common perceptions on security that subways do, they have similarities that need to be considered. Areas should feel open and be well lit, avoiding corners and changes in direction where possible in order to open up clear lines of sight, and avoid blind spots. They should be at least partially transparent from 1m above floor level, and enclosed passageways on footbridges should be minimised. The use of glazing on decks and stairs can open up visual connectivity, reduce the feeling of claustrophobia and increase passive surveillance and the perception of security. Lighting should provide uniform intensity and coverage and allow all passengers to read information and signage clearly at all times of day.

7.4.3 Environment

Section 2.6 sets out a description of the existing environment, under key environmental criteria, while the key constraints associated with this study area are outlined in Section 4.2. This is further supported by Annex 3.1 Constraints Report. Below is a summary of the key findings of the MCA under the various environmental criteria, with an emphasis on differentiating aspects for the options considered.

7.4.3.1 Landscape and Visual Quality

Option SA-P-4 has a significant comparative disadvantage over Option SA-P-6 under the 'Landscape and Visual' sub-criteria. There is a considerable visual impact to the residential and commercial premises on Serpentine Avenue, due to the close proximity of the footbridge which will represent a prominent visual element.

There is a greater potential impact for loss of privacy and lighting from the footbridge on the residential premises on Serpentine Avenue and Oakbury Court Apartments.

Option SA-P-6 has a significant comparative advantage over Option SA-P-4 under the 'Landscape and Visual' sub-criteria. Given the proposed underground connection, there is minimal visual impact to the surrounding area with only the lift shafts extending above street level. The potential impact for

loss of privacy and lighting from the subway on the residential premises on Serpentine Avenue is significantly reduced.

7.4.3.2 Biodiversity

All Options are comparable under the 'Biodiversity' sub-criteria. The level crossing is located c. 200m from a cricket club and grounds. Bird species, such as brent geese, curlew and oystercatcher use these habitats for inland foraging during the winter periods. Many of these species are SCI species from nearby European sites in Dublin Bay and along the eastern coastline. The works are within the ZoI of these areas, with the potential for noise, vibration, and lighting impacts on SCI bird species.

For option SA-P-4 foundation works will be required to construct the footbridge, however, less excavation is required when compared to constructing the subway, thereby requiring a shorter construction duration. The construction of the footbridge is likely to impact less on biodiversity in the area. The reduced construction duration will reduce the amount of disturbance, and noise or vibration impacts on local wildlife. However, during the operational stage, the footbridge is likely to have an increased amount of lighting, and noise or vibration impacts.

For Option SA-P-6 a greater amount of excavation is required to construct the subway, compared to constructing the footbridge, thereby requiring a longer construction duration. Potential impacts on the groundwater body would also be a consideration, with the underground construction required for the subway, and subsequently potential impacts on groundwater dependent habitats and species in the surrounding habitat and within European sites nearby.

7.4.3.3 Noise and Vibration

All Options are comparable under the 'Noise and Vibration' sub-criteria at this options assessment stage. During the construction stage it is expected that Option SA-P-4 should have a reduced impact in relation to noise & vibration, due to the shorter construction duration.

During the operational stage, it is expected that Option SA-P-4 will result in higher noise impacts due to the elevated crossing, however it is not considered that this will be to the extent as to significantly differentiate between the options.

During the construction stage it is expected that Option SA-P-6 should have an increased impact in relation to noise & vibration, due to the longer construction duration. During the operational stage, it is expected that Option SA-P-6 will result in lower noise impacts due to the sub-surface crossing.

7.4.3.4 Water Resources

All Options are comparable under the 'Water Resource' sub-criteria. Opportunities to enhance the quality of surface waters and associated floodplains could be considered in the design of the subway water management system if necessary.

7.4.3.5 Archaeology, Architectural and Cultural Heritage

Option SA-P-4 has a comparative advantage over Option SA-P-6 under the 'Archaeology, Architectural and Cultural Heritage' sub-criteria.

Construction of a footbridge requires less excavation, when compared to that of a subway, and therefore has less potential to reveal previously undisturbed archaeological deposits. There are no recorded monuments located at the proposed works.

Option SA-P-6 has a comparative disadvantage over Option SA-P-4 under the 'Archaeology, Architectural and Cultural Heritage' sub-criteria. Construction of a subway requires more excavation, when compared to that of a footbridge, and therefore there is a greater potential to reveal previously undisturbed archaeological deposits. There are no recorded monuments located at the proposed works.

7.4.3.6 Geology and Soils

Option SA-P-4 has a comparative advantage over Option SA-P-6 under the 'Geology & Soils' sub-criteria. The proposed works for Option SA-P-4 consist of the construction of a footbridge with both stair and lift access. Pile foundations will be required to support the structure overhead, which should be less intrusive to the existing geology and soils than the extent of excavation required for a subway. Additionally, the reduced excavation of made ground and natural materials decreases the potential for management of contaminated materials.

Option SA-P-6 has a comparative disadvantage over Option SA-P-4 under the 'Geology & Soils' sub-criteria. The proposed works for Option SA-P-6 consist of the construction of a subway with both stair and lift access. Excavation works will be required, thereby generating comparatively significant surplus earthworks materials, both made ground and natural materials. Due to the limited reuse options, these materials would require recovery or offsite disposal. Additionally, the stability of the railway, roads, structures, and services adjacent to the subway may be impacted due to the presence of made ground, soft ground (alluvial deposit and soft marine sediments) and gravels present at and within the vicinity of the site.

7.4.3.7 Agricultural and Non-agricultural

All Options are comparable under the 'Agricultural and Non-agricultural' sub-criteria.

7.4.3.8 Air Quality and Climate

All Options are comparable under the 'Air Quality & Climate Change' sub-criteria. The impacts of closing the level crossing are the same for all options, including reduction in operational traffic in the area and the type of rolling stock used on the line. Option SA-P-6 is expected to have a longer construction duration which will increase construction traffic; however, this is not considered significant enough to be considered a comparative advantage over Option SA-P-4.

7.4.4 Accessibility and Social Inclusion

Accessibility and Social Inclusion has been assessed using the two sub-criteria described below.

7.4.4.1 Accessibility

Option SA-P-6 has a comparative advantage over Option SA-P-4 under the 'Accessibility' sub-criteria. The design of stairs is particularly important. Poorly designed stairs can create a barrier for a large proportion of passengers including the frail elderly and those with cognitive, sensory and mobility disabilities.

The subway offers greater benefits to the passenger flow and accessibility as the vertical displacement (3.15m) is reduced by 50%, in comparison with a footbridge (6.30m). This results in a reduced stair length of 60% (14.80m), in comparison with a footbridge (37.2m).

7.4.4.2 Social Inclusion

All Options are comparable under the 'Social Inclusion' sub-criteria. All options provide unrestricted movements for pedestrians and cyclists. Lifts are an essential feature for people who are unable to negotiate steps, including wheelchair users and some ambulant disabled people where the change in level is greater than 2 m and where there is no space to provide a suitable ramp. Lifts are also helpful for older people and families with young children. Passengers with luggage should always have the option to use lifts rather than stairs and escalators, for safety reasons.

Consideration should be given to providing two lifts either side of the crossing to ensure sufficient redundancy is provided in the event of a lift failing.

7.4.5 Integration

Integration has been assessed using the five sub-criteria described below.

7.4.5.1 Adaptability in the Future

All Options are comparable under the 'Adaptability in the Future' sub-criteria. All options have the same impacts to vehicle crossing closure and provide unrestricted pedestrian/cycle crossings.

7.4.5.2 Transport Integration

All Options are comparable under the 'Transport Integration' sub-criteria. All options provide the same integration with other transport systems.

7.4.5.3 Land Use Integration

Option SA-P-6 has a comparative advantage over Option SA-P-4 under the 'Land Use Integration' sub-criteria. All options comply with policies to increase use of public transport. Option SA-P-6 has a footprint approx. 20% smaller than that of Option SA-P-4. With the exception of the openings for the stairs to the subway, there are minimal obstacles introduced on the site which offers greater potential for future land use adaptability.

7.4.5.4 Geographical Integration

All Options are comparable under the 'Geographical Integration' sub-criteria. All options comply with policies to increased use of public transport.

7.4.5.5 Government Policy Integration

All Options are comparable under the 'Government Policy Integration' sub-criteria. All options comply with policies to increased use of public transport.

7.4.6 Physical Activity

7.4.6.1 Walking/Cycling Opportunities

All Options are comparable under the 'Walking/Cycling Opportunities' sub-criteria. An unrestricted connection will be provided for pedestrians and cyclists across the rail line. Provision of bicycle wheeling ramps will make stairs accessible to cyclists by enabling them to go up or down staircases without having to physically carry their bike. While it may be less desirable for cyclists to dismount when using the stairs, this benefits vulnerable users who may be hindered by fast moving mounted cyclists using the crossing, thereby creating a healthy environment conducive to active travel for all users.

7.4.7 Summary & EPO

7.4.7.1 Non-preferred option

Option SA-P-4 is not preferred due to:

- Higher maintenance costs due to the footbridge having a higher interface with the live railway, which require isolation of the lines for some activities;
- There are disadvantages when it comes to accessibility and land use integration as a footbridge creates a further distance for pedestrians and cyclist to travel and in turn takes up a greater percentage of land; and
- There is a considerable visual impact to the area with a footbridge, which will represent a prominent visual element.

7.4.7.2 Emerging Preferred Option

Option SA-P-6 has been identified as the Emerging Preferred Option. It has a number of advantages over the other options, such as:

- It has advantages when it comes to land use integration as it has a smaller footprint that the other option (approx. 20%);
- It offers greater benefits to the passenger flow and accessibility as the vertical displacement is reduced by 50%, resulting in a reduced stair length of 60%;
- This option has advantages when it comes to having a lower maintenance cost when compared to footbridges due to nature of the crossing having minimal interface with the live railway; and
- Due to the underground connection, there is minimal visual impact to the area.

7.5 Infrastructure MCA 3: Sandymount Avenue Pedestrian/Cyclist Only Crossing Options

The results of the Multi-Criteria Assessment for the Local 'Infrastructure' Pedestrian/Cyclist Only Crossing at Sandymount Avenue are presented in Table 7-5. This has been developed to reflect the relative rankings for all sub-criteria assessed for each of the options and is presented as a summary of the key issues considered.

Table 7-8 Sandymount Avenue Pedestrian/Cyclist Only Crossing Options MCA Summary

Criteria	Sub-Criteria	SM-P-4	SM-P-6
		New Footbridge with Stair & Lift Access	New Subway with Stair & Lift Access
Economy	CAPEX		
	OPEX		
	Train Operations Functionality/Economic Benefit		
	Traffic functionality and associated economic activities and opportunities		
Safety	Employer's Safety		
	Public Safety		
Environment	Landscape and Visual Quality		
	Biodiversity		
	Noise and Vibration		
	Water Resources		
	Archaeology, Architectural and Cultural Heritage		
	Geology and Soils		
	Agricultural and Non-agricultural		
	Air Quality & Climate Change		
Accessibility & Social Inclusion	Accessibility		
	Social Inclusion		
Integration	Adaptability in the Future		
	Transport Integration		
	Land Use Integration		
	Government Policy Integration		
	Geographical Integration		
Physical Activity	Walking/Cycling Opportunities		

Table 7-9 Overall criteria MCA summary table

Criteria	SM-P-4	SM-P-6
	New Footbridge with Stair & Lift Access	New Subway with Stairs & Lift Access
Economy		
Safety		
Environmental		
Accessibility & Social Inclusion		

	SM-P-4	SM-P-6
Integration		
Physical Activity		

A more detailed table is provided in Appendix B with the full detailed rationale behind the scoring of each criterion and option.

7.5.1 Economy

Economy has been divided into four sub-criteria which are considered below.

7.5.1.1 CAPEX

Option SM-P-4 has a comparative advantage over Option SM-P-6 under the 'CAPEX' sub-criteria. The differences between the options are greater than 25% and therefore considered as a comparative difference based on the high level of the cost estimate.

7.5.1.2 OPEX

Option SM-P-6 has a comparative advantage over Option SM-P-4 under the 'Operational Costs (OPEX)' sub-criteria. Subways tend to have a lower maintenance cost when compared to footbridges due to nature of the crossing having minimal interface with the live rail line. Therefore, structural inspections and maintenance can be conducted without requiring isolation of the lines. Footbridges tend to have a higher maintenance cost when compared to subways. This is adequate due to maintenance on footbridges having a higher interface with the live railway, which require isolation of the lines for some activities. Use of non-conductive materials should be used, and all materials should be adequately bonded to help mitigate the risks in undertaking maintenance activities. Should glass be considered as part of the solid parapet to provide visibility for user comfort, a safe methodology should be in place for glass cleaning which will require the isolation of the lines.

Footbridges do not require the same level of drainage and prevention of flooding as subways do and can be further protected through provision of a roof structure overhead. Subways require more maintenance of drainage and prevention of flooding than a footbridge due to the sub-surface crossing. Water ingress should be managed so that it is drained away safely and should be concealed behind ceiling finishes or wall panels. Panels should be opened at regular intervals in order to allow access for inspection, monitoring, and maintenance. Pumps to manage and remove water ingress should be considered where necessary.

Services integration for footbridges should be carefully considered as part of the cable management system. Services should be combined into CMS where possible and run above structure and behind finishes. Service integration for subways should be contained within wall panels for ease of access.

7.5.1.3 Train Operations Functionality/Economic Benefits

All Options are comparable under the 'Train Operations' sub-criteria. All options meet the Train Service Specification.

7.5.1.4 Traffic Functionality and associated Economic Activities and Opportunities

All Options are comparable under the 'Traffic' sub-criteria. The impacts of closing the level crossing are the same for all options. The diversion of general traffic to other crossing locations in addition to the modification of the directional system will disrupt traffic flow during the construction and operational stage.

7.5.2 Safety

Safety has been divided into two sub-criteria which are considered below. It should be noted that all options are safe, but some will have the potential for greater residual risks to remain. This criterion considers relative advantages of each option on the criteria of safety.

7.5.2.1 Employer's Safety

All Options are comparable under the 'Employer's Safety' sub-criteria. It is not envisaged that IÉ staff will be responsible for conducting activities in relation to maintaining, inspecting, or monitoring the new assets.

7.5.2.2 Public Safety

All Options are comparable under the 'Public Safety' sub-criteria. Both options eliminate the level crossing risk by completely closing the crossing. A common perception of subways is that these spaces are dark and oppressive. Maximising visibility by providing clear lines of sight, avoiding corners and changes in direction, wide passageways and keeping ceilings as high as possible create a more expansive feel that improves the perception of security. Good lighting is crucial in subway spaces. Artificial lighting should have good colour rendering, and provide uniform intensity and coverage, at all times of day. Natural lighting should be used wherever possible, and this helps to improve the perception of security and creates a connection with the outside. When natural light is maximised at routes in and out of subways such as over a stair, natural light can assist with intuitive wayfinding.

While footbridges do not have the common perceptions on security that subways do, they have similarities that need to be considered. Areas should feel open and be well lit, avoiding corners and changes in direction where possible in order to open up clear lines of sight, and avoid blind spots. They should be at least partially transparent from 1m above floor level, and enclosed passageways on footbridges should be minimised. The use of glazing on decks and stairs can open up visual connectivity, reduce the feeling of claustrophobia and increase passive surveillance and the perception of security. Lighting should provide uniform intensity and coverage and allow all passengers to read information and signage clearly at all times of day.

7.5.3 Environment

Section 2.6 sets out a description of the existing environment, under key environmental criteria, while the key constraints associated with this study area are outlined in Section 4.2. This is further supported by Annex 3.1 Constraints Report. Below is a summary of the key findings of the MCA under the various environmental criteria, with an emphasis on differentiating aspects for the options considered.

7.5.3.1 Landscape and Visual Quality

Option SM-P-4 has a significant comparative disadvantage over Option SM-P-6 under the 'Landscape and Visual' sub-criteria. There is a considerable visual impact to Sandymount Station and surrounding area due to the close proximity of the footbridge which will represent a prominent visual element. There is a greater potential impact for loss of privacy and lighting from the footbridge on the residential premises on Sandymount Avenue.

Option SM-P-6 has a significantly comparative advantage over Option SM-P-4 under the 'Landscape and Visual' sub-criteria. Due to the underground connection, there is minimal visual impact to Sandymount Station and the surrounding area with only the lift shafts extending above street level. The potential impact from loss of privacy and lighting from the subway on the residential premises on Sandymount Avenue is significantly reduced.

7.5.3.2 Biodiversity

Option SM-P-4 has a comparative advantage over Option SM-P-6 under the 'Biodiversity' sub-criteria. The level crossing is located c. 120m from a cricket club and grounds. Bird species, such as brent geese, curlew and oystercatcher use these habitats for inland foraging during the winter periods. Many of these species are SCI species from nearby European sites in Dublin Bay and along the eastern coastline. The works are within the ZoI of these areas, with the potential for noise, vibration, and lighting impacts on SCI bird species.

For Option SM-P-4 foundation works will be required to construct the footbridge, however, less excavation is required when compared to constructing the subway, thereby requiring a shorter construction duration. The construction of the footbridge is likely to impact less on biodiversity in the area. The reduced construction duration will reduce the amount of disturbance, and noise or vibration impacts on local wildlife. However, during the operational stage, the footbridge is likely to have an increased amount of lighting, and noise or vibration impacts.

For Option SM-P-6 a greater amount of excavation is required to construct the subway, compared to constructing the footbridge, thereby requiring a longer construction duration. Potential impacts on the groundwater body would also be a consideration, with the underground construction required for the subway, and subsequently potential impacts on groundwater dependent habitats and species in the surrounding habitat and within European sites nearby.

7.5.3.3 Noise and Vibration

All Options are comparable under the 'Noise and Vibration' sub-criteria at this options assessment stage. During the construction stage it is expected that Option SM-P-4 should have a reduced impact in relation to noise & vibration, due to the shorter construction duration. During the operational stage, it is expected that Option SM-P-4 would result in higher noise impacts due to the elevated crossing, however it is not considered that this will be to the extent as to significantly differentiate between the options.

During the construction stage it is expected that Option SM-P-6 should have an increased impact in relation to noise & vibration, due to the longer construction duration. During the operational stage, it is expected that Option SM-P-6 would result in lower noise impacts due to the sub-service crossing.

7.5.3.4 Water Resources

All Options are comparable under the 'Water Resource' sub-criteria. Opportunities to enhance the quality of surface waters and associated floodplains could be considered in the design of the subway water management system if necessary.

7.5.3.5 Archaeology, Architectural and Cultural Heritage

Option SM-P-4 has a comparative advantage over Option SM-P-6 under the 'Archaeology, Architectural and Cultural Heritage' sub-criteria. Construction of a footbridge requires less excavation, when compared to that of a subway, and therefore has less potential to reveal previously undisturbed archaeological deposits. There are no recorded monuments located at the proposed works.

For Option SM-P-6, construction of a subway requires more excavation, when compared to that of a footbridge, and therefore there is a greater potential to reveal previously undisturbed archaeological deposits. There are no recorded monuments located at the proposed works.

7.5.3.6 Geology and Soils

Option SM-P-4 has a comparative advantage over Option SM-P-6 under the 'Geology & Soils' sub-criteria. The proposed works for Option SM-P-4 consist of the construction of a footbridge with both stair and lift access . Pile foundations will likely be required to support the structure overhead, which should be less intrusive to the existing geology and soils than the extent of excavation required for a subway. Additionally, the reduced excavation of made ground and natural materials decreases the potential for management of contaminated materials.

Option SM-P-6 has a comparative disadvantage over Option SM-P-4 under the 'Geology & Soils' sub-criteria. The proposed works for Option SM-P-6 consist of the construction of a subway with both stair and lift access. Excavation works will be required, thereby generating comparatively significant surplus earthworks materials, both made ground and natural materials. Due to the limited reuse options, these materials would require recovery or offsite disposal. Additionally, the stability of the railway, roads, structures, and services adjacent to the subway may be impacted due to the presence of made ground, soft ground (alluvial deposit and soft marine sediments) and gravels present at and within the vicinity of the site.

7.5.3.7 Agricultural and Non-agricultural

All Options are comparable under the 'Agricultural and Non-agricultural' sub-criteria.

7.5.3.8 Air Quality and Climate

All Options are comparable under the 'Air Quality & Climate Change' sub-criteria. The impacts of closing the level crossing are the same for all options, including reduction in operational traffic in the area and the type of rolling stock used on the line. Option SM-P-6 is expected to have a longer construction duration which will increase construction traffic; however, this is not considered significant enough to be considered a comparative advantage over Option SM-P-4.

7.5.4 Accessibility and Social Inclusion

Accessibility and Social Inclusion has been assessed using the two sub-criteria described below.

7.5.4.1 Accessibility

Option SM-P-6 has a comparative advantage over Option SM-P-4 under the 'Accessibility' sub-criteria. The design of stairs is very important. Poorly designed stairs can create a barrier for a large proportion of passengers including the frail elderly and those with cognitive, sensory and mobility disabilities. The subway offers greater benefits to the passenger flow and accessibility as the vertical displacement (3.45m) is reduced by 40%, in comparison with a footbridge (6.00m). This results a reduced stair length of 33% (20.0m), in comparison with a footbridge (30.8m).

7.5.4.2 Social Inclusion

All Options are comparable under the 'Social Inclusion' sub-criteria. All options provide unrestricted movements for pedestrians and cyclists. Lifts are an essential feature for people who are unable to negotiate steps, including wheelchair users and some ambulant disabled people where the change in level is greater than 2m and where there is no space to provide a suitable ramp. Lifts are also helpful for older people and families with young children. Passengers with luggage should always have the option to use lifts rather than stairs and escalators, for safety reasons.

Consideration should be given to providing two lifts either side of the crossing to ensure sufficient redundancy is provided in the event of a lift failing.

7.5.5 Integration

Integration has been assessed using the five sub-criteria described below.

7.5.5.1 Adaptability in the Future

All Options are comparable under the 'Adaptability in the Future' sub-criteria. All options have the same impacts to vehicle crossing closure and provide unrestricted pedestrian/cycle crossings.

7.5.5.2 Transport Integration

All Options are comparable under the 'Transport Integration' sub-criteria. All options provide the same integration with other transport systems.

7.5.5.3 Land Use Integration

All Options are comparable under the 'Land Use Integration' sub-criteria. All options comply with policies to increase use of public transport. Both options have approximately the same footprint.

7.5.5.4 Geographical Integration

All Options are comparable under the 'Geographical Integration' sub-criteria. All options comply with policies to increased use of public transport.

7.5.5.5 Government Policy Integration

All Options are comparable under the 'Government Policy Integration' sub-criteria. All options comply with policies to increased use of public transport.

7.5.6 Physical Activity

7.5.6.1 Walking/Cycling Opportunities

All Options are comparable under the 'Walking/Cycling Opportunities' sub-criteria. An unrestricted connection will be provided for pedestrians and cyclists across the rail line. Provision of bicycle wheeling ramps will make stairs accessible to cyclists by enabling them to go up or down staircases without having to physically carry their bike. While it may be less desirable for cyclists to dismount when using the stairs, this benefits vulnerable users who may be hindered by fast moving mounted cyclists using the crossing, thereby creating a healthy environment conducive to active travel for all users.

7.5.7 Summary & EPO

7.5.7.1 Non-preferred option

Option SM-P-4 is not preferred due to:

- Higher maintenance costs due to the footbridge having a higher interface with the live railway, which require isolation of the lines for some activities;
- There are disadvantages when it comes to accessibility as a footbridge creates a further distance for pedestrians and cyclist to travel; and
- There is a considerable visual impact to the area with a footbridge, which will represent a prominent visual element.

7.5.8 Emerging Preferred Option

Option SM-P-6 has been identified as the Emerging Preferred Option. It has a number of advantages over the other options, such as:

- It offers greater benefits to the passenger flow and accessibility as the vertical displacement is reduced by 40%, resulting in a reduced stair length of 33%;
- This option has advantages when it comes to having a lower maintenance cost when compared to footbridges due to nature of the crossing having minimal interface with the live railway; and
- Due to the underground connection, there is minimal visual impact to the area.

7.6 Infrastructure MCA 4: Sydney Parade Pedestrian/Cyclist Only Crossing Options

The results of the Multi-Criteria Assessment for the Local 'Infrastructure' Pedestrian/Cyclist Only Crossing at Sydney Parade Avenue are presented in Table 7-10. This has been developed to reflect the relative rankings for all sub-criteria assessed for each of the options and is presented as a summary of the key issues considered.

Table 7-10 Sydney Parade Avenue Pedestrian/Cyclist Only Crossing Options MCA Summary

Criteria	Sub-Criteria	SP-P-4	SP-P-6
		New Footbridge with Stair & Lift Access	New Subway with Stair & Lift Access
Economy	CAPEX		
	OPEX		
	Train Operations Functionality/Economic Benefit		
	Traffic functionality and associated economic activities and opportunities		
Safety	Employer's Safety		
	Public Safety		
Environment	Landscape and Visual Quality		
	Biodiversity		
	Noise and Vibration		
	Water Resources		
	Archaeology, Architectural and Cultural Heritage		
	Geology and Soils		
	Agricultural and Non-agricultural		
	Air Quality & Climate Change		
Accessibility & Social Inclusion	Accessibility		
	Social Inclusion		
Integration	Adaptability in the Future		
	Transport Integration		
	Land Use Integration		
	Government Policy Integration		
	Geographical Integration		
Physical Activity	Walking/Cycling Opportunities		

Table 7-11 Overall criteria MCA summary table

Criteria	SP-P-4	SP-P-6
	New Footbridge with Stair & Lift Access	New Subway with Stairs & Lift Access
Economy		
Safety		
Environmental		
Accessibility & Social Inclusion		

	SP-P-4	SP-P-6
Integration		
Physical Activity		

A more detailed table is provided in Appendix B with the full detailed rationale behind the scoring of each criterion and option

7.6.1 Economy

Economy has been divided into four sub-criteria which are considered below.

7.6.1.1 CAPEX

Option SP-P-4 has a comparative advantage over Option SP-P-6 under the 'CAPEX' sub-criteria. The differences between the options are greater than 25% and therefore considered as a comparative difference based on the high level of the cost estimate.

7.6.1.2 OPEX

Option SP-P-6 has a comparative advantage over Option SP-P-4 under the 'Operational Costs (OPEX)' sub-criteria. Subways tend to have a lower maintenance cost when compared to footbridges due to nature of the crossing having minimal interface with the live rail line. Therefore, structural inspections and maintenance can be carried out without requiring isolation of the lines. Footbridges tend to have a higher maintenance cost when compared to subways. This is adequate due to maintenance on footbridges having a higher interface with the live railway, which require isolation of the lines for some activities. Use of non-conductive materials should be used, and all materials should be adequately bonded to help mitigate the risks in undertaking maintenance activities. Should glass be considered as part of the solid parapet to provide visibility for user comfort, a safe methodology should be in place for glass cleaning which will require the isolation of the lines.

Footbridges do not require the same level of drainage and prevention of flooding as subways do and can be further protected through provision of a roof structure overhead. Subways require more maintenance of drainage and prevention of flooding than a footbridge due to the sub-surface crossing. Water ingress should be managed so that it is drained away safely and should be concealed behind ceiling finishes or wall panels. Panels should be opened at regular intervals in order to allow access for inspection, monitoring, and maintenance. Pumps to manage and remove water ingress should be considered where necessary.

Services integration for footbridges should be carefully considered as part of the cable management system. Services should be combined into CMS where possible and run above structure and behind finishes. Service integration for subways should be contained within wall panels for ease of access.

7.6.1.3 Train Operations Functionality/Economic Benefits

All Options are comparable under the 'Train Operations' sub-criteria. All options meet the Train Service Specification.

7.6.1.4 Traffic Functionality and associated Economic Activities and Opportunities

All Options are comparable under the 'Traffic' sub-criteria. The impacts of closing the level crossing are the same for all options. The diversion of general traffic to other crossing locations in addition to the modification of the directional system will disrupt traffic flow during the construction and operational stage.

7.6.2 Safety

Safety has been divided into two sub-criteria which are considered below. It should be noted that all options are safe, but some will have the potential for greater residual risks to remain. This criterion considers relative advantages of each option on the criteria of safety.

7.6.2.1 Employer's Safety

All Options are comparable under the 'Employer's Safety' sub-criteria. It is not envisaged that IÉ staff will be responsible for carrying out activities in relation to maintaining, inspecting, or monitoring the new assets.

7.6.2.2 Public Safety

All Options are comparable under the 'Public Safety' sub-criteria. Both options eliminate the level crossing risk by completely closing the crossing. A common perception of subways is that these spaces are dark and oppressive. Maximising visibility by providing clear lines of sight, avoiding corners and changes in direction, wide passageways and keeping ceilings as high as possible create a more expansive feel that improves the perception of security. Good lighting is crucial in subway spaces. Artificial lighting should have good colour rendering, and provide uniform intensity and coverage, at all times of day. Natural lighting should be used wherever possible, and this helps to improve the perception of security and creates a connection with the outside. When natural light is maximised at routes in and out of subways such as over a stair, natural light can assist with intuitive wayfinding.

While footbridges do not have the common perceptions on security that subways do, they have similarities that need to be considered. Areas should feel open and be well lit, avoiding corners and changes in direction where possible in order to open up clear lines of sight, and avoid blind spots. They should be at least partially transparent from 1m above floor level, and enclosed passageways on footbridges should be minimised. The use of glazing on decks and stairs can open up visual connectivity, reduce the feeling of claustrophobia and increase passive surveillance and the perception of security. Lighting should provide uniform intensity and coverage and allow all passengers to read information and signage clearly at all times of day.

7.6.3 Environment

Section 2.6 sets out a description of the existing environment, under key environmental criteria, while the key constraints associated with this study area are outlined in Section 4.2. This is further supported by Annex 3.1 Constraints Report. Below is a summary of the key findings of the MCA under the various environmental criteria, with an emphasis on differentiating aspects for the options considered.

7.6.3.1 Landscape and Visual Quality

Option SP-P-4 has a significant comparative disadvantage over Option SP-P-6 under the 'Landscape and Visual' sub-criteria. There is a considerable visual impact to Sydney Parade Station and surrounding area due to the close proximity of the footbridge which will represent a prominent visual element. The higher lift shafts will create overshadowing of the existing signal box. There is a greater potential impact for loss of privacy and lighting from the footbridge on the residential premises on Sandymount Avenue.

Option SP-P-6 has a significant comparative advantage over Option SP-P-4 under the 'Landscape and Visual' sub-criteria. Due to the underground connection, there is minimal visual impact to Sydney Parade Station and the surrounding area with only the lift shafts extending above street level. The potential impact for loss of privacy and lighting from the subway on the residential premises on Sydney Parade Avenue is significantly reduced.

7.6.3.2 Biodiversity

The level crossing is located c. 300m from Dublin Bay, and the designated sites within, namely; South Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA, and South Dublin Bay pNHA, which are designated for marine and intertidal habitats and overwintering birds. These designated areas are of international and national biodiversity importance. The works are within the ZoI of these areas, with the potential indirect impacts including construction related impacts (e.g., potential for water quality impacts or disturbance to birds) and new lighting which could impact on birds.

Option SP-P-4 has a comparative advantage over Option SP-P-6 under the 'Biodiversity' sub-criteria. Foundation works will be required to construct the footbridge; however, less excavation is required when compared to constructing the subway, thereby requiring a shorter construction duration. The construction of the footbridge is likely to impact less on biodiversity in the area. The reduced construction duration will reduce the amount of disturbance, and noise or vibration impacts on local wildlife. However, during the operational stage, the footbridge is likely to have an increased amount of lighting, and noise or vibration impacts.

Option SP-P-6 has a comparative disadvantage over Option SP-P-4 under the 'Biodiversity' sub-criteria. A greater amount of excavation is required to construct the subway, compared to constructing the footbridge, thereby requiring a longer construction duration. Potential impacts on the groundwater body would also be a consideration, with the underground construction required for the subway, and subsequently potential impacts on groundwater dependent habitats and species in the surrounding habitat and within European sites nearby.

7.6.3.3 Noise and Vibration

All Options are comparable under the 'Noise and Vibration' sub-criteria at this options assessment stage. During the construction stage it is expected that Option SP-P-4 should have a reduced impact in relation to noise & vibration, due to the shorter construction duration. During the operational stage, it is expected that Option SP-P-4 would result in higher noise impacts due to the elevated crossing, however it is not considered that this will be to the extent as to significantly differentiate between the options.

7.6.3.4 Water Resources

All Options are comparable under the 'Water Resource' sub-criteria. Opportunities to enhance the quality of surface waters and associated floodplains could be considered in the design of the subway water management system if necessary.

7.6.3.5 Archaeology, Architectural and Cultural Heritage

Option SP-P-4 has a comparative advantage over Option SP-P-6 under the 'Archaeology, Architectural and Cultural Heritage' sub-criteria. Construction of a footbridge requires less excavation, when compared to that of a subway, and therefore has less potential to reveal previously undisturbed archaeological deposits. There are no recorded monuments located at the proposed works. The proposed eastern lift is located very close to the Signal box which is part of the Sydney Parade station complex and also the boundary walls to the houses on Sydney Parade so there is potential for damage during construction.

Option SP-P-6 has a comparative disadvantage over Option SP-P-4 under the 'Archaeology, Architectural and Cultural Heritage' sub-criteria. Construction of a subway requires more excavation, when compared to that of a subway, and therefore there is a greater potential to reveal previously undisturbed archaeological deposits. There are no recorded monuments located at the proposed works. The proposed eastern lift is located very close to the Signal box which is part of the Sydney Parade station complex and also the boundary walls to the houses on Sydney Parade so there is potential for damage.

7.6.3.6 Geology and Soils

Option SP-P-4 has a comparative advantage over Option SP-P-6 under the 'Geology & Soils' sub-criteria. The proposed works for Option SP-P-4 consist of the construction of a footbridge with both stair and lift access . Pile foundations will likely be required to support the structure overhead, which should be less intrusive to the existing geology and soils than the extent of excavation required for a subway. Additionally, the reduced excavation of made ground and natural materials decreases the potential for management of contaminated materials.

Option SP-P-6 has a comparative disadvantage over Option SP-P-4 under the 'Geology & Soils' sub-criteria. The proposed works for Option SP-P-6 consist of the construction of a subway with both stair and lift access. Excavation works will be required, thereby generating comparatively significant surplus earthworks materials, both made ground and natural materials. Due to the limited reuse options, these materials would require recovery or offsite disposal.

Additionally, the stability of the railway, roads, structures, and services adjacent to the subway may be impacted due to the presence of made ground, soft ground (alluvial deposit and soft marine sediments) and gravels present at and within the vicinity of the site.

7.6.3.7 Agricultural and Non-agricultural

All Options are comparable under the 'Agricultural and Non-agricultural' sub-criteria.

7.6.3.8 Air Quality and Climate

All Options are comparable under the 'Air Quality & Climate Change' sub-criteria. The impacts of closing the level crossing are the same for all options, including reduction in operational traffic in the area and the type of rolling stock used on the line. Option SP-P-6 is expected to have a longer construction duration which will increase construction traffic; however, this is not considered significant enough to be considered a comparative advantage over Option SP-P-4.

7.6.4 Accessibility and Social Inclusion

Accessibility and Social Inclusion has been assessed using the two sub-criteria described below.

7.6.4.1 Accessibility

Option SP-P-6 has a comparative advantage over Option SP-P-4 under the 'Accessibility' sub-criteria.

The design of stairs is very important. Poorly designed stairs can create a barrier for a large proportion of passengers including the frail elderly and those with cognitive, sensory and mobility disabilities. The subway offers greater benefits to the passenger flow and accessibility as the vertical displacement (2.85m) is reduced by 50%, in comparison with a footbridge (7.05m). This results in a reduced stair length of 50% (17.4m), in comparison with a footbridge (36.4m).

7.6.4.2 Social Inclusion

All Options are comparable under the 'Social Inclusion' sub-criteria. All options provide unrestricted movements for pedestrians and cyclists. Lifts are an essential feature for people who are unable to negotiate steps, including wheelchair users and some ambulant disabled people where the change in level is greater than 2m and where there is no space to provide a suitable ramp. Lifts are also helpful for older people and families with young children. Passengers with luggage should always have the option to use lifts rather than stairs and escalators, for safety reasons.

Consideration should be given to providing two lifts either side of the crossing to ensure sufficient redundancy is provided in the event of a lift failing.

7.6.5 Integration

Integration has been assessed using the five sub-criteria described below.

7.6.5.1 Adaptability in the Future

All Options are comparable under the 'Adaptability in the Future' sub-criteria. All options have the same impacts to vehicle crossing closure and provide unrestricted pedestrian/cycle crossings.

7.6.5.2 Transport Integration

All Options are comparable under the 'Transport Integration' sub-criteria. All options provide the same integration with other transport systems.

7.6.5.3 Land Use Integration

Option SP-P-6 has a comparative advantage over Option SP-P-4 under the 'Land Use Integration' sub-criteria. All options comply with policies to increase use of public transport.

Option SP-P-6 has a footprint approx. 10% smaller than that of Option SP-P-4. With the exception of the openings for the stairs to the subway, there are minimal obstacles introduced on the site which offers greater potential for future land use adaptability.

7.6.5.4 Geographical Integration

All Options are comparable under the 'Geographical Integration' sub-criteria. All options comply with policies to increased use of public transport.

7.6.5.5 Government Policy Integration

All Options are comparable under the 'Government Policy Integration' sub-criteria. All options comply with policies to increased use of public transport.

7.6.6 Physical Activity

7.6.6.1 Walking/Cycling Opportunities

All Options are comparable under the 'Walking/Cycling Opportunities' sub-criteria. An unrestricted connection will be provided for pedestrians and cyclists across the rail line. Provision of bicycle wheeling ramps will make stairs accessible to cyclists by enabling them to go up or down staircases without having to physically carry their bike. While it may be less desirable for cyclists to dismount when using the stairs, this benefits vulnerable users who may be hindered by fast moving mounted cyclists using the crossing, thereby creating a healthy environment conducive to active travel for all users.

7.6.7 Summary & EPO

7.6.7.1 Non-preferred option

Option SP-P-4 is not preferred due to:

- Higher maintenance costs due to the footbridge having a higher interface with the live railway, which require isolation of the lines for some activities;
- There are disadvantages when it comes to accessibility and land use integration as a footbridge creates a further distance for pedestrians and cyclist to travel and in turn takes up a greater area of land; and
- There is a considerable visual impact to the area with a footbridge, which will represent a prominent visual element.

7.6.7.2 Emerging Preferred Option

Option SP-P-6 has been identified as the Emerging Preferred Option. It has a number of advantages over the other options, such as:

- It has advantages when it comes to land use integration as it has a smaller footprint that the other option (approx. 10%);

- It offers greater benefits to the passenger flow and accessibility as the vertical displacement is reduced by 50%, resulting in a reduced stair length of 50%;
- This option has advantages when it comes to having a lower maintenance cost when compared to footbridges due to nature of the crossing having minimal interface with the live railway; and
- Due to the underground connection, there is minimal visual impact to the area.

7.7 Infrastructure MCA 5: Merrion Gate Pedestrian/Cyclist Only Crossing Options

The results of the Multi-Criteria Assessment for the Local 'Infrastructure' Pedestrian/Cyclist Only Crossing at Merrion Gates are presented in Table 7-12. This has been developed to reflect the relative rankings for all sub-criteria assessed for each of the options and is presented as a summary of the key issues considered.

Table 7-12 Merrion Gates Pedestrian/Cyclist Only Crossing Options MCA Summary

Criteria	Sub-Criteria	MG-P-2	MG-P-3	MG-P-4	MG-P-6
		New Footbridge with Compressed Ramp Access	New Footbridge with Non-Linear Ramp Access	New Footbridge with Stair & Lift Access	New Subway with Stair & Lift Access
Economy	CAPEX				
	OPEX				
	Train Operations Functionality/Economic Benefit				
	Traffic functionality and associated economic activities and opportunities				
Safety	Employer's Safety				
	Public Safety				
Environment	Landscape and Visual Quality				
	Biodiversity				
	Noise and Vibration				
	Water Resources				
	Archaeology, Architectural and Cultural Heritage				
	Geology and Soils				
	Agricultural and Non-agricultural				
	Air Quality & Climate Change				
Accessibility & Social Inclusion	Accessibility				
	Social Inclusion				
Integration	Adaptability in the Future				

Criteria	Sub-Criteria	MG-P-2	MG-P-3	MG-P-4	MG-P-6
		New Footbridge with Compressed Ramp Access	New Footbridge with Non-Linear Ramp Access	New Footbridge with Stair & Lift Access	New Subway with Stair & Lift Access
	Transport Integration				
	Land Use Integration				
	Government Policy Integration				
	Geographical Integration				
Physical Activity	Walking/Cycling Opportunities				

Table 7-13 Overall criteria MCA summary table

Criteria	MG-P-2	MG-P-3	MG-P-4	MG-P-6
	New Footbridge with Compressed Ramp Access	New Footbridge with Non-Linear Ramp Access	New Footbridge with Stair & Lift Access	New Subway with Stairs & Lift Access
Economy				
Safety				
Environmental				
Accessibility & Social Inclusion				
Integration				
Physical Activity				

A more detailed table is provided in Appendix B with the full detailed rationale behind the scoring of each criterion and option

7.7.1 Economy

Economy has been divided into four sub-criteria which are considered below.

7.7.1.1 CAPEX

Option MG-P-4 and Option MG-P-6 have a significant comparative advantage over the other options under the 'CAPEX' sub-criteria. The differences between the options are greater than 40% and therefore considered as a comparative difference based on the high level of the cost estimate.

7.7.1.2 OPEX

Option MG-P-2 and Option MG-P-3 have a comparative advantage over the other options under the 'Operational Costs (OPEX)' sub-criteria. Replacing lifts with ramp access removes the redundancy and maintenance risks associated with lifts. Subways tend to have a lower maintenance cost when compared to footbridges due to nature of the crossing having minimal interface with the live rail line.

Therefore, structural inspections and maintenance can be carried out without requiring isolation of the lines. Footbridges tend to have a higher maintenance cost when compared to subways. This is due to maintenance on footbridges having a higher interface with the live railway, which requires isolation of the lines for some activities. Use of non-conductive materials should be used, and all materials should be adequately bonded to help mitigate the risks in undertaking maintenance activities. Should glass be considered as part of the solid parapet to provide visibility for user comfort, a safe methodology should be in place for glass cleaning which will require the isolation of the lines.

Footbridges do not require the same level of drainage and prevention of flooding as subways do and can be further protected through provision of a roof structure overhead. Subways require more maintenance of drainage and prevention of flooding than a footbridge due to the sub-surface crossing. Water ingress should be managed so that it is drained away safely and should be concealed behind ceiling finishes or wall panels. Panels should be opened at regular intervals in order to allow access for inspection, monitoring, and maintenance. Pumps to manage and remove water ingress should be considered where necessary.

Although there are differences in maintenance between options MG-P-4 and MG-P-6, they both have comparable disadvantages to the other options due to maintenance required for the lifts.

Services integration for footbridges should be carefully considered as part of the cable management system. Services should be combined into CMS where possible and run above structure and behind finishes. Service integration for subways should be contained within wall panels for ease of access.

7.7.1.3 Train Operations Functionality/Economic Benefits

All Options are comparable under the 'Train Operations' sub-criteria. All options meet the Train Service Specification.

7.7.1.4 Traffic Functionality and associated Economic Activities and Opportunities

All Options are comparable under the 'Traffic' sub-criteria. The impacts of closing the level crossing are the same for all options. The diversion of general traffic to other crossing locations in addition to the modification of the directional system will disrupt traffic flow during the construction and operational stage.

7.7.2 Safety

Safety has been divided into two sub-criteria which are considered below. It should be noted that all options are safe, but some will have the potential for greater residual risks. This criterion considers relative advantages of each option on the criteria of safety.

7.7.2.1 Employer's Safety

All Options are comparable under the 'Employer's Safety' sub-criteria. It is not envisaged that IÉ staff will be responsible for carrying out activities in relation to maintaining, inspecting, or monitoring the new assets.

7.7.2.2 Public Safety

All Options are comparable under the 'Public Safety' sub-criteria. Both options eliminate the level crossing risk by completely closing the crossing.

A common perception of subways is that these spaces are dark and oppressive. Maximising visibility by providing clear lines of sight, avoiding corners and changes in direction, wide passageways and keeping ceilings as high as possible create a more expansive fell that improves the perception of security. Good lighting is crucial in subway spaces. Artificial lighting should have good colour rendering, and provide uniform intensity and coverage, at all times of day. Natural lighting should be used wherever possible, and this helps to improve the perception of security and creates a connection with the outside. When natural light is maximised at routes in and out of subways such as over a stair, natural light can assist with intuitive wayfinding.

While footbridges do not have the common perceptions on security that subways do, they have similarities that need to be considered. Areas should feel open and be well lit, avoiding corners and changes in direction where possible in order to open up clear lines of sight, and avoid blind spots. They should be at least partially transparent from 1m above floor level, and enclosed passageways on footbridges should be minimised. The use of glazing on decks and stairs can open up visual connectivity, reduce the feeling of claustrophobia and increase passive surveillance and the perception of security. Lighting should provide uniform intensity and coverage and allow all passengers to read information and signage clearly at all times of day.

7.7.3 Environment

Section 2.6 sets out a description of the existing environment, under key environmental criteria, while the key constraints associated with this study area are outlined in Section 4.2. This is further supported by Annex 3.1 Constraints Report. Below is a summary of the key findings of the MCA under the various environmental criteria, with an emphasis on differentiating aspects for the options considered.

7.7.3.1 Landscape and Visual Quality

Option MG-P-2 has a comparative disadvantage over other options under the 'Landscape and Visual' sub-criteria. There is considerable visual impact to St. Marys Apartments located on the west side of Merrion Road creating a prominent visual barrier to the coast. The ramps will create overshadowing of the single storey residential properties at 278 & 280 Merrion Road and 207 Strand Mews. There is a greater potential impact for loss of privacy and lighting from the footbridge on the residential premises in the area.

Option MG-P-3 has a significant comparative disadvantage over other options under the 'Landscape and Visual' sub-criteria. There is a significant visual impact to St. Marys Apartments located on the west side of Merrion Road creating a prominent visual barrier to the coast.

The ramps will create overshadowing of the adjacent single storey residential properties. There is a greater potential impact for loss of privacy and lighting from the footbridge on the residential premises in the area.

Option MG-P-4 has a comparative advantage over other options under the 'Landscape and Visual' sub-criteria. Although there is a visual impact to the surrounding area due to the close proximity of the footbridge which will represent a prominent visual element, when compared to Options MG-P-2/3, they are not as significant. There is a potential impact for loss of privacy and lighting from the footbridge on the residential premises on Sandymount Avenue.

Option MG-P-6 has a significant comparative advantage over other options under the 'Landscape and Visual' sub-criteria. Due to the underground connection, there is minimal visual impact to the surrounding area with only the lift shafts extending above street level. The potential impact for loss of privacy and lighting from the subway on the residential premises on Strand Road and Merrion Road is significantly reduced.

7.7.3.2 Biodiversity

Option MG-P-2 has a comparative disadvantage over the other options under the 'Biodiversity' sub-criteria. This option extends into the boundaries of the South Dublin Bay SAC, is metres away from the South Dublin Bay pNHA, and 30m away from the South Dublin Bay and River Tolka Estuary SPA. Potential direct impacts include works within the designated site boundaries, potentially involving habitat removal as a result of the ramp access. Potential indirect impacts include construction related impacts (e.g., potential for water quality impacts or disturbance to birds) new lighting, and collision risks which could impact on birds. The elevated ramp is in close proximity to the adjacent SPA, which is a nationally and internationally important area for wintering and breeding birds and collision risk during operation would be a significant concern here.

Option MG-P-3 has a significant comparative disadvantage over the other options under the 'Biodiversity' sub-criteria. This option extends even further into the SAC, but the potential impacts would be considered comparative to Option MG-P-2. Potential direct impacts include works within the designated site boundaries, potentially involving habitat removal as a result of the ramp access. Potential indirect impacts include construction related impacts (e.g., potential for water quality impacts or disturbance to birds) new lighting, and collision risks which could impact on birds. The elevated ramp is in close proximity to the adjacent SPA, which is a nationally and internationally important area for wintering and breeding birds and collision risk during operation would be a significant concern here.

Option MG-P-4 has a significant comparative advantage over the other options under the 'Biodiversity' sub-criteria due to construction and operation related impacts. This option does not extend into any designated site, although is in close proximity to the designated sites in Dublin Bay (less than 10m). However, although there is potential for indirect impacts on the nearby designated sites, it is likely to be at a lesser degree than other options, and significantly so. Indirect impacts would include the potential for water quality impacts and/or disturbance to birds during construction, and collision risk and disturbance to birds from lighting and an increase in public traffic during operation. The construction of this option would only cause temporary disturbance due to the less complicated nature of the works over other options.

Option MG-P-6 has a comparative disadvantage over the other options under the 'Biodiversity' sub-criteria. This option does not extend into any designated site, although is in close proximity to the designated sites in Dublin Bay (less than 10m). This option would require a higher level of construction activities for installing the subway than other options.

Indirect impacts would include the potential for water quality impacts and/or disturbance to birds during construction, and disturbance to birds from lighting and an increase in public traffic during operation. Potential impacts on the groundwater body would also be a consideration, with the underground construction required for the subway, and subsequently potential impacts on groundwater dependent habitats and species in the surrounding habitat and within European sites nearby.

7.7.3.3 Noise and Vibration

All Options are comparable under the 'Noise and Vibration' sub-criteria. During the construction stage it is expected that Option MG-P-4 should have a reduced impact in relation to noise & vibration, due to the shorter construction duration. During the operational stage, the footbridge options are expected to result in higher noise impacts due to the elevated crossing, however it is not considered that this will be to the extent as to significantly differentiate between these options and Option MG-P-6.

7.7.3.4 Water Resources

All Options are comparable under the 'Water Resource' sub-criteria. Opportunities to enhance the quality of surface waters and associated floodplains could be considered in the design of the subway water management system if necessary.

7.7.3.5 Archaeology, Architectural and Cultural Heritage

Option MG-P-4 have a significant comparative advantage over the other options under the 'Archaeology, Architectural and Cultural Heritage' sub-criteria. The construction of a footbridge requires less excavation, when compared to that of a subway.

Option MG-P-2 has a comparative advantage over the other options. Construction of a footbridge requires less excavation, when compared to that of a subway. However, the increased number of piled foundations required (when compared to Option MG-P-4 due to the inclusion of ramps) has the potential to reveal previously undisturbed archaeological deposits, albeit less likely than that of excavation.

Option MG-P-3 has a comparative disadvantage over the other options. Construction of a footbridge requires less excavation, when compared to that of a subway. However, the increased number of piled foundations required (when compared to Option MG-P-2 due to the inclusion of longer ramps) has the potential to reveal previously undisturbed archaeological deposits, albeit less likely than that of excavation.

Option MG-P-6 has a significant comparative disadvantage over the other options. The construction of a subway requires more excavation, when compared to that of a footbridge, and therefore there is a greater potential to reveal previously undisturbed archaeological deposits.

Note there are no recorded monuments located at the proposed works for all options. There are potential direct impacts to the rubble 19th century boundary walls to the railway and the remains of a small brick and rubble substation/signal box during construction.

7.7.3.6 Geology and Soils

Option MG-P-2 has a comparative advantage over other options under the 'Geology & Soils' sub-criteria. A greater number of pile foundations will likely be required to support the structure overhead, which should be less intrusive to the existing geology and soils than the extent of excavation required for a subway. Additionally, the reduced excavation of made ground and natural materials decreases the potential for management of contaminated materials. However, part of the proposed footprint falls within the boundary of an SAC (South Dublin Bay, Site Code: 000210) and additional land take is needed in comparison with the other options.

Option MG-P-3 has a significant comparative disadvantage over the other options under the 'Geology & Soils' sub-criteria. The proposed works comprise a ramped crossing with stairs and lift access. This option has the largest overall footprint, and a significant additional land take is needed in comparison with the other options. The proposed option is on the coastline with a portion of the proposed structure located within a region prone to erosion; some works will also be required on the foreshore thereby requiring consultation with the foreshore unit in the Department of Housing, Local Government and Heritage.

Option MG-P-4 has a significant comparative advantage over the other options under the 'Geology & Soils' sub-criteria. This option is the least intrusive from a geology and soils perspective and will require less modification to the level crossing and surrounding environment. Pile foundations will likely be required to support the structure overhead, which should be less intrusive to the existing geology and soils than the extent of excavation required for a subway. Additionally, the reduced excavation of made ground and natural materials decreases the potential for management of contaminated materials.

Option MG-P-6 has a significant comparative disadvantage over the other options. The proposed works for this option consist of the construction of a subway with both stair and lift access. Excavation works will be required, thereby generating comparatively significant surplus earthworks materials, both made ground and natural materials. Due to the limited reuse options, these materials would require recovery or offsite disposal. Additionally, the stability of the railway, roads, structures, and services adjacent to the subway may be impacted due to the presence of made ground, soft ground (alluvial deposit and soft marine sediments) and gravels present at and within the vicinity of the site.

7.7.3.7 Agricultural and Non-agricultural

All Options are comparable under the 'Agricultural and Non-agricultural' sub-criteria.

7.7.3.8 Air Quality and Climate

All Options are comparable under the 'Air Quality & Climate Change' sub-criteria. The impacts of closing the level crossing are the same for all options, including reduction in operational traffic in the area and the type of rolling stock used on the line. Option MG-P-6 is expected to have a longer construction duration which will increase construction traffic; however, this is not considered significant enough to be considered a comparative advantage over the other options.

7.7.4 Accessibility and Social Inclusion

Accessibility and Social Inclusion has been assessed using the two sub-criteria described below.

7.7.4.1 Accessibility

Option MG-P-6 has a significant comparative advantage over the other options as it offers greater benefits to the passenger flow and accessibility as the vertical displacement (3.45m) is reduced by 35%, in comparison with a footbridge (5.7m). This results a reduced stair length of 40% (20.2m), in comparison with Option MG-P-4 (33.2m).

Option MG-P-4 has a comparative advantage as the passenger flow and accessibility as the vertical displacement (5.7m) is increased by 65%, in comparison with a subway (3.45m). This results in an increased stair length of 65% (33.2m), in comparison with Option MG-P-6 (20.2m).

Option MG-P-2 has a comparative disadvantage over the options as the passenger flow and accessibility as the vertical displacement (5.7m) is increased by 65%, in comparison with Option MG-P-6 (3.45m). This results in an increased stair length of 50% (29.8m), in comparison with Option MG-P-6 (20.2m). This results in a decreased ramp length of 45% (154.4), in comparison with Option MG-P-3 (285.4m).

Option MG-P-3 has a significant comparative disadvantage as the passenger flow and accessibility as the vertical displacement (5.7m) is increased by 65%, in comparison with Option MG-P-6 (3.45m). This results in an increased stair length of 50% (29.8m), in comparison with Option MG-P-6 (20.2m). This results in an increased ramp length of 80% (285.4), in comparison with Option MG-P-2 (154.4m).

7.7.4.2 Social Inclusion

Option MG-P-4 and MG-P-6 have a comparative advantage over Options MG-P-2 and MG-P-3 under the 'Social Inclusion' sub-criteria. All options provide unrestricted movements for pedestrians and cyclists.

The design of stairs and ramps are very important. Poorly designed stairs and ramps can create a barrier for a large proportion of passengers including the frail elderly and those with cognitive, sensory and mobility disabilities.

Lifts are an essential feature for people who are unable to negotiate steps, including wheelchair users and some ambulant disabled people where the change in level is greater than 2m and where there is no space to provide a suitable ramp. Lifts are also helpful for older people and families with young children. Passengers with luggage should always have the option to use lifts rather than stairs and escalators, for safety reasons. Consideration should be given to providing two lifts either side of the crossing to ensure sufficient redundancy is provided in the event of a lift failing.

7.7.5 Integration

Integration has been assessed using the five sub-criteria described below.

7.7.5.1 Adaptability in the Future

All Options are comparable under the 'Adaptability in the Future' sub-criteria. All options have the same impacts to vehicle crossing closure and provide unrestricted pedestrian/cycle crossings.

7.7.5.2 Transport Integration

All Options are comparable under the 'Transport Integration' sub-criteria. All options provide the same integration with other transport systems.

7.7.5.3 Land Use Integration

Both Option MG-P-6 and Option MG-P-4 have significant comparative advantages over the other options under the 'Land Use Integration' sub-criteria.

Option MG-P-4 has approx. the same footprint as Option MG-P-6. With the exception of the openings for the stairs to the subway, there is minimal obstacles introduced on the site which offers greater potential for future land use adaptability.

Options MG-P-3 has a significant comparative disadvantage over the other options as it has an increased footprint, approximately 6 times larger, when compared to Option MG-P-6.

Option MG-P-2 has a comparative disadvantage over the other options as it has an increased footprint, approximately 5 times larger, when compared to Option MG-P-6.

Note all options comply with policies to increase use of public transport.

7.7.5.4 Geographical Integration

All Options are comparable under the 'Geographical Integration' sub-criteria. All options comply with policies to increased use of public transport.

7.7.5.5 Government Policy Integration

All Options are comparable under the 'Government Policy Integration' sub-criteria. All options comply with policies to increased use of public transport.

7.7.6 Physical Activity

7.7.6.1 Walking/Cycling Opportunities

All Options are comparable under the 'Walking/Cycling Opportunities' sub-criteria. An unrestricted connection will be provided for pedestrians and cyclists across the rail line. Provision of bicycle wheeling ramps will make stairs accessible to cyclists by enabling them to go up or down staircases without having to physically carry their bike.

While it may be less desirable for cyclists to dismount when using the stairs, this benefits vulnerable users who may be hindered by fast moving mounted cyclists using the crossing, thereby creating a healthy environment conducive to active travel for all users.

7.7.7 Summary & EPO

7.7.7.1 Non-preferred options

Option MG-P-2 is not preferred due to:

- There are higher CAPEX costs associated with this option, mainly due to the compressed ramps;
- There are disadvantages when it comes to accessibility and land use integration as a footbridge creates a further distance for pedestrians and cyclist to travel and in turn takes up a greater percentage of land;
- This option scores poorly for social inclusion due to the omission of lifts. Lifts are an essential feature for people who are unable to negotiate steps or significantly increased wayfinding, including wheelchair users and some ambulant disabled people where the change in level is greater than 2m; and
- A number of environmental disadvantages such as visual quality and biodiversity.

Option MG-P-3 is not preferred due to:

- There are higher CAPEX costs associated with this option, mainly due to the non-linear ramps;
- There are disadvantages when it comes to accessibility and land use integration as a footbridge creates a further distance for pedestrians and cyclist to travel and in turn takes up a greater percentage of land;
- This option scores poorly for social inclusion due to the omission of lifts. Lifts are an essential feature for people who are unable to negotiate steps, including wheelchair users and some ambulant disabled people where the change in level is greater than 2m; and
- A number of environmental disadvantages such as visual quality, geology, and biodiversity.

Option MG-P-4 is not preferred due to:

- Higher maintenance costs due to the footbridge having a higher interface with the live railway, which require isolation of the lines for some activities;
- There are disadvantages when it comes to accessibility as a footbridge creates a further distance for pedestrians and cyclist to travel, when compared to a subway; and
- There is a considerable visual impact to the area with a footbridge, which will represent a prominent visual element.

7.7.8 Emerging Preferred Option

Option MG-P-6 has been identified as the Emerging Preferred Option. It has a number of advantages over the other options, such as:

- It has advantages when it comes to land use integration as it has a smaller footprint that the other options;
- It offers greater benefits to the passenger flow and accessibility as the vertical displacement is reduced by 35%, resulting in a reduced stair length of 40% (when compared to the footbridge);
- This option has advantages when it comes to having a lower maintenance cost when compared to footbridges due to nature of the crossing having minimal interface with the live railway; and
- Due to the underground connection, there is minimal visual impact to the area.

7.8 Infrastructure MCA 6: Merrion Gates North Full Crossing Options

The results of the Multi-Criteria Assessment for the Local 'Infrastructure' Full Crossing at Merrion Gates North are presented in Table 7-14. This has been developed to reflect the relative rankings for all sub-criteria assessed for each of the options and is presented as a summary of the key issues considered.

Table 7-14 Merrion Gates North Full Crossing Options MCA Summary

Criteria	Sub-Criteria	MG-V-5a New Overpass - 2-way Vehicular Crossing North of Level Crossing.	MG-V-5b New Underpass - 2-way Vehicular Crossing North of Level Crossing.
Economy	CAPEX		
	OPEX		
	Train Operations Functionality/Economic Benefit		
	Traffic functionality and associated economic activities and opportunities		
Safety	Employer's Safety		
	Public Safety		
Environment	Landscape and Visual Quality		
	Biodiversity		
	Noise and Vibration		
	Water Resources		
	Archaeology, Architectural and Cultural Heritage		
	Geology and Soils		
	Agricultural and Non-agricultural		
	Air Quality & Climate Change		
Accessibility & Social Inclusion	Accessibility		
	Social Inclusion		
Integration	Adaptability in the Future		
	Transport Integration		
	Land Use Integration		
	Government Policy Integration		
	Geographical Integration		
Physical Activity	Walking/Cycling Opportunities		

Table 7-15 Overall criteria MCA summary table

Criteria	MG-V-5a New Overpass - 2-way Vehicular Crossing North of Level Crossing.	MG-V-5b New Underpass - 2-way Vehicular Crossing North of Level Crossing.
Economy		
Safety		
Environmental		
Accessibility & Social Inclusion		
Integration		
Physical Activity		

A more detailed table is provided in Appendix B with the full detailed rationale behind the scoring of each criterion and option.

7.8.1 Economy

Economy has been divided into four sub-criteria which are considered below.

7.8.1.1 CAPEX

Option MG-V-5b has a significant comparative advantage over Option MG-V-5a under the 'CAPEX' sub-criteria. The differences between the options are greater than 30% and therefore considered as a significant comparative difference based on the high level of the cost estimate.

7.8.1.2 OPEX

Option MG-V-5b has a comparative advantage over Option MG-V-5a under the 'Operational Costs (OPEX)' sub-criteria. An underpass tends to have a lower maintenance cost when compared to an overpass due to nature of the crossing having minimal interface with the live rail line. Therefore, structural inspections and maintenance can be carried out without requiring isolation of the lines. An overpass tends to have a higher maintenance cost when compared to an underpass. This is largely due to maintenance on an overpass having a higher interface with the live railway, which require isolation of the lines for some activities.

Use of non-conductive materials should be used, and all materials should be adequately bonded to help mitigate the risks in undertaking maintenance activities. Should glass be considered as part of the solid parapet to provide visibility for user comfort, a safe methodology should be in place for glass cleaning which will require the isolation of the lines.

An overpass does not require the same level of drainage and prevention of flooding as an underpass does and can be further protected through provision of a roof structure overhead. An underpass requires more maintenance of drainage and prevention of flooding than an overpass due to the sub-surface crossing. Water ingress should be managed so that it is drained away safely and should be concealed behind ceiling finishes or wall panels. Panels should be opened at regular intervals in order to allow access for inspection, monitoring and maintenance. Pumps to manage and remove water ingress should be considered where necessary.

Services integration for overpasses should be carefully considered as part of the cable management system. Services should be combined into CMS where possible and run above structure and behind finishes. Service integration for underpasses should be contained within wall panels for ease of access.

7.8.1.3 Train Operations Functionality/Economic Benefits

All Options are comparable under the 'Train Operations' sub-criteria. All options meet the Train Service Specification.

7.8.1.4 Traffic Functionality and associated Economic Activities and Opportunities

All Options are comparable under the 'Traffic' sub-criteria. The impacts of closing the level crossing are the same for all options. The diversion of general traffic to other crossing locations in addition to the modification of the directional system will disrupt traffic flow during the construction and operational stage.

7.8.2 Safety

Safety has been divided into two sub-criteria which are considered below. It should be noted that all options are safe, but some will have the potential for greater residual risks to remain. This criterion considers relative advantages of each option on the criteria of safety.

7.8.2.1 Employer's Safety

All Options are comparable under the 'Employer's Safety' sub-criteria. It is not envisaged that IÉ staff will be responsible for carrying out activities in relation to maintaining, inspecting, or monitoring the new assets.

7.8.2.2 Public Safety

All Options are comparable under the 'Public Safety' sub-criteria. Both options eliminate the level crossing risk by completely closing the crossing.

7.8.3 Environment

Section 2.6 sets out a description of the existing environment, under key environmental criteria, while the key constraints associated with this study area are outlined in Section 4.2. This is further supported by Annex 3.1 Constraints Report. Below is a summary of the key findings of the MCA under the various environmental criteria, with an emphasis on differentiating aspects for the options considered.

7.8.3.1 Landscape and Visual Quality

Option MG-V-5a has a significant comparative disadvantage over Option MG-V-5b under the 'Landscape and Visual' sub-criteria. There is a considerable visual impact to the surrounding area in close proximity of the overpass. The overpass will represent the most prominent visual element in this area, introducing a visual barrier to Our Lady Queen of Peace Church which could be considered to have cultural importance. There is a greater potential impact for loss of privacy and lighting from the overpass on the residential premises in Ailesbury Mews, and the commercial properties on Merrion Road and Merrion Hall.

Option MG-V-5b has a significant comparative advantage over Option MG-V-5a under the 'Landscape and Visual' sub-criteria. Due to the underground connection, there is minimal visual impact to the surrounding area. The potential impact for loss of privacy and lighting from the underpass on the residential premises on the residential premises in Ailesbury Mews, and the commercial properties on Merrion Road and Merrion Hall is significantly reduced.

7.8.3.2 Biodiversity

Both options would likely have potential indirect impacts on adjacent European and National sites in Dublin Bay, i.e., potential for water quality impacts and/or disturbance to birds during construction, and collision risk and disturbance to birds from lighting and an increase in the public traffic during operation.

Option MG-V-5a has a comparative advantage over Option MG-V-5b under the 'Biodiversity' sub-criteria. This option is proposed in an area that is already quite urban, and has multistorey buildings adjacent to the works location, so collision risk may not be a significant impact. It is assumed the level of construction would be to a lesser degree and would take less time than construction of an underpass.

Option MG-V-5b has a comparative disadvantage over Option MG-V-5a under the 'Biodiversity' sub-criteria. As this option involves an underpass and would require excavations into the ground, potential impacts on the groundwater body would require consideration. Subsequently there could be potential impacts on groundwater dependent habitats and species in the surrounding habitat and within European sites nearby. It is assumed this option would have a higher level of impact due to the nature of the works, and would potentially generate a greater level of noise, vibration and would have a longer construction time than the overpass.

7.8.3.3 Noise and Vibration

Option MG-V-5a has a comparative disadvantage over Option MG-V-5b under the 'Noise and Vibration' sub-criteria. During the construction stage it is expected that Option MG-V-5a should have a reduced impact in relation to noise & vibration, due to the shorter construction duration than Option MG-V-5a. During the operational stage, it is expected that Option MG-V-5a will result in comparatively higher noise impacts from vehicles due to the elevated crossing and close proximity to sensitive sensors such as the church and Montessori School.

Option MG-V-5b has a comparative advantage over Option MG-V-5a under the 'Noise and Vibration' sub-criteria. During the construction stage it is expected that Option MG-V-5b should have an increased impact in relation to noise & vibration, due to the longer construction duration. During the operational stage, it is expected that Option MG-V-5b will result in lower noise impacts due to the sub-service crossing.

7.8.3.4 Water Resources

All Options are comparable under the 'Water Resource' sub-criteria. For coastal flooding, the overbridge would have a slight advantage as the underpass storage is not seen as beneficial for coastal flooding.

7.8.3.5 Archaeology, Architectural and Cultural Heritage

Option MG-V-5a has a comparative advantage over Option MG-V-5b under the 'Archaeology, Architectural and Cultural Heritage' sub-criteria. There are no recorded monuments located at the proposed works. This option requires less excavation and therefore there is a greater potential to reveal previously undisturbed archaeological deposits. There are no architectural heritage features in the immediate vicinity which are likely to be impacted by the proposal.

Option MG-V-5b has a comparative disadvantage over Option MG-V-5a under the 'Archaeology, Architectural and Cultural Heritage' sub-criteria. There are no recorded monuments located at the proposed works. This option requires more excavation and therefore there is a greater potential to reveal previously undisturbed archaeological deposits. It is less preferable to a proposed overpass. There are no architectural heritage features in the immediate vicinity which are likely to be impacted by the proposal.

7.8.3.6 Geology and Soils

Option MG-V-5a has a significant comparative advantage over Option MG-V-5b under the 'Geology & Soils' sub-criteria. The proposed works comprise the construction of a two-way vehicular overbridge. As such, this option is comparatively less intrusive from a geology and soils perspective to the surrounding environment. Furthermore, this option involves minimal excavation of made ground (including potential contaminated materials) and natural materials.

Option MG-V-5b has a significant comparative disadvantage over Option MG-V-5a under the 'Geology & Soils' sub-criteria. The proposed works for Option MG-V-5b consist of the construction of a two-way vehicular underpass crossing.

As such, significant excavation works will be needed thereby generating comparatively significant surplus earthworks materials associated with made ground and natural materials. Due to the limited reuse options, these materials would require recovery or offsite disposal. Additionally, the stability of the railway, roads, structures, and services adjacent to the underpass may be impacted due to the presence of made ground and soft ground associated with historic/stream.

7.8.3.7 Agricultural and Non-agricultural

All Options are comparable under the 'Agricultural and Non-agricultural' sub-criteria.

7.8.3.8 Air Quality and Climate

All Options are comparable under the 'Air Quality & Climate Change' sub-criteria. The impacts of closing the level crossing are the same for all options, including reduction in operational traffic in the area and the type of rolling stock used on the line. While there may be a change in traffic distribution in the wider area as a result of this development, this will not likely result in significant air quality and climate effects, particularly considering the potential positive impacts on greenhouse emissions due to modal shift. Option MG-V-5b is expected to have a longer construction duration which will increase construction traffic; however, this is not considered significant enough to be considered a comparative advantage over Option MG-V-5a.

7.8.4 Accessibility and Social Inclusion

Accessibility and Social Inclusion has been assessed using the two sub-criteria described below.

7.8.4.1 Accessibility

All Options are comparable under the 'Accessibility ' sub-criteria. All options provide unrestricted movements for pedestrians and cyclists along the length of the new road alignment.

7.8.4.2 Social Inclusion

All Options are comparable under the 'Social Inclusion' sub-criteria. All options provide unrestricted movements for pedestrians and cyclists.

7.8.5 Integration

Integration has been assessed using the five sub-criteria described below.

7.8.5.1 Adaptability in the Future

All Options are comparable under the 'Adaptability in the Future' sub-criteria. All options have the same impacts to vehicle crossing closure and provide unrestricted pedestrian/cycle crossings.

7.8.5.2 Transport Integration

All Options are comparable under the 'Transport Integration' sub-criteria. All options provide the same integration with other transport systems.

7.8.5.3 Land Use Integration

Option MG-V-5b has a comparative advantage over Option MG-V-5a under the 'Land Use Integration' sub-criteria. All options comply with policies to increase use of public transport. Both options have a comparative footprint. With the exception of the openings for the ramps to the underpass, Option MG-V-5b has minimal obstacles introduced on the site which offers greater potential for future land use adaptability.

7.8.5.4 Geographical Integration

All Options are comparable under the 'Geographical Integration' sub-criteria. All options comply with policies to increased use of public transport.

7.8.5.5 Government Policy Integration

All Options are comparable under the 'Government Policy Integration' sub-criteria. All options comply with policies to increased use of public transport.

7.8.6 Physical Activity

7.8.6.1 Walking/Cycling Opportunities

All Options are comparable under the 'Walking/Cycling Opportunities' sub-criteria. An unrestricted connection will be provided for pedestrians and cyclists across the rail line.

7.8.7 Summary & EPO

7.8.7.1 Non-preferred option

Option MG-V-5a is not preferred due to:

- Higher maintenance costs due to the overpass having a higher interface with the live railway, which require isolation of the lines for some activities;
- The option also has higher CAPEX costs compared to Option MG-V-5b;
- There are disadvantages when it comes to land use integration as the overpass creates obstacles on the site which limits potential for future land use adaptability; and
- Although having some environmental benefits, such as for geology and biodiversity, it negatively impacts the landscape and created greater noise and vibrations when compared to the other option.

7.8.7.2 Emerging Preferred Option

Option MG-V-5b has been identified as the Emerging Preferred Option. It has a number of advantages over the other options, such as:

- Lower CAPEX and OPEX costs when compared to Option MG-V-5a;
- It has minimal obstacles introduced on the site which offers greater potential for future land use adaptability; and
- Due to the underground connection, there is minimal visual impact to the area.

8. CONCLUSION AND RECOMMENDATIONS

8.1 Emerging Preferred Option

Through the optioneering process, under accessibility (Section 7.2), Option 2C has been identified as the Emerging Preferred Option (EPO).

Table 8-1 presents the combination of infrastructure EPOs which form the accessibility EPO. Refer to Sections 7.2 to 7.8 for the reasons why these options were taken forward as the EPO.

Table 8-1 Accessibility EPO, Infrastructure EPO Combination

Location	Type of Crossing	EPO	Description
Sandymount Area	Not Applicable	2C	Railway At-Grade, All Level Crossings Closed, 1 New Full Crossing at Merrion Gate North + 4 Ped/Cycle Crossings.
Lansdowne Road	Pedestrian/Cyclist	LR-P-6	New Subway with Stair & Lift Access
Serpentine Avenue	Pedestrian/Cyclist	SA-P-6	New Subway with Stair & Lift Access
Sandymount Avenue	Pedestrian/Cyclist	SM-P-6	New Subway with Stair & Lift Access
Sydney Parade	Pedestrian/Cyclist	SP-P-6	New Subway with Stair & Lift Access
Merrion Gates North (new)	Full	MG-V-5b	New Underpass - 2-way Vehicular Crossing North of Level Crossing including ped/cycle access.
Merrion Gates	Closed	MG-V-5b	Level crossing with the alternative crossing located at Merrion Gates North.

8.2 Key Risks / Next Steps

8.2.1.1 Construction Consideration

The proposed pedestrian/cyclist crossings are located in an urban residential area which is likely to cause much disruption to the public during construction. At Lansdowne Road, any works will likely have a significant impact on the designated use of the Aviva Stadium over the duration of the project.

Construction staging will be carried out at Preliminary Design and will need to consider the impacts to property access and provision of suitable alternatives where required. The impacts to car parking at Merrion Hall and Our Lady Queen of Peace Church will need careful consideration. Due to the close proximity of the proposed crossings within the area, road diversions and any potential closures will have to be considered as a system and sequencing of the works must mitigate the impacts to traffic movements as far as reasonably practicable.

Access/egress routes to the worksites will need to be considered at Preliminary Design Stage. Due to the tight space constraints, appropriate construction traffic management procedures may apply such as speed restrictions, clear signage, traffic marshals and notification of site foreman in advance of delivery vehicles arrival to avoid queues on residential access roads. In some instances, materials may need to be craned into position, subject to the adopted construction method, or an area they can be transported from will need to be identified.

Due to the presence of mature trees in close proximity to the proposed crossing locations tree protection zones will be required to be set out prior to works commencing and maintained for the duration of the project.

Safe access will need to be provided to the construction site, which is to be segregated from both public areas, passenger areas and station operations at Lansdowne Road, Sandymount Avenue and Sydney Parade. Work sites will need to be separated from passenger areas using secure hoardings.

Consideration should be given to lines of sight, wayfinding, lighting, and ambience for temporary works and scenarios with the same attention as the final condition. Hoardings should not impact lines of sight to signalling equipment and train dispatch equipment. The public and passengers will be less familiar with temporary arrangements, so good wayfinding should not be forgotten.

There are a significant number of existing buried services crossing the railway at the proposed crossing locations, as shown in Section 2.7 of this report. Most notable is the potential diversion of deep gravity brick wastewater sewers (approx. 1000-1200mm dia.) required at Serpentine Avenue, Sandymount Avenue and Sydney Parade Avenue. Significant excavation and temporary works are envisaged to divert these utilities into new utility corridors as outlined in Section 4.1.3. Due to the close proximity of the proposed crossings within the area, any utility diversions will have to be considered as a system and sequencing of the works must mitigate the impacts to services as far as reasonably practicable.

In the construction of an underpass/subway there is a need for significant piling, excavation, and temporary works to construct a notable underground structure (finished floor level approximately 3.5m below existing road level). Potential extended duration possessions will be required associated with the excavation under the rail line.

8.2.2 Key Risks

The following risks have been identified as part of this study:

- The sizing of the proposed pedestrian/cyclist crossings will be subject to demand modelling which will inform the development of the preliminary design. In particular at Lansdowne Road, consideration of event management and emergency procedures may result in larger structure widths to be provided which may lead to increased CPO of residential and commercial land to account for the structure footprint and enabling works, such as utility diversions;
- Based on the final sizing of underpasses, these will need to be assessed for drainage mitigation required, such as the provision of pumping if necessary;
- The sequencing of utility diversions will need to be carefully considered and developed through regular engagement with key stakeholders, such as Irish Water and Dublin City Council, so as to limit the potential impact on services to residents in the area;
- Limited information on overburden stratigraphy, depth to bedrock, groundwater and geo-environmental are currently available at the specific sites. As such, a site-specific ground investigation is a prerequisite at the locations of the proposed works to investigate the current ground and groundwater conditions.
- Assessment of local traffic to determine any local road upgrades/changes that may be required to support the Emerging Preferred Option, in addition to ensuring local access is maintained in both the construction and permanent stage;

- Evaluation of any potential impacts on surrounding buildings, in particular those within close proximity to the proposed construction sites;
- Disposal of excavation material for subway/underpass and identification and management of haulage routes needs to be considered;
- Possible development of improvements to pedestrian/cycle route throughout the study area and interface with the BusConnects Scheme; and
- Possession and phasing strategy is to be developed in parallel with the preliminary design so as to minimise disruption to rail users during the construction, including modifications to station access and disruption to rail services.

8.2.3 Next Steps

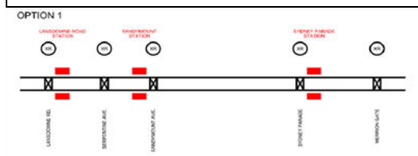
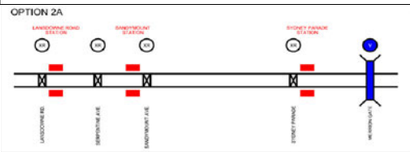
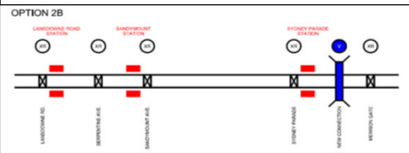
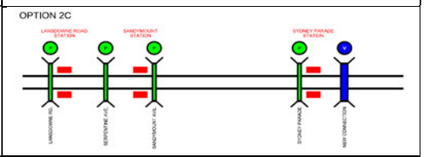
Through preliminary design, elements of the design that will undergo development include, but are not limited to:

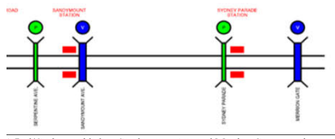
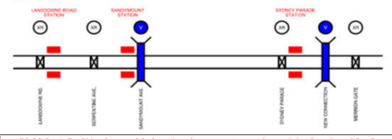
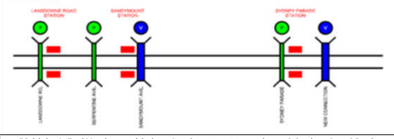
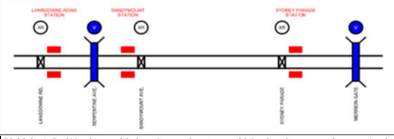
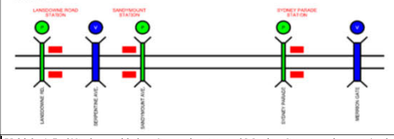
- Consider feedback received from PC1 and update preliminary design accordingly;
- Finalise signalling scheme plan;
- Update the existing model infrastructure with the finalised signalling plan and updated CTC data;
- Undertake further transport modelling to design required highway modifications and interventions based on impacts to the wider network;
- Environmental Mitigation;
- Construction & Logistics Strategy;
- Traction Power and OLE;
- Utility Diversions;
- Lineside Civils and platform work;
- Structural design of proposed crossing solutions;
- Ground investigations;
- Track and Highway Alignment and Earthworks;
- Drainage design;
- Track access and maintenance strategy;
- The Overall Temporary Construction Boundary – the extent of land required to construct the scheme;
- Limit of Permanent Works – The boundary encompassing the permanent engineering and environment mitigation works; and
- Ongoing stakeholder engagement to be carried out with key stakeholders such as Irish Water, Gas Networks Ireland, Dublin City Council, BusConnects and Aviva.

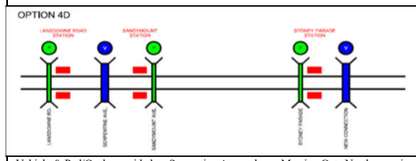
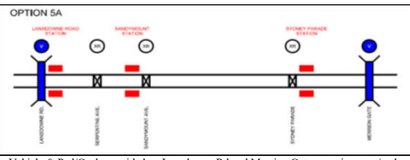
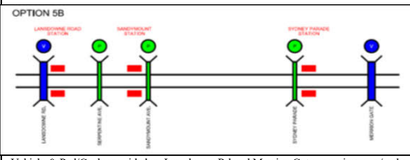
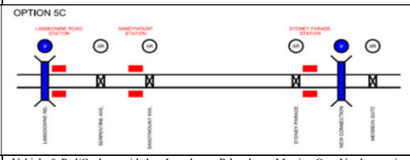
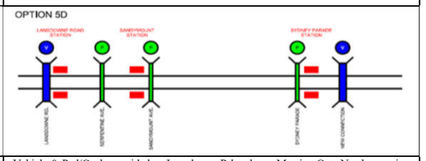
Appendix A: Assessment of longlist options against project objectives and requirements

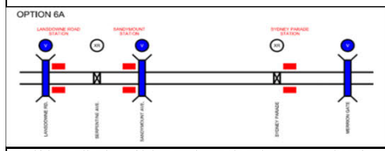
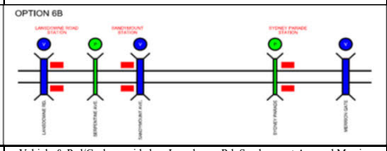
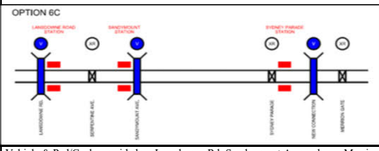
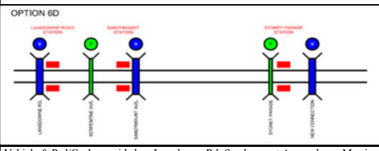
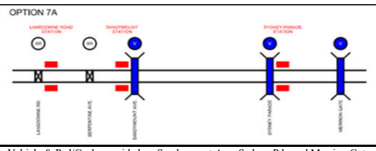
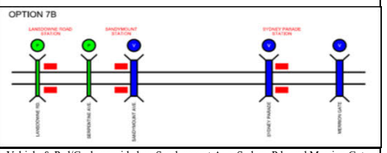
Appendix A.1: Longlist Accessibility Options Sift

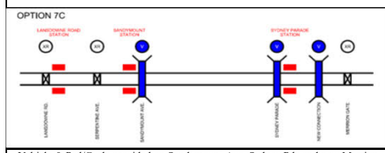
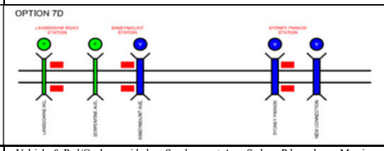
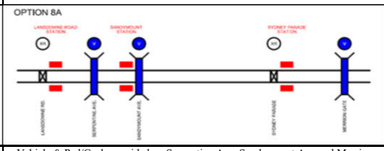
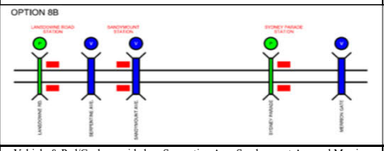
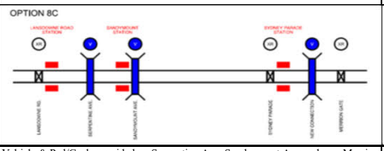
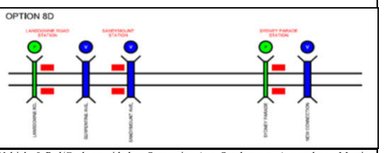
Longlist Concept Options (Accessibility) Sift Sheet

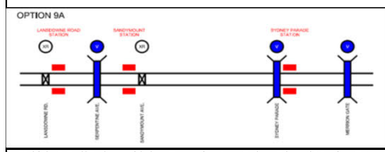
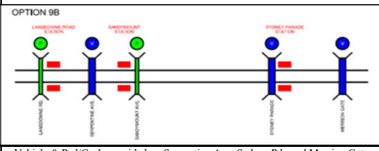
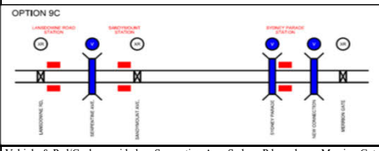
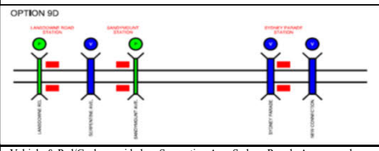
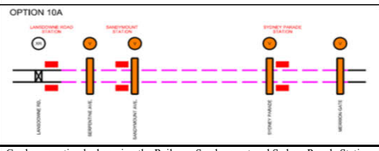
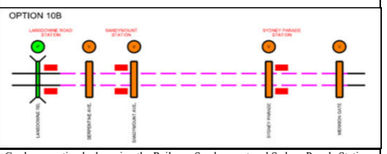
	Assessment Criteria	Descrition	Option 1 "Do nothing/minimum" 5 Retained Level Crossings		Option 2A Railway At-Grade (MG) 1 Full Crossing (Grade Separated) + 4 Retained Level Crossings		Option 2B Railway At-Grade (MG) 1 Full Crossing (Grade Separated) + 5 Retained Level Crossings		Option 2C Railway At-Grade (MG) 1 Full Crossing (Grade Separated) + 4 Ped/Cycle Crossings	
										
			Level Crossings XR001, XR002, XR003, XR004 & XR005 all retained.		Vehicle & Ped/Cycle provided on Merrion Gate, crossing over/under the Railway. Level Crossings XR001 (Lansdowne Rd), XR002 (Serpentine Ave), XR003 (Sandymount Ave) and XR004 (Sydney Pde) retained.		Vehicle & Ped/Cycle provided on new Merrion Gate North, crossing over/under the Railway. Level Crossings XR001 (Lansdowne Rd), XR002 (Serpentine Ave), XR003 (Sandymount Ave), XR004 (Sydney Pde) and XR005 (Merrion Gates) retained.		Vehicle & Ped/Cycle provided on new Merrion Gate North, crossing over/under the Railway. Ped/Cycle only provided at Lansdowne Rd, Serpentine Ave, Sandymount Ave and Sydney Pde, crossing over/under the Railway.	
			Pass/Fail	Rationale	Pass/Fail	Rationale	Pass/Fail	Rationale	Pass/Fail	Rationale
1	Project Specific Objective	Deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it results to deliver a higher frequency, higher capacity, reliable, electrified route to enable increased DART service frequency.	Pass	This option meets the project objective as it results to deliver a higher frequency, higher capacity, reliable, electrified route to enable increased DART service frequency.	Pass	This option meets the project objective as it results to deliver a higher frequency, higher capacity, reliable, electrified route to enable increased DART service frequency.	Pass	This option meets the project objective as it results to deliver a higher frequency, higher capacity, reliable, electrified route to enable increased DART service frequency.
2	Project Specific Objective	Deliver solutions which improve the passenger experience where passenger infrastructure interventions are required to meet the planned increase in DART service frequency.	Pass	This option meets the project objective as there are no infrastructure interventions required.	Pass	This option meets the project objective as it considers providing infrastructure for an improved passenger experience (interventions required).	Pass	This option meets the project objective as it considers providing infrastructure for an improved passenger experience (interventions required).	Pass	This option meets the project objective as it considers providing infrastructure for an improved passenger experience (interventions required).
3	Project Specific Objective	Deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works.	Pass	This option meets the project objective as it results to deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works.	Pass	This option meets the project objective as it results to deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works.	Pass	This option meets the project objective as it results to deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works.	Pass	This option meets the project objective as it results to deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works.
4	Project Specific Objective	Identify cost-effective solutions from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it results to be cost-effective from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it results to be cost-effective from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it results to be cost-effective from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it results to be cost-effective from a capital, operations, and maintenance perspective.
5	Project Specific Objective	Minimise adverse impacts on the natural and built environment associated with the construction, operation and maintenance of the project.	Pass	This option meets the project objective as it doesn't result to have any impacts on the natural and built environment during construction, operation and demolition.	Pass	This option meets the project objective as it doesn't result to have any impacts on the natural and built environment during construction, operation and demolition.	Pass	This option meets the project objective as it doesn't result to have any impacts on the natural and built environment during construction, operation and demolition.	Pass	This option meets the project objective as it doesn't result to have any impacts on the natural and built environment during construction, operation and demolition.
6	Project Specific Objective	Minimise adverse impacts on existing rail services, road users and landowners associated with the construction, operation and maintenance of the project.	Fail	This option fails to meet the project objective. Although road users are able to cross the railway corridor at the level crossing locations, the number of opportunities is decreased due to the increased train frequency.	Pass	This option meets the project objective as it results to have mitigable impacts on existing rail services, road users and landowners during construction and operation.	Pass	This option meets the project objective as it results to have mitigable impacts on existing rail services, road users and landowners during construction and operation.	Pass	This option meets the project objective as it results to have mitigable impacts on existing rail services, road users and landowners during construction and operation.
7	Project Specific Objective	Provide efficient and cost-effective integration of systems with the other DART+ Programme projects.	Pass	This option meets the project objective as it provides efficient and cost-effective integration of systems with the other DART routes.	Pass	This option meets the project objective as it provides efficient and cost-effective integration of systems with the other DART routes.	Pass	This option meets the project objective as it provides efficient and cost-effective integration of systems with the other DART routes.	Pass	This option meets the project objective as it provides efficient and cost-effective integration of systems with the other DART routes.
8	Project Specific Requirement	Designs are in accordance with IE Standards and relevant national and EU standards and guidelines.	Pass	This option meets the project objective as it provides an appropriate application of relevant standards.	Pass	This option meets the project objective as it provides an appropriate application of relevant standards.	Pass	This option meets the project objective as it provides an appropriate application of relevant standards.	Pass	This option meets the project objective as it provides an appropriate application of relevant standards.
9	Project Specific Requirement	Designs shall comply with the Minimum Employer's Functional Requirements and meet the Train Service Specification.	Pass	This option meets the project objective as it complies with the Minimum Employer's Functional Requirements to meet the TSS.	Pass	This option meets the project objective as it complies with the Minimum Employer's Functional Requirements to meet the TSS.	Pass	This option meets the project objective as it complies with the Minimum Employer's Functional Requirements to meet the TSS.	Pass	This option meets the project objective as it complies with the Minimum Employer's Functional Requirements to meet the TSS.
10	Project Specific Requirement	Provide an appropriate level of vehicular access across the railway line to/from Sandymount Village and neighbouring areas for all modes.	Fail	This option fails to meet the project objective. Maintaining accessibility to the strategic road network from a multimodal point of view, maintaining accessibility to shopping facilities and schools, and limited impact on traffic flows at critical junctions are only partly satisfied.	Pass	This option meets the project objective as it provides accessibility to the strategic road network from a multimodal point of view, accessibility to shopping facilities and schools, and limited impact on traffic flows at critical junctions.	Pass	This option meets the project objective as it provides accessibility to the strategic road network from a multimodal point of view, accessibility to shopping facilities and schools, and limited impact on traffic flows at critical junctions.	Pass	This option meets the project objective as it provides accessibility to the strategic road network from a multimodal point of view, accessibility to shopping facilities and schools, and limited impact on traffic flows at critical junctions.
11	Project Specific Requirement	Provide an appropriate level of accessibility at a local level for pedestrians and cyclists.	Fail	This option fails to meet the project objective. Pedestrian and cycling accessibility and permeability are not maintained at local level due to lack of P/C connections.	Fail	This option fails to meet the project objective. Pedestrian and cycling accessibility and permeability are not maintained at local level due to lack of P/C connections.	Fail	This option fails to meet the project objective. Pedestrian and cycling accessibility and permeability are not maintained at local level due to lack of P/C connections.	Pass	This option meets the project objective as it results to maintain pedestrian and cycling accessibility and permeability at local level.
12	Project Specific Requirement	Provide an appropriate level of accessibility for emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it maintains adequate accessibility to emergency services in terms of catchment with limited impacts on response time.	Pass	This option meets the project objective as it maintains adequate accessibility to emergency services in terms of catchment with limited impacts on response time.	Pass	This option meets the project objective as it maintains adequate accessibility to emergency services in terms of catchment with limited impacts on response time.	Pass	This option meets the project objective as it maintains adequate accessibility to emergency services in terms of catchment with limited impacts on response time.
		Overall Pass/Fail	Fail	**This option fails as it doesn't meet the following objectives: To maintain accessibility to the strategic road network from a multimodal point of view, to maintain accessibility to shopping facilities and schools, and to limit impact on traffic flows at critical junctions; To maintain pedestrian and cycling accessibility at local level; Minimise adverse impacts on existing rail services, road users and landowners associated with the construction, operation and maintenance of the project.**	Fail	**This option fails as it doesn't meet the following objectives:To maintain pedestrian and cycling accessibility at local level**	Fail	**This option fails as it doesn't meet the following objectives: To maintain pedestrian and cycling accessibility at local level**	Pass	**This option meets all project objectives and requirements; therefore, it passes the assessment.**

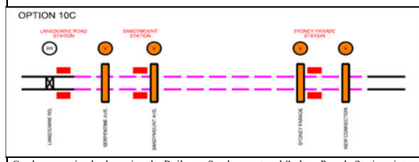
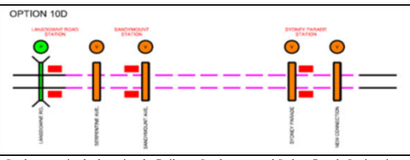
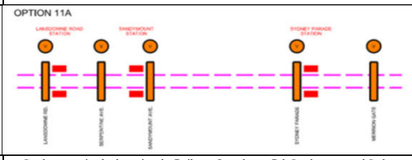
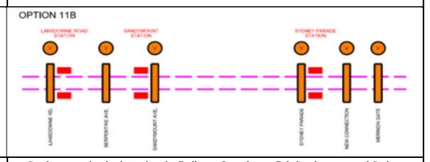
Option 3B Railway At-Grade (MG/SM) ossings (Grade Separated) + 3 Ped/Cycle Crossings (Grade Separated)		**Option 3C** Railway At-Grade (MG/SM) 2 Full Crossings (Grade Separated) + 4 Retained Level Crossings		**Option 3D** Railway At-Grade (MG/SM) 2 Full Crossings (Grade Separated) + 3 Ped/Cycle Crossings (Grade Separated)		**Option 4A** Railway At-Grade (MG/SA) 2 Full Crossings (Grade Separated) + 3 Retained Level Crossings		**Option 4B** Railway At-Grade (MG/SA) 2 Full Crossings (Grade Separated) + 3 Ped/Cycle Crossings (Grade Separated)		**Option 4C** Railway At-Grade (MG/SA) 2 Full Crossings (Grade Separated) + 4 Retained Level Crossings	
											
k Ped/Cycle provided on Sandymount Ave and Merrion Gate, crossing : Railway. Ped/Cycle only provided at Lansdowne Rd, Serpentine Ave and Sydney Pde, crossing over/under the Railway.		Vehicle & Ped/Cycle provided on Sandymount Ave and new Merrion Gate North, crossing over/under the Railway. Level Crossings XR001 (Lansdowne Rd), XR002 (Serpentine Ave), XR004 (Sydney Pde) and XR005 (Merrion Gate) retained.		Vehicle & Ped/Cycle provided on Sandymount Ave and new Merrion Gate North, crossing over/under the Railway. Ped/Cycle only provided at Lansdowne Rd, Serpentine Ave and Sydney Pde, crossing over/under the Railway.		Vehicle & Ped/Cycle provided on Serpentine Ave and Merrion Gate, crossing over/under the Railway. Level Crossings XR001 (Lansdowne Rd), XR003 (Sandymount Ave) and XR004 (Sydney Pde) retained.		Vehicle & Ped/Cycle provided on Serpentine Ave and Merrion Gate, crossing over/under the Railway. Ped/Cycle only provided at Lansdowne Rd, Sandymount Ave and Sydney Pde, crossing over/under the Railway.		Vehicle & Ped/Cycle provided on Serpentine Ave and new Merrion Gate North, crossing over/under the Railway. Level Crossings XR001 (Lansdowne Rd), XR003 (Sandymount Ave), XR004 (Sydney Pde) and XR005 (Merrion Gate) retained.	
Rationale	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**
This option meets the project objective as it results to deliver a higher frequency, higher capacity, reliable, electrified route to enable increased DART service frequency.	Pass	This option meets the project objective as it results to deliver a higher frequency, higher capacity, reliable, electrified route to enable increased DART service frequency.	Pass	This option meets the project objective as it results to deliver a higher frequency, higher capacity, reliable, electrified route to enable increased DART service frequency.	Pass	This option meets the project objective as it results to deliver a higher frequency, higher capacity, reliable, electrified route to enable increased DART service frequency.	Pass	This option meets the project objective as it results to deliver a higher frequency, higher capacity, reliable, electrified route to enable increased DART service frequency.	Pass	This option meets the project objective as it results to deliver a higher frequency, higher capacity, reliable, electrified route to enable increased DART service frequency.	Pass
This option meets the project objective as it considers providing infrastructure for an improved passenger experience (interventions required).	Pass	This option meets the project objective as it considers providing infrastructure for an improved passenger experience (interventions required).	Pass	This option meets the project objective as it considers providing infrastructure for an improved passenger experience (interventions required).	Pass	This option meets the project objective as it considers providing infrastructure for an improved passenger experience (interventions required).	Pass	This option meets the project objective as it considers providing infrastructure for an improved passenger experience (interventions required).	Pass	This option meets the project objective as it considers providing infrastructure for an improved passenger experience (interventions required).	Pass
This option meets the project objective as it results to deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works.	Pass	This option meets the project objective as it results to deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works.	Pass	This option meets the project objective as it results to deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works.	Pass	This option meets the project objective as it results to deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works.	Pass	This option meets the project objective as it results to deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works.	Pass	This option meets the project objective as it results to deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works.	Pass
This option meets the project objective as it results to be cost-effective from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it results to be cost-effective from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it results to be cost-effective from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it results to be cost-effective from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it results to be cost-effective from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it results to be cost-effective from a capital, operations, and maintenance perspective.	Pass
This option meets the project objective as it doesn't result to have any impacts on the natural and built environment during construction, operation and demolition.	Pass	This option meets the project objective as it doesn't result to have any impacts on the natural and built environment during construction, operation and demolition.	Pass	This option meets the project objective as it doesn't result to have any impacts on the natural and built environment during construction, operation and demolition.	Pass	This option meets the project objective as it doesn't result to have any impacts on the natural and built environment during construction, operation and demolition.	Pass	This option meets the project objective as it doesn't result to have any impacts on the natural and built environment during construction, operation, and demolition.	Pass	This option meets the project objective as it doesn't result to have any impacts on the natural and built environment during construction, operation and demolition.	Pass
This option meets the project objective as it results to have mitigable impacts on existing rail services, road users and landowners during construction and operation.	Pass	This option meets the project objective as it results to have mitigable impacts on existing rail services, road users and landowners during construction and operation.	Pass	This option meets the project objective as it results to have mitigable impacts on existing rail services, road users and landowners during construction and operation.	Pass	This option meets the project objective as it results to have mitigable impacts on existing rail services, road users and landowners during construction and operation.	Pass	This option meets the project objective as it results to have mitigable impacts on existing rail services, road users and landowners during construction and operation.	Pass	This option meets the project objective as it results to have mitigable impacts on existing rail services, road users and landowners during construction and operation.	Pass
This option meets the project objective as it provides efficient and cost-effective integration of systems with the other DART routes.	Pass	This option meets the project objective as it provides efficient and cost-effective integration of systems with the other DART routes.	Pass	This option meets the project objective as it provides efficient and cost-effective integration of systems with the other DART routes.	Pass	This option meets the project objective as it provides efficient and cost-effective integration of systems with the other DART routes.	Pass	This option meets the project objective as it provides efficient and cost-effective integration of systems with the other DART routes.	Pass	This option meets the project objective as it provides efficient and cost-effective integration of systems with the other DART routes.	Pass
This option meets the project objective as it provides an appropriate application of relevant standards.	Pass	This option meets the project objective as it provides an appropriate application of relevant standards.	Pass	This option meets the project objective as it provides an appropriate application of relevant standards.	Pass	This option meets the project objective as it provides an appropriate application of relevant standards.	Pass	This option meets the project objective as it provides an appropriate application of relevant standards.	Pass	This option meets the project objective as it provides an appropriate application of relevant standards.	Pass
This option meets the project objective as it complies with the Minimum Employer's Functional Requirements to meet the TSS.	Pass	This option meets the project objective as it complies with the Minimum Employer's Functional Requirements to meet the TSS.	Pass	This option meets the project objective as it complies with the Minimum Employer's Functional Requirements to meet the TSS.	Pass	This option meets the project objective as it complies with the Minimum Employer's Functional Requirements to meet the TSS.	Pass	This option meets the project objective as it complies with the Minimum Employer's Functional Requirements to meet the TSS.	Pass	This option meets the project objective as it complies with the Minimum Employer's Functional Requirements to meet the TSS.	Pass
This option meets the project objective as it provides accessibility to the strategic road network from a multimodal point of view, accessibility to shopping facilities and schools, and limited impact on traffic flows at critical junctions.	Pass	This option meets the project objective as it provides accessibility to the strategic road network from a multimodal point of view, accessibility to shopping facilities and schools, and limited impact on traffic flows at critical junctions.	Pass	This option meets the project objective as it provides accessibility to the strategic road network from a multimodal point of view, accessibility to shopping facilities and schools, and limited impact on traffic flows at critical junctions.	Pass	This option meets the project objective as it provides accessibility to the strategic road network from a multimodal point of view, accessibility to shopping facilities and schools, and limited impact on traffic flows at critical junctions.	Pass	This option meets the project objective as it provides accessibility to the strategic road network from a multimodal point of view, accessibility to shopping facilities and schools, and limited impact on traffic flows at critical junctions.	Pass	This option meets the project objective as it provides accessibility to the strategic road network from a multimodal point of view, accessibility to shopping facilities and schools, and limited impact on traffic flows at critical junctions.	Pass
This option meets the project objective as it results to maintain pedestrian and cycling accessibility and permeability at local level.	Fail	This option fails to meet the project objective. Pedestrian and cycling accessibility and permeability are not maintained at local level due to lack of P/C connections.	Pass	This option meets the project objective as it results to maintain pedestrian and cycling accessibility and permeability at local level.	Fail	This option fails to meet the project objective. Pedestrian and cycling accessibility and permeability are not maintained at local level due to lack of P/C connections.	Pass	This option meets the project objective as it results to maintain pedestrian and cycling accessibility and permeability at local level.	Fail	This option fails to meet the project objective. Pedestrian and cycling accessibility and permeability are not maintained at local level due to lack of P/C connections.
This option meets the project objective as it results to provide accessibility to emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it results to provide accessibility to emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it results to provide accessibility to emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it results to provide accessibility to emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it results to provide accessibility to emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it results to provide accessibility to emergency services in terms of catchment and response time.	Pass
This option meets all project objectives and requirements; therefore, it passes the assessment.	Fail	**This option fails as it doesn't meet the following objectives: To maintain pedestrian and cycling accessibility at local level.**	Pass	**This option meets all project objectives and requirements; therefore, it passes the assessment.**	Fail	**This option fails as it doesn't meet the following objectives: To maintain pedestrian and cycling accessibility at local level.**	Pass	**This option meets all project objectives and requirements; therefore, it passes the assessment.**	Fail	**This option fails as it doesn't meet the following objectives: To maintain pedestrian and cycling accessibility at local level.**

Option 4D Railway At-Grade (MG/SA) 2 Full Crossings (Grade Separated) + 3 Ped/Cycle Crossings (Grade Separated)		**Option 5A** Railway At-Grade (MG/LR) 2 Full Crossings (Grade Separated) + 3 Retained Level Crossings		**Option 5B** Railway At-Grade (MG/LR) 2 Full Crossings (Grade Separated) + 3 Ped/Cycle Crossings (Grade Separated)		**Option 5C** Railway At-Grade (MG/LR) 2 Full Crossings (Grade Separated) + 4 Retained Level Crossings		**Option 5D** Railway At-Grade (MG/LR) 2 Full Crossings (Grade Separated) + 3 Ped/Cycle Crossings (Grade Separated)	
									
Vehicle & Ped/Cycle provided on Serpentine Ave and new Merrion Gate North, crossing over/under the Railway. Ped/Cycle only provided at Lansdowne Rd, Sandymount Ave and Sydney Pde, crossing over/under the Railway.		Vehicle & Ped/Cycle provided on Lansdowne Rd and Merrion Gate, crossing over/under the Railway. Level Crossings XR002 (Serpentine Ave), XR003 (Sandymount Ave) and XR004 (Sydney Pde) retained.		Vehicle & Ped/Cycle provided on Lansdowne Rd and Merrion Gate, crossing over/under the Railway. Ped/Cycle only provided at Serpentine Ave, Sandymount Ave and Sydney Pde, crossing over/under the Railway.		Vehicle & Ped/Cycle provided on Lansdowne Rd and new Merrion Gate North, crossing over/under the Railway. Level Crossings XR002 (Serpentine Ave), XR003 (Sandymount Ave), XR004 (Sydney Pde) and XR005 (Merrion Gate) retained.		Vehicle & Ped/Cycle provided on Lansdowne Rd and new Merrion Gate North, crossing over/under the Railway. Ped/Cycle only provided at Serpentine Ave, Sandymount Ave and Sydney Pde, crossing over/under the Railway.	
Pass/Fail	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**
Pass	This option meets the project objective as it results to deliver a higher frequency, higher capacity, reliable, electrified route to enable increased DART service frequency.	Pass	This option meets the project objective as it results to deliver a higher frequency, higher capacity, reliable, electrified route to enable increased DART service frequency.	Pass	This option meets the project objective as it results to deliver a higher frequency, higher capacity, reliable, electrified route to enable increased DART service frequency.	Pass	This option meets the project objective as it results to deliver a higher frequency, higher capacity, reliable, electrified route to enable increased DART service frequency.	Pass	This option meets the project objective as it results to deliver a higher frequency, higher capacity, reliable, electrified route to enable increased DART service frequency.
Pass	This option meets the project objective as it considers providing infrastructure for an improved passenger experience (interventions required).	Pass	This option meets the project objective as it considers providing infrastructure for an improved passenger experience (interventions required).	Pass	This option meets the project objective as it considers providing infrastructure for an improved passenger experience (interventions required).	Pass	This option meets the project objective as it considers providing infrastructure for an improved passenger experience (interventions required).	Pass	This option meets the project objective as it considers providing infrastructure for an improved passenger experience (interventions required).
Pass	This option meets the project objective as it results to deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works.	Pass	This option meets the project objective as it results to deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works.	Pass	This option meets the project objective as it results to deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works.	Pass	This option meets the project objective as it results to deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works.	Pass	This option meets the project objective as it results to deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works.
Pass	This option meets the project objective as it results to be cost-effective from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it results to be cost-effective from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it results to be cost-effective from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it results to be cost-effective from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it results to be cost-effective from a capital, operations, and maintenance perspective.
Pass	This option meets the project objective as it doesn't result to have any impacts on the natural and built environment during construction, operation and demolition.	Fail	This option fails to meet the project objective. Adverse impacts on the natural and built environment during construction, operation and demolition might occur due to the proximity to the Aviva Stadium (Lansdowne Rd.)	Fail	This option fails to meet the project objective. Adverse impacts on the natural and built environment during construction, operation and demolition might occur due to the proximity to the Aviva Stadium (Lansdowne Rd.)	Fail	This option fails to meet the project objective. Adverse impacts on the natural and built environment during construction, operation and demolition might occur due to the proximity to the Aviva Stadium (Lansdowne Rd.)	Fail	This option fails to meet the project objective. Adverse impacts on the natural and built environment during construction, operation and demolition might occur due to the proximity to the Aviva Stadium (Lansdowne Rd.)
Pass	This option meets the project objective as it results to have mitigable impacts on existing rail services, road users and landowners during construction and operation.	Pass	This option meets the project objective as it results to have mitigable impacts on existing rail services, road users and landowners during construction and operation.	Pass	This option meets the project objective as it results to have mitigable impacts on existing rail services, road users and landowners during construction and operation.	Pass	This option meets the project objective as it results to have mitigable impacts on existing rail services, road users and landowners during construction and operation.	Pass	This option meets the project objective as it results to have mitigable impacts on existing rail services, road users and landowners during construction and operation.
Pass	This option meets the project objective as it provides efficient and cost-effective integration of systems with the other DART routes.	Pass	This option meets the project objective as it provides efficient and cost-effective integration of systems with the other DART routes.	Pass	This option meets the project objective as it provides efficient and cost-effective integration of systems with the other DART routes.	Pass	This option meets the project objective as it provides efficient and cost-effective integration of systems with the other DART routes.	Pass	This option meets the project objective as it provides efficient and cost-effective integration of systems with the other DART routes.
Pass	This option meets the project objective as it provides an appropriate application of relevant standards.	Pass	This option meets the project objective as it provides an appropriate application of relevant standards.	Pass	This option meets the project objective as it provides an appropriate application of relevant standards.	Pass	This option meets the project objective as it provides an appropriate application of relevant standards.	Pass	This option meets the project objective as it provides an appropriate application of relevant standards.
Pass	This option meets the project objective as it complies with the Minimum Employer's Functional Requirements to meet the TSS.	Pass	This option meets the project objective as it complies with the Minimum Employer's Functional Requirements to meet the TSS.	Pass	This option meets the project objective as it complies with the Minimum Employer's Functional Requirements to meet the TSS.	Pass	This option meets the project objective as it complies with the Minimum Employer's Functional Requirements to meet the TSS.	Pass	This option meets the project objective as it complies with the Minimum Employer's Functional Requirements to meet the TSS.
Pass	This option meets the project objective as it provides accessibility to the strategic road network from a multimodal point of view, accessibility to shopping facilities and schools, and limited impact on traffic flows at critical junctions.	Pass	This option meets the project objective as it provides accessibility to the strategic road network from a multimodal point of view, accessibility to shopping facilities and schools, and limited impact on traffic flows at critical junctions.	Pass	This option meets the project objective as it provides accessibility to the strategic road network from a multimodal point of view, accessibility to shopping facilities and schools, and limited impact on traffic flows at critical junctions.	Pass	This option meets the project objective as it provides accessibility to the strategic road network from a multimodal point of view, accessibility to shopping facilities and schools, and limited impact on traffic flows at critical junctions.	Pass	This option meets the project objective as it provides accessibility to the strategic road network from a multimodal point of view, accessibility to shopping facilities and schools, and limited impact on traffic flows at critical junctions.
Pass	This option meets the project objective as it results to maintain pedestrian and cycling accessibility and permeability at local level.	Fail	This option fails to meet the project objective. Pedestrian and cycling accessibility and permeability are not maintained at local level due to lack of P/C connections.	Pass	This option meets the project objective as it results to maintain pedestrian and cycling accessibility and permeability at local level.	Fail	This option fails to meet the project objective. Pedestrian and cycling accessibility and permeability are not maintained at local level due to lack of P/C connections.	Pass	This option meets the project objective as it results to maintain pedestrian and cycling accessibility and permeability at local level.
Pass	This option meets the project objective as it results to provide accessibility to emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it results to provide accessibility to emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it results to provide accessibility to emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it results to provide accessibility to emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it results to provide accessibility to emergency services in terms of catchment and response time.
Pass	**This option meets all project objectives and requirements; therefore, it passes the assessment.**	Fail	**This option fails as it doesn't meet the following objectives: To consider the adverse impacts on the natural and built environment during construction, operation and demolition; To maintain pedestrian and cycling accessibility at local level.**	Fail	**This option fails as it doesn't meet the following objectives: To consider the adverse impacts on the natural and built environment during construction, operation and demolition.**	Fail	**This option fails as it doesn't meet the following objectives: To consider the adverse impacts on the natural and built environment during construction, operation and demolition; To maintain pedestrian and cycling accessibility at local level.**	Fail	**This option fails as it doesn't meet the following objectives: To consider the adverse impacts on the natural and built environment during construction, operation and demolition.**

Option 6A Railway At-Grade (MG/SM/LR) 3 Full Crossings (Grade Separated) + 2 Retained Level Crossings		**Option 6B** Railway At-Grade (MG/SM/LR) 3 Full Crossings (Grade Separated) + 2 Ped/Cycle Crossings (Grade Separated)		**Option 6C** Railway At-Grade (MG/SM/LR) 3 Full Crossings (Grade Separated) + 3 Retained Level Crossings		**Option 6D** Railway At-Grade (MG/SM/LR) 3 Full Crossings (Grade Separated) + 2 Ped/Cycle Crossings (Grade Separated)		**Option 7A** Railway At-Grade (MG/SM/SP) 3 Full Crossings (Grade Separated) + 2 Retained Level Crossings		**Option 7B** Railway At-Grade (MG/SM/SP) 3 Full Crossings (Grade Separated) + 2 Ped/Cycle Crossings (Grade Separated)	
											
Vehicle & Ped/Cycle provided on Lansdowne Rd, Sandymount Ave and Merrion Gate, crossing over/under the Railway. Level Crossings XR002 (Serpentine Ave) and XR004 (Sydney Pde) retained.		Vehicle & Ped/Cycle provided on Lansdowne Rd, Sandymount Ave and Merrion Gate, crossing over/under the Railway. Ped/Cycle only provided at Serpentine Ave and Sydney Pde, crossing over/under the Railway.		Vehicle & Ped/Cycle provided on Lansdowne Rd, Sandymount Ave and new Merrion Gate North, crossing over/under the Railway. Level Crossings XR002 (Serpentine Ave), XR004 (Sydney Pde) and XR005 (Merrion Gate) retained.		Vehicle & Ped/Cycle provided on Lansdowne Rd, Sandymount Ave and new Merrion Gate North, crossing over/under the Railway. Ped/Cycle only provided at Serpentine Ave and Sydney Pde, crossing over/under the Railway.		Vehicle & Ped/Cycle provided on Sandymount Ave, Sydney Pde and Merrion Gate, crossing over/under the Railway. Level Crossings XR001 (Landsdowne Rd) and XR002 (Serpentine Ave) retained.		Vehicle & Ped/Cycle provided on Sandymount Ave, Sydney Pde and Merrion Gate, crossing over/under the Railway. Ped/Cycle only provided at Lansdowne Rd and Serpentine Ave, crossing over/under the Railway.	
Pass/Fail	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**
Pass	This option meets the project objective as it results to deliver a higher frequency, higher capacity, reliable, electrified route to enable increased DART service frequency.	Pass	This option meets the project objective as it results to deliver a higher frequency, higher capacity, reliable, electrified route to enable increased DART service frequency.	Pass	This option meets the project objective as it results to deliver a higher frequency, higher capacity, reliable, electrified route to enable increased DART service frequency.	Pass	This option meets the project objective as it results to deliver a higher frequency, higher capacity, reliable, electrified route to enable increased DART service frequency.	Pass	This option meets the project objective as it results to deliver a higher frequency, higher capacity, reliable, electrified route to enable increased DART service frequency.	Pass	This option meets the project objective as it results to deliver a higher frequency, higher capacity, reliable, electrified route to enable increased DART service frequency.
Pass	This option meets the project objective as it considers providing infrastructure for an improved passenger experience (interventions required).	Pass	This option meets the project objective as it considers providing infrastructure for an improved passenger experience (interventions required).	Pass	This option meets the project objective as it considers providing infrastructure for an improved passenger experience (interventions required).	Pass	This option meets the project objective as it considers providing infrastructure for an improved passenger experience (interventions required).	Pass	This option meets the project objective as it considers providing infrastructure for an improved passenger experience (interventions required).	Pass	This option meets the project objective as it considers providing infrastructure for an improved passenger experience (interventions required).
Pass	This option meets the project objective as it results to deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works.	Pass	This option meets the project objective as it results to deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works.	Pass	This option meets the project objective as it results to deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works.	Pass	This option meets the project objective as it results to deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works.	Pass	This option meets the project objective as it results to deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works.	Pass	This option meets the project objective as it results to deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works.
Pass	This option meets the project objective as it results to be cost-effective from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it results to be cost-effective from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it results to be cost-effective from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it results to be cost-effective from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it results to be cost-effective from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it results to be cost-effective from a capital, operations, and maintenance perspective.
Fail	This option fails to meet the project objective. Adverse impacts on the natural and built environment during construction, operation and demolition might occur due to the proximity to the Aviva Stadium (Lansdowne Rd.)	Fail	This option fails to meet the project objective. Adverse impacts on the natural and built environment during construction, operation and demolition might occur due to the proximity to the Aviva Stadium (Lansdowne Rd.)	Fail	This option fails to meet the project objective. Adverse impacts on the natural and built environment during construction, operation and demolition might occur due to the proximity to the Aviva Stadium (Lansdowne Rd.)	Fail	This option fails to meet the project objective. Adverse impacts on the natural and built environment during construction, operation and demolition might occur due to the proximity to the Aviva Stadium (Lansdowne Rd.)	Pass	This option meets the project objective as it doesn't result to have any impacts on the natural and built environment during construction, operation and demolition.	Pass	This option meets the project objective as it doesn't result to have any impacts on the natural and built environment during construction, operation and demolition.
Pass	This option meets the project objective as it results to have mitigable impacts on existing rail services, road users and landowners during construction and operation.	Pass	This option meets the project objective as it results to have mitigable impacts on existing rail services, road users and landowners during construction and operation.	Pass	This option meets the project objective as it results to have mitigable impacts on existing rail services, road users and landowners during construction and operation.	Pass	This option meets the project objective as it results to have mitigable impacts on existing rail services, road users and landowners during construction and operation.	Pass	This option meets the project objective as it results to have mitigable impacts on existing rail services, road users and landowners during construction and operation.	Pass	This option meets the project objective as it results to have mitigable impacts on existing rail services, road users and landowners during construction and operation.
Pass	This option meets the project objective as it provides efficient and cost-effective integration of systems with the other DART routes.	Pass	This option meets the project objective as it provides efficient and cost-effective integration of systems with the other DART routes.	Pass	This option meets the project objective as it provides efficient and cost-effective integration of systems with the other DART routes.	Pass	This option meets the project objective as it provides efficient and cost-effective integration of systems with the other DART routes.	Pass	This option meets the project objective as it provides efficient and cost-effective integration of systems with the other DART routes.	Pass	This option meets the project objective as it provides efficient and cost-effective integration of systems with the other DART routes.
Pass	This option meets the project objective as it provides an appropriate application of relevant standards.	Pass	This option meets the project objective as it provides an appropriate application of relevant standards.	Pass	This option meets the project objective as it provides an appropriate application of relevant standards.	Pass	This option meets the project objective as it provides an appropriate application of relevant standards.	Pass	This option meets the project objective as it provides an appropriate application of relevant standards.	Pass	This option meets the project objective as it provides an appropriate application of relevant standards.
Pass	This option meets the project objective as it complies with the Minimum Employer's Functional Requirements to meet the TSS.	Pass	This option meets the project objective as it complies with the Minimum Employer's Functional Requirements to meet the TSS.	Pass	This option meets the project objective as it complies with the Minimum Employer's Functional Requirements to meet the TSS.	Pass	This option meets the project objective as it complies with the Minimum Employer's Functional Requirements to meet the TSS.	Pass	This option meets the project objective as it complies with the Minimum Employer's Functional Requirements to meet the TSS.	Pass	This option meets the project objective as it complies with the Minimum Employer's Functional Requirements to meet the TSS.
Pass	This option meets the project objective as it provides accessibility to the strategic road network from a multimodal point of view, accessibility to shopping facilities and schools, and limited impact on traffic flows at critical junctions.	Pass	This option meets the project objective as it provides accessibility to the strategic road network from a multimodal point of view, accessibility to shopping facilities and schools, and limited impact on traffic flows at critical junctions.	Pass	This option meets the project objective as it provides accessibility to the strategic road network from a multimodal point of view, accessibility to shopping facilities and schools, and limited impact on traffic flows at critical junctions.	Pass	This option meets the project objective as it provides accessibility to the strategic road network from a multimodal point of view, accessibility to shopping facilities and schools, and limited impact on traffic flows at critical junctions.	Pass	This option meets the project objective as it provides accessibility to the strategic road network from a multimodal point of view, accessibility to shopping facilities and schools, and limited impact on traffic flows at critical junctions.	Pass	This option meets the project objective as it provides accessibility to the strategic road network from a multimodal point of view, accessibility to shopping facilities and schools, and limited impact on traffic flows at critical junctions.
Fail	This option fails to meet the project objective. Pedestrian and cycling accessibility and permeability are not maintained at local level due to lack of P/C connections.	Pass	This option meets the project objective as it results to maintain pedestrian and cycling accessibility and permeability at local level.	Fail	This option fails to meet the project objective. Pedestrian and cycling accessibility and permeability are not maintained at local level due to lack of P/C connections.	Pass	This option meets the project objective as it results to maintain pedestrian and cycling accessibility and permeability at local level.	Fail	This option fails to meet the project objective. Pedestrian and cycling accessibility and permeability are not maintained at local level due to lack of P/C connections.	Pass	This option meets the project objective as it results to maintain pedestrian and cycling accessibility and permeability at local level.
Pass	This option meets the project objective as it results to provide accessibility to emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it results to provide accessibility to emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it results to provide accessibility to emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it results to provide accessibility to emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it results to provide accessibility to emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it results to provide accessibility to emergency services in terms of catchment and response time.
Fail	**This option fails as it doesn't meet the following objectives: To consider the adverse impacts on the natural and built environment during construction, operation and demolition; To maintain pedestrian and cycling accessibility at local level.**	Fail	**This option fails as it doesn't meet the following objectives: To consider the adverse impacts on the natural and built environment during construction, operation and demolition.**	Fail	**This option fails as it doesn't meet the following objectives: To consider the adverse impacts on the natural and built environment during construction, operation and demolition; To maintain pedestrian and cycling accessibility at local level.**	Fail	**This option fails as it doesn't meet the following objectives: To consider the adverse impacts on the natural and built environment during construction, operation and demolition.**	Fail	**This option fails as it doesn't meet the following objectives: To maintain pedestrian and cycling accessibility at local level.**	Pass	**This option meets all project objectives and requirements; therefore, it passes the assessment.**

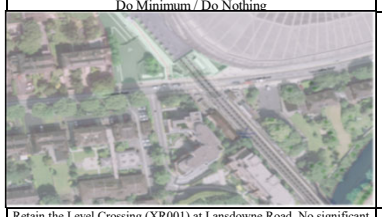
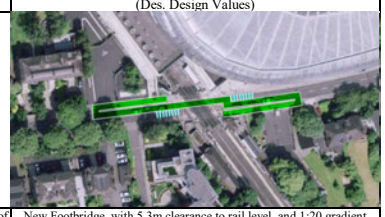
Option 7C Railway At-Grade (MG/SM/SP) 3 Full Crossings (Grade Separated) + 3 Retained Level Crossings		**Option 7D** Railway At-Grade (MG/SM/SP) 3 Full Crossings (Grade Separated) + 2 Ped/Cycle Crossings (Grade Separated)		**Option 8A** Railway At-Grade (MG/SM/SA) 3 Full Crossings (Grade Separated) + 2 Retained Level Crossings		**Option 8B** Railway At-Grade (MG/SM/SP) 3 Full Crossings (Grade Separated) + 2 Ped/Cycle Crossings (Grade Separated)		**Option 8C** Railway At-Grade (MG/SM/SA) 3 Full Crossings (Grade Separated) + 3 Retained Level Crossings		**Option 8D** Railway At-Grade (MG/SM/SP) 3 Full Crossings (Grade Separated) + 2 Ped/Cycle Crossings (Grade Separated)	
											
Vehicle & Ped/Cycle provided on Sandymount Ave, Sydney Pde and new Merrion Gate North, crossing over/under the Railway. Level Crossings XR001 (Landsdowne Rd), XR002 (Serpentine Ave) and XR005 (Merrion Gate) retained.		Vehicle & Ped/Cycle provided on Sandymount Ave, Sydney Pde and new Merrion Gate North, crossing over/under the Railway. Ped/Cycle only provided at Lansdowne Rd and Serpentine Ave, crossing over/under the Railway.		Vehicle & Ped/Cycle provided on Serpentine Ave, Sandymount Ave and Merrion Gate, crossing over/under the Railway. Level Crossings XR001 (Landsdowne Rd) and XR004 (Sydney Pde) retained.		Vehicle & Ped/Cycle provided on Serpentine Ave, Sandymount Ave and Merrion Gate, crossing over/under the Railway. Ped/Cycle only provided at Lansdowne Rd and Sydney Pde, crossing over/under the Railway.		Vehicle & Ped/Cycle provided on Serpentine Ave, Sandymount Ave and new Merrion Gate North, crossing over/under the Railway. Level Crossings XR001 (Landsdowne Rd), XR004 (Sydney Pde) and XR005 (Merrion Gate) retained.		Vehicle & Ped/Cycle provided on Serpentine Ave, Sandymount Ave and new Merrion Gate North, crossing over/under the Railway. Ped/Cycle only provided at Lansdowne Rd and Sydney Pde, crossing over/under the Railway.	
Pass/Fail	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**
Pass	This option meets the project objective as it results to deliver a higher frequency, higher capacity, reliable, electrified route to enable increased DART service frequency.	Pass	This option meets the project objective as it results to deliver a higher frequency, higher capacity, reliable, electrified route to enable increased DART service frequency.	Pass	This option meets the project objective as it results to deliver a higher frequency, higher capacity, reliable, electrified route to enable increased DART service frequency.	Pass	This option meets the project objective as it results to deliver a higher frequency, higher capacity, reliable, electrified route to enable increased DART service frequency.	Pass	This option meets the project objective as it results to deliver a higher frequency, higher capacity, reliable, electrified route to enable increased DART service frequency.	Pass	This option meets the project objective as it results to deliver a higher frequency, higher capacity, reliable, electrified route to enable increased DART service frequency.
Pass	This option meets the project objective as it considers providing infrastructure for an improved passenger experience (interventions required).	Pass	This option meets the project objective as it considers providing infrastructure for an improved passenger experience (interventions required).	Pass	This option meets the project objective as it considers providing infrastructure for an improved passenger experience (interventions required).	Pass	This option meets the project objective as it considers providing infrastructure for an improved passenger experience (interventions required).	Pass	This option meets the project objective as it considers providing infrastructure for an improved passenger experience (interventions required).	Pass	This option meets the project objective as it considers providing infrastructure for an improved passenger experience (interventions required).
Pass	This option meets the project objective as it results to deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works.	Pass	This option meets the project objective as it results to deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works.	Pass	This option meets the project objective as it results to deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works.	Pass	This option meets the project objective as it results to deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works.	Pass	This option meets the project objective as it results to deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works.	Pass	This option meets the project objective as it results to deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works.
Pass	This option meets the project objective as it results to be cost-effective from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it results to be cost-effective from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it results to be cost-effective from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it results to be cost-effective from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it results to be cost-effective from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it results to be cost-effective from a capital, operations, and maintenance perspective.
Pass	This option meets the project objective as it doesn't result to have any impacts on the natural and built environment during construction, operation and demolition.	Pass	This option meets the project objective as it doesn't result to have any impacts on the natural and built environment during construction, operation and demolition.	Pass	This option meets the project objective as it doesn't result to have any impacts on the natural and built environment during construction, operation and demolition.	Pass	This option meets the project objective as it doesn't result to have any impacts on the natural and built environment during construction, operation and demolition.	Pass	This option meets the project objective as it doesn't result to have any impacts on the natural and built environment during construction, operation and demolition.	Pass	This option meets the project objective as it doesn't result to have any impacts on the natural and built environment during construction, operation and demolition.
Pass	This option meets the project objective as it results to have mitigable impacts on existing rail services, road users and landowners during construction and operation.	Pass	This option meets the project objective as it results to have mitigable impacts on existing rail services, road users and landowners during construction and operation.	Pass	This option meets the project objective as it results to have mitigable impacts on existing rail services, road users and landowners during construction and operation.	Pass	This option meets the project objective as it results to have mitigable impacts on existing rail services, road users and landowners during construction and operation.	Pass	This option meets the project objective as it results to have mitigable impacts on existing rail services, road users and landowners during construction and operation.	Pass	This option meets the project objective as it results to have mitigable impacts on existing rail services, road users and landowners during construction and operation.
Pass	This option meets the project objective as it provides efficient and cost-effective integration of systems with the other DART routes.	Pass	This option meets the project objective as it provides efficient and cost-effective integration of systems with the other DART routes.	Pass	This option meets the project objective as it provides efficient and cost-effective integration of systems with the other DART routes.	Pass	This option meets the project objective as it provides efficient and cost-effective integration of systems with the other DART routes.	Pass	This option meets the project objective as it provides efficient and cost-effective integration of systems with the other DART routes.	Pass	This option meets the project objective as it provides efficient and cost-effective integration of systems with the other DART routes.
Pass	This option meets the project objective as it provides an appropriate application of relevant standards.	Pass	This option meets the project objective as it provides an appropriate application of relevant standards.	Pass	This option meets the project objective as it provides an appropriate application of relevant standards.	Pass	This option meets the project objective as it provides an appropriate application of relevant standards.	Pass	This option meets the project objective as it provides an appropriate application of relevant standards.	Pass	This option meets the project objective as it provides an appropriate application of relevant standards.
Pass	This option meets the project objective as it complies with the Minimum Employer's Functional Requirements to meet the TSS.	Pass	This option meets the project objective as it complies with the Minimum Employer's Functional Requirements to meet the TSS.	Pass	This option meets the project objective as it complies with the Minimum Employer's Functional Requirements to meet the TSS.	Pass	This option meets the project objective as it complies with the Minimum Employer's Functional Requirements to meet the TSS.	Pass	This option meets the project objective as it complies with the Minimum Employer's Functional Requirements to meet the TSS.	Pass	This option meets the project objective as it complies with the Minimum Employer's Functional Requirements to meet the TSS.
Pass	This option meets the project objective as it provides accessibility to the strategic road network from a multimodal point of view, accessibility to shopping facilities and schools, and limited impact on traffic flows at critical junctions.	Pass	This option meets the project objective as it provides accessibility to the strategic road network from a multimodal point of view, accessibility to shopping facilities and schools, and limited impact on traffic flows at critical junctions.	Pass	This option meets the project objective as it provides accessibility to the strategic road network from a multimodal point of view, accessibility to shopping facilities and schools, and limited impact on traffic flows at critical junctions.	Pass	This option meets the project objective as it provides accessibility to the strategic road network from a multimodal point of view, accessibility to shopping facilities and schools, and limited impact on traffic flows at critical junctions.	Pass	This option meets the project objective as it provides accessibility to the strategic road network from a multimodal point of view, accessibility to shopping facilities and schools, and limited impact on traffic flows at critical junctions.	Pass	This option meets the project objective as it provides accessibility to the strategic road network from a multimodal point of view, accessibility to shopping facilities and schools, and limited impact on traffic flows at critical junctions.
Fail	This option fails to meet the project objective. Pedestrian and cycling accessibility and permeability are not maintained at local level due to lack of P/C connections.	Pass	This option meets the project objective as it results to maintain pedestrian and cycling accessibility and permeability at local level.	Fail	This option fails to meet the project objective. Pedestrian and cycling accessibility and permeability are not maintained at local level due to lack of P/C connections.	Pass	This option meets the project objective as it results to maintain pedestrian and cycling accessibility and permeability at local level.	Fail	This option fails to meet the project objective. Pedestrian and cycling accessibility and permeability are not maintained at local level due to lack of P/C connections.	Pass	This option meets the project objective as it results to maintain pedestrian and cycling accessibility and permeability at local level.
Pass	This option meets the project objective as it results to provide accessibility to emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it results to provide accessibility to emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it results to provide accessibility to emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it results to provide accessibility to emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it results to provide accessibility to emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it results to provide accessibility to emergency services in terms of catchment and response time.
Fail	**This option fails as it doesn't meet the following objectives: To maintain pedestrian and cycling accessibility at local level.**	Pass	**This option meets all project objectives and requirements; therefore, it passes the assessment.**	Fail	**This option fails as it doesn't meet the following objectives: To maintain pedestrian and cycling accessibility at local level.**	Pass	**This option meets all project objectives and requirements; therefore, it passes the assessment.**	Fail	**This option fails as it doesn't meet the following objectives: To maintain pedestrian and cycling accessibility at local level.**	Pass	**This option meets all project objectives and requirements; therefore, it passes the assessment.**

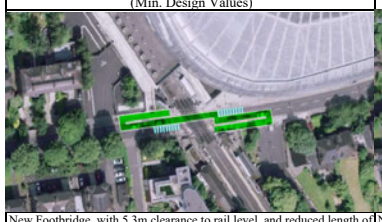
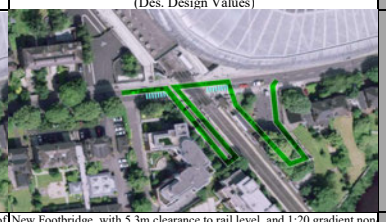
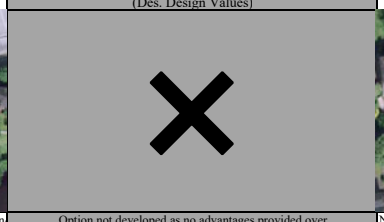
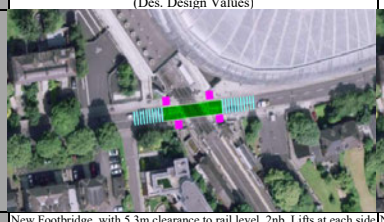
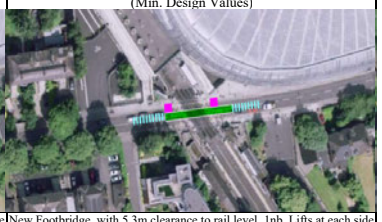
Option 9A Railway At-Grade (MG/SA/SP) 3 Full Crossings (Grade Separated) + 2 Retained Level Crossings		**Option 9B** Railway At-Grade (MG/SA/SP) 3 Full Crossings (Grade Separated) + 2 Ped/Cycle Crossings (Grade Separated)		**Option 9C** Railway At-Grade (MG/SA/SP) 3 Full Crossings (Grade Separated) + 3 Retained Level Crossings		**Option 9D** Railway At-Grade (MG/SA/SP) 3 Full Crossings (Grade Separated) + 2 Ped/Cycle Crossings (Grade Separated)		**Option 10A** Railway Cut & Cover 4 Full Crossings (At-Grade) + 1 Retained Level Crossing		**Option 10B** Railway Cut & Cover 4 Full Crossings (At-Grade) + 1 Ped/Cycle Crossing (Grade Separated)	
											
Vehicle & Ped/Cycle provided on Serpentine Ave, Sydney Pde and Merrion Gate, crossing over/under the Railway. Level Crossings XR001 (Landsdowne Rd) and XR003 (Sandymount Ave) retained.		Vehicle & Ped/Cycle provided on Serpentine Ave, Sydney Pde and Merrion Gate, crossing over/under the Railway. Ped/Cycle only provided at Lansdowne Rd and Sandymounnt Ave, crossing over/under the Railway.		Vehicle & Ped/Cycle provided on Serpentine Ave, Sydney Pde and new Merrion Gate North, crossing over/under the Railway. Level Crossings XR001 (Landsdowne Rd), XR003 (Sandymount Ave) and XR005 (Merrion Gate) retained.		Vehicle & Ped/Cycle provided on Serpentine Ave, Sydney Parade Avenue and new Merrion Gate North, crossing over/under the Railway. Ped/Cycle only provided at Lansdowne Rd and Sandymount Avenue, crossing over/under the Railway.		Grade separation by lowering the Railway, Sandymount and Sydney Parade Stations into a cut & cover infrastructure solution. Vehicle & Ped/Cycle provided on Serpentine Ave, Sandymount Ave, Sydney Pde and Merrion Gate, crossings at-grade. Level Crossing XR001 retained at Lansdowne Rd.		Grade separation by lowering the Railway, Sandymount and Sydney Parade Stations into a cut & cover infrastructure solution. Vehicle & Ped/Cycle provided on Serpentine Ave, Sandymount Ave, Sydney Pde and Merrion Gate, crossings at-grade. Ped/Cycle only provided at Lansdowne Rd, crossing over/under the Railway.	
Pass/Fail	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**
Pass	This option meets the project objective as it results to deliver a higher frequency, higher capacity, reliable, electrified route to enable increased DART service frequency.	Pass	This option meets the project objective as it results to deliver a higher frequency, higher capacity, reliable, electrified route to enable increased DART service frequency.	Pass	This option meets the project objective as it results to deliver a higher frequency, higher capacity, reliable, electrified route to enable increased DART service frequency.	Pass	This option meets the project objective as it results to deliver a higher frequency, higher capacity, reliable, electrified route to enable increased DART service frequency.	Pass	This option meets the project objective as it results to deliver a higher frequency, higher capacity, reliable, electrified route to enable increased DART service frequency.	Pass	This option meets the project objective as it results to deliver a higher frequency, higher capacity, reliable, electrified route to enable increased DART service frequency.
Pass	This option meets the project objective as it considers providing infrastructure for an improved passenger experience (interventions required).	Pass	This option meets the project objective as it considers providing infrastructure for an improved passenger experience (interventions required).	Pass	This option meets the project objective as it considers providing infrastructure for an improved passenger experience (interventions required).	Pass	This option meets the project objective as it considers providing infrastructure for an improved passenger experience (interventions required).	Pass	This option meets the project objective as it considers providing infrastructure for an improved passenger experience (interventions required).	Pass	This option meets the project objective as it considers providing infrastructure for an improved passenger experience (interventions required).
Pass	This option meets the project objective as it results to deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works.	Pass	This option meets the project objective as it results to deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works.	Pass	This option meets the project objective as it results to deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works.	Pass	This option meets the project objective as it results to deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works.	Fail	This option fails to meet the project objective. The construction of a railway tunnel or 'cut and cover' fails to deliver a sustainable, low carbon and climate resilient design solution with use of existing infrastructure.	Fail	This option fails to meet the project objective. The construction of a railway tunnel or 'cut and cover' fails to deliver a sustainable, low carbon and climate resilient design solution with use of existing infrastructure.
Pass	This option meets the project objective as it results to be cost-effective from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it results to be cost-effective from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it results to be cost-effective from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it results to be cost-effective from a capital, operations, and maintenance perspective.	Fail	This option passes the project objective but is considered a limit case. The construction of a railway tunnel or 'cut and cover' might not be cost effective from a capital, operations, and maintenance perspective.	Fail	This option passes the project objective but is considered a limit case. The construction of a railway tunnel or 'cut and cover' might not be cost effective from a capital, operations, and maintenance perspective.
Pass	This option meets the project objective as it doesn't result to have any impacts on the natural and built environment during construction, operation and demolition.	Pass	This option meets the project objective as it doesn't result to have any impacts on the natural and built environment during construction, operation and demolition.	Pass	This option meets the project objective as it doesn't result to have any impacts on the natural and built environment during construction, operation and demolition.	Pass	This option meets the project objective as it doesn't result to have any impacts on the natural and built environment during construction, operation and demolition.	Fail	This option doesn't meet the project objective as the construction of a railway tunnel or 'cut and cover' have implications on the natural and built environment during construction, operation and demolition.	Fail	This option doesn't meet the project objective as the construction of a railway tunnel or 'cut and cover' have implications on the natural and built environment during construction, operation and demolition.
Pass	This option meets the project objective as it results to have mitigable impacts on existing rail services, road users and landowners during construction and operation.	Pass	This option meets the project objective as it results to have mitigable impacts on existing rail services, road users and landowners during construction and operation.	Pass	This option meets the project objective as it results to have mitigable impacts on existing rail services, road users and landowners during construction and operation.	Pass	This option meets the project objective as it results to have mitigable impacts on existing rail services, road users and landowners during construction and operation.	Fail	This option fails to meet the project objective. The construction of a railway tunnel or 'cut and cover' impact existing rail services, road users and landowners during construction and operation.	Fail	This option fails to meet the project objective. The construction of a railway tunnel or 'cut and cover' impact existing rail services, road users and landowners during construction and operation.
Pass	This option meets the project objective as it provides efficient and cost-effective integration of systems with the other DART routes.	Pass	This option meets the project objective as it provides efficient and cost-effective integration of systems with the other DART routes.	Pass	This option meets the project objective as it provides efficient and cost-effective integration of systems with the other DART routes.	Pass	This option meets the project objective as it provides efficient and cost-effective integration of systems with the other DART routes.	Pass	This option meets the project objective as it provides efficient and cost-effective integration of systems with the other DART routes.	Pass	This option meets the project objective as it provides efficient and cost-effective integration of systems with the other DART routes.
Pass	This option meets the project objective as it provides an appropriate application of relevant standards.	Pass	This option meets the project objective as it provides an appropriate application of relevant standards.	Pass	This option meets the project objective as it provides an appropriate application of relevant standards.	Pass	This option meets the project objective as it provides an appropriate application of relevant standards.	Pass	This option meets the project objective as it provides an appropriate application of relevant standards.	Pass	This option meets the project objective as it provides an appropriate application of relevant standards.
Pass	This option meets the project objective as it complies with the Minimum Employer's Functional Requirements to meet the TSS.	Pass	This option meets the project objective as it complies with the Minimum Employer's Functional Requirements to meet the TSS.	Pass	This option meets the project objective as it complies with the Minimum Employer's Functional Requirements to meet the TSS.	Pass	This option meets the project objective as it complies with the Minimum Employer's Functional Requirements to meet the TSS.	Pass	This option meets the project objective as it complies with the Minimum Employer's Functional Requirements to meet the TSS.	Pass	This option meets the project objective as it complies with the Minimum Employer's Functional Requirements to meet the TSS.
Pass	This option meets the project objective as it provides accessibility to the strategic road network from a multimodal point of view, accessibility to shopping facilities and schools, and limited impact on traffic flows at critical junctions.	Pass	This option meets the project objective as it provides accessibility to the strategic road network from a multimodal point of view, accessibility to shopping facilities and schools, and limited impact on traffic flows at critical junctions.	Pass	This option meets the project objective as it provides accessibility to the strategic road network from a multimodal point of view, accessibility to shopping facilities and schools, and limited impact on traffic flows at critical junctions.	Pass	This option meets the project objective as it provides accessibility to the strategic road network from a multimodal point of view, accessibility to shopping facilities and schools, and limited impact on traffic flows at critical junctions.	Pass	This option meets the project objective as it provides accessibility to the strategic road network from a multimodal point of view, accessibility to shopping facilities and schools, and limited impact on traffic flows at critical junctions.	Pass	This option meets the project objective as it provides accessibility to the strategic road network from a multimodal point of view, accessibility to shopping facilities and schools, and limited impact on traffic flows at critical junctions.
Fail	This option fails to meet the project objective. Pedestrian and cycling accessibility and permeability are not maintained at local level due to lack of P/C connections.	Pass	This option meets the project objective as it results to maintain pedestrian and cycling accessibility and permeability at local level.	Fail	This option fails to meet the project objective. Pedestrian and cycling accessibility and permeability are not maintained at local level due to lack of P/C connections.	Pass	This option meets the project objective as it results to maintain pedestrian and cycling accessibility and permeability at local level.	Pass	This option meets the project objective as it results to maintain pedestrian and cycling accessibility and permeability at local level.	Pass	This option meets the project objective as it results to maintain pedestrian and cycling accessibility and permeability at local level.
Pass	This option meets the project objective as it results to provide accessibility to emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it results to provide accessibility to emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it results to provide accessibility to emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it results to provide accessibility to emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it results to provide accessibility to emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it results to provide accessibility to emergency services in terms of catchment and response time.
Fail	**This option fails as it doesn't meet the following objectives: To maintain pedestrian and cycling accessibility at local level.**	Pass	**This option meets all project objectives and requirements; therefore, it passes the assessment.**	Fail	**This option fails as it doesn't meet the following objectives: To maintain pedestrian and cycling accessibility at local level.**	Pass	**This option meets all project objectives and requirements; therefore, it passes the assessment.**	Fail	**This option fails as it doesn't meet the following objectives: Minimise adverse impacts on existing rail services, road users and landowners associated with the construction, operation and maintenance of the project & Deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works.**	Fail	**This option fails as it doesn't meet the following objectives: Minimise adverse impacts on existing rail services, road users and landowners associated with the construction, operation and maintenance of the project & Deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works.**

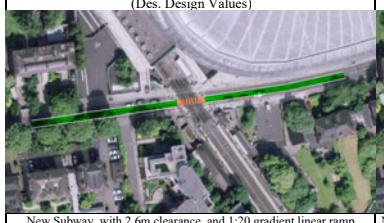
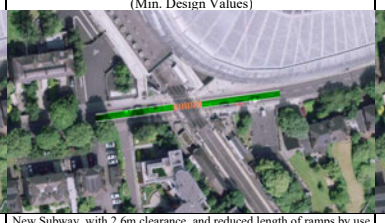
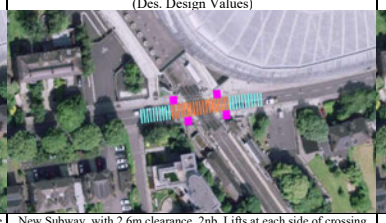
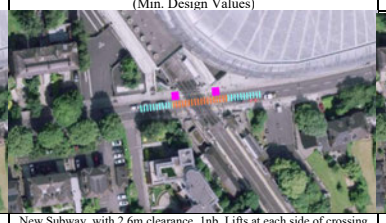
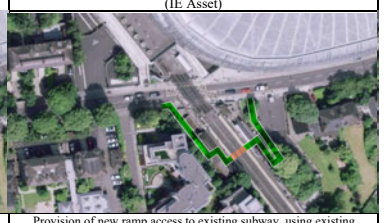
Option 10C Railway Cut & Cover 4 Full Crossings (At-Grade) + 1 Retained Level Crossing		**Option 10D** Railway Cut & Cover 4 Full Crossings (At-Grade) + 1 Ped/Cycle Crossing (Grade Separated)		**Option 11A** Railway Tunnel 5 Full Crossings (At-Grade)		**Option 11B** Railway Tunnel 6 Full Crossings (At-Grade)	
							
Grade separation by lowering the Railway, Sandymount and Sydney Parade Stations into a cut & cover infrastructure solution. Vehicle & Ped/Cycle provided on Serpentine Ave, Sandymount Ave, Sydney Pde and Merrion Gate North, crossings at-grade. Level Crossing XR001 retained at Lansdowne Rd.		Grade separation by lowering the Railway, Sandymount and Sydney Parade Stations into a cut & cover infrastructure solution. Vehicle & Ped/Cycle provided on Serpentine Ave, Sandymount Ave, Sydney Pde and Merrion Gate North, crossings at-grade. Ped/Cycle only provided at Lansdowne Rd, crossing over/under the Railway.		Grade separation by lowering the Railway, Lansdowne Rd, Sandymount and Sydney Parade Stations into a tunnel / cut & cover infrastructure solution. Vehicle & Ped/Cycle provided on Lansdowne Rd, Serpentine Ave, Sandymount Ave, Sydney Pde and Merrion Gate, crossings at-grade.		Grade separation by lowering the Railway, Lansdowne Rd, Sandymount and Sydney Parade Stations into a tunnel / cut & cover infrastructure solution. Vehicle & Ped/Cycle provided on Lansdowne Rd, Serpentine Ave, Sandymount Ave, Sydney Pde, Merrion Gate North and Merrion Gate, crossings at-grade.	
Pass/Fail	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**
Pass	This option meets the project objective as it results to deliver a higher frequency, higher capacity, reliable, electrified route to enable increased DART service frequency.	Pass	This option meets the project objective as it results to deliver a higher frequency, higher capacity, reliable, electrified route to enable increased DART service frequency.	Pass	This option meets the project objective as it results to deliver a higher frequency, higher capacity, reliable, electrified route to enable increased DART service frequency.	Pass	This option meets the project objective as it results to deliver a higher frequency, higher capacity, reliable, electrified route to enable increased DART service frequency.
Pass	This option meets the project objective as it considers providing infrastructure for an improved passenger experience (interventions required).	Pass	This option meets the project objective as it considers providing infrastructure for an improved passenger experience (interventions required).	Pass	This option meets the project objective as it considers providing infrastructure for an improved passenger experience (interventions required).	Pass	This option meets the project objective as it considers providing infrastructure for an improved passenger experience (interventions required).
Fail	This option fails to meet the project objective. The construction of a railway tunnel or 'cut and cover' fails to deliver a sustainable, low carbon and climate resilient design solution with use of existing infrastructure.	Fail	This option fails to meet the project objective. The construction of a railway tunnel or 'cut and cover' fails to deliver a sustainable, low carbon and climate resilient design solution with use of existing infrastructure.	Fail	This option fails to meet the project objective. The construction of a railway tunnel or 'cut and cover' fails to deliver a sustainable, low carbon and climate resilient design solution with use of existing infrastructure.	Fail	This option fails to meet the project objective. The construction of a railway tunnel or 'cut and cover' fails to deliver a sustainable, low carbon and climate resilient design solution with use of existing infrastructure.
Fail	This option passes the project objective but is considered a limit case. The construction of a railway tunnel or 'cut and cover' might not be cost-effective from a capital, operations, and maintenance perspective.	Fail	This option passes the project objective but is considered a limit case. The construction of a railway tunnel or 'cut and cover' might not be cost-effective from a capital, operations, and maintenance perspective.	Fail	This option passes the project objective but is considered a limit case. The construction of a railway tunnel or 'cut and cover' might not be cost-effective from a capital, operations, and maintenance perspective.	Fail	This option passes the project objective but is considered a limit case. The construction of a railway tunnel or 'cut and cover' might not be cost-effective from a capital, operations, and maintenance perspective.
Fail	This option doesn't meet the project objective as the construction of a railway tunnel or 'cut and cover' have implications on the natural and built environment during construction, operation and demolition.	Fail	This option doesn't meet the project objective as the construction of a railway tunnel or 'cut and cover' have implications on the natural and built environment during construction, operation and demolition.	Fail	This option doesn't meet the project objective as the construction of a railway tunnel or 'cut and cover' have implications on the natural and built environment during construction, operation and demolition.	Fail	This option doesn't meet the project objective as the construction of a railway tunnel or 'cut and cover' have implications on the natural and built environment during construction, operation and demolition.
Fail	This option fails to meet the project objective. The construction of a railway tunnel or 'cut and cover' impact existing rail services, road users and landowners during construction and operation.	Fail	This option fails to meet the project objective. The construction of a railway tunnel or 'cut and cover' impact existing rail services, road users and landowners during construction and operation.	Fail	This option fails to meet the project objective. The construction of a railway tunnel or 'cut and cover' impact existing rail services, road users and landowners during construction and operation.	Fail	This option fails to meet the project objective. The construction of a railway tunnel or 'cut and cover' impact existing rail services, road users and landowners during construction and operation.
Pass	This option meets the project objective as it provides efficient and cost-effective integration of systems with the other DART routes.	Pass	This option meets the project objective as it provides efficient and cost-effective integration of systems with the other DART routes.	Pass	This option meets the project objective as it provides efficient and cost-effective integration of systems with the other DART routes.	Pass	This option meets the project objective as it provides efficient and cost-effective integration of systems with the other DART routes.
Pass	This option meets the project objective as it provides an appropriate application of relevant standards.	Pass	This option meets the project objective as it provides an appropriate application of relevant standards.	Pass	This option meets the project objective as it provides an appropriate application of relevant standards.	Pass	This option meets the project objective as it provides an appropriate application of relevant standards.
Pass	This option meets the project objective as it complies with the Minimum Employer's Functional Requirements to meet the TSS.	Pass	This option meets the project objective as it complies with the Minimum Employer's Functional Requirements to meet the TSS.	Pass	This option meets the project objective as it complies with the Minimum Employer's Functional Requirements to meet the TSS.	Pass	This option meets the project objective as it complies with the Minimum Employer's Functional Requirements to meet the TSS.
Pass	This option meets the project objective as it provides accessibility to the strategic road network from a multimodal point of view, accessibility to shopping facilities and schools, and limited impact on traffic flows at critical junctions.	Pass	This option meets the project objective as it provides accessibility to the strategic road network from a multimodal point of view, accessibility to shopping facilities and schools, and limited impact on traffic flows at critical junctions.	Pass	This option meets the project objective as it provides accessibility to the strategic road network from a multimodal point of view, accessibility to shopping facilities and schools, and limited impact on traffic flows at critical junctions.	Pass	This option meets the project objective as it provides accessibility to the strategic road network from a multimodal point of view, accessibility to shopping facilities and schools, and limited impact on traffic flows at critical junctions.
Pass	This option meets the project objective as it results to maintain pedestrian and cycling accessibility and permeability at local level.	Pass	This option meets the project objective as it results to maintain pedestrian and cycling accessibility and permeability at local level.	Pass	This option meets the project objective as it results to maintain pedestrian and cycling accessibility and permeability at local level.	Pass	This option meets the project objective as it results to maintain pedestrian and cycling accessibility and permeability at local level.
Pass	This option meets the project objective as it results to provide accessibility to emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it results to provide accessibility to emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it results to provide accessibility to emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it results to provide accessibility to emergency services in terms of catchment and response time.
Fail	**This option fails as it doesn't meet the following objectives: Minimise adverse impacts on existing rail services, road users and landowners associated with the construction, operation and maintenance of the project & Deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works.**	Fail	**This option fails as it doesn't meet the following objectives: Minimise adverse impacts on existing rail services, road users and landowners associated with the construction, operation and maintenance of the project & Deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works.**	Fail	**This option fails as it doesn't meet the following objectives: Minimise adverse impacts on existing rail services, road users and landowners associated with the construction, operation and maintenance of the project & Deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works.**	Fail	**This option fails as it doesn't meet the following objectives: Minimise adverse impacts on existing rail services, road users and landowners associated with the construction, operation and maintenance of the project & Deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works.**

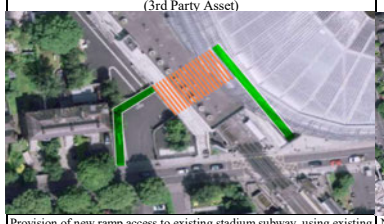
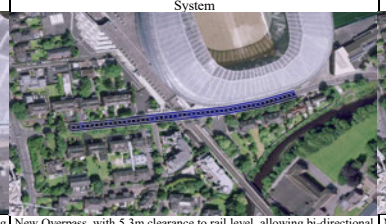
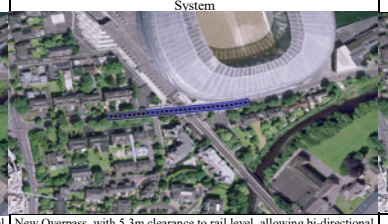
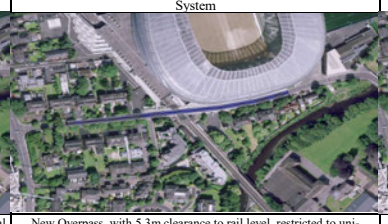
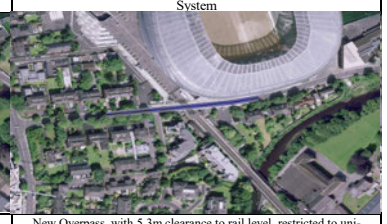
Appendix A.2: Longlist Infrastructure Options Sift – Lansdowne Road

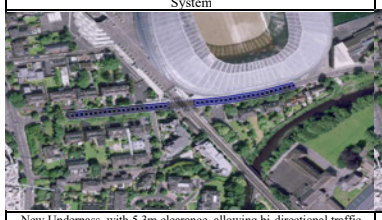
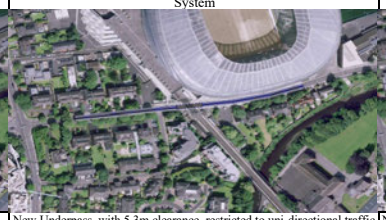
Longlist Concept Options (Infrastructure) Sift Sheet
Lansdowne Road (LR)

	Assessment Criteria	Description	Option 0 Existing Arrangement Do Minimum / Do Nothing		Option P-1a New Footbridge with Linear Ramp Access (Des. Design Values)		Option P-1b New Footbridge with Linear Ramp Access (Min. Design Values)		Option P-2a New Footbridge with Compressed Ramp Access (Des. Design Values)	
										
			Retain the Level Crossing (XR001) at Lansdowne Road. No significant infrastructure interventions are considered.		New Footbridge, with 5.3m clearance to rail level, and 1:20 gradient linear ramp access. Ramps positioned along the existing Road.		New Footbridge, with 5.3m clearance to rail level, and reduced length of ramps by use of 1:12 gradient linear ramp access. Ramps positioned along the existing Road.		New Footbridge, with 5.3m clearance to rail level, and 1:20 gradient compressed ramp access. Ramps can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.	
			Pass/Fail	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**
1	**Project Specific Objective**	Deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Fail	This option fails to meets the project objective as it does not contribute to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
2	**Project Specific Objective**	Deliver solutions which improve the passenger experience where passenger infrastructure interventions are required to meet the planned increase in DART service frequency.	Fail	This option fails to meet the project objective as no new infrastructure is provided which allows for uninterrupted passage across the rail corridor for the public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.
3	**Project Specific Objective**	Deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.
4	**Project Specific Objective**	Identify cost-effective solutions from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.
5	**Project Specific Objective**	Minimise adverse impacts on the natural and built environment associated with the construction, operation and maintenance of the project.	Pass	This option meets the project objective as it has a minimal impact on the natural and built environment during construction, operation and maintenance, as the existing level crossing is to be retained and no new crossing is proposed.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential and commercial properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Lansdowne Road on both sides of the crossing, potentially requiring extensive CPO of lands. The proposed option also creates a significant restriction for access to Aviva Stadium.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential and commercial properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Lansdowne Road on both sides of the crossing. The proposed option also creates a significant restriction for access to Aviva Stadium.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding commercial property and access to the station. In particular, this option significantly restricts access to Aviva Stadium to the west of the crossing, restricting access to the existing underpass and requiring a reconfiguration of the stairs. Access to the station on the eastern side is blocked off, including the overflow area for large crowds.
6	**Project Specific Objective**	Minimise adverse impacts on existing rail services, road users and landowners associated with the construction, operation and maintenance of the project.	Pass	This option meets the project objective as it has a minimal impact on existing rail services, road users and landowners during construction, operation and maintenance, as the existing level crossing is to be retained and no new crossing is proposed.	Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked. This solution significantly restricts access to overflow area for large crowds on the eastern side of the station.	Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked. This solution significantly restricts access to overflow area for large crowds on the eastern side of the station.	Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked. This solution significantly restricts access to overflow area for large crowds on the eastern side of the station.
7	**Project Specific Objective**	Provide efficient and cost-effective integration of systems with the other DART+ Programme projects.	Fail	This option fails to meet the project objective as retaining the level crossing maintains constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
8	**Project Specific Requirement**	Designs are in accordance with IÉ Standards and relevant national and EU standards and guidelines.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.
9	**Project Specific Requirement**	Designs shall comply with the Minimum Employer's Functional Requirements and meet the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.
10	**Project Specific Requirement**	Provide an appropriate level of vehicular access across the railway line to/from Sandymount Village and neighbouring areas for all modes.	Fail	This option fails to meet the project objective. Due to the increased barrier closure times as a result of the planned increase in DART service frequency between Greystones and Dublin City Centre, the existing accessibility at the crossing cannot be maintained as no segregated vehicular crossing is provided.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.
11	**Project Specific Requirement**	Provide an appropriate level of accessibility at a local level for pedestrians and cyclists.	Fail	This option fails to meet the project objective. Due to the increased barrier closure times as a result of the planned increase in DART service frequency between Greystones and Dublin City Centre, the existing accessibility at the crossing cannot be maintained as no segregated pedestrian/cyclist crossing is provided.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.	Pass	This option meets the project objective, albeit at a minimum level. The use of 1:12 ramp gradients to vertically traverse 6 m up and over the railway lines is not desirable to provide an appropriate level of access for those with disabilities. Further mitigation measures may need to be considered, such as intermediate landings, to ensure that pedestrian routes are accessible.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.
12	**Project Specific Requirement**	Provide an appropriate level of accessibility for emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, due to the increased barrier closure times as a result of the planned increase in DART service frequency between Greystones and Dublin City Centre the crossing will effectively block off both private vehicular access and emergency vehicle access across the railway line.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Lansdowne Road on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Lansdowne Road on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time.
		Overall Pass/Fail	Fail	**This option fails to meet the following project specific objectives and requirements:** **- Deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre;** **- Deliver solutions which improve the passenger experience where passenger infrastructure interventions are required to meet the planned increase in DART service frequency;** **- Provide efficient and cost-effective integration of systems with the other DART+ Programme projects;** **- Provide an appropriate level of vehicular access across the railway line to/from Sandymount Village and neighbouring areas for all modes;** **- Provide an appropriate level of accessibility at a local level for pedestrians and cyclists.**	Fail	**This option fails to meet the following project specific objectives and requirements:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners**	Fail	**This option fails to meet the following project specific objectives and requirements:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners**	Fail	**This option fails to meet the following project specific objectives and requirements:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners**

Option P-2b New Footbridge with Compressed Ramp Access (Min. Design Values)		**Option P-3a** New Footbridge with Non-Linear Ramp Access (Des. Design Values)		**Option P-3b** New Footbridge with Non-Linear Ramp Access (Des. Design Values)		**Option P-4a** New Footbridge with Stair & Lift Access (Des. Design Values)		**Option P-4b** New Footbridge with Stair & Lift Access (Min. Design Values)	
									
New Footbridge, with 5.3m clearance to rail level, and reduced length of ramps by use of 1:12 gradient linear ramp access. Ramps can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.		New Footbridge, with 5.3m clearance to rail level, and 1:20 gradient non-linear ramp access. Ramps can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.		Option not developed as no advantages provided over Option P-3a.		New Footbridge, with 5.3m clearance to rail level, 2nb. Lifts at each side of crossing and full width ped/cycleway. Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.		New Footbridge, with 5.3m clearance to rail level, 1nb. Lifts at each side of crossing and minimum width ped/cycleway. Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.	
Pass/Fail	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**
Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.			Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.			Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.
Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.			Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.
Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.			Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.
Pass	This option meets the project objective as it has a minimal impact on the natural and built environment during construction, operation and maintenance, relative to the form of crossing proposed.	Fail	This option fails to meet the project objective. This option requires an elevated structure to be placed adjacent to and in close proximity to an apartment building, with the associated overshadowing and privacy issues. In addition this Option will require demolition and re-construction of the station on the western side.			Pass	This option meets the project objective as it has a minimal impact on the natural and built environment during construction, operation and maintenance, relative to the form of crossing proposed.	Pass	This option meets the project objective as it has a minimal impact on the natural and built environment during construction, operation and maintenance, relative to the form of crossing proposed.
Fail	This option fails to meet the project objective. The space required to implement this solution significantly restricts access to overflow area for large crowds on the eastern side of the station.	Fail	This option fails to meet the project objective. The station on the western side will need to be demolished and rebuilt, resulting in a prolonged time of disruption to rail users at this station during construction.			Pass	This option meets the project objective as it has a minimal impact on existing rail services, road users and landowners during construction, operation and maintenance.	Pass	This option meets the project objective as it has a minimal impact on existing rail services, road users and landowners during construction, operation and maintenance.
Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.			Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.			Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.
Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.			Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.
Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.			Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.
Pass	This option meets the project objective, albeit at a minimum level. The use of 1:12 ramp gradients to vertically traverse 6 m up and over the railway lines is not desirable to provide an appropriate level of access for those with disabilities. Further mitigation measures may need to be considered, such as intermediate landings, to ensure that pedestrian routes are accessible.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.			Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.
Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time.			Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time.
Fail	**This option fails to meet the following project specific objectives and requirements:** **- Minimise adverse impacts on existing rail services, road users and landowners;**	Fail	**This option fails to meet the following project specific objectives and requirements:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners**			Pass	**This option meets all project specific objectives and requirements; therefore, it passes the assessment.**	Pass	**This option meets all project specific objectives and requirements; therefore, it passes the assessment.**

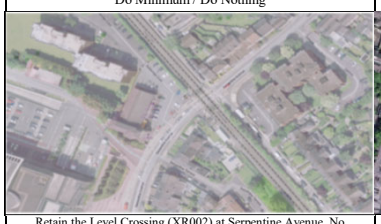
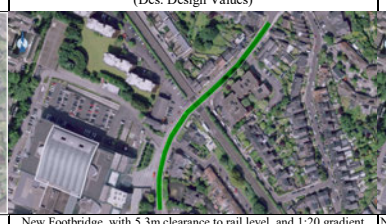
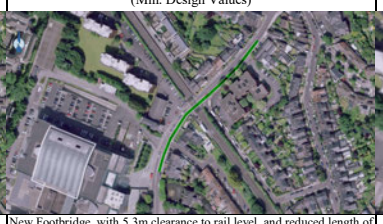
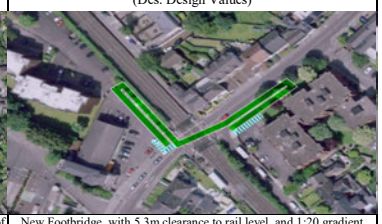
Option P-5a New Subway with Linear Ramp Access (Des. Design Values)		**Option P-5b** New Subway with Linear Ramp Access (Min. Design Values)		**Option P-6a** New Subway with Stair & Lift Access (Des. Design Values)		**Option P-6b** New Subway with Stair & Lift Access (Min. Design Values)		**Option P-7a** Modification of Existing Grade Separated Crossing (IÉ Asset)	
									
New Subway, with 2.6m clearance, and 1:20 gradient linear ramp access. Ramps positioned along the existing Road.		New Subway, with 2.6m clearance, and reduced length of ramps by use of 1:12 gradient linear ramp access. Ramps positioned along the existing Road.		New Subway, with 2.6m clearance, 2nb. Lifts at each side of crossing and full width ped/cycleway. Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.		New Subway, with 2.6m clearance, 1nb. Lifts at each side of crossing and minimum width ped/cycleway. Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.		Provision of new ramp access to existing subway, using existing clearances, within the station area. Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.	
Pass/Fail	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**
Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.
Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.
Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.
Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential and commercial properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Lansdowne Road on both sides of the crossing. The proposed option also creates a significant restriction for access to Aviva Stadium.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential and commercial properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Lansdowne Road on both sides of the crossing. The proposed option also creates a significant restriction for access to Aviva Stadium.	Pass	This option meets the project objective as it has a minimal impact on the natural and built environment during construction, operation and maintenance, relative to the form of crossing proposed.	Pass	This option meets the project objective as it has a minimal impact on the natural and built environment during construction, operation and maintenance, relative to the form of crossing proposed.	Pass	This option meets the project objective as it minimises the impact on the natural and built environment during construction, operation and maintenance, relative to the form of crossing proposed. The space required to implement this solution will require demolition and re-construction of the station on the western side.
Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked. This solution significantly restricts access to overflow area for large crowds on the eastern side of the station.	Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked. This solution significantly restricts access to overflow area for large crowds on the eastern side of the station.	Pass	This option meets the project objective as it has a minimal impact on existing rail services, road users and landowners during construction, operation and maintenance.	Pass	This option meets the project objective as it has a minimal impact on existing rail services, road users and landowners during construction, operation and maintenance.	Fail	This option fails to meet the project objective. The option results in ramps down to an existing subway crossing with blind bends along the access route, creating an unsafe user environment and adversely impacting on the user. The station on the western side will need to be demolished and rebuilt, resulting in a prolonged time of disruption to rail users at this station during construction.
Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Fail	This option fails to meet the project objective. This option proposes to retain the existing subway crossing, which has a vertical clearance of 2.05 m. This is below the minimum requirement of current design standards.
Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.
Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.
Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.	Pass	This option meets the project objective, albeit at a minimum level. The use of 1:12 ramp gradients is not desirable to provide an appropriate level of access for those with disabilities. Further mitigation measures may need to be considered, such as intermediate landings, to ensure that pedestrian routes are accessible.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.
Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Lansdowne Road on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Lansdowne Road on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time.
Fail	**This option fails to meet the following project specific objectives and requirements:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners**	Fail	**This option fails to meet the following project specific objectives and requirements:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners**	Pass	**This option meets all project specific objectives and requirements; therefore, it passes the assessment.**	Pass	**This option meets all project specific objectives and requirements; therefore, it passes the assessment.**	Fail	**This option fails to meet the following project specific objectives and requirements:** **- Minimise adverse impacts on existing rail services, road users and landowners;** **- Comply with the relevant standards and design guidelines**

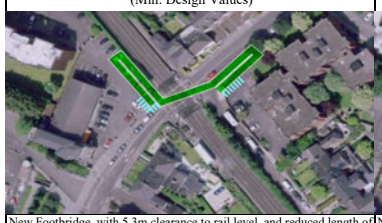
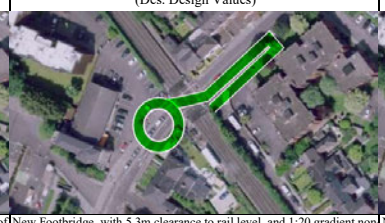
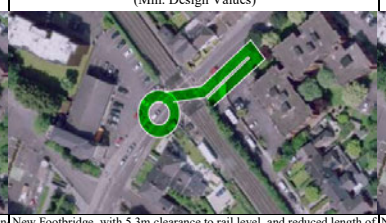
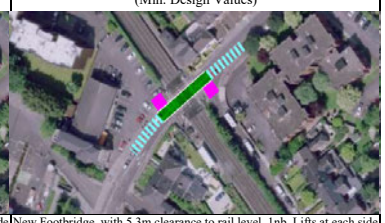
Option P-7b Modification of Existing Grade Separated Crossing (3rd Party Asset)		**Option V-1a** New Overpass for Existing Road with Bi-directional Traffic System		**Option V-1b** New Overpass for Existing Road with Bi-directional Traffic System		**Option V-2a** New Overpass for Existing Road with Uni-directional Traffic System		**Option V-2b** New Overpass for Existing Road with Uni-directional Traffic System	
									
Provision of new ramp access to existing stadium subway, using existing clearances, located north of the existing LX. Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.		New Overpass, with 5.3m clearance to rail level, allowing bi-directional traffic movements and desirable approach gradients of 5% on the road either side of the crossing.		New Overpass, with 5.3m clearance to rail level, allowing bi-directional traffic movements and minimum approach gradients of 8% on the road either side of the crossing.		New Overpass, with 5.3m clearance to rail level, restricted to uni-directional traffic movements and desirable approach gradients of 5% on the road either side of the crossing.		New Overpass, with 5.3m clearance to rail level, restricted to uni-directional traffic movements and minimum approach gradients of 8% on the road either side of the crossing.	
Pass/Fail	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**
Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.
Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.
Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.
Pass	This option meets the project objective as it has a minimal impact on the natural and built environment during construction, operation and maintenance, relative to the form of crossing proposed.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential and commercial properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Lansdowne Road on both sides of the crossing, potentially requiring extensive CPO of lands. The proposed option also creates a significant restriction for access to Aviva Stadium.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential and commercial properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Lansdowne Road on both sides of the crossing, potentially requiring extensive CPO of lands. The proposed option also creates a significant restriction for access to Aviva Stadium.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential and commercial properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Lansdowne Road on both sides of the crossing, potentially requiring extensive CPO of lands. The proposed option also creates a significant restriction for access to Aviva Stadium.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential and commercial properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Lansdowne Road on both sides of the crossing, potentially requiring extensive CPO of lands. The proposed option also creates a significant restriction for access to Aviva Stadium.
Fail	This option fails to meet the project objective. The option results in ramps down to an existing subway crossing which create blind bends along the access route, creating an unsafe user environment and adversely impacting on the user. This solution significantly restricts access to overflow area for large crowds on the eastern side of the station by increasing demand on the existing subway.	Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked. This solution significantly restricts access to overflow area for large crowds on the eastern side of the station. Existing access to the station will be blocked off requiring alternative access arrangements to be provided.	Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked. This solution significantly restricts access to overflow area for large crowds on the eastern side of the station. Existing access to the station will be blocked off requiring alternative access arrangements to be provided.	Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked. This solution significantly restricts access to overflow area for large crowds on the eastern side of the station. Existing access to the station will be blocked off requiring alternative access arrangements to be provided.	Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked. This solution significantly restricts access to overflow area for large crowds on the eastern side of the station. Existing access to the station will be blocked off requiring alternative access arrangements to be provided.
Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
Fail	This option fails to meet the project objective. This option proposes to retain the existing subway crossing, which has a vertical clearance of ~2.1 m. This is below the minimum requirement of current design standards.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.
Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.
Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.
Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.	Pass	This option meets the project objective, albeit at a minimum level. The use of 1:12 ramp gradients is not desirable to provide an appropriate level of access for those with disabilities. Further mitigation measures may need to be considered, such as intermediate landings, to ensure that pedestrian routes are accessible.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.	Pass	This option meets the project objective, albeit at a minimum level. The use of 1:12 ramp gradients is not desirable to provide an appropriate level of access for those with disabilities. Further mitigation measures may need to be considered, such as intermediate landings, to ensure that pedestrian routes are accessible.
Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Lansdowne Road on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Lansdowne Road on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Lansdowne Road on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Lansdowne Road on both sides of the crossing.
Fail	**This option fails to meet the following project specific objectives and requirements:** **- Minimise adverse impacts on existing rail services, road users and landowners;** **- Comply with the relevant standards and design guidelines**	Fail	**This option fails to meet the following project specific objectives and requirements:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners**	Fail	**This option fails to meet the following project specific objectives and requirements:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners**	Fail	**This option fails to meet the following project specific objectives and requirements:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners**	Fail	**This option fails to meet the following project specific objectives and requirements:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners**

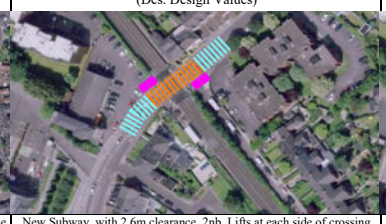
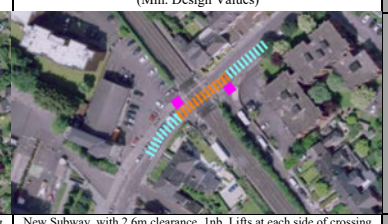
Option V-3a New Underpass for Existing Road with Bi-directional Traffic System		**Option V-3b** New Underpass for Existing Road with Bi-directional Traffic System		**Option V-4a** New Underpass for Existing Road with Uni-directional Traffic System		**Option V-4b** New Underpass for Existing Road with Uni-directional Traffic System		**Option V-5** New Alternative Crossing	
									
New Underpass, with 5.3m clearance, allowing bi-directional traffic movements and desirable approach gradients of 5% on the road either side of the crossing.		New Underpass, with 5.3m clearance, allowing bi-directional traffic movements and minimum approach gradients of 8% on the road either side of the crossing.		New Underpass, with 5.3m clearance, restricted to uni-directional traffic movements and desirable approach gradients of 5% on the road either side of the crossing.		New Underpass, with 5.3m clearance, restricted to uni-directional traffic movements and minimum approach gradients of 8% on the road either side of the crossing.		A viable full grade-separated solution designed through an alternative road alignment and/or suitable location to minimise impacts on adjacent properties was not identified due to the restrictions of the Aviva Stadium and the River Dodder.	
Pass/Fail	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**
Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.		
Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.		
Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.		
Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.		
Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential and commercial properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Lansdowne Road on both sides of the crossing, potentially requiring extensive CPO of lands. The proposed option also creates a significant restriction for access to Aviva Stadium.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential and commercial properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Lansdowne Road on both sides of the crossing, potentially requiring extensive CPO of lands. The proposed option also creates a significant restriction for access to Aviva Stadium.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential and commercial properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Lansdowne Road on both sides of the crossing, potentially requiring extensive CPO of lands. The proposed option also creates a significant restriction for access to Aviva Stadium.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential and commercial properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Lansdowne Road on both sides of the crossing, potentially requiring extensive CPO of lands. The proposed option also creates a significant restriction for access to Aviva Stadium.		
Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked. This solution significantly restricts access to overflow area for large crowds on the eastern side of the station. Existing access to the station will be blocked off requiring alternative access arrangements to be provided.	Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked. This solution significantly restricts access to overflow area for large crowds on the eastern side of the station. Existing access to the station will be blocked off requiring alternative access arrangements to be provided.	Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked. This solution significantly restricts access to overflow area for large crowds on the eastern side of the station. Existing access to the station will be blocked off requiring alternative access arrangements to be provided.	Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked. This solution significantly restricts access to overflow area for large crowds on the eastern side of the station. Existing access to the station will be blocked off requiring alternative access arrangements to be provided.		
Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.		
Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.		
Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.		
Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.		
Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.	Pass	This option meets the project objective, albeit at a minimum level. The use of 1:12 ramp gradients is not desirable to provide an appropriate level of access for those with disabilities. Further mitigation measures may need to be considered, such as intermediate landings, to ensure that pedestrian routes are accessible.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.	Pass	This option meets the project objective, albeit at a minimum level. The use of 1:12 ramp gradients is not desirable to provide an appropriate level of access for those with disabilities. Further mitigation measures may need to be considered, such as intermediate landings, to ensure that pedestrian routes are accessible.		
Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Lansdowne Road on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Lansdowne Road on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Lansdowne Road on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Lansdowne Road on both sides of the crossing.		
Fail	**This option fails to meet the following project specific objectives and requirements:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners**	Fail	**This option fails to meet the following project specific objectives and requirements:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners**	Fail	**This option fails to meet the following project specific objectives and requirements:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners**	Fail	**This option fails to meet the following project specific objectives and requirements:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners**		

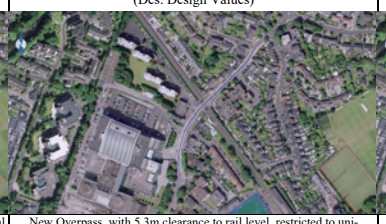
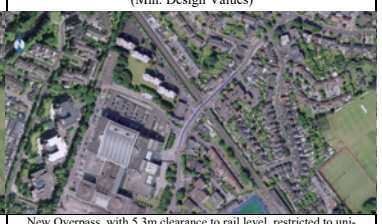
Appendix A.3: Longlist Infrastructure Options Sift – Serpentine Avenue

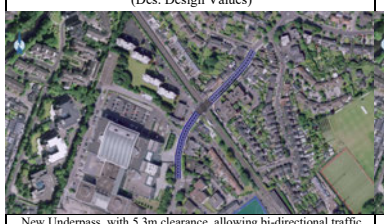
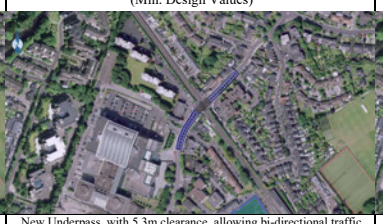
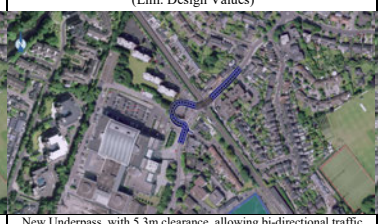
Longlist Concept Options (Infrastructure) Sift Sheet
Serpentine Avenue (SA)

	Assessment Criteria	Descrition	**Option 0** Existing Arrangement Do Minimum / Do Nothing		**Option P-1a** New Footbridge with Linear Ramp Access (Des. Design Values)		**Option P-1b** New Footbridge with Linear Ramp Access (Min. Design Values)		**Option P-2a** New Footbridge with Compressed Ramp Access (Des. Design Values)	
										
			Retain the Level Crossing (XR002) at Serpentine Avenue. No significant infrastructure interventions are considered.		New Footbridge, with 5.3m clearance to rail level, and 1:20 gradient linear ramp access. Ramps positioned along the existing Road.		New Footbridge, with 5.3m clearance to rail level, and reduced length of ramps by use of 1:12 gradient linear ramp access. Ramps positioned along the existing Road.		New Footbridge, with 5.3m clearance to rail level, and 1:20 gradient compressed ramp access. Ramps can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.	
			Pass/Fail	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**
1	**Project Specific Objective**	Deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Fail	This option fails to meets the project objective as it does not contribute to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
2	**Project Specific Objective**	Deliver solutions which improve the passenger experience where passenger infrastructure interventions are required to meet the planned increase in DART service frequency.	Fail	This option fails to meet the project objective as no new infrastructure is provided which allows for uninterrupted passage across the rail corridor for the public.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for the public.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for the public.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for the public.
3	**Project Specific Objective**	Deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.
4	**Project Specific Objective**	Identify cost-effective solutions from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.
5	**Project Specific Objective**	Minimise adverse impacts on the natural and built environment associated with the construction, operation and maintenance of the project.	Pass	This option meets the project objective as it has a minimal impact on the natural and built environment during construction, operation and maintenance, as the existing level crossing is to be retained and no new crossing is proposed.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential and commercial properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Serpentine Avenue on both sides of the crossing, potentially requiring extensive CPO of lands. The proposed option also blocks off access to commercial properties to the west of the crossing.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential and commercial properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Serpentine Avenue on both sides of the crossing, potentially requiring extensive CPO of lands. The proposed option also blocks off access to commercial properties to the west of the crossing.	Pass	This option meets the project objective as it minimses the impact on the natural and built environment during construction, operation and maintenance, relative to the form of crossing proposed. This option will require CPO of car-parking space and garden frontage to the apartment plot to the east of the crossing.
6	**Project Specific Objective**	Minimise adverse impacts on existing rail services, road users and landowners associated with the construction, operation and maintenance of the project.	Pass	This option meets the project objective as it has a minimal impact on existing rail services, road users and landowners during construction, operation and maintenance, as the existing level crossing is to be retained and no new crossing is proposed.	Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.	Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.	Fail	This option fails to meet the project objective. The space required to implement this solution will have significant impacts on a number of existing landowners adjacent to the proposed solution, in particular emergency access to 4 apartment blocks, since access to these properties will be blocked..
7	**Project Specific Objective**	Provide efficient and cost-effective integration of systems with the other DART+ Programme projects.	Fail	This option fails to meet the project objective as retaining the level crossing maintains constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
8	**Project Specific Requirement**	Designs are in accordance with IÉ Standards and relevant national and EU standards and guidelines.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.
9	**Project Specific Requirement**	Designs shall comply with the Minimum Employer's Functional Requirements and meet the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.
10	**Project Specific Requirement**	Provide an appropriate level of vehicular access across the railway line to/from Sandymount Village and neighbouring areas for all modes.	Fail	This option fails to meet the project objective. Due to the increased barrier closure times as a result of the planned increase in DART service frequency between Greystones and Dublin City Centre, the existing accessibility at the crossing cannot be maintained as no segregated vehicular crossing is provided.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.
11	**Project Specific Requirement**	Provide an appropriate level of accessibility at a local level for pedestrians and cyclists.	Fail	This option fails to meet the project objective. Due to the increased barrier closure times as a result of the planned increase in DART service frequency between Greystones and Dublin City Centre, the existing accessibility at the crossing cannot be maintained as no segregated pedestrian/cyclist crossing is provided.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.	Pass	This option meets the project objective, albeit at a minimum level. The use of 1:12 ramp gradients to vertically traverse 6 m up and over the railway lines is not desirable to provide an appropriate level of access for those with disabilities. Further mitigation measures may need to be considered, such as intermediate landings, to ensure that pedestrian routes are accessible.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.
12	**Project Specific Requirement**	Provide an appropriate level of accessibility for emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, due to the increased barrier closure times as a result of the planned increase in DART service frequency between Greystones and Dublin City Centre the crossing will effectively block off both private vehicular access and emergency vehicle access across the railway line.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Lansdowne Road on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Lansdowne Road on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time.
		Overall Pass/Fail	Fail	**This option fails to meet the following project specific objectives and requirements:** **- Deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre;** **- Deliver solutions which improve the passenger experience where passenger infrastructure interventions are required to meet the planned increase in DART service frequency;** **- Provide efficient and cost-effective integration of systems with the other DART+ Programme projects;** **- Provide an appropriate level of vehicular access across the railway line to/from Sandymount Village and neighbouring areas for all modes;** **- Provide an appropriate level of accessibility at a local level for pedestrians and cyclists.**	Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**	Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**	Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on existing rail services, road users and landowners.**

Option P-2b New Footbridge with Compressed Ramp Access (Min. Design Values)		**Option P-3a** New Footbridge with Non-Linear Ramp Access (Des. Design Values)		**Option P-3b** New Footbridge with Non-Linear Ramp Access (Min. Design Values)		**Option P-4a** New Footbridge with Stair & Lift Access (Des. Design Values)		**Option P-4b** New Footbridge with Stair & Lift Access (Min. Design Values)	
									
New Footbridge, with 5.3m clearance to rail level, and reduced length of ramps by use of 1:12 gradient linear ramp access. Ramps can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.		New Footbridge, with 5.3m clearance to rail level, and 1:20 gradient non linear ramp access. Ramps can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.		New Footbridge, with 5.3m clearance to rail level, and reduced length of ramps by use of 1:12 gradient non-linear ramp access. Ramps can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.		New Footbridge, with 5.3m clearance to rail level, 2nb. Lifts at each side of crossing and full width ped/cycleway. Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.		New Footbridge, with 5.3m clearance to rail level, 1nb. Lifts at each side of crossing and minimum width ped/cycleway. Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.	
Pass/Fail	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**
Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for the public.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for the public.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for the public.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for the public.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for the public.
Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.
Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.
Pass	This option meets the project objective as it minimses the impact on the natural and built environment during construction, operation and maintenance, relative to the form of crossing proposed. This option will require CPO of car-parking space and garden frontage to the apartment plot to the east of the crossing.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential and commercial properties. In particular, this option requires additional CPO of residential property to the west of the railway and will require CPO of car-parking space and garden frontage to the apartment plot to the east of the crossing.	Pass	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential and commercial properties. In particular, this option requires additional CPO of residential property to the west of the railway and will require CPO of car-parking space and garden frontage to the apartment plot to the east of the crossing.	Pass	This option meets the project objective as it has a minimal impact on the natural and built environment during construction, operation and maintenance, relative to the form of crossing proposed. This option may require CPO of car-parking space to the apartment plot to the east of the crossing.	Pass	This option meets the project objective as it has a minimal impact on the natural and built environment during construction, operation and maintenance, relative to the form of crossing proposed. This option may require CPO of car-parking space to the apartment plot to the east of the crossing.
Fail	This option fails to meet the project objective. The space required to implement this solution will have significant impacts on a number of existing landowners adjacent to the proposed solution, in particular emergency access to 4 apartment blocks, since access to these properties will be blocked..	Fail	This option fails to meet the project objective. The space required to implement this solution will have significant impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked during construction.	Fail	This option fails to meet the project objective. The space required to implement this solution will have significant impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked during construction.	Pass	This option meets the project objective as it has a minimal impact on existing rail services, road users and landowners during construction, operation and maintenance.	Pass	This option meets the project objective as it has a minimal impact on existing rail services, road users and landowners during construction, operation and maintenance.
Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.
Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.
Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.
Pass	This option meets the project objective, albeit at a minimum level. The use of 1:12 ramp gradients to vertically traverse 6 m up and over the railway lines is not desirable to provide an appropriate level of access for those with disabilities. Further mitigation measures may need to be considered, such as intermediate landings, to ensure that pedestrian routes are accessible.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.	Pass	This option meets the project objective, albeit at a minimum level. The use of 1:12 ramp gradients to vertically traverse 6 m up and over the railway lines is not desirable to provide an appropriate level of access for those with disabilities. Further mitigation measures may need to be considered, such as intermediate landings, to ensure that pedestrian routes are accessible.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.
Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time.
Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on existing rail services, road users and landowners.**	Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**	Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**	Pass	**This option meets all project objectives and requirements; therefore, it passes the assessment.**	Pass	**This option meets all project objectives and requirements; therefore, it passes the assessment.**

Option P-5a New Subway with Linear Ramp Access (Des. Design Values)		**Option P-5b** New Subway with Linear Ramp Access (Min. Design Values)		**Option P-6a** New Subway with Stair & Lift Access (Des. Design Values)		**Option P-6b** New Subway with Stair & Lift Access (Min. Design Values)		**Option P-7a** Modification of Existing Grade Separated Crossing (IÉ Asset)	
									
New Subway, with 2.6m clearance, and 1:20 gradient linear ramp access. Ramps positioned along the existing Road.		New Subway, with 2.6m clearance, and reduced length of ramps by use of 1:12 gradient linear ramp access. Ramps positioned along the existing Road.		New Subway, with 2.6m clearance, 2nb. Lifts at each side of crossing and full width ped/cycleway. Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.		New Subway, with 2.6m clearance, 1nb. Lifts at each side of crossing and minimum width ped/cycleway. Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.		Option not developed as there is no existing infrastructure crossing the rail at this location.	
Pass/Fail	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**
Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.		
Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for the public.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for the public.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for the public.	Pass	**This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for the public.**		
Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.		
Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.		
Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential and commercial properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Serpentine Avenue on both sides of the crossing, potentially requiring extensive CPO of lands. The proposed option also blocks off access to commercial properties to the west of the crossing.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential and commercial properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Serpentine Avenue on both sides of the crossing, potentially requiring extensive CPO of lands. The proposed option also blocks off access to commercial properties to the west of the crossing.	Pass	This option meets the project objective as it has a minimal impact on the natural and built environment during construction, operation and maintenance, relative to the form of crossing proposed. This option may require CPO of car-parking space to the apartment plot to the east of the crossing.	Pass	This option meets the project objective as it has a minimal impact on the natural and built environment during construction, operation and maintenance, relative to the form of crossing proposed. This option may require CPO of car-parking space to the apartment plot to the east of the crossing.		
Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.	Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.	Pass	This option meets the project objective as it has a minimal impact on existing rail services, road users and landowners during construction, operation and maintenance.	Pass	This option meets the project objective as it has a minimal impact on existing rail services, road users and landowners during construction, operation and maintenance.		
Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.		
Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.		
Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.		
Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.		
Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.		
Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Lansdowne Road on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Lansdowne Road on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time.		
Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**	Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**	Pass	**This option meets all project objectives and requirements; therefore, it passes the assessment.**	Pass	**This option meets all project objectives and requirements; therefore, it passes the assessment.**		

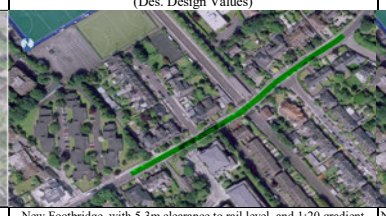
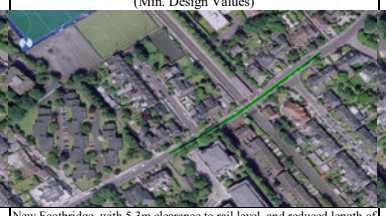
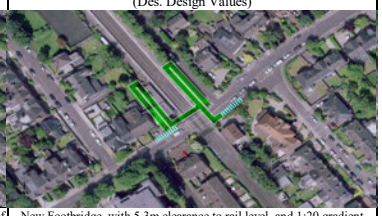
Option P-7b Modification of Existing Grade Separated Crossing (3rd Party Asset)		**Option V-1a** New Overpass for Existing Road with Bi-directional Traffic System (Des. Design Values)		**Option V-1b** New Overpass for Existing Road with Bi-directional Traffic System (Min. Design Values)		**Option V-2a** New Overpass for Existing Road with Uni-directional Traffic System (Des. Design Values)		**Option V-2b** New Overpass for Existing Road with Uni-directional Traffic System (Min. Design Values)	
✕									
Option not developed as there is no existing infrastructure crossing the rail at this location.		New Overpass, with 5.3m clearance to rail level, allowing bi-directional traffic movements and desirable approach gradients on the road either side of the crossing.		New Overpass, with 5.3m clearance to rail level, allowing bi-directional traffic movements and minimum approach gradients on the road either side of the crossing.		New Overpass, with 5.3m clearance to rail level, restricted to uni-directional traffic movements and desirable approach gradients on the road either side of the crossing.		New Overpass, with 5.3m clearance to rail level, restricted to uni-directional traffic movements and minimum approach gradients on the road either side of the crossing.	
Pass/Fail	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**
		Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
		Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for the public.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for the public.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for the public.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for the public.
		Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.
		Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.
		Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential and commercial properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Serpentine Avenue on both sides of the crossing, potentially requiring extensive CPO of lands.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential and commercial properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Serpentine Avenue on both sides of the crossing, potentially requiring extensive CPO of lands.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential and commercial properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Serpentine Avenue on both sides of the crossing, potentially requiring extensive CPO of lands.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential and commercial properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Serpentine Avenue on both sides of the crossing, potentially requiring extensive CPO of lands.
		Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.	Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.	Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.	Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.
		Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
		Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.
		Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.
		Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.
		Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.	Pass	This option meets the project objective, albeit at a minimum level. The use of 1:12 ramp gradients to vertically traverse 6.5 m up and over the railway lines is not desirable to provide an appropriate level of access for those with disabilities. Further mitigation measures may need to be considered, such as intermediate landings, to ensure that pedestrian routes are accessible.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.	Pass	This option meets the project objective, albeit at a minimum level. The use of 1:12 ramp gradients to vertically traverse 6.5 m up and over the railway lines is not desirable to provide an appropriate level of access for those with disabilities. Further mitigation measures may need to be considered, such as intermediate landings, to ensure that pedestrian routes are accessible.
		Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Serpentine Avenue on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Serpentine Avenue on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Serpentine Avenue on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Serpentine Avenue on both sides of the crossing.
		Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**	Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**	Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**	Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**

Option V-3a New Underpass for Existing Road with Bi-directional Traffic System (Des. Design Values)		**Option V-3b** New Underpass for Existing Road with Bi-directional Traffic System (Min. Design Values)		**Option V-3c** New Underpass for Existing Road with Bi-directional Traffic System (Lim. Design Values)	
					
New Underpass, with 5.3m clearance, allowing bi-directional traffic movements and desirable approach gradients on the road either side of the crossing.		New Underpass, with 5.3m clearance, allowing bi-directional traffic movements and minimum approach gradients on the road either side of the crossing.		New Underpass, with 5.3m clearance, allowing bi-directional traffic movements and minimum approach gradients on the road either side of the crossing.	
Pass/Fail	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**
Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for the public.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for the public.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for the public.
Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.
Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.
Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential and commercial properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Serpentine Avenue on both sides of the crossing, potentially requiring extensive CPO of lands.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential and commercial properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Serpentine Avenue on both sides of the crossing, potentially requiring extensive CPO of lands.	Pass	This option meets the project objective as it has a minimal impact on the natural and built environment during construction, operation and maintenance, relative to the form of crossing proposed. This option will require CPO of the commercial properties to the west of the crossing. This option will require CPO of car-parking space and garden frontage to the apartment plot to the east of the crossing.
Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.	Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.	Pass	This option meets the project objective as it has a minimal impact on existing rail services, road users and landowners during construction, operation and maintenance, relative to the form of crossing proposed
Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site. This option will require a deviation from the standards (with reduced design speeds and tight vertical and horizontal road geometry) to provide a vehicular solution which limits the impact on the surrounding properties.
Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.
Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.
Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.	Pass	This option meets the project objective, albeit at a minimum level. The use of 1:12 ramp gradients to vertically traverse 6.2 m up and over the railway lines is not desirable to provide an appropriate level of access for those with disabilities. Further mitigation measures may need to be considered, such as intermediate landings, to ensure that pedestrian routes are accessible.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists. This option would incorporate pedestrian and cycle access which is independent of the vehicular ramps.
Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Serpentine Avenue on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Serpentine Avenue on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time.
Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**	Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**	Pass	**This option meets all project objectives and requirements; therefore, it passes the assessment.**

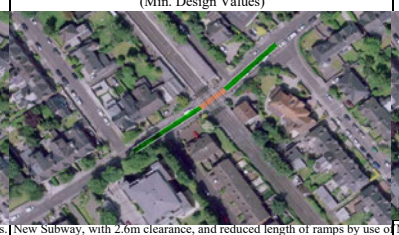
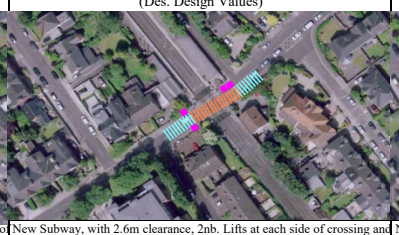
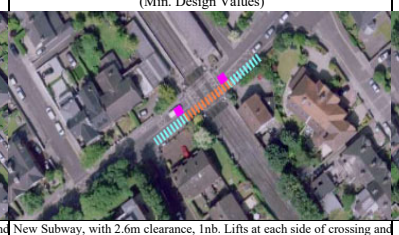
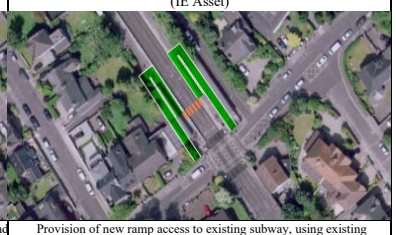
Option V-4a New Underpass for Existing Road with Uni-directional Traffic System (Des. Design Values)		**Option V-4b** New Underpass for Existing Road with Uni-directional Traffic System (Min. Design Values)		**Option V-4c** New Underpass for Existing Road with Uni-directional Traffic System (Lim. Design Values)		**Option V-5** New Alternative Crossing	
New Underpass, with 5.3m clearance, restricted to uni-directional traffic movements and desirable approach gradients on the road either side of the crossing.		New Underpass, with 5.3m clearance, restricted to uni-directional traffic movements and minimum approach gradients on the road either side of the crossing.		New Underpass, with 5.3m clearance, restricted to uni-directional traffic movements and minimum approach gradients on the road either side of the crossing.		New connection between Serpentine Avenue (West of Railway) and Sandymount Avenue (East of Railway) crossing under the railway at the north end of Sandymount Station.	
Pass/Fail	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**
Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for the public.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for the public.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for the public.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for the public.
Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.
Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.
Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential and commercial properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Serpentine Avenue on both sides of the crossing, potentially requiring extensive CPO of lands.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential and commercial properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Serpentine Avenue on both sides of the crossing, potentially requiring extensive CPO of lands.	Pass	This option meets the project objective as it has a minimal impact on the natural and built environment during construction, operation and maintenance, relative to the form of crossing proposed. This option will require CPO of the commercial properties to the west of the crossing. This option will require CPO of car-parking space and garden frontage to the apartment plot to the east of the crossing.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential and commercial properties. In particular, this option requires the CPO of residential properties to the east to allow route to connect with Sandymount Ave. This option will require CPO of a portion of the sports club, demolishing and reconstructing the club house and removing one of the pitches.
Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.	Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.	Pass	This option meets the project objective as it has a minimal impact on existing rail services, road users and landowners during construction, operation and maintenance, relative to the form of crossing proposed	Fail	This option fails to meet the project objective. The space required to implement this solution will have a significant impact on the sports club and its users, reducing the number of pitches. The removal of residential property to the east will have a direct impact on the residents.
Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site. This option will require a deviation from the standards (with reduced design speeds and tight vertical and horizontal road geometry) to provide a vehicular solution which limits the impact on the surrounding properties.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.
Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.
Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.
Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.	Pass	This option meets the project objective, albeit at a minimum level. The use of 1:12 ramp gradients to vertically traverse 6.2 m up and over the railway lines is not desirable to provide an appropriate level of access for those with disabilities. Further mitigation measures may need to be considered, such as intermediate landings, to ensure that pedestrian routes are accessible.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists. This option would incorporate pedestrian and cycle access which is independent of the vehicular ramps.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists. This option would incorporate pedestrian and cycle access which is independent of the vehicular ramps.
Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Serpentine Avenue on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Serpentine Avenue on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time.
Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**	Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**	Pass	**This option meets all project objectives and requirements; therefore, it passes the assessment.**	Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**

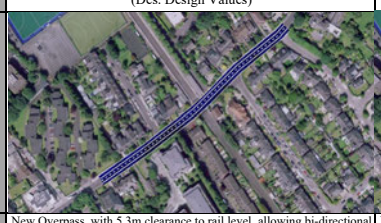
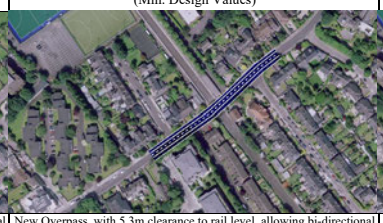
Appendix A.4: Longlist Infrastructure Options Sift – Sandymount Avenue

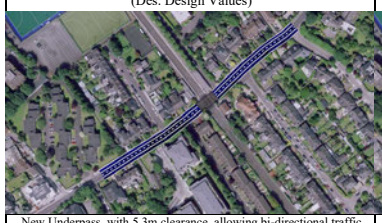
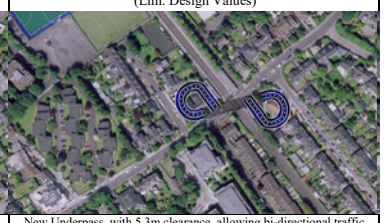
Longlist Concept Options (Infrastructure) Sift Sheet
Sandymount Avenue (SM)

	Assessment Criteria	Descrition	Option 0 Existing Arrangement Do Minimum / Do Nothing		Option P-1a New Footbridge with Linear Ramp Access (Des. Design Values)		Option P-1b New Footbridge with Linear Ramp Access (Min. Design Values)		Option P-2a New Footbridge with Compressed Ramp Access (Des. Design Values)	
										
			Retain the Level Crossing (XR003) at Sandymount Avenue. No significant infrastructure interventions are considered.		New Footbridge, with 5.3m clearance to rail level, and 1:20 gradient linear ramp access. Ramps positioned along the existing Road.		New Footbridge, with 5.3m clearance to rail level, and reduced length of ramps by use of 1:12 gradient linear ramp access. Ramps positioned along the existing Road.		New Footbridge, with 5.3m clearance to rail level, and 1:20 gradient compressed ramp access. Ramps can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.	
			Pass/Fail	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**
1	**Project Specific Objective**	Deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Fail	This option fails to meets the project objective as it does not contribute to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
2	**Project Specific Objective**	Deliver solutions which improve the passenger experience where passenger infrastructure interventions are required to meet the planned increase in DART service frequency.	Fail	This option fails to meet the project objective as no new infrastructure is provided which allows for uninterrupted passage across the rail corridor for the public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.
3	**Project Specific Objective**	Deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.
4	**Project Specific Objective**	Identify cost-effective solutions from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.
5	**Project Specific Objective**	Minimise adverse impacts on the natural and built environment associated with the construction, operation and maintenance of the project.	Pass	This option meets the project objective as it has a minimal impact on the natural and built environment during construction, operation and maintenance, as the existing level crossing is to be retained and no new crossing is proposed.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sandymount Avenue on both sides of the crossing, potentially requiring extensive CPO of lands.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sandymount Avenue on both sides of the crossing, potentially requiring extensive CPO of lands.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential properties. In particular, this option requires additional CPO of residential property to the west of the railway and will require the relocation of the station building on the eastern platform.
6	**Project Specific Objective**	Minimise adverse impacts on existing rail services, road users and landowners associated with the construction, operation and maintenance of the project.	Pass	This option meets the project objective as it has a minimal impact on existing rail services, road users and landowners during construction, operation and maintenance, as the existing level crossing is to be retained and no new crossing is proposed.	Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.	Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.	Fail	This option fails to meet the project objective. The station on the eastern side will need to be demolished and rebuilt, resulting in a prolonged time of disruption to rail users at this station during construction.
7	**Project Specific Objective**	Provide efficient and cost-effective integration of systems with the other DART+ Programme projects.	Fail	This option fails to meet the project objective as retaining the level crossing maintains constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
8	**Project Specific Requirement**	Designs are in accordance with IÉ Standards and relevant national and EU standards and guidelines.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.
9	**Project Specific Requirement**	Designs shall comply with the Minimum Employer's Functional Requirements and meet the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.
10	**Project Specific Requirement**	Provide an appropriate level of vehicular access across the railway line to/from Sandymount Village and neighbouring areas for all modes.	Fail	This option fails to meet the project objective. Due to the increased barrier closure times as a result of the planned increase in DART service frequency between Greystones and Dublin City Centre, the existing accessibility at the crossing cannot be maintained as no segregated vehicular crossing is provided.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.
11	**Project Specific Requirement**	Provide an appropriate level of accessibility at a local level for pedestrians and cyclists.	Fail	This option fails to meet the project objective. Due to the increased barrier closure times as a result of the planned increase in DART service frequency between Greystones and Dublin City Centre, the existing accessibility at the crossing cannot be maintained as no segregated pedestrian/cyclist crossing is provided.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.	Pass	This option meets the project objective, albeit at a minimum level. The use of 1:12 ramp gradients is not desirable to provide an appropriate level of access for those with disabilities. Further mitigation measures may need to be considered, such as intermediate landings, to ensure that pedestrian routes are accessible.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.
12	**Project Specific Requirement**	Provide an appropriate level of accessibility for emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, due to the increased barrier closure times as a result of the planned increase in DART service frequency between Greystones and Dublin City Centre the crossing will effectively block off both private vehicular access and emergency vehicle access across the railway line.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Lansdowne Road on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Lansdowne Road on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time.
		Overall Pass/Fail	Fail	**This option fails to meet the following project specific objectives and requirements:** **- Deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre;** **- Deliver solutions which improve the passenger experience where passenger infrastructure interventions are required to meet the planned increase in DART service frequency;** **- Provide efficient and cost-effective integration of systems with the other DART+ Programme projects;** **- Provide an appropriate level of vehicular access across the railway line to/from Sandymount Village and neighbouring areas for all modes;** **- Provide an appropriate level of accessibility at a local level for pedestrians and cyclists.**	Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**	Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**	Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**

Option P-2b New Footbridge with Compressed Ramp Access (Min. Design Values)		**Option P-3a** New Footbridge with Non-Linear Ramp Access (Des. Design Values)		**Option P-3b** New Footbridge with Non-Linear Ramp Access (Min. Design Values)		**Option P-4a** New Footbridge with Stair & Lift Access (Des. Design Values)		**Option P-4b** New Footbridge with Stair & Lift Access (Min. Design Values)	
New Footbridge, with 5.3m clearance to rail level, and reduced length of ramps by use of 1:12 gradient linear ramp access. Ramps can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.		New Footbridge, with 5.3m clearance to rail level, and 1:20 gradient non-linear ramp access. Ramps can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.		New Footbridge, with 5.3m clearance to rail level, and 1:12 gradient non-linear ramp access. Ramps can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.		New Footbridge, with 5.3m clearance to rail level, 2nb. Lifts at each side of crossing and full width ped/cycleway. Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.		New Footbridge, with 5.3m clearance to rail level, 1nb. Lifts at each side of crossing and minimum width ped/cycleway. Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.	
Pass/Fail	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**
Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.
Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.
Pass	This option meets the project objective as it provides fo a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides fo a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides fo a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides fo a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides fo a cost-effective solution from a capital, operations, and maintenance perspective.
Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential properties. In particular, this option requires additional CPO of residential property to the west of the railway and will require the relocation of the station building on the eastern platform.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential properties. In particular, this option requires additional CPO of residential property on both sides of the railway.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential properties. In particular, this option requires additional CPO of residential property on both sides of the railway.	Pass	This option meets the project objective as it has a minimal impact on the natural and built environment during construction, operationand maintenance, relative to the form of crossing proposed. This option requires CPO of residential property to the west of the railway and will impact on vehicle access to the property on the eastern side.	Pass	This option meets the project objective as it has a minimal impact on the natural and built environment during construction, operationsand maintenance, relative to the form of crossing proposed.
Fail	This option fails to meet the project objective. The station on the eastern side will need to be demolished and rebuilt, resulting in a prolonged time of disruption to rail users at this station during construction.	Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.	Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.	Pass	This option meets the project objective as it has a minimal impact on existing rail services, road users and landowners during construction, operation and maintenance.	Pass	This option meets the project objective as it has a minimal impact on existing rail services, road users and landowners during construction, operation and maintenance. Access to the property to the east will be maintain by passing beneath the proposed bridge structure.
Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.
Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.
Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.
Pass	This option meets the project objective, albeit at a minimum level. The use of 1:12 ramp gradients is not desirable to provide an appropriate level of access for those with disabilities. Further mitigation measures may need to be considered, such as intermediate landings, to ensure that pedestrian routes are accessible	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.	Pass	This option meets the project objective, albeit at a minimum level. The use of 1:12 ramp gradients is not desirable to provide an appropriate level of access for those with disabilities. Further mitigation measures may need to be considered, such as intermediate landings, to ensure that pedestrian routes are accessible	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.
Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency service in terms of catchment and response time.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency service in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Lansdowne Road on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency service in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Lansdowne Road on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency service in terms of catchment and response time.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency service in terms of catchment and response time.
Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**	Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**	Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**	Pass	**This option meets all project objectives and requirements; therefore, it passes the assessment.**	Pass	**This option meets all project objectives and requirements; therefore, it passes the assessment.**

Option P-5a New Subway with Linear Ramp Access (Des. Design Values)		**Option P-5b** New Subway with Linear Ramp Access (Min. Design Values)		**Option P-6a** New Subway with Stair & Lift Access (Des. Design Values)		**Option P-6b** New Subway with Stair & Lift Access (Min. Design Values)		**Option P-7a** Modification of Existing Grade Separated Crossing (IÉ Asset)	
									
New Subway, with 2.6m clearance, and 1:20 gradient linear ramp access. Ramps positioned along the existing Road.		New Subway, with 2.6m clearance, and reduced length of ramps by use of 1:12 gradient linear ramp access. Ramps positioned along the existing Road.		New Subway, with 2.6m clearance, 2nb. Lifts at each side of crossing and full width ped/cycleway. Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.		New Subway, with 2.6m clearance, 1nb. Lifts at each side of crossing and minimum width ped/cycleway. Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.		Provision of new ramp access to existing subway, using existing clearances, within the station area. Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.	
Pass/Fail	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**
Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.
Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.
Pass	This option meets the project objective as it provides fo a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides fo a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides fo a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides fo a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides fo a cost-effective solution from a capital, operations, and maintenance perspective.
Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sandymount Avenue on both sides of the crossing, potentially requiring extensive CPO of lands.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sandymount Avenue on both sides of the crossing, potentially requiring extensive CPO of lands.	Pass	This option meets the project objective as it has a minimal impact on the natural and built environment during construction, operationand maintenance, relative to the form of crossing proposed. This option requires CPO of residential property to the west of the railway and will impact on vehicle access to the property on the eastern side.	Pass	This option meets the project objective as it has a minimal impact on the natural and built environment during construction, operationand maintenance, relative to the form of crossing proposed.	Pass	This option meets the project objective as it minimises the impact on the natural and built environment during construction, operationand maintenance, relative to the form of crossing proposed. The space required to implement this solution will require demolition and re-construction of the station on the western side.
Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.	Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.	Pass	This option meets the project objective as it has a minimal impact on existing rail services, road users and landowners during construction, operation and maintenance.	Pass	This option meets the project objective as it has a minimal impact on existing rail services, road users and landowners during construction, operation and maintenance. Vehicular access to the property to the west will be restricted. Access to the property to the east will be maintain by passing over the proposed subway structure.	Fail	This option fails to meet the project objective. The option results in ramps down to an existing subway crossing with blind bends along the access route, creating an unsafe user environment and adversely impacting on the user. The station on the western side will need to be demolished and rebuilt, resulting in a prolonged time of disruption to rail users at this station during construction.
Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Fail	This option fails to meet the project objective. This option proposes to retain the existing subway crossing, which has a vertical clearance of 2.05 m. This is below the minimum requirement of current design standards.
Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.
Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.
Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.	Pass	This option meets the project objective, albeit at a minimum level. The use of 1:12 ramp gradients is not desirable to provide an appropriate level of access for those with disabilities. Further mitigation measures may need to be considered, such as intermediate landings, to ensure that pedestrian routes are accessible	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.
Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Lansdowne Road on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Lansdowne Road on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time.
Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**	Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**	Pass	**This option meets all project objectives and requirements; therefore, it passes the assessment.**	Pass	**This option meets all project objectives and requirements; therefore, it passes the assessment.**	Fail	**This option fails to meet the following project specific objectives and requirements:** **- Minimise adverse impacts on existing rail services, road users and landowners;** **- Comply with the relevant standards and design guidelines**

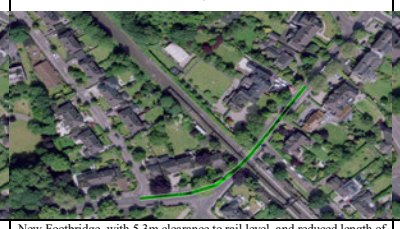
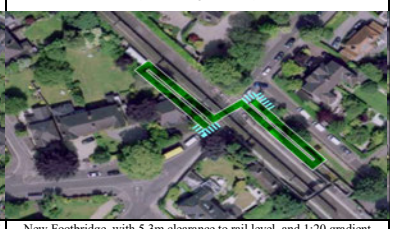
Option P-7b Modification of Existing Grade Separated Crossing (3rd Party Asset)		**Option V-1a** New Overpass for Existing Road with Bi-directional Traffic System (Des. Design Values)		**Option V-1b** New Overpass for Existing Road with Bi-directional Traffic System (Min. Design Values)		**Option V-2a** New Overpass for Existing Road with Uni-directional Traffic System (Des. Design Values)		**Option V-2b** New Overpass for Existing Road with Uni-directional Traffic System (Min. Design Values)	
✕									
Option not developed as there is no existing infrastructure crossing the rail at this location.		New Overpass, with 5.3m clearance to rail level, allowing bi-directional traffic movements and desirable approach gradients on the road either side of the crossing.		New Overpass, with 5.3m clearance to rail level, allowing bi-directional traffic movements and minimum approach gradients on the road either side of the crossing.		New Overpass, with 5.3m clearance to rail level, restricted to uni-directional traffic movements and desirable approach gradients on the road either side of the crossing.		New Overpass, with 5.3m clearance to rail level, restricted to uni-directional traffic movements and minimum approach gradients on the road either side of the crossing.	
Pass/Fail	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**
		Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
		Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.
		Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.
		Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.
		Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sandymount Avenue on both sides of the crossing, potentially requiring extensive CPO of lands.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sandymount Avenue on both sides of the crossing, potentially requiring extensive CPO of lands.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sandymount Avenue on both sides of the crossing, potentially requiring extensive CPO of lands.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sandymount Avenue on both sides of the crossing, potentially requiring extensive CPO of lands.
		Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.	Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.	Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.	Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.
		Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
		Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.
		Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.
		Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.
		Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.	Pass	This option meets the project objective, albeit at a minimum level. The use of 1:12 ramp gradients is not desirable to provide an appropriate level of access for those with disabilities. Further mitigation measures may need to be considered, such as intermediate landings, to ensure that pedestrian routes are accessible.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.	Pass	This option meets the project objective, albeit at a minimum level. The use of 1:12 ramp gradients is not desirable to provide an appropriate level of access for those with disabilities. Further mitigation measures may need to be considered, such as intermediate landings, to ensure that pedestrian routes are accessible.
		Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sandymount Avenue on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sandymount Avenue on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sandymount Avenue on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sandymount Avenue on both sides of the crossing.
		Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**	Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**	Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**	Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**

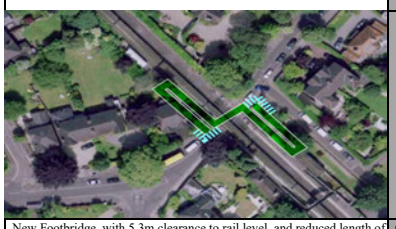
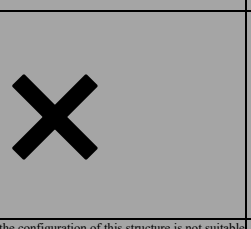
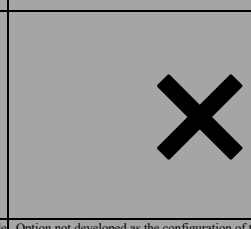
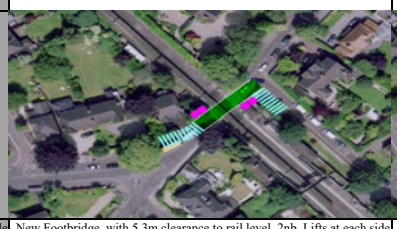
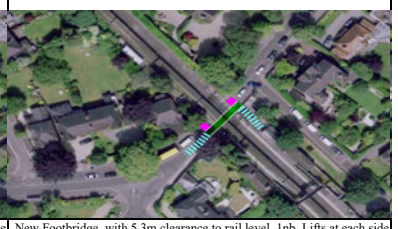
Option V-3a New Underpass for Existing Road with Bi-directional Traffic System (Des. Design Values)		**Option V-3b** New Underpass for Existing Road with Bi-directional Traffic System (Min. Design Values)		**Option V-3c** New Underpass for Existing Road with Bi-directional Traffic System (Lim. Design Values)	
					
New Underpass, with 5.3m clearance, allowing bi-directional traffic movements and desirable approach gradients on the road either side of the crossing.		New Underpass, with 5.3m clearance, allowing bi-directional traffic movements and minimum approach gradients on the road either side of the crossing.		New Underpass, with 5.3m clearance, allowing bi-directional traffic movements and minimum approach gradients on the road either side of the crossing.	
Pass/Fail	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**
Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.
Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.
Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.
Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sandymount Avenue on both sides of the crossing, potentially requiring extensive CPO of lands.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sandymount Avenue on both sides of the crossing, potentially requiring extensive CPO of lands.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential properties. In particular, this option would require the CPO of approximately 8 No. residential properties, impacting on both sides of the level crossing.
Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.	Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.	Pass	This option meets the project objective as it has a minimal impact on existing rail services, road users and landowners during construction, operation and maintenance, relative to the form of crossing proposed
Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site. This option will require a deviation from the standards (with reduced design speeds and tight vertical and horizontal road geometry) to provide a vehicular solution which limits the impact on the surrounding properties.
Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.
Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.
Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.	Pass	This option meets the project objective, albeit at a minimum level. The use of 1:12 ramp gradients is not desirable to provide an appropriate level of access for those with disabilities. Further mitigation measures may need to be considered, such as intermediate landings, to ensure that pedestrian routes are accessible.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists. This option would incorporate pedestrian and cycle access which is independent of the vehicular ramps.
Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sandymount Avenue on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sandymount Avenue on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time.
Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**	Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**	Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment**

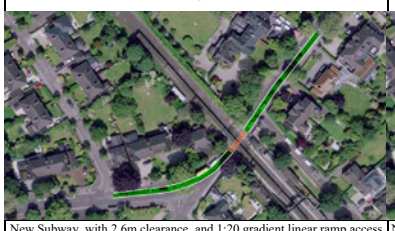
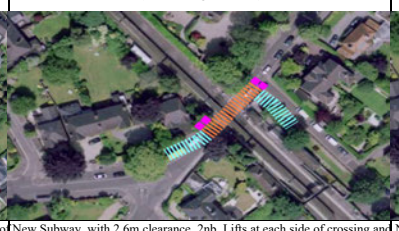
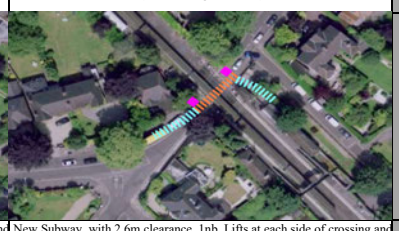
Option V-4a New Underpass for Existing Road with Uni-directional Traffic System (Des. Design Values)		**Option V-4b** New Underpass for Existing Road with Uni-directional Traffic System (Min. Design Values)		**Option V-4c** New Underpass for Existing Road with Uni-directional Traffic System (Lim. Design Values)		**Option V-5** New Alternative Crossing	
New Underpass, with 5.3m clearance, restricted to uni-directional traffic movements and desirable approach gradients on the road either side of the crossing.		New Underpass, with 5.3m clearance, restricted to uni-directional traffic movements and minimum approach gradients on the road either side of the crossing.		New Underpass, with 5.3m clearance, restricted to uni-directional traffic movements and minimum approach gradients on the road either side of the crossing.		New connection between Serpentine Avenue (West of Railway) and Sandymount Avenue (East of Railway) crossing under the railway at the north end of Sandymount Station.	
Pass/Fail	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**
Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.
Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.
Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.
Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sandymount Avenue on both sides of the crossing, potentially requiring extensive CPO of lands.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sandymount Avenue on both sides of the crossing, potentially requiring extensive CPO of lands.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential properties. In particular, this option would require the CPO of approximately 8 No. residential properties, impacting on both sides of the level crossing.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential and commercial properties. In particular, this option requires the CPO of residential properties to the east to allow route to connect with Sandymount Ave. This option will require CPO of a portion of the sports club, demolishing and reconstructing the club house and removing one of the pitches.
Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.	Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.	Pass	This option meets the project objective as it has a minimal impact on existing rail services, road users and landowners during construction, operation and maintenance, relative to the form of crossing proposed	Fail	This option fails to meet the project objective. The space required to implement this solution will have a significant impact on the sports club and its users, reducing the number of pitches. The removal of residential property to the east will have a direct impact on the residents.
Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site. This option will require a deviation from the standards (with reduced design speeds and tight vertical and horizontal road geometry) to provide a vehicular solution which limits the impact on the surrounding properties.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.
Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.
Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.
Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.	Pass	This option meets the project objective, albeit at a minimum level. The use of 1:12 ramp gradients is not desirable to provide an appropriate level of access for those with disabilities. Further mitigation measures may need to be considered, such as intermediate landings, to ensure that pedestrian routes are accessible.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists. This option would incorporate pedestrian and cycle access which is independent of the vehicular ramps.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists. This option would incorporate pedestrian and cycle access which is independent of the vehicular ramps.
Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sandymount Avenue on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sandymount Avenue on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time.
Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**	Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**	Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment**	Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**

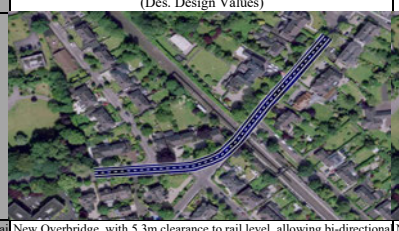
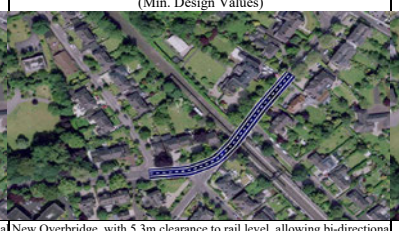
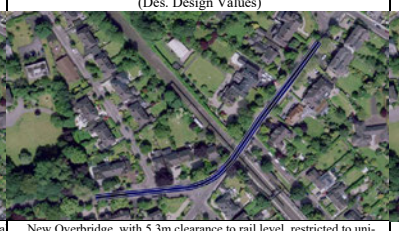
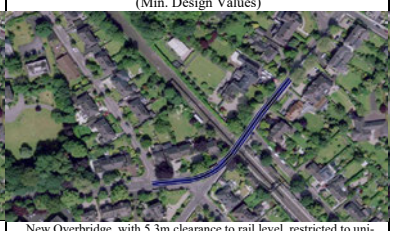
Appendix A.5: Longlist Infrastructure Options Sift – Sydney Parade

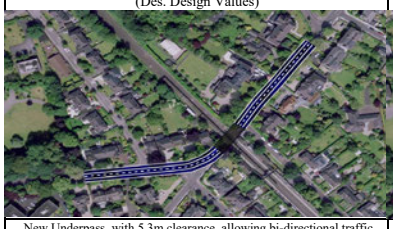
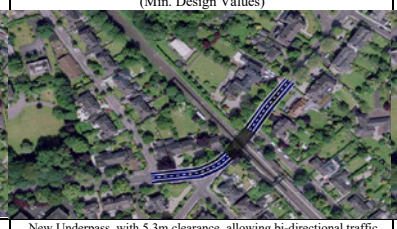
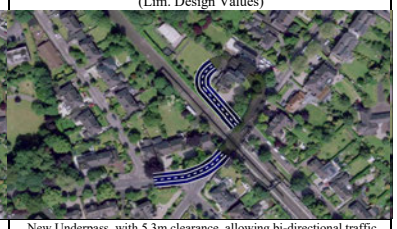
Longlist Concept Options (Infrastructure) Sift Sheet
Sydney Parade (SP)

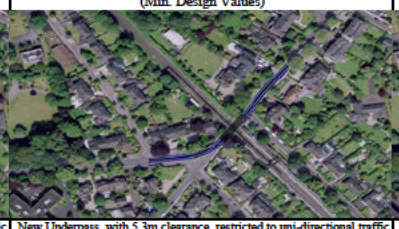
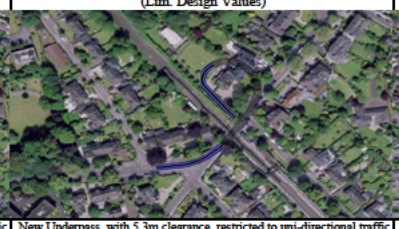
	Assessment Criteria	Descrition	Option 0 Existing Arrangement Do Minimum / Do Nothing		Option P-1a New Footbridge with Linear Ramp Access (Des. Design Values)		Option P-1b New Footbridge with Linear Ramp Access (Min. Design Values)		Option P-2a New Footbridge with Compressed Ramp Access (Des. Design Values)	
										
			Retain the Level Crossing (XR004) at Sydney Parade Avenue. No significant infrastructure interventions are considered.		New Footbridge, with 5.3m clearance to rail level, and 1:20 gradient linear ramp access. Ramps positioned along the existing Road.		New Footbridge, with 5.3m clearance to rail level, and reduced length of ramps by use of 1:12 gradient linear ramp access. Ramps positioned along the existing Road.		New Footbridge, with 5.3m clearance to rail level, and 1:20 gradient compressed ramp access. Ramps can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.	
			Pass/Fail	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**
1	**Project Specific Objective**	Deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Fail	This option fails to meets the project objective as it does not contribute to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
2	**Project Specific Objective**	Deliver solutions which improve the passenger experience where passenger infrastructure interventions are required to meet the planned increase in DART service frequency.	Fail	This option fails to meet the project objective as no new infrastructure is provided which allows for uninterrupted passage across the rail corridor for the public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.
3	**Project Specific Objective**	Deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.
4	**Project Specific Objective**	Identify cost-effective solutions from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.
5	**Project Specific Objective**	Minimise adverse impacts on the natural and built environment associated with the construction, operation and maintenance of the project.	Pass	This option meets the project objective as it has a minimal impact on the natural and built environment during construction, operation and maintenance, as the existing level crossing is to be retained and no new crossing is proposed.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sydney Parade on both sides of the crossing, potentially requiring extensive CPO of lands.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sydney Parade on both sides of the crossing, potentially requiring extensive CPO of lands.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential properties. In particular, this option requires CPO of residential property to the west of the railway and will require the relocation of the station building on the eastern platform.
6	**Project Specific Objective**	Minimise adverse impacts on existing rail services, road users and landowners associated with the construction, operation and maintenance of the project.	Pass	This option meets the project objective as it has a minimal impact on existing rail services, road users and landowners during construction, operation and maintenance, as the existing level crossing is to be retained and no new crossing is proposed.	Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.	Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.	Fail	This option fails to meet the project objective. The station on the eastern side will need to be demolished and rebuilt, resulting in a prolonged time of disruption to rail users at this station during construction.
7	**Project Specific Objective**	Provide efficient and cost-effective integration of systems with the other DART+ Programme projects.	Fail	This option fails to meet the project objective as retaining the level crossing maintains constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
8	**Project Specific Requirement**	Designs are in accordance with IÉ Standards and relevant national and EU standards and guidelines.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.
9	**Project Specific Requirement**	Designs shall comply with the Minimum Employer's Functional Requirements and meet the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.
10	**Project Specific Requirement**	Provide an appropriate level of vehicular access across the railway line to/from Sandymount Village and neighbouring areas for all modes.	Fail	This option fails to meet the project objective. Due to the increased barrier closure times as a result of the planned increase in DART service frequency between Greystones and Dublin City Centre, the existing accessibility at the crossing cannot be maintained as no segregated vehicular crossing is provided.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.
11	**Project Specific Requirement**	Provide an appropriate level of accessibility at a local level for pedestrians and cyclists.	Fail	This option fails to meet the project objective. Due to the increased barrier closure times as a result of the planned increase in DART service frequency between Greystones and Dublin City Centre, the existing accessibility at the crossing cannot be maintained as no segregated pedestrian/cyclist crossing is provided.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.	Pass	This option meets the project objective, albeit at a minimum level. The use of 1:12 ramp gradients is not desirable to provide an appropriate level of access for those with disabilities. Further mitigation measures may need to be considered, such as intermediate landings, to ensure that pedestrian routes are accessible.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.
12	**Project Specific Requirement**	Provide an appropriate level of accessibility for emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, due to the increased barrier closure times as a result of the planned increase in DART service frequency between Greystones and Dublin City Centre the crossing will effectively block off both private vehicular access and emergency vehicle access across the railway line.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time.
		Overall Pass/Fail	Fail	**This option fails to meet the following project specific objectives and requirements:** **- Deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre;** **- Deliver solutions which improve the passenger experience where passenger infrastructure interventions are required to meet the planned increase in DART service frequency;** **- Provide efficient and cost-effective integration of systems with the other DART+ Programme projects;** **- Provide an appropriate level of vehicular access across the railway line to/from Sandymount Village and neighbouring areas for all modes;** **- Provide an appropriate level of accessibility at a local level for pedestrians and cyclists.**	Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**	Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**	Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**

Option P-2b New Footbridge with Compressed Ramp Access (Min. Design Values)		**Option P-3a** New Footbridge with Non-Linear Ramp Access (Des. Design Values)		**Option P-3b** New Footbridge with Non-Linear Ramp Access (Min. Design Values)		**Option P-4a** New Footbridge with Stair & Lift Access (Des. Design Values)		**Option P-4b** New Footbridge with Stair & Lift Access (Min. Design Values)	
									
New Footbridge, with 5.3m clearance to rail level, and reduced length of ramps by use of 1:12 gradient linear ramp access. Ramps can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.		Option not developed as the configuration of this structure is not suitable for public desire lines and unreasonable land take required. No advantages provided over Option P-2a.		Option not developed as the configuration of this structure is not suitable for public desire lines and unreasonable land take required. No advantages provided over Option P-2b.		New Footbridge, with 5.3m clearance to rail level, 2nb. Lifts at each side of crossing and full width ped/cycleway. Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.		New Footbridge, with 5.3m clearance to rail level, 1nb. Lifts at each side of crossing and minimum width ped/cycleway. Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.	
Pass/Fail	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**
Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.					Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.					Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.
Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.					Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.
Pass	This option meets the project objective as it provides fo a cost-effective solution from a capital, operations, and maintenance perspective.					Pass	This option meets the project objective as it provides fo a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides fo a cost-effective solution from a capital, operations, and maintenance perspective.
Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential properties. In particular, this option requires additional CPO of residential property to the west of the railway and will require the relocation of the station building on the eastern platform.					Pass	This option meets the project objective as it has a minimal impact on the natural and built environment during construction, operationand maintenance, relative to the form of crossing proposed. This option requires CPO of residential property to the west of the railway and will require a reconfiguration of the station on the eastern side.	Pass	This option meets the project objective as it has a minimal impact on the natural and built environment during construction, operationand maintenance, relative to the form of crossing proposed.
Fail	This option fails to meet the project objective. The station on the eastern side will need to be demolished and rebuilt, resulting in a prolonged time of disruption to rail users at this station during construction.					Pass	This option meets the project objective as it has a minimal impact on existing rail services, road users and landowners during construction, operation and maintenance.	Pass	This option meets the project objective as it has a minimal impact on existing rail services, road users and landowners during construction, operation and maintenance. Access to the property to the east will be maintain by passing beneath the proposed bridge structure.
Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.					Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.					Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.
Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.					Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.
Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.					Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.
Pass	This option meets the project objective, albeit at a minimum level. The use of 1:12 ramp gradients is not desirable to provide an appropriate level of access for those with disabilities. Further mitigation measures may need to be considered, such as intermediate landings, to ensure that pedestrian routes are accessible					Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.
Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time.					Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time.
Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**					Pass	**This option meets all project objectives and requirements; therefore, it passes the assessment.**	Pass	**This option meets all project objectives and requirements; therefore, it passes the assessment.**

Option P-5a New Subway with Linear Ramp Access (Des. Design Values)		**Option P-5b** New Subway with Linear Ramp Access (Min. Design Values)		**Option P-6a** New Subway with Stair & Lift Access (Des. Design Values)		**Option P-6b** New Subway with Stair & Lift Access (Min. Design Values)		**Option P-7a** Modification of Existing Grade Separated Crossing (IÉ Asset)	
									
New Subway, with 2.6m clearance, and 1:20 gradient linear ramp access. Ramps positioned along the existing Road.		New Subway, with 2.6m clearance, and reduced length of ramps by use of 1:12 gradient linear ramp access. Ramps positioned along the existing Road.		New Subway, with 2.6m clearance, 2nb. Lifts at each side of crossing and full width ped/cycleway. Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.		New Subway, with 2.6m clearance, 1nb. Lifts at each side of crossing and minimum width ped/cycleway. Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.		Option not developed as the configuration of this structure is not suitable for compliant passage. The bridge would need replacement of the superstructure to provide for level crossing over the tracks.	
Pass/Fail	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**
Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.		
Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.		
Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.		
Pass	This option meets the project objective as it provides fo a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides fo a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides fo a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides fo a cost-effective solution from a capital, operations, and maintenance perspective.		
Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sydney Parade on both sides of the crossing, potentially requiring extensive CPO of lands.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sydney Parade on both sides of the crossing, potentially requiring extensive CPO of lands.	Pass	This option meets the project objective as it has a minimal impact on the natural and built environment during construction, operationand maintenance, relative to the form of crossing proposed. This option requires CPO of residential property to the west of the railway and will require a reconfiguration of the station on the eastern side.	Pass	This option meets the project objective as it has a minimal impact on the natural and built environment during construction, operationand maintenance, relative to the form of crossing proposed.		
Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.	Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.	Pass	This option meets the project objective as it has a minimal impact on existing rail services, road users and landowners during construction, operation and maintenance.	Pass	This option meets the project objective as it has a minimal impact on existing rail services, road users and landowners during construction, operation and maintenance. Vehicular access to the property to the west will be restricted. Access to the property to the east will be maintain by passing over the proposed subway structure.		
Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.		
Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.		
Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.		
Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.		
Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.	Pass	This option meets the project objective, albeit at a minimum level. The use of 1:12 ramp gradients is not desirable to provide an appropriate level of access for those with disabilities. Further mitigation measures may need to be considered, such as intermediate landings, to ensure that pedestrian routes are accessible	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.		
Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time.		
Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**	Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**	Pass	**This option meets all project objectives and requirements; therefore, it passes the assessment.**	Pass	**This option meets all project objectives and requirements; therefore, it passes the assessment.**		

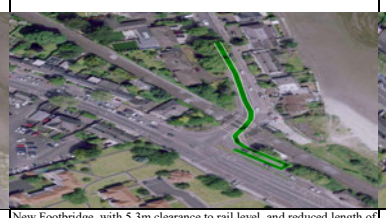
		Option V-1a New Overbridge for Existing Road with Bi-directional Traffic System (Des. Design Values)		**Option V-1b** New Overbridge for Existing Road with Bi-directional Traffic System (Min. Design Values)		**Option V-2a** New Overbridge for Existing Road with Uni-directional Traffic System (Des. Design Values)		**Option V-2b** New Overbridge for Existing Road with Uni-directional Traffic System (Min. Design Values)	
Option P-7b Modification of Existing Grade Separated Crossing (3rd Party Asset)									
Option not developed as there is no existing infrastructure crossing the rail at this location.		New Overbridge, with 5.3m clearance to rail level, allowing bi-directional traffic movements and desirable approach gradients on the road either side of the crossing.		New Overbridge, with 5.3m clearance to rail level, allowing bi-directional traffic movements and minimum approach gradients on the road either side of the crossing.		New Overbridge, with 5.3m clearance to rail level, restricted to uni-directional traffic movements and desirable approach gradients on the road either side of the crossing.		New Overbridge, with 5.3m clearance to rail level, restricted to uni-directional traffic movements and minimum approach gradients on the road either side of the crossing.	
Pass/Fail	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**
		Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
		Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.
		Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.
		Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.
		Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sydney Parade on both sides of the crossing, potentially requiring extensive CPO of lands.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sydney Parade on both sides of the crossing, potentially requiring extensive CPO of lands.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sydney Parade on both sides of the crossing, potentially requiring extensive CPO of lands.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sydney Parade on both sides of the crossing, potentially requiring extensive CPO of lands.
		Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.	Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.	Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.	Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.
		Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
		Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.
		Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.
		Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.
		Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.	Pass	This option meets the project objective, albeit at a minimum level. The use of 1:12 ramp gradients is not desirable to provide an appropriate level of access for those with disabilities. Further mitigation measures may need to be considered, such as intermediate landings, to ensure that pedestrian routes are accessible	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.	Pass	This option meets the project objective, albeit at a minimum level. The use of 1:12 ramp gradients is not desirable to provide an appropriate level of access for those with disabilities. Further mitigation measures may need to be considered, such as intermediate landings, to ensure that pedestrian routes are accessible
		Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sydney Parade Avenue on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sydney Parade Avenue on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency service in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sydney Parade Avenue on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sydney Parade Avenue on both sides of the crossing.
		Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**	Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**	Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**	Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**

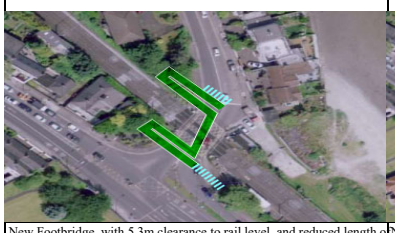
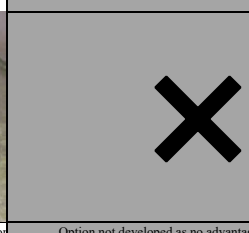
Option V-3a New Underpass for Existing Road with Bi-directional Traffic System (Des. Design Values)		**Option V-3b** New Underpass for Existing Road with Bi-directional Traffic System (Min. Design Values)		**Option V-3c** New Underpass for Existing Road with Bi-directional Traffic System (Lim. Design Values)	
					
New Underpass, with 5.3m clearance, allowing bi-directional traffic movements and desirable approach gradients on the road either side of the crossing.		New Underpass, with 5.3m clearance, allowing bi-directional traffic movements and minimum approach gradients on the road either side of the crossing.		New Underpass, with 5.3m clearance, allowing bi-directional traffic movements and minimum approach gradients on the road either side of the crossing.	
Pass/Fail	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**
Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.
Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.
Pass	This option meets the project objective as it provides fo a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides fo a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides fo a cost-effective solution from a capital, operations, and maintenance perspective.
Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sydney Parade on both sides of the crossing, potentially requiring extensive CPO of lands.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sydney Parade on both sides of the crossing, potentially requiring extensive CPO of lands.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential properties. In particular, this option would require the CPO of approximately 6 No. residential properties, impacting on both sides of the level crossing.
Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.	Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.	Pass	This option meets the project objective as it has a minimal impact on existing rail services, road users and landowners during construction, operation and maintenance, relative to the form of crossing proposed.
Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site. This option will require a deviation from the standards (with reduced design speeds and tight vertical and horizontal road geometry) to provide a vehicular solution which limits the impact on the surrounding properties.
Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.
Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.
Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.	Pass	This option meets the project objective, albeit at a minimum level. The use of 1:12 ramp gradients is not desirable to provide an appropriate level of access for those with disabilities. Further mitigation measures may need to be considered, such as intermediate landings, to ensure that pedestrian routes are accessible	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists. This option would incorporate pedestrian and cycle access which is independent of the vehicular ramps.
Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sydney Parade Avenue on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sydney Parade Avenue on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sydney Parade Avenue on both sides of the crossing.
Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**	Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**	Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment.**

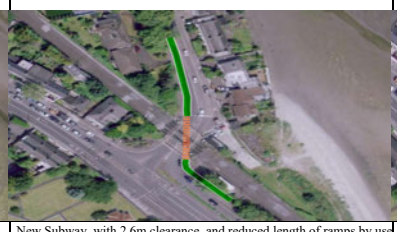
Option V-4a New Underpass for Existing Road with Uni-directional Traffic System (Des. Design Values)		**Option V-4b** New Underpass for Existing Road with Uni-directional Traffic System (Min. Design Values)		**Option V-4c** New Underpass for Existing Road with Uni-directional Traffic System (Lim. Design Values)		**Option V-5** New Alternative Crossing	
							
New Underpass, with 5.3m clearance, restricted to uni-directional traffic movements and desirable approach gradients on the road either side of the crossing.		New Underpass, with 5.3m clearance, restricted to uni-directional traffic movements and minimum approach gradients on the road either side of the crossing.		New Underpass, with 5.3m clearance, restricted to uni-directional traffic movements and minimum approach gradients on the road either side of the crossing.		New connection between Ailesbury Gardens (East of Railway) and Merrion Road (West of Railway, North of Herbert Avenue Jnc.) crossing under the railway south of Sydney Parade Station.	
Pass/Fail	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**
Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for both public and rail passengers unable to use the existing passage at the station.
Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.
Pass	This option meets the project objective as it provides fo a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides fo a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides fo a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides fo a cost-effective solution from a capital, operations, and maintenance perspective.
Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sydney Parade on both sides of the crossing, potentially requiring extensive CPO of lands.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sydney Parade on both sides of the crossing, potentially requiring extensive CPO of lands.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential properties. In particular, this option would require the CPO of approximately 6 No. residential properties, impacting on both sides of the level crossing.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential properties. In particular, this option will cause significant disruption to access to the apartments and houses off Merrion Village during construction. This option will also results in the removal of a number of mature trees along the eastern side.
Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.	Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.	Pass	This option meets the project objective as it has a minimal impact on existing rail services, road users and landowners during construction, operation and maintenance, relative to the form of crossing proposed.	Fail	This option fails to meet the project objective. The space required to implement this solution will have a significant impact on the residents off Merrion Village during construction of the works, potentially restricting vehicular access for a prolonged period of time.
Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site. This option will require a deviation from the standards (with reduced design speeds and tight vertical and horizontal road geometry) to provide a vehicular solution which limits the impact on the surrounding properties.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.
Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.
Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.
Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.	Pass	This option meets the project objective, albeit at a minimum level. The use of 1:12 ramp gradients is not desirable to provide an appropriate level of access for those with disabilities. Further mitigation measures may need to be considered, such as intermediate landings, to ensure that pedestrian routes are accessible	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists. This option would incorporate pedestrian and cycle access which is independent of the vehicular ramps.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists. This option would incorporate pedestrian and cycle access which is independent of the vehicular ramps.
Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency service in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sydney Parade Avenue on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency service in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sydney Parade Avenue on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency service in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sydney Parade Avenue on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency service in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Sydney Parade Avenue on both sides of the crossing.
Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**	Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**	Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment.**	Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**

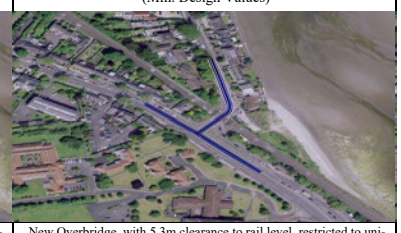
Appendix A.6: Longlist Infrastructure Options Sift – Merrion Gates

Longlist Concept Options (Infrastructure) Sift Sheet
Merrion Gate (MG)

	Assessment Criteria	Descrition	Option 0 Existing Arrangement Do Minimum / Do Nothing		Option P-1a New Footbridge with Linear Ramp Access (Des. Design Values)		Option P-1b New Footbridge with Linear Ramp Access (Min. Design Values)		Option P-2a New Footbridge with Compressed Ramp Access (Des. Design Values)	
										
			Retain the Level Crossing (XR005) at Merrion Gates. No significant infrastructure interventions are considered.		New Footbridge, with 5.3m clearance to rail level, and 1:20 gradient linear ramp access. Ramps positioned along the existing Road.		New Footbridge, with 5.3m clearance to rail level, and reduced length of ramps by use of 1:12 gradient linear ramp access. Ramps positioned along the existing Road.		New Footbridge, with 5.3m clearance to rail level, and 1:20 gradient compressed ramp access. Ramps can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.	
			Pass/Fail	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**
1	**Project Specific Objective**	Deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Fail	This option fails to meets the project objective as it does not contribute to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
2	**Project Specific Objective**	Deliver solutions which improve the passenger experience where passenger infrastructure interventions are required to meet the planned increase in DART service frequency.	Fail	This option fails to meet the project objective as no new infrastructure is provided which allows for uninterrupted passage across the rail corridor for the public.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for the public.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for the public.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for the public.
3	**Project Specific Objective**	Deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.
4	**Project Specific Objective**	Identify cost-effective solutions from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.
5	**Project Specific Objective**	Minimise adverse impacts on the natural and built environment associated with the construction, operation and maintenance of the project.	Pass	This option meets the project objective as it has a minimal impact on the natural and built environment during construction, operation and maintenance, as the existing level crossing is to be retained and no new crossing is proposed.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Strand Road, potentially requiring extensive CPO of lands.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Strand Road, potentially requiring extensive CPO of lands.	Pass	This option meets the project objective as it has a minimal impact on the natural and built environment during construction, operation and maintenance, relative to the form of crossing proposed.
6	**Project Specific Objective**	Minimise adverse impacts on existing rail services, road users and landowners associated with the construction, operation and maintenance of the project.	Pass	This option meets the project objective as it has a minimal impact on existing rail services, road users and landowners during construction, operation and maintenance, as the existing level crossing is to be retained and no new crossing is proposed.	Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.	Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.	Pass	This option meets the project objective as it has a minimal impact on existing rail services, road users and landowners during construction, operation and maintenance, relative to the form of crossing proposed.
7	**Project Specific Objective**	Provide efficient and cost-effective integration of systems with the other DART+ Programme projects.	Fail	This option fails to meet the project objective as retaining the level crossing maintains constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
8	**Project Specific Requirement**	Designs are in accordance with IÉ Standards and relevant national and EU standards and guidelines.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.
9	**Project Specific Requirement**	Designs shall comply with the Minimum Employer's Functional Requirements and meet the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.
10	**Project Specific Requirement**	Provide an appropriate level of vehicular access across the railway line to/from Sandymount Village and neighbouring areas for all modes.	Fail	This option fails to meet the project objective. Due to the increased barrier closure times as a result of the planned increase in DART service frequency between Greystones and Dublin City Centre, the existing accessibility at the crossing cannot be maintained as no segregated vehicular crossing is provided.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.
11	**Project Specific Requirement**	Provide an appropriate level of accessibility at a local level for pedestrians and cyclists.	Fail	This option fails to meet the project objective. Due to the increased barrier closure times as a result of the planned increase in DART service frequency between Greystones and Dublin City Centre, the existing accessibility at the crossing cannot be maintained as no segregated pedestrian/cyclist crossing is provided.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.	Pass	This option meets the project objective, albeit at a minimum level. The use of 1:12 ramp gradients is not desirable to provide an appropriate level of access for those with disabilities. Further mitigation measures may need to be considered, such as intermediate landings, to ensure that pedestrian routes are accessible.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.
12	**Project Specific Requirement**	Provide an appropriate level of accessibility for emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, due to the increased barrier closure times as a result of the planned increase in DART service frequency between Greystones and Dublin City Centre the crossing will effectively block off both private vehicular access and emergency vehicle access across the railway line.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time.
		Overall Pass/Fail	Fail	**This option fails to meet the following project specific objectives and requirements: - Deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre; - Deliver solutions which improve the passenger experience where passenger infrastructure interventions are required to meet the planned**	Fail	**This option fails to meet the following objectives: - Minimise adverse impacts on the natural and built environment; - Minimise adverse impacts on existing rail services, road users and landowners.**	Fail	**This option fails to meet the following objectives: - Minimise adverse impacts on the natural and built environment; - Minimise adverse impacts on existing rail services, road users and landowners.**	Pass	**This option meets all project objectives and requirements; therefore, it passes the assessment.**

Option P-2b New Footbridge with Compressed Ramp Access (Min. Design Values)		**Option P-3a** New Footbridge with Non-Linear Ramp Access (Des. Design Values)		**Option P-3b** New Footbridge with Non-Linear Ramp Access (Min. Design Values)		**Option P-4a** New Footbridge with Stair & Lift Access (Des. Design Values)		**Option P-4b** New Footbridge with Stair & Lift Access (Min. Design Values)	
									
New Footbridge, with 5.3m clearance to rail level, and reduced length of ramps by use of 1:12 gradient linear ramp access. Ramps can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.		New Footbridge, with 5.3m clearance to rail level, and 1:20 gradient non linear ramp access. Ramps can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.		Option not developed as no advantages provided over Option P-3a.		New Footbridge, with 5.3m clearance to rail level, 2nb. Lifts at each side of crossing and full width ped/cycleway. Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.		New Footbridge, with 5.3m clearance to rail level, 1nb. Lifts at each side of crossing and minimum width ped/cycleway. Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.	
Pass/Fail	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**
Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.			Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for the public.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for the public.			Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for the public.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for the public.
Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.			Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.
Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.			Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.
Pass	This option meets the project objective as it has a minimal impact on the natural and built environment during construction, operationand maintenance, as the existing level crossing is to be retained and no new crossing is proposed.	Pass	This option meets the project objective as it has a minimal impact on the natural and built environment during construction, operationand maintenance, relative to the form of crossing proposed.			Pass	This option meets the project objective as it has a minimal impact on the natural and built environment during construction, operationand maintenance, relative to the form of crossing proposed.	Pass	This option meets the project objective as it has a minimal impact on the natural and built environment during construction, operationand maintenance, relative to the form of crossing proposed.
Pass	This option meets the project objective as it has a minimal impact on existing rail services, road users and landowners during construction, operation and maintenance, relative to the form of crossing proposed.	Pass	This option meets the project objective as it has a minimal impact on existing rail services, road users and landowners during construction, operation and maintenance, relative to the form of crossing proposed.			Pass	This option meets the project objective as it has a minimal impact on existing rail services, road users and landowners during construction, operation and maintenance, relative to the form of crossing proposed.	Pass	This option meets the project objective as it has a minimal impact on existing rail services, road users and landowners during construction, operation and maintenance, relative to the form of crossing proposed.
Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.			Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.			Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.
Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.			Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.
Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.			Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.
Pass	This option meets the project objective, albeit at a minimum level. The use of 1:12 ramp gradients is not desirable to provide an appropriate level of access for those with disabilities. Further mitigation measures may need to be considered, such as intermediate landings, to ensure that pedestrian routes are accessible.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.			Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.
Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time.			Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time.
Pass	**This option meets all project objectives and requirements; therefore, it passes the assessment.**	Pass	**This option meets all project objectives and requirements; therefore, it passes the assessment.**			Pass	**This option meets all project objectives and requirements; therefore, it passes the assessment.**	Pass	**This option meets all project objectives and requirements; therefore, it passes the assessment.**

Option P-5a New Subway with Linear Ramp Access (Des. Design Values)		**Option P-5b** New Subway with Linear Ramp Access (Min. Design Values)		**Option P-6a** New Subway with Stair & Lift Access (Des. Design Values)		**Option P-6b** New Subway with Stair & Lift Access (Min. Design Values)		**Option P-7a** Modification of Existing Grade Separated Crossing (IÉ Asset)	
									
New Subway, with 2.6m clearance, and 1:20 gradient linear ramp access. Ramps positioned along the existing Road.		New Subway, with 2.6m clearance, and reduced length of ramps by use of 1:12 gradient linear ramp access. Ramps positioned along the existing Road.		New Subway, with 2.6m clearance, 2nb. Lifts at each side of crossing and full width ped/cycleway. Access can be positioned to minimise impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.		New Subway, with 2.6m clearance, 1nb. Lifts at each side of crossing and minimum width ped/cycleway. Access can be positioned to minimis impacts on adjacent properties through best use of IÉ, public and 3rd Party lands.		Option not developed as there is no existing infrastructure crossing the rail at this location.	
Pass/Fail	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**
Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.		
Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for the public.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for the public.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for the public.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for the public.		
Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.		
Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.		
Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Strand Road, potentially requiring extensive CPO of lands.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Strand Road, potentially requiring extensive CPO of lands.	Pass	This option meets the project objective as it has a minimal impact on the natural and built environment during construction, operationand maintenance, relative to the form of crossing proposed.	Pass	This option meets the project objective as it has a minimal impact on the natural and built environment during construction, operationand maintenance, relative to the form of crossing proposed.		
Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.	Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.	Pass	This option meets the project objective as it has a minimal impact on existing rail services, road users and landowners during construction, operation and maintenance.	Pass	This option meets the project objective as it has a minimal impact on existing rail services, road users and landowners during construction, operation and maintenance.		
Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.		
Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.		
Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.		
Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.		
Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.	Pass	This option meets the project objective, albeit at a minimum level. The use of 1:12 ramp gradients is not desirable to provide an appropriate level of access for those with disabilities. Further mitigation measures may need to be considered, such as intermediate landings, to ensure that pedestrian routes are accessible.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.		
Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time.		
Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**	Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**	Pass	**This option meets all project objectives and requirements; therefore, it passes the assessment.**	Pass	**This option meets all project objectives and requirements; therefore, it passes the assessment.**		

Option P-7b Modification of Existing Grade Separated Crossing (3rd Party Asset)		**Option V-1a** New Overbridge for Existing Road with Bi-directional Traffic System (Des. Design Values)		**Option V-1b** New Overbridge for Existing Road with Bi-directional Traffic System (Min. Design Values)		**Option V-2a** New Overbridge for Existing Road with Uni-directional Traffic System (Des. Design Values)		**Option V-2b** New Overbridge for Existing Road with Uni-directional Traffic System (Min. Design Values)	
✕									
Option not developed as there is no existing infrastructure crossing the rail at this location.		New Overbridge, with 5.3m clearance to rail level, allowing bi-directional traffic movements and desirable approach gradients on the road either side of the crossing.		New Overbridge, with 5.3m clearance to rail level, allowing bi-directional traffic movements and minimum approach gradients on the road either side of the crossing.		New Overbridge, with 5.3m clearance to rail level, restricted to uni-directional traffic movements and desirable approach gradients on the road either side of the crossing.		New Overbridge, with 5.3m clearance to rail level, restricted to uni-directional traffic movements and minimum approach gradients on the road either side of the crossing.	
Pass/Fail	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**
		Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
		Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for the public.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for the public.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for the public.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for the public.
		Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.
		Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.
		Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Strand Road and Merrion Road on both sides of the crossing, potentially requiring extensive CPO of lands.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Strand Road and Merrion Road on both sides of the crossing, potentially requiring extensive CPO of lands.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Strand Road and Merrion Road on both sides of the crossing, potentially requiring extensive CPO of lands.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Strand Road and Merrion Road on both sides of the crossing, potentially requiring extensive CPO of lands.
		Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.	Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.	Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.	Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.
		Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
		Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.
		Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.
		Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.
		Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.	Pass	This option meets the project objective, albeit at a minimum level. The use of 1:12 ramp gradients is not desirable to provide an appropriate level of access for those with disabilities. Further mitigation measures may need to be considered, such as intermediate landings, to ensure that pedestrian routes are accessible.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.	Pass	This option meets the project objective, albeit at a minimum level. The use of 1:12 ramp gradients is not desirable to provide an appropriate level of access for those with disabilities. Further mitigation measures may need to be considered, such as intermediate landings, to ensure that pedestrian routes are accessible.
		Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Merrion Gates on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Merrion Gates on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Merrion Gates on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Merrion Gates on both sides of the crossing.
		Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**	Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**	Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**	Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**

Option V-3a New Underpass for Existing Road with Bi-directional Traffic System (Des. Design Values)		**Option V-3b** New Underpass for Existing Road with Bi-directional Traffic System (Min. Design Values)	
New Underpass, with 5.3m clearance, allowing bi-directional traffic movements and desirable approach gradients on the road either side of the crossing.		New Underpass, with 5.3m clearance, allowing bi-directional traffic movements and minimum approach gradients on the road either side of the crossing.	
Pass/Fail	**Rationale**	**Pass/Fail**	**Rationale**
Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for the public.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for the public.
Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.
Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.
Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Strand Road and Merrion Road on both sides of the crossing, potentially requiring extensive CPO of lands	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Strand Road and Merrion Road on both sides of the crossing, potentially requiring extensive CPO of lands
Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.	Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.
Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.
Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.
Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.
Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.	Pass	This option meets the project objective, albeit at a minimum level. The use of 1:12 ramp gradients is not desirable to provide an appropriate level of access for those with disabilities. Further mitigation measures may need to be considered, such as intermediate landings, to ensure that pedestrian routes are accessible.
Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Merrion Gates on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Merrion Gates on both sides of the crossing.
Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**	Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**

Option V-4a New Underpass for Existing Road with Uni-directional Traffic System (Des. Design Values)		**Option V-4b** New Underpass for Existing Road with Uni-directional Traffic System (Min. Design Values)		**Option V-5a** New Overpass, Alternative Location		**Option V-5b** New Underpass, Alternative Location		**Option V-5c** New Overpass, Alternative Location	
New Underpass, with 5.3m clearance, restricted to uni-directional traffic movements and desirable approach gradients on the road either side of the crossing.		New Underpass, with 5.3m clearance, restricted to uni-directional traffic movements and minimum approach gradients on the road either side of the crossing.		New connection between Strand Road (East of Railway, south of St. Albans Park Jnc.) and Merrion Road (West of Railway, north of Herbert Park Jnc.) crossing over the railway south of Footbridge (OBR65A).		New connection between Strand Road (East of Railway, south of St. Albans Park Jnc.) and Merrion Road (West of Railway, north of Herbert Park Jnc.) crossing under the railway south of Footbridge (OBR65A).		New connection between Strand Road (East of Railway) and Merrion Road (West of Railway) crossing over the railway south of Merrion Gates Bus Stop 424.	
Pass/Fail	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**	**Pass/Fail**	**Rationale**
Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for the public.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for the public.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for the public.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for the public.	Pass	This option meets the project objective as it provides infrastructure which allows for uninterrupted passage across the rail corridor for the public.
Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering a sustainable, low carbon and climate resilient design solution for the project.
Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.	Pass	This option meets the project objective as it provides for a cost-effective solution from a capital, operations, and maintenance perspective.
Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Strand Road and Merrion Road on both sides of the crossing, potentially requiring extensive CPO of lands	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the surrounding residential properties. In particular, this option blocks off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Strand Road and Merrion Road on both sides of the crossing, potentially requiring extensive CPO of lands	Pass	This option meets the project objective as it has a minimal impact on the natural and built environment during construction, operationand maintenance, relative to the form of crossing proposed. This option will require CPO of the church carpark to allow installation of the southern ramp, but will avoid on directly impacting the church building. This option will require CPO of some of the car-parking space of Merrion Hall, along with the northern access lane.	Pass	This option meets the project objective as it has a minimal impact on the natural and built environment during construction, operationand maintenance, relative to the form of crossing proposed. This option will require CPO of the church carpark to allow installation of the southern ramp, but will avoid on directly impacting the church building. This option will require CPO of some of the car-parking space of Merrion Hall, along with the northern access lane.	Fail	This option fails to meet the project objective. The space required to implement this solution will have unacceptable impacts on the natural and built environment. In particular, this option would require CPO of property associated with St Mary's care facility and would also impact on access to this property. This option would also require extensive temporary and permanent works within the Merrion Strand seafront to accommodate the approach ramp on the eastern side.
Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.	Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.	Pass	This option meets the project objective as it has a minimal impact on existing rail services, road users and landowners during construction, operation and maintenance, relative to the form of crossing proposed.	Pass	This option meets the project objective as it has a minimal impact on existing rail services, road users and landowners during construction, operation and maintenance, relative to the form of crossing proposed.	Fail	This option fails to meet the project objective. The space required to implement this solution will have impacts on a number of existing landowners adjacent to the proposed solution, since access to these properties will be blocked.
Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	This option meets the project objective as it contributes to removing constraints on the existing line to deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.
Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.	Pass	This option meets the project objective as it provides a solution which is in accordance with the relevant standards and guidelines taking into account the constraints of the site.
Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.	Pass	This option meets the project objective as it provides a solution which complies with the Minimum Employer's Functional Requirements and meets the Train Service Specification.
Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.	Pass	This option meets the project objective as the proposed infrastructure solution contributes to delivering appropriate connectivity across the railway line as part of the accessibility options being considered.
Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.	Pass	This option meets the project objective, albeit at a minimum level. The use of 1:12 ramp gradients is not desirable to provide an appropriate level of access for those with disabilities. Further mitigation measures may need to be considered, such as intermediate landings, to ensure that pedestrian routes are accessible.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for both pedestrians and cyclists.
Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Merrion Gates on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Merrion Gates on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Merrion Gates on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Merrion Gates on both sides of the crossing.	Pass	This option meets the project objective as it provides an appropriate level of accessibility for emergency services in terms of catchment and response time. However, the space required to implement this solution will block off both private vehicular access and emergency vehicle access to multiple residential properties along the length of Merrion Gates on both sides of the crossing.
Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**	Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**	Pass	**This option meets all project objectives and requirements; therefore, it passes the assessment.**	Pass	**This option meets all project objectives and requirements; therefore, it passes the assessment.**	Fail	**This option fails to meet the following objectives:** **- Minimise adverse impacts on the natural and built environment;** **- Minimise adverse impacts on existing rail services, road users and landowners.**

Appendix B: MCA Matrix

Appendix B.1: Accessibility Options

				Economy							
				Capital Expenditure (CAPEX): Construction, land acquisition, temporary works		Operational Costs (OPEX): (IÉ or other entities), Technology advancements and future proofing/obsolescence		Train Operations Functionality/Economic Benefit		Traffic functionality and associated economic activities and opportunities	
Works Description	**Summary of Requirements**	**Option Number**	**Description of Option**	**Qualitative appraisal of potential infrastructure costs of proposed options**	**Rationale**	**Qualitative appraisal of potential ongoing infrastructure maintenance costs of proposed options**	**Rationale**	**Qualitative appraisal of potential ongoing operational costs of proposed options**	**Rationale**	**Qualitative appraisal of potential wider benefits of proposed options**	**Rationale**
				Estimate high level cost of construction of option. Extent and type of 3rd party lands required permanently. Extent and type of 3rd party land required temporarily for temporary works during construction.		Cost to maintain the infrastructure over the whole life. Effects of infrastructure maintenance to services. Provision of ways of undertaking routine inspections and maintenance activities while minimising the effect on service to customers.		Potential improvement or deterioration of the operation conditions of the line (reduction or increase of the risk of interruption of service). Increased DART service improving connectivity and economy (leading to increased competition in economy, increased output of firms, increased tax revenue).		Potential benefit to vehicular traffic flows in the vicinity of the works during construction and associated economic activities and opportunities in the vicinity. Consideration of duration of traffic disruption and length of diversions. To minimise the impacts on traffic and transportation during the construction and operational stages.	
MCA 7: Regional Accessibility Options for the Sandymount Area.	To provide an appropriate level of vehicular access for all modes to facilitate access to/from Sandymount Village and neighbouring areas for all modes. To provide an appropriate level of accessibility at a local level for pedestrians and cyclists. To provide an appropriate level of accessibility for emergency services (Fire Brigades, Hospitals) in terms of catchment and response time.	**2C**	Railway At-Grade, All Level Crossings Closed, 1 New Grade Separated Full Crossing at Merrion Gate North + 4 Ped/Cycle Crossings.		Option 2C has a comparative advantage over the other options under the 'CAPEX' sub-criteria. The differences between the options is approx. 25% and therefore considered as a comparative difference based on the high level of the cost estimate.		Option 2C has a comparative advantage over the other options under the 'OPEX' sub-criteria. By not requiring the provision of the additional underpass with associated maintenance of drainage and restricted road geometry is considered as a comparative difference.		All Options are comparable under the 'Train Operations' sub-criteria. All options meet the Train Service Specification.		Option 2C has a comparative disadvantage over Option 4D under the 'Traffic' sub-criteria. Both options will result in a more pronounced impact in terms of the increase in volumes along the M50, North Strand Road and local roads such as Merrion Road, Northumberland Road, Shelbourne Road, and Bath Avenue. The assessment of traffic functionality shows that the provision of one unrestricted crossing is sufficient. However, clearly, the provision of two unrestricted crossings is advantageous in this regard.
		4D	Railway At-Grade, All Level Crossings Closed, 2 New Grade Separated Full Crossings at Serpentine Avenue and Merrion Gate North + 3 Ped/Cycle Crossings.		Option 4D has a comparative disadvantage over the other options under the 'CAPEX' sub-criteria. This is the most expensive option, approx. 25% more than Option 2C, and requires the CPO of business premises to provide a vehicle crossing at Serpentine Avenue. Therefore it is considered as a comparative difference based on the high level of the cost estimate.		Option 4D has a comparative disadvantage over the other options under the 'OPEX' sub-criteria. The provision of the additional underpass with associated maintenance of drainage and restricted road geometry is considered as a comparative difference.		All Options are comparable under the 'Train Operations' sub-criteria. All options meet the Train Service Specification.		Option 4D has a comparative advantage over the other options under the 'Traffic' sub-criteria. Both options will result in a more pronounced impact in terms of the increase in volumes along the M50, North Strand Road and local roads such as Merrion Road, Northumberland Road, Shelbourne Road, and Bath Avenue. The assessment of traffic functionality shows that the provision of one unrestricted crossing is sufficient. However, clearly, the provision of two unrestricted crossings is advantageous in this regard.

Safety									
Employer's Safety		**Public Safety**		**Landscape and Visual Qualitative**		**Biodiversity**		**Noise and Vibration**	
Qualitative appraisal on the safety impacts on IÉ or railway staff	**Rationale**	**Qualitative appraisal on the safety impacts on the public (road/rail/cycle/pedestrian)**	**Rationale**	**Appraisal of landscape and visual impacts of options based on the sensitive viewpoints**	**Rationale**	**Qualitative appraisal on the impact on biodiversity**	**Rationale**	**Qualitative appraisal of the potential noise and vibration impact**	**Rationale**
To reduce safety risks associated with construction maintenance and operations. To reduce the potential for incidents or near-misses for IÉ/construction staff.		To reduce safety risks associated with passengers at platforms, public adjacent to the railway and road, pedestrian and cycle users at level crossings. To reduce the potential for accidents for members of the public/passengers on railway infrastructure. To reduce the potential for conflict between rail and road users.		To avoid / minimise impact on designated amenities, landscapes, protected trees or views. To avoid / minimise visual impact on properties & amenities. To avoid / minimise removal of trees / hedgerows. To avoid / minimise impact from light pollution. To provide opportunities to enhance the local amenity and green infrastructure.		To consider effects on biodiversity of the area and/, such as impacts on specific flora or fauna, or on defined habitats. To provide opportunities to enhance biodiversity. To ensure that impacts on nature conservation resources are prevented and mitigated. These can occur through direct loss or damage to habitat or specific species, creation of barriers to population movement or indirect effects resulting from, for example, changes in water quality of levels, air quality or noise and light levels.		To provide a solution which ensures minimum levels of noise and vibration.	
	All Options are comparable under the 'Employer's Safety' sub-criteria. It is not envisaged that IÉ staff will be responsible for carrying out activities in relation to maintaining, inspecting or monitoring the new assets.		All Options are comparable under the 'Public Safety' sub-criteria. Both options eliminate the level crossing risk by completely closing the crossing.		All Options are comparable under the 'Landscape and Visual' sub-criteria. It is unlikely that the difference between the three options will be enough to create a significant effect. The impacts are more significant at a Local Level.		All Options are comparable under the 'Biodiversity' sub-criteria. It is unlikely that the difference between the three options will be enough to create a significant effect. The impacts are more significant at a Local Level.		All Options are comparable under the 'Noise and Vibration' sub-criteria. It is unlikely that the difference in traffic flow between the three options will be enough to create a significant effect. Traffic noise modelling would be required to ascertain whether there is a significant increase/decrease in traffic noise, which is not available at this stage. During the construction stage it is expected that Option 2C should have a reduced impact in relation to noise & vibration, due to the shorter construction duration as a result of the provision of only 1 vehicular crossing at Merrion Gates North. While each of the options will produce a slightly different level of
	All Options are comparable under the 'Employer's Safety' sub-criteria. It is not envisaged that IÉ staff will be responsible for carrying out activities in relation to maintaining, inspecting or monitoring the new assets.		All Options are comparable under the 'Public Safety' sub-criteria. Both options eliminate the level crossing risk by completely closing the crossing.		All Options are comparable under the 'Landscape and Visual' sub-criteria. It is unlikely that the difference between the three options will be enough to create a significant effect. The impacts are more significant at a Local Level.		All Options are comparable under the 'Biodiversity' sub-criteria. It is unlikely that the difference between the three options will be enough to create a significant effect. The impacts are more significant at a Local Level.		All Options are comparable under the 'Noise and Vibration' sub-criteria. It is unlikely that the difference in traffic flow between the three options will be enough to create a significant effect. Traffic noise modelling would be required to ascertain whether there is a significant increase/decrease in traffic noise, which is not available at this stage. During the construction stage it is expected that Option 4D should have an increased impact in relation to noise & vibration, due to the longer construction duration as a result of the provision of 2 vehicular crossing at Serpentine Avenue and Merrion Gates North. While each of the options will produce a slightly different level of

Environment

Water Resources		Archaeology, Architectural and Cultural Heritage		Geology & Soils		Agricultural and Non-agricultural		Air Quality & Climate Change	
Qualitative appraisal on the potential impacts to surface ground or coastal waters	**Rationale**	**Qualitative appraisal of the potential impacts of proposed options on potential sub surface archaeology and impact on foundations and above ground elements of architectural heritage**	**Rationale**	**Qualitative appraisal of the potential of the proposed options on waste and material resources including the reuse of site won materials.**	**Rationale**	**Qualitative appraisal of impacts on valued resources either from a human or natural origin with value arising for economic or cultural reasons. These assets can be existing utilities or non-renewable resources**	**Rationale**	**Qualitative appraisal of air quality and climate impacts both on the operational and construction phases**	**Rationale**
To minimise the impact or provide opportunities to enhance the quality of surface waters and associated floodplains, ground waters and coastal waters.		The construction, presence and operation of transport infrastructure can impact directly on such cultural heritage resources through physical impacts resulting from direct loss or damage, or indirectly through changes in setting, noise and vibration levels, air quality, and water levels. To minimise the impact on cultural heritage such as on below ground archaeological remains, historic buildings (individual and areas), and historic landscapes and parks.		To consider the impacts on designated areas of geological interest, unstable natural ground and ground contamination. To consider the impacts on agricultural soil and sensitive or vulnerable soils and material resources, including the reuse of site won materials.		Qualitative appraisal of impacts on valued resources either from a human or natural origin with value arising for economic or cultural reasons. These assets can be existing utilities or non-renewable resources.		Impacts of Construction Traffic. Improvements in air quality through use of EMUs over DMUs. Improvements in greenhouse gas emission through modal shift from road to rail. Improvements in greenhouse gas emission through use of EMUs over DMUs. Reduction in greenhouse gas emissions. Preservation or enhancement the local air quality.	
	Option 2C has a comparative advantage over Option 4D under the 'Water Resource' sub-criteria. Construction at Serpentine Avenue of both a vehicle underpass and ped/cycle subway requires more excavation which has the potential to impact the groundwater and possible intervention to avoid flooding would need to be considered.		Option 2C has a comparative advantage over Option 4D under the 'Archaeology, Architectural and Cultural Heritage' sub-criteria. Construction of a ped/cycle only subway requires less excavation, when compared to that of an additional vehicle underpass, and therefore has less potential to reveal previously undisturbed archaeological deposits.		Option 2C has a comparative advantage over Option 4D under the 'Geology & Soils' sub-criteria. The proposed works for Option 2C does not consider a vehicle crossing to be accomodated at Serpentine Avenue. Therefore the required excavation works that are required will generate comparatively less significant surplus earthworks materials, both made ground and natural materials.		All Options are comparable under the 'Agricultural and Non-agricultural' sub-criteria.		All options are comparable under the 'Air Quality & Climate Change' sub-criteria. Each option will result in some increases and decreases in air quality at a local level, so can be considered comparable.
	Option 2C has a comparative advantage over Option 4D under the 'Water Resource' sub-criteria. Construction at Serpentine Avenue of both a vehicle underpass and ped/cycle subway requires more excavation which has the potential to impact the groundwater and possible intervention to avoid flooding would need to be considered.		Option 4D has a comparative disadvantage over Option 2C under the 'Archaeology, Architectural and Cultural Heritage' sub-criteria. Construction of both a vehicle underpass and ped/cycle only subway requires more excavation, when compared to that of a ped/cycle only subway, and therefore has less potential to reveal previously undisturbed archaeological deposits.		Option 4D has a comparative disadvantage over Option 2C under the 'Geology & Soils' sub-criteria. The proposed works for Option 4D consist of an additional vehicle underpass to be constructed at Serpentine Avenue. The excavation works required will generate comparatively significant surplus earthworks materials, both made ground and natural materials. Due to the limited reuse options, these materials would require recovery or off site disposal.		All Options are comparable under the 'Agricultural and Non-agricultural' sub-criteria.		All options are comparable under the 'Air Quality & Climate Change' sub-criteria. Each option will result in some increases and decreases in air quality at a local level, so can be considered comparable.

Accessibility & Social Inclusion				Integration					
Accessibility		Social Inclusion		Adaptability in the Future		Transport Integration		Land Use Integration	
Qualitative appraisal of capacity of options to facilitate the movement of people (either within, on to or across the rail system)	**Rationale**	**Qualitative appraisal of capacity of options to provide ease of access for the mobility and visually impaired**	**Rationale**	**Qualitative appraisal of capacity of options to cater for future projects or aspirations**	**Rationale**	**Qualitative appraisal of the options and their impact on integration with other transport modes**	**Rationale**	**Qualitative appraisal of the options and their impact on integration with land use policies**	**Rationale**
Capacity of options to facilitate the movement of people (either within, on to or across the rail system). Impact on the wellbeing of the passenger and public. Positive impact on passenger and public experience. Improve accessibility to key facilities, such as employment, education, transport and healthcare to satisfy transport demand for all trip types.		Positive impact towards vulnerable groups Improvement of accessibility to public transport facilities, in particular from deprived geographic areas.		Allowance for future internal transport links within Ireland.		Similarity of systems with other DART+ Programmes. The solution proposed should integrate with other transport systems such as DART+ West, Metrolink and light rail lines, local and national traffic road systems, walkways, and cycleways.		Integration with land use policies and objectives. Integration with regional and local land use plans. Adhesion to regional and local plans and policies.	
	Option 2C has a comparative disadvantage over the other options under the 'Accessibility' sub-criteria. While the provision of only one unrestricted crossing would reduce local connectivity for vehicles to work, school, college, and local amenities it is deemed sufficient from a vehicle connectivity perspective. In terms of emergency vehicle access, the number of alternative route options to cross into the Sandymount area from either the Donnybrook fire station or the Dublin fire station would also be reduced for Option 2C, although consultation with the fire services has indicated this would not be a significant issue. For both options unrestricted connectivity for pedestrians and cyclists is provided.		All Options are comparable under the 'Social Inclusion' sub-criteria. All options provide unrestricted movements for pedestrians and cyclists.		All Options are comparable under the 'Adaptability in the Future' sub-criteria. All options have the same impacts to vehicle crossing closure and provide unrestricted pedestrian/cycle crossings.		All Options are comparable under the 'Transport Integration' sub-criteria. All options provide good integration with other forms of public transport (bus network in particular) in Sandymount through the provision of a full corssing at Merrion Gates for all modes.		All Options are comparable under the 'Land Use Integration' sub-criteria. All options comply with policies to increase use of public transport.
	Option 4D has a comparative advantage over the other options under the 'Accessibility' sub-criteria. The provision of two unrestricted level crossings at Serpentine Avenue and Merrion Gates would ensure a similar level of vehicular accessibility is maintained across the railway line, with a reduced impact network wide and in the immediate study area in terms of queueing and delays. For both options unrestricted connectivity for pedestrians and cyclists is provided.		All Options are comparable under the 'Social Inclusion' sub-criteria. All options provide unrestricted movements for pedestrians and cyclists.		All Options are comparable under the 'Adaptability in the Future' sub-criteria. All options have the same impacts to vehicle crossing closure and provide unrestricted pedestrian/cycle crossings.		All Options are comparable under the 'Transport Integration' sub-criteria. All options provide good integration with other forms of public transport (bus network in particular) in Sandymount through the provision of a full corssing at Merrion Gates for all modes.		All Options are comparable under the 'Land Use Integration' sub-criteria. All options comply with policies to increase use of public transport.

				Physical Activity	
Geographical Integration		**Government Policy Integration**		**Walking/Cycling Opportunities**	
Qualitative appraisal of the options and their impact on integration with geographical polices	**Rationale**	**Qualitative appraisal of the options and their impact on integration with geographical and government polices**	**Rationale**	**Qualitative appraisal of the options and their impact to enable walking and cycling opportunities in a safer environment for the communities along the route**	**Rationale**
Integration with land use policies and objectives. Integration with regional and local land use plans.		Integration with national and international plans and policies.		To enable walking and cycling opportunities in a safer environment in the communities along the route. To create a healthy environment conducive to active travel.	
	All Options are comparable under the 'Geographical Integration' sub-criteria. All options comply with policies to increased use of public transport.		Under the Climate Action Plan 2023, the policy direction in terms of active mobility and modal shift from the private car is strengthened considerably, such that there is an argument that Option 2C with only one unrestricted vehicular crossing has a comparative advantage over Option 4D, which provides two vehicular crossings.		Option 2C has a comparative advantage over Option 4D under the 'Walking/Cycling Opportunities' sub-criteria. The provision of only one unrestricted level crossing offers significant opportunity to enhance the active travel corridor at Serpentine Avenue due to the footprint saving in not having to provide a vehicle crossing in this area. Therefore, the subway can be maximised to provide a more attractive ped/cycle crossing than when provided adjacent to the vehicle crossing due to the horizontal space constraints.
	All Options are comparable under the 'Geographical Integration' sub-criteria. All options comply with policies to increased use of public transport.		Under the Climate Action Plan 2023, the policy direction in terms of active mobility and modal shift from the private car is strengthened considerably, such that there is an argument that Option 2C with only one unrestricted vehicular crossing has a comparative advantage over Option 4D, which provides two vehicular crossings.		Option 4D has a comparative disadvantage over Option 2C under the 'Walking/Cycling Opportunities' sub-criteria. The provision of only one unrestricted level crossing offers significant opportunity to enhance the active travel corridor at Serpentine Avenue due to the footprint saving in not having to provide a vehicle crossing in this area. Therefore, the subway can be maximised to provide a more attractive ped/cycle crossing than when provided adjacent to the vehicle crossing due to the horizontal space constraints.

Appendix B.2: Lansdowne Road Pedestrian / Cyclist Only Crossing Options

				Economy							
				Capital Expenditure (CAPEX): Construction, land acquisition, temporary works		Operational Costs (OPEX): (IÉ or other entities), Technology advancements and future proofing/obsolescence		Train Operations Functionality/Economic Benefit		Traffic functionality and associated economic activities and opportunities	
Works Description	**Summary of Requirements**	**Option Number**	**Description of Option**	**Qualitative appraisal of potential infrastructure costs of proposed options**	**Rationale**	**Qualitative appraisal of potential ongoing infrastructure maintenance costs of proposed options**	**Rationale**	**Qualitative appraisal of potential ongoing operational costs of proposed options**	**Rationale**	**Qualitative appraisal of potential wider benefits of proposed options**	**Rationale**
				Estimate high level cost of construction of option. Extent and type of 3rd party lands required permanently. Extent and type of 3rd party land required temporarily for temporary works during construction.		Cost to maintain the infrastructure over the whole life. Effects of infrastructure maintenance to services. Provision of ways of undertaking routine inspections and maintenance activities while minimising the effect on service to customers.		Potential improvement or deterioration of the operation conditions of the line (reduction or increase of the risk of interruption of service). Increased DART service improving connectivity and economy (leading to increased competition in economy, increased output of firms, increased tax revenue).		Potential benefit to vehicular traffic flows in the vicinity of the works during construction and associated economic activities and opportunities in the vicinity. Consideration of duration of traffic disruption and length of diversions. To minimise the impacts on traffic and transportation during the construction and operational stages.	
MCA 1: Local Infrastructure Options for the Pedestrian/Cycle Crossing at Lansdowne Road.	To provide an appropriate level of vehicular access for all modes to facilitate access to/from Sandymount Village and neighbouring areas for all modes. To provide an appropriate level of accessibility at a local level for pedestrians and cyclists. To provide an appropriate level of accessibility for emergency services (Fire Brigades, Hospitals) in terms of catchment and response time.	**LR-P-4**	New Footbridge with Stair & Lift Access		All Options are comparable under the 'CAPEX' sub-criteria. The differences between the options is approx. 2% so therefore not considered as a comparative difference based on the high level of the cost estimate.		Option LR-P-4 has a comparative disadvantage over Option LR-P-6 under the 'Operational Costs (OPEX)' sub-criteria. Footbridges tend to have a higher maintenance cost when compared to subways. This is largely due to maintenance on footbridges having a higher interface with the live railway, which require isolation of the lines for some activities. Use of non-conductive materials should be used and all materials should be adequately bonded to help mitigate the risks in undertaking maintenance activities. Should glass be considered as part of the solid parapet to provide visibility for user comfort, a safe methodology should be in place for glass cleaning which will require the isolation of the lines. Footbridges do not require the same level of drainage and prevention of flooding as subways do and can be further protected through provision of a roof structure overhead. Services integration should be carefully considered as part of the cable management system. Services should be combined into CMS where possible and run above structure and behind finishes.		All Options are comparable under the 'Train Operations' sub-criteria. All options meet the Train Service Specification.		All Options are comparable under the 'Traffic' sub-criteria. The impacts of closing the level crossing are the same for all options. The diversion of general traffic to other crossing locations in addition to the modification of the directional system will disrupt traffic flow during the construction and operational stage.
		LR-P-6	New Subway with Stair & Lift Access		All Options are comparable under the 'CAPEX' sub-criteria. The differences between the options is approx. 2% so therefore not considered as a comparative difference based on the high level of the cost estimate.		Option LR-P-6 has a comparative advantage over Option LR-P-4 under the 'Operational Costs (OPEX)' sub-criteria. Subways tend to have a lower maintenance cost when compared to footbridges due to nature of the crossing having minimal interface with the live railway. Therefore structural inspections and maintenance can be carried out without requiring isolation of the lines. Subways require more maintenance of drainage and prevention of flooding than a footbridge due to the sub-surface crossing. Water ingress should be managed so that it is drained away safely, and should be concealed behind ceiling finishes or wall panels. Panels should be opened at regular intervals in order to allow access for inspection, monitoring and maintenance. Pumps to manage and remove water ingress should be considered where necessary. Service integration should be contained within wall panels for ease of access.		All Options are comparable under the 'Train Operations' sub-criteria. All options meet the Train Service Specification.		All Options are comparable under the 'Traffic' sub-criteria. The impacts of closing the level crossing are the same for all options. The diversion of general traffic to other crossing locations in addition to the modification of the directional system will disrupt traffic flow during the construction and operational stage.

Safety										
Employer's Safety		**Public Safety**		**Landscape and Visual Qualitative**		**Biodiversity**		**Noise and Vibration**		
Qualitative appraisal on the safety impacts on IÉ or railway staff	**Rationale**	**Qualitative appraisal on the safety impacts on the public (road/rail/cycle/pedestrian)**	**Rationale**	**Appraisal of landscape and visual impacts of options based on the sensitive viewpoints**	**Rationale**	**Qualitative appraisal on the impact on biodiversity**	**Rationale**	**Qualitative appraisal of the potential noise and vibration impact**	**Rationale**	
To reduce safety risks associated with construction maintenance and operations. To reduce the potential for incidents or near-misses for IÉ/construction staff.		To reduce safety risks associated with passengers at platforms, public adjacent to the railway and road, pedestrian and cycle users at level crossings. To reduce the potential for accidents for members of the public/passengers on railway infrastructure. To reduce the potential for conflict between rail and road users.		To avoid / minimise impact on designated amenities, landscapes, protected trees or views. To avoid / minimise visual impact on properties & amenities. To avoid / minimise removal of trees / hedgerows. To avoid / minimise impact from light pollution. To provide opportunities to enhance the local amenity and green infrastructure.		To consider effects on biodiversity of the area and/, such as impacts on specific flora or fauna, or on defined habitats. To provide opportunities to enhance biodiversity. To ensure that impacts on nature conservation resources are prevented and mitigated. These can occur through direct loss or damage to habitat or specific species, creation of barriers to population movement or indirect effects resulting from, for example, changes in water quality of levels, air quality or noise and light levels.		To provide a solution which ensures minimum levels of noise and vibration.	
	All Options are comparable under the 'Employer's Safety' sub-criteria. It is not envisaged that IÉ staff will be responsible for carrying out activities in relation to maintaining, inspecting or monitoring the new assets.		All Options are comparable under the 'Public Safety' sub-criteria. Both options eliminate the level crossing risk by completely closing the crossing. While footbridges do not have the common perceptions on security that subways do, they have similarities that need to be considered. Areas should feel open and be well lit, avoiding corners and changes in direction where possible in order to open up clear lines of site, and avoid blind spots. They should be at least partially transparent from 1m above floor level, and enclosed passageways on footbridges should be minimised. The use of glazing on decks and stairs can open up visual connectivity, reduce the feeling of claustrophobia and increase passive surveillance and the perception of security. Lighting should provide uniform intensity and coverage, and allow all passengers to read information and signage clearly at all times of day.		Option LR-P-4 has a significantly comparative disadvantage over Option LR-P-6 under the 'Landscape and Visual' sub-criteria. There is a considerable visual impact to Lansdowne Road Station due to the close proximity of the footbridge which will represent a prominent visual element. The higher lift shafts will create overshadowing of the existing signal box. The most prominent visual element in this area will remain the Aviva Stadium, however, the footbridge will likely introduce a visual barrier of the stadium which could be considered to have cultural importance. There is a greater potential impact for loss of privacy and lighting from the footbridge on the Lansdowne Wood Apartments.		Option LR-P-4 has a comparative advantage over Option LR-P-6 under the 'Biodiversity' sub-criteria. The Dodder River is located c. 110m from the level crossing. Otter and kingfisher (Annex II species on the Habitat's Directive and Annex I species on the Bird's Directive, respectively) are known to be present on this river, which is also an important tributary of the River Liffey. A range of bat species also rely on the River for commuting and foraging along. Both options would be within the ZoI of these species, all of which would be sensitive to light, noise and vibration impacts in proximity to areas of suitable habitat. Foundation works will be required to construct the footbridge, however, less excavation is required when compared to constructing the subway, thereby requiring a shorter construction duration. The construction of the footbridge is likely to impact less on biodiversity in the area. The reduced construction duration will also reduce the amount of disturbance, and noise or vibration impacts on local wildlife.		All Options are comparable under the 'Noise and Vibration' sub-criteria. During the construction stage it is expected that Option LR-P-4 should have a reduced impact in relation to noise & vibration, due to the shorter construction duration. During the operational stage, it is expected that Option LR-P-4 would result in higher noise impacts due to the elevated crossing.
	All Options are comparable under the 'Employer's Safety' sub-criteria. It is not envisaged that IÉ staff will be responsible for carrying out activities in relation to maintaining, inspecting or monitoring the new assets.		All Options are comparable under the 'Public Safety' sub-criteria. Both options eliminate the level crossing risk by completely closing the crossing. A common perception of subways is that these spaces are dark and oppressive. Maximising visibility by providing clear lines of sight, avoiding corners and changes in direction, wide passageways and keeping ceilings as high as possible create a more expansive fell that improves the perception of security. Good lighting is crucial in subway spaces. Artificial lighting should have good colour rendering, and provide uniform intensity and coverage, at all times of day. Natural lighting should be used wherever possible, and this helps to improve the perception of security and creates a connection with the outside. When natural light is maximised at routes in and out of subways such as over a stair, natural light can assist with intuitive wayfinding. The existing emergency arrangements for the Aviva Stadium include the temporary closure of the rail lines and use of the level crossing to be used in evacuation. Option LR-P-6 provides the opportunity of minimal obstacles at surface level, which may hinder pedestrian flow, during this operation.		Option LR-P-6 has a significantly comparative advantage over Option LR-P-4 under the 'Landscape and Visual' sub-criteria. Due to the underground connection, there is minimal visual impact to Lansdowne Road Station. The most prominent visual element in this area will remain the Aviva Stadium, with minimal visual barrier introduced by the subway with only the lift shafts extend above street level. The potential impact for loss of privacy and lighting from the subway on the Lansdowne Wood Apartments is significantly reduced.		Option LR-P-6 has a comparative disadvantage over Option LR-P-4 under the 'Biodiversity' sub-criteria. The Dodder River is located c. 110m from the level crossing. Otter and kingfisher (Annex II species on the Habitat's Directive and Annex I species on the Bird's Directive, respectively) are known to be present on this river, which is also an important tributary of the River Liffey. A range of bat species also rely on the River for commuting and foraging along. Both options would be within the ZoI of these species, all of which would be sensitive to light, noise and vibration impacts in proximity to areas of suitable habitat. A greater amount of excavation is required to construct the subway, compared to constructing the footbridge, thereby requiring a longer construction duration. Potential impacts on the groundwater body would also be a consideration, with the underground construction required for the subway, and subsequently potential impacts on groundwater dependent habitats and species in the surrounding habitat and within European sites nearby.		All Options are comparable under the 'Noise and Vibration' sub-criteria. During the construction stage it is expected that Option LR-P-6 should have an increased impact in relation to noise & vibration, due to the longer construction duration. During the operational stage, it is expected that Option LR-P-6 would result in lower noise impacts due to the sub-service crossing.

Environment

Water Resources		Archaeology, Architectural and Cultural Heritage		Geology & Soils		Agricultural and Non-agricultural		Air Quality & Climate Change	
Qualitative appraisal on the potential impacts to surface ground or coastal waters	**Rationale**	**Qualitative appraisal of the potential impacts of proposed options on potential sub surface archaeology and impact on foundations and above ground elements of architectural heritage**	**Rationale**	**Qualitative appraisal of the potential of the proposed options on waste and material resources including the reuse of site won materials.**	**Rationale**	**Qualitative appraisal of impacts on valued resources either from a human or natural origin with value arising for economic or cultural reasons. These assets can be existing utilities or non-renewable resources**	**Rationale**	**Qualitative appraisal of air quality and climate impacts both on the operational and construction phases**	**Rationale**
To minimise the impact or provide opportunities to enhance the quality of surface waters and associated floodplains, ground waters and coastal waters.		The construction, presence and operation of transport infrastructure can impact directly on such cultural heritage resources through physical impacts resulting from direct loss or damage, or indirectly through changes in setting, noise and vibration levels, air quality, and water levels. To minimise the impact on cultural heritage such as on below ground archaeological remains, historic buildings (individual and areas), and historic landscapes and parks.		To consider the impacts on designated areas of geological interest, unstable natural ground and ground contamination. To consider the impacts on agricultural soil and sensitive or vulnerable soils and material resources, including the reuse of site won materials.		Qualitative appraisal of impacts on valued resources either from a human or natural origin with value arising for economic or cultural reasons. These assets can be existing utilities or non-renewable resources.		Impacts of Construction Traffic. Improvements in air quality through use of EMUs over DMUs. Improvements in greenhouse gas emission through modal shift from road to rail. Improvements in greenhouse gas emission through use of EMUs over DMUs. Reduction in greenhouse gas emissions. Preservation or enhancement the local air quality.	
	All Options are comparable under the 'Water Resource' sub-criteria.		Option LR-P-4 has a comparative advantage over Option LR-P-6 under the 'Archaeology, Architectural and Cultural Heritage' sub-criteria. Construction of a footbridge requires less excavation, when compared to that of a subway, and therefore has less potential to reveal previously undisturbed archaeological deposits. There are no recorded monuments located at the proposed works. The proposed eastern lift is located very close to the Signal box which is part of the Lansdowne Road station complex so there is potential for damage.		Option LR-P-4 has a comparative advantage over Option LR-P-6 under the 'Geology & Soils' sub-criteria. The proposed works for Option LR-P-4 consist of the construction of a footbridge with both stair and lift access. Pile foundations will likely be required to support the structure overhead, which should be less intrusive to the existing geology and soils than the extent of excavation required for a subway. Additionally, the reduced excavation of made ground and natural materials decreases the potential for management of contaminated materials.		All Options are comparable under the 'Agricultural and Non-agricultural' sub-criteria.		All Options are comparable under the 'Air Quality & Climate Change' sub-criteria. The impacts of closing the level crossing are the same for all options, including reduction in operational traffic in the area and the type of rolling stock used on the line. Option LR-P-6 is expected to have a longer construction duration which will increase construction traffic, however this is not considered significant enough to be considered a comparative advantage over Option LR-P-4.
	All Options are comparable under the 'Water Resource' sub-criteria. Opportunities to enhance the quality of surface waters and associated floodplains could be considered in the design of the subway water management system if necessary.		Option LR-P-6 has a comparative disadvantage over Option LR-P-4 under the 'Archaeology, Architectural and Cultural Heritage' sub-criteria. Construction of a subway requires more excavation, when compared to that of a subway, and therefore there is a greater potential to reveal previously undisturbed archaeological deposits. There are no recorded monuments located at the proposed works. The proposed eastern lift is located very close to the Signal box which is part of the Lansdowne Road station complex so there is potential for damage.		Option LR-P-6 has a comparative disadvantage over Option LR-P-4 under the 'Geology & Soils' sub-criteria. The proposed works for Option LR-P-6 consist of the construction of a subway with both stair and lift access. Excavation works will be required, thereby generating comparatively significant surplus earthworks materials, both made ground and natural materials. Due to the limited reuse options, these materials would require recovery or off site disposal. Additionally, the stability of the railway, roads, structures (in particular that associated with the stadium) and services adjacent to the subway may be impacted due to the presence of made ground, soft ground (alluvial deposits) present at and within the vicinity of the site, some of which are associated with nearby river and historic streams.		All Options are comparable under the 'Agricultural and Non-agricultural' sub-criteria.		All Options are comparable under the 'Air Quality & Climate Change' sub-criteria. The impacts of closing the level crossing are the same for all options, including reduction in operational traffic in the area and the type of rolling stock used on the line. Option LR-P-6 is expected to have a longer construction duration which will increase construction traffic, however this is not considered significant enough to be considered a comparative advantage over Option LR-P-4.

Accessibility & Social Inclusion				Integration					
Accessibility		Social Inclusion		Adaptability in the Future		Transport Integration		Land Use Integration	
Qualitative appraisal of capacity of options to facilitate the movement of people (either within, on to or across the rail system)	**Rationale**	**Qualitative appraisal of capacity of options to provide ease of access for the mobility and visually impaired**	**Rationale**	**Qualitative appraisal of capacity of options to cater for future projects or aspirations**	**Rationale**	**Qualitative appraisal of the options and their impact on integration with other transport modes**	**Rationale**	**Qualitative appraisal of the options and their impact on integration with land use policies**	**Rationale**
Capacity of options to facilitate the movement of people (either within, on to or across the rail system). Impact on the wellbeing of the passenger and public. Positive impact on passenger and public experience. Improve accessibility to key facilities, such as employment, education, transport and healthcare to satisfy transport demand for all trip types.		Positive impact towards vulnerable groups Improvement of accessibility to public transport facilities, in particular from deprived geographic areas.		Allowance for future internal transport links within Ireland.		Similarity of systems with other DART+ Programmes. The solution proposed should integrate with other transport systems such as DART+ West, Metrolink and light rail lines, local and national traffic road systems, walkways, and cycleways.		Integration with land use policies and objectives. Integration with regional and local land use plans. Adhesion to regional and local plans and policies.	
	Option LR-P-4 has a comparative disadvantage over Option LR-P-6 under the 'Accessibility' sub-criteria. The design of stairs is very important. Poorly designed stairs can create a barrier for a large proportion of passengers including the frail elderly and those with cognitive, sensory and mobility disabilities. The footbridge worsens the passenger flow and accessibility as the vertical displacement (7.05m) is increased by 150%, in comparison with a subway (2.85m). This results in an increased stair length of 200% (37.8m), in comparison with a subway (12.6m).		All Options are comparable under the 'Social Inclusion' sub-criteria. All options provide unrestricted movements for pedestrians and cyclists. Lifts are an essential feature for people who are unable to negotiate steps, including wheelchair users and some ambulant disabled people where the change in level is greater than 2 m and where there is no space to provide a suitable ramp. Lifts are also helpful for older people and families with young children. Passengers with luggage should always have the option to use lifts rather than stairs and escalators, for safety reasons. Consideration should be given to providing two lifts either side of the crossing to ensure sufficient redundancy is provided in the event of a lift failing.		All Options are comparable under the 'Adaptability in the Future' sub-criteria. All options have the same impacts to vehicle crossing closure and provide unrestricted pedestrian/cycle crossings.		All Options are comparable under the 'Transport Integration' sub-criteria. All options provide the same integration with other transport systems.		Option LR-P-4 has a comparative disadvantage over Option LR-P-6 under the 'Land Use Integration' sub-criteria. All options comply with policies to increase use of public transport. Option LR-P-4 has a footprint approx. 60% larger than that of Option LR-P-6. It also creates obstacles on the site which limits potential for future land use adaptability.
	Option LR-P-6 has a comparative advantage over Option LR-P-4 under the 'Accessibility' sub-criteria. The design of stairs is very important. Poorly designed stairs can create a barrier for a large proportion of passengers including the frail elderly and those with cognitive, sensory and mobility disabilities. The subway offers greater benefits to the passenger flow and accessibility as the vertical displacement (2.85m) is reduced by 60%, in comparison with a footbridge (7.05m). This results a reduced stair length of 66% (12.6m), in comparison with a subway (37.8m).		All Options are comparable under the 'Social Inclusion' sub-criteria. All options provide unrestricted movements for pedestrians and cyclists. Lifts are an essential feature for people who are unable to negotiate steps, including wheelchair users and some ambulant disabled people where the change in level is greater than 2 m and where there is no space to provide a suitable ramp. Lifts are also helpful for older people and families with young children. Passengers with luggage should always have the option to use lifts rather than stairs and escalators, for safety reasons. Consideration should be given to providing two lifts either side of the crossing to ensure sufficient redundancy is provided in the event of a lift failing.		All Options are comparable under the 'Adaptability in the Future' sub-criteria. All options have the same impacts to vehicle crossing closure and provide unrestricted pedestrian/cycle crossings.		All Options are comparable under the 'Transport Integration' sub-criteria. All options provide the same integration with other transport systems.		Option LR-P-6 has a comparative advantage over Option LR-P-4 under the 'Land Use Integration' sub-criteria. All options comply with policies to increase use of public transport. Option LR-P-6 has a footprint approx. 40% smaller than that of Option LR-P-4. With the exception of the openings for the stairs to the subway, there is minimal obstacles introduced on the site which offers greater potential for future land use adaptability.

				Physical Activity	
Geographical Integration		**Government Policy Integration**		**Walking/Cycling Opportunities**	
Qualitative appraisal of the options and their impact on integration with geographical polices	**Rationale**	**Qualitative appraisal of the options and their impact on integration with geographical and government polices**	**Rationale**	**Qualitative appraisal of the options and their impact to enable walking and cycling opportunities in a safer environment for the communities along the route**	**Rationale**
Integration with land use policies and objectives. Integration with regional and local land use plans.		Integration with national and international plans and policies.		To enable walking and cycling opportunities in a safer environment in the communities along the route. To create a healthy environment conducive to active travel.	
	All Options are comparable under the 'Geographical Integration' sub-criteria. All options comply with policies to increased use of public transport.		All Options are comparable under the 'Government Policy Integration' sub-criteria. All options comply with policies to increased use of public transport.		All Options are comparable under the 'Walking/Cycling Opportunities' sub-criteria. An unrestricted connection will be provided for pedestrians and cyclists across the railway. Provision of bicycle wheeling ramps will make stairs accessible to cyclists by enabling them to go up or down staircases without having to physically carry their bike. While it may be less desirable for cyclists to dismount when using the stairs, this benefits vulnerable users which may be hindered by fast moving mounted cyclists using the crossing. Therefore creating healthy environment conducive to active travel for all users.
	All Options are comparable under the 'Geographical Integration' sub-criteria. All options comply with policies to increased use of public transport.		All Options are comparable under the 'Government Policy Integration' sub-criteria. All options comply with policies to increased use of public transport.		All Options are comparable under the 'Walking/Cycling Opportunities' sub-criteria. An unrestricted connection will be provided for pedestrians and cyclists across the railway. Provision of bicycle wheeling ramps will make stairs accessible to cyclists by enabling them to go up or down staircases without having to physically carry their bike. While it may be less desirable for cyclists to dismount when using the stairs, this benefits vulnerable users which may be hindered by fast moving mounted cyclists using the crossing. Therefore creating healthy environment conducive to active travel for all users.

Appendix B.3: Serpentine Avenue Pedestrian / Cyclist Only Crossing Options

				Economy							
				Capital Expenditure (CAPEX): Construction, land acquisition, temporary works		Operational Costs (OPEX): (IÉ or other entities), Technology advancements and future proofing/obsolescence		Train Operations Functionality/Economic Benefit		Traffic functionality and associated economic activities and opportunities	
Works Description	Summary of Requirements	Option Number	Description of Option	Qualitative appraisal of potential infrastructure costs of proposed options	Rationale	Qualitative appraisal of potential ongoing infrastructure maintenance costs of proposed options	Rationale	Qualitative appraisal of potential ongoing operational costs of proposed options	Rationale	Qualitative appraisal of potential wider benefits of proposed options	Rationale
				Estimate high level cost of construction of option. Extent and type of 3rd party lands required permanently. Extent and type of 3rd party land required temporarily for temporary works during construction.		Cost to maintain the infrastructure over the whole life. Effects of infrastructure maintenance to services. Provision of ways of undertaking routine inspections and maintenance activities while minimising the effect on service to customers.		Potential improvement or deterioration of the operation conditions of the line (reduction or increase of the risk of interruption of service). Increased DART service improving connectivity and economy (leading to increased competition in economy, increased output of firms, increased tax revenue).		Potential benefit to vehicular traffic flows in the vicinity of the works during construction and associated economic activities and opportunities in the vicinity. Consideration of duration of traffic disruption and length of diversions. To minimise the impacts on traffic and transportation during the construction and operational stages.	
MCA 2: Local Infrastructure Options for the Pedestrian/Cycle Crossing at Serpentine Avenue.	To provide an appropriate level of vehicular access for all modes to facilitate access to/from Sandymount Village and neighbouring areas for all modes. To provide an appropriate level of accessibility at a local level for pedestrians and cyclists. To provide an appropriate level of accessibility for emergency services (Fire Brigades, Hospitals) in terms of catchment and response time.	**SA-P-4**	New Footbridge with Stair & Lift Access		All Options are comparable under the 'CAPEX' sub-criteria. The differences between the options is less than 25% so therefore not considered as a comparative difference based on the high level of the cost estimate.		Option SA-P-4 has a comparative disadvantage over Option SA-P-6 under the 'Operational Costs (OPEX)' sub-criteria. Footbridges tend to have a higher maintenance cost when compared to subways. This is largely due to maintenance on footbridges having a higher interface with the live railway, which require isolation of the lines for some activities. Use of non-conductive materials should be used and all materials should be adequately bonded to help mitigate the risks in undertaking maintenance activities. Should glass be considered as part of the solid parapet to provide visibility for user comfort, a safe methodoly should be in place for glass cleaning which will require the isolation of the lines. Footbridges do not require the same level of drainage and prevention of flooding as subways do and can be further protected through provision of a roof structure overhead. Services integration should be carefully considered as part of the cable management system. Services should be combined into CMS where possible and run above structure and behind finishes.		All Options are comparable under the 'Train Operations' sub-criteria. All options meet the Train Service Specification.		All Options are comparable under the 'Traffic' sub-criteria. The impacts of closing the level crossing are the same for all options. The diversion of general traffic to other crossing locations in addition to the modification of the directional system will disrupt traffic flow during the construction and operational stage.
		SA-P-6	New Subway with Stair & Lift Access		All Options are comparable under the 'CAPEX' sub-criteria. The differences between the options is less than 25% so therefore not considered as a comparative difference based on the high level of the cost estimate.		Option SA-P-6 has a comparative advantage over Option SA-P-4 under the 'Operational Costs (OPEX)' sub-criteria. Subways tend to have a lower maintenance cost when compared to footbridges due to nature of the crossing having minimal interface with the live railway. Therefore structural inspections and maintenance can be carried out without requiring isolation of the lines. Subways require more maintenance of drainage and prevention of flooding than a footbridge due to the sub-surface crossing. Water ingress should be managed so that it is drained away safely, and should be concealed behind ceiling finishes or wall panels. Panels should be opened at regular intervals in order to allow access for inspection, monitoring and maintenance. Pumps to manage and remove water ingress should be considered where necessary. Service integration should be contained within wall panels for ease of access.		All Options are comparable under the 'Train Operations' sub-criteria. All options meet the Train Service Specification.		All Options are comparable under the 'Traffic' sub-criteria. The impacts of closing the level crossing are the same for all options. The diversion of general traffic to other crossing locations in addition to the modification of the directional system will disrupt traffic flow during the construction and operational stage.

Safety									
Employer's Safety		**Public Safety**		**Landscape and Visual Qualitative**		**Biodiversity**		**Noise and Vibration**	
Qualitative appraisal on the safety impacts on IÉ or railway staff	**Rationale**	**Qualitative appraisal on the safety impacts on the public (road/rail/cycle/pedestrian)**	**Rationale**	**Appraisal of landscape and visual impacts of options based on the sensitive viewpoints**	**Rationale**	**Qualitative appraisal on the impact on biodiversity**	**Rationale**	**Qualitative appraisal of the potential noise and vibration impact**	**Rationale**
To reduce safety risks associated with construction maintenance and operations. To reduce the potential for incidents or near-misses for IÉ/construction staff.		To reduce safety risks associated with passengers at platforms, public adjacent to the railway and road, pedestrian and cycle users at level crossings. To reduce the potential for accidents for members of the public/passengers on railway infrastructure. To reduce the potential for conflict between rail and road users.		To avoid / minimise impact on designated amenities, landscapes, protected trees or views. To avoid / minimise visual impact on properties & amenities. To avoid / minimise removal of trees / hedgerows. To avoid / minimise impact from light pollution. To provide opportunities to enhance the local amenity and green infrastructure.		To consider effects on biodiversity of the area and/, such as impacts on specific flora or fauna, or on defined habitats. To provide opportunities to enhance biodiversity. To ensure that impacts on nature conservation resources are prevented and mitigated. These can occur through direct loss or damage to habitat or specific species, creation of barriers to population movement or indirect effects resulting from, for example, changes in water quality of levels, air quality or noise and light levels.		To provide a solution which ensures minimum levels of noise and vibration.	
	All Options are comparable under the 'Employer's Safety' sub-criteria. It is not envisaged that IÉ staff will be responsible for carrying out activities in relation to maintaining, inspecting or monitoring the new assets.		All Options are comparable under the 'Public Safety' sub-criteria. Both options eliminate the level crossing risk by completely closing the crossing. While footbridges do not have the common perceptions on security that subways do, they have similarities that need to be considered. Areas should feel open and be well lit, avoiding corners and changes in direction where possible in order to open up clear lines of site, and avoid blind spots. They should be at least partially transparent from 1m above floor level, and enclosed passageways on footbridges should be minimised. The use of glazing on decks and stairs can open up visual connectivity, reduce the feeling of claustrophobia and increase passive surveillance and the perception of security. Lighting should provide uniform intensity and coverage, and allow all passengers to read information and signage clearly at all times of day.		Option SA-P-4 has a significantly comparative disadvantage over Option SA-P-6 under the 'Landscape and Visual' sub-criteria. There is a considerable visual impact to the residential and commercial premises on Serpentine Avenue, due to the close proximity of the footbridge which will represent a prominent visual element. There is a greater potential impact for loss of privacy and lighting from the footbridge on the residential premises on Serpentine Avenue, in particular No. 55, 58 & 60 Serpentine Avenue and Oakbury Court Apartments.		All Options are comparable under the 'Biodiversity' sub-criteria. The level crossing is located c. 200m from a cricket club and grounds. Bird species, such as brent geese, curlew and oystercatcher use these habitats for inland foraging during the winter periods. Many of these species are SCI species from nearby European sites in Dublin Bay and along the eastern coastline. The works are within the ZoI of these areas, with the potential for noise, vibration and lighting impacts on SCI bird species. Foundation works will be required to construct the footbridge, however, less excavation is required when compared to constructing the subway, thereby requiring a shorter construction duration. The construction of the footbridge is likely to impact less on biodiversity in the area. The reduced construction duration will reduce the amount of disturbance, and noise or vibration impacts on local wildlife. However, during the operational stage, the footbridge is likely to have an increased amount of lighting, and noise or vibration impacts.		All Options are comparable under the 'Noise and Vibration' sub-criteria. During the construction stage it is expected that Option SA-P-4 should have a reduced impact in relation to noise & vibration, due to the shorter construction duration. During the operational stage, it is expected that Option SA-P-4 is expected to result in higher noise impacts due to the elevated crossing.
	All Options are comparable under the 'Employer's Safety' sub-criteria. It is not envisaged that IÉ staff will be responsible for carrying out activities in relation to maintaining, inspecting or monitoring the new assets.		All Options are comparable under the 'Public Safety' sub-criteria. Both options eliminate the level crossing risk by completely closing the crossing. A common perception of subways is that these spaces are dark and oppressive. Maximising visibility by providing clear lines of sight, avoiding corners and changes in direction, wide passageways and keeping ceilings as high as possible create a more expansive fell that improves the perception of security. Good lighting is crucial in subway spaces. Artificial lighting should have good colour rendering, and provide uniform intensity and coverage, at all times of day. Natural lighting should be used wherever possible, and this helps to improve the perception of security and creates a connection with the outside. When natural light is maximised at routes in and out of subways such as over a stair, natural light can assist with intuitive wayfinding.		Option SA-P-6 has a significantly comparative advantage over Option SA-P-4 under the 'Landscape and Visual' sub-criteria. Due to the underground connection, there is minimal visual impact to the surrounding area with only the lift shafts extend above street level. The potential impact for loss of privacy and lighting from the subway on the residential premises on Serpentine Avenue is significantly reduced.		All Options are comparable under the 'Biodiversity' sub-criteria. The level crossing is located c. 200m from a cricket club and grounds. Bird species, such as brent geese, curlew and oystercatcher use these habitats for inland foraging during the winter periods. Many of these species are SCI species from nearby European sites in Dublin Bay and along the eastern coastline. The works are within the ZoI of these areas, with the potential for noise, vibration and lighting impacts on SCI bird species. A greater amount of excavation is required to construct the subway, compared to constructing the footbridge, thereby requiring a longer construction duration. Potential impacts on the groundwater body would also be a consideration, with the underground construction required for the subway, and subsequently potential impacts on groundwater dependent habitats and species in the surrounding habitat and within European sites nearby.		All Options are comparable under the 'Noise and Vibration' sub-criteria. During the construction stage it is expected that Option SA-P-6 should have an increased impact in relation to noise & vibration, due to the longer construction duration. During the operational stage, it is expected that Option SA-P-6 is expected to result in lower noise impacts due to the sub-surface crossing.

Environment									
Water Resources		**Archaeology, Architectural and Cultural Heritage**		**Geology & Soils**		**Agricultural and Non-agricultural**		**Air Quality & Climate Change**	
Qualitative appraisal on the potential impacts to surface ground or coastal waters	**Rationale**	**Qualitative appraisal of the potential impacts of proposed options on potential sub surface archaeology and impact on foundations and above ground elements of architectural heritage**	**Rationale**	**Qualitative appraisal of the potential of the proposed options on waste and material resources including the reuse of site won materials.**	**Rationale**	**Qualitative appraisal of impacts on valued resources either from a human or natural origin with value arising for economic or cultural reasons. These assets can be existing utilities or non-renewable resources**	**Rationale**	**Qualitative appraisal of air quality and climate impacts both on the operational and construction phases**	**Rationale**
To minimise the impact or provide opportunities to enhance the quality of surface waters and associated floodplains, ground waters and coastal waters.		The construction, presence and operation of transport infrastructure can impact directly on such cultural heritage resources through physical impacts resulting from direct loss or damage, or indirectly through changes in setting, noise and vibration levels, air quality, and water levels. To minimise the impact on cultural heritage such as on below ground archaeological remains, historic buildings (individual and areas), and historic landscapes and parks.		To consider the impacts on designated areas of geological interest, unstable natural ground and ground contamination. To consider the impacts on agricultural soil and sensitive or vulnerable soils and material resources, including the reuse of site won materials.		Qualitative appraisal of impacts on valued resources either from a human or natural origin with value arising for economic or cultural reasons. These assets can be existing utilities or non-renewable resources.		Impacts of Construction Traffic. Improvements in air quality through use of EMUs over DMUs. Improvements in greenhouse gas emission through modal shift from road to rail. Improvements in greenhouse gas emission through use of EMUs over DMUs. Reduction in greenhouse gas emissions. Preservation or enhancement the local air quality.	
	All Options are comparable under the 'Water Resource' sub-criteria.		Option SA-P-4 has a comparative advantage over Option SA-P-6 under the 'Archaeology, Architectural and Cultural Heritage' sub-criteria. Construction of a footbridge requires less excavation, when compared to that of a subway, and therefore has less potential to reveal previously undisturbed archaeological deposits. There are no recorded monuments located at the proposed works.		Option SA-P-4 has a comparative advantage over Option SA-P-6 under the 'Geology & Soils' sub-criteria. The proposed works for Option SA-P-4 consist of the construction of a footbridge with both stair and lift access with an overall approximate footprint of 58.2m x 3.5m and a height of 6.30m above street level. Pile foundations will likely be required to support the structure overhead, which should be less intrusive to the existing geology and soils than the extent of excavation required for a subway. Additionally, the reduced excavation of made ground and natural materials decreases the potential for management of contaminated materials.		All Options are comparable under the 'Agricultural and Non-agricultural' sub-criteria.		All Options are comparable under the 'Air Quality & Climate Change' sub-criteria. The impacts of closing the level crossing are the same for all options, including reduction in operational traffic in the area and the type of rolling stock used on the line. Option SA-P-6 is expected to have a longer construction duration which will increase construction traffic, however this is not considered significant enough to be considered a comparative advantage over Option SA-P-4.
	All Options are comparable under the 'Water Resource' sub-criteria. Opportunities to enhance the quality of surface waters and associated floodplains could be considered in the design of the subway water management system if necessary.		Option SA-P-6 has a comparative disadvantage over Option SA-P-4 under the 'Archaeology, Architectural and Cultural Heritage' sub-criteria. Construction of a subway requires more excavation, when compared to that of a subway, and therefore there is a greater potential to reveal previously undisturbed archaeological deposits. There are no recorded monuments located at the proposed works.		Option SA-P-6 has a comparative disadvantage over Option SA-P-4 under the 'Geology & Soils' sub-criteria. The proposed works for Option SA-P-6 consist of the construction of a subway with both stair and lift access with an overall approximate footprint of 41.9m x 4.00m and a depth to floor of 3.15m below street level. Excavation works will be required, thereby generating comparatively significant surplus earthworks materials, both made ground and natural materials. Due to the limited reuse options, these materials would require recovery or off site disposal. Additionally, the stability of the railway, roads, structures and services adjacent to the subway may be impacted due to the presence of made ground, soft ground (alluvial deposit and soft marine sediments) and gravels present at and within the vicinity of the site.		All Options are comparable under the 'Agricultural and Non-agricultural' sub-criteria.		All Options are comparable under the 'Air Quality & Climate Change' sub-criteria. The impacts of closing the level crossing are the same for all options, including reduction in operational traffic in the area and the type of rolling stock used on the line. Option SA-P-6 is expected to have a longer construction duration which will increase construction traffic, however this is not considered significant enough to be considered a comparative advantage over Option SA-P-4.

Accessibility & Social Inclusion				Integration					
Accessibility		Social Inclusion		Adaptability in the Future		Transport Integration		Land Use Integration	
Qualitative appraisal of capacity of options to facilitate the movement of people (either within, on to or across the rail system)	**Rationale**	**Qualitative appraisal of capacity of options to provide ease of access for the mobility and visually impaired**	**Rationale**	**Qualitative appraisal of capacity of options to cater for future projects or aspirations**	**Rationale**	**Qualitative appraisal of the options and their impact on integration with other transport modes**	**Rationale**	**Qualitative appraisal of the options and their impact on integration with land use policies**	**Rationale**
Capacity of options to facilitate the movement of people (either within, on to or across the rail system). Impact on the wellbeing of the passenger and public. Positive impact on passenger and public experience. Improve accessibility to key facilities, such as employment, education, transport and healthcare to satisfy transport demand for all trip types.		Positive impact towards vulnerable groups Improvement of accessibility to public transport facilities, in particular from deprived geographic areas.		Allowance for future internal transport links within Ireland.		Similarity of systems with other DART+ Programmes. The solution proposed should integrate with other transport systems such as DART+ West, Metrolink and light rail lines, local and national traffic road systems, walkways, and cycleways.		Integration with land use policies and objectives. Integration with regional and local land use plans. Adhesion to regional and local plans and policies.	
	Option SA-P-4 has a comparative disadvantage over Option SA-P-6 under the 'Accessibility' sub-criteria. The design of stairs is very important. Poorly designed stairs can create a barrier for a large proportion of passengers including the frail elderly and those with cognitive, sensory and mobility disabilities. The footbridge worsens the passenger flow and accessibility as the vertical displacement (6.30m) is increased by 100%, in comparison with a subway (3.15m). This results in an increased stair length of 150% (37.2m), in comparison with a subway (14.80m).		All Options are comparable under the 'Social Inclusion' sub-criteria. All options provide unrestricted movements for pedestrians and cyclists. Lifts are an essential feature for people who are unable to negotiate steps, including wheelchair users and some ambulant disabled people where the change in level is greater than 2 m and where there is no space to provide a suitable ramp. Lifts are also helpful for older people and families with young children. Passengers with luggage should always have the option to use lifts rather than stairs and escalators, for safety reasons. Consideration should be given to providing two lifts either side of the crossing to ensure sufficient redundancy is provided in the event of a lift failing.		All Options are comparable under the 'Adaptability in the Future' sub-criteria. All options have the same impacts to vehicle crossing closure and provide unrestricted pedestrian/cycle crossings.		All Options are comparable under the 'Transport Integration' sub-criteria. All options provide the same integration with other transport systems.		Option SA-P-4 has a comparative disadvantage over Option SA-P-6 under the 'Land Use Integration' sub-criteria. All options comply with policies to increase use of public transport. Option SA-P-4 has a footprint approx. 20% larger than that of Option SA-P-6. It also creates obstacles on the site which limits potential for future land use adaptability.
	Option SA-P-6 has a comparative advantage over Option SA-P-4 under the 'Accessibility' sub-criteria. The design of stairs is very important. Poorly designed stairs can create a barrier for a large proportion of passengers including the frail elderly and those with cognitive, sensory and mobility disabilities. The subway offers greater benefits to the passenger flow and accessibility as the vertical displacement (3.15m) is reduced by 50%, in comparison with a footbridge (6.30m). This results a reduced stair length of 60% (14.80m), in comparison with a subway (37.2m).		All Options are comparable under the 'Social Inclusion' sub-criteria. All options provide unrestricted movements for pedestrians and cyclists. Lifts are an essential feature for people who are unable to negotiate steps, including wheelchair users and some ambulant disabled people where the change in level is greater than 2 m and where there is no space to provide a suitable ramp. Lifts are also helpful for older people and families with young children. Passengers with luggage should always have the option to use lifts rather than stairs and escalators, for safety reasons. Consideration should be given to providing two lifts either side of the crossing to ensure sufficient redundancy is provided in the event of a lift failing.		All Options are comparable under the 'Adaptability in the Future' sub-criteria. All options have the same impacts to vehicle crossing closure and provide unrestricted pedestrian/cycle crossings.		All Options are comparable under the 'Transport Integration' sub-criteria. All options provide the same integration with other transport systems.		Option SA-P-6 has a comparative advantage over Option SA-P-4 under the 'Land Use Integration' sub-criteria. All options comply with policies to increase use of public transport. Option SA-P-6 has a footprint approx. 20% smaller than that of Option SA-P-4. With the exception of the openings for the stairs to the subway, there is minimal obstacles introduced on the site which offers greater potential for future land use adaptability.

				Physical Activity	
Geographical Integration		**Government Policy Integration**		**Walking/Cycling Opportunities**	
Qualitative appraisal of the options and their impact on integration with geographical polices	**Rationale**	**Qualitative appraisal of the options and their impact on integration with geographical and government polices**	**Rationale**	**Qualitative appraisal of the options and their impact to enable walking and cycling opportunities in a safer environment for the communities along the route**	**Rationale**
Integration with land use policies and objectives. Integration with regional and local land use plans.		Integration with national and international plans and policies.		To enable walking and cycling opportunities in a safer environment in the communities along the route. To create a healthy environment conducive to active travel.	
	All Options are comparable under the 'Geographical Integration' sub-criteria. All options comply with policies to increased use of public transport.		All Options are comparable under the 'Government Policy Integration' sub-criteria. All options comply with policies to increased use of public transport.		All Options are comparable under the 'Walking/Cycling Opportunities' sub-criteria. An unrestricted connection will be provided for pedestrians and cyclists across the railway. Provision of bicycle wheeling ramps will make stairs accessible to cyclists by enabling them to go up or down staircases without having to physically carry their bike. While it may be less desirable for cyclists to dismount when using the stairs, this benefits vulnerable users which may be hindered by fast moving mounted cyclists using the crossing. Therefore creating healthy environment conducive to active travel for all users.
	All Options are comparable under the 'Geographical Integration' sub-criteria. All options comply with policies to increased use of public transport.		All Options are comparable under the 'Government Policy Integration' sub-criteria. All options comply with policies to increased use of public transport.		All Options are comparable under the 'Walking/Cycling Opportunities' sub-criteria. An unrestricted connection will be provided for pedestrians and cyclists across the railway. Provision of bicycle wheeling ramps will make stairs accessible to cyclists by enabling them to go up or down staircases without having to physically carry their bike. While it may be less desirable for cyclists to dismount when using the stairs, this benefits vulnerable users which may be hindered by fast moving mounted cyclists using the crossing. Therefore creating healthy environment conducive to active travel for all users.

Appendix B.4: Sandymount Avenue Pedestrian / Cyclist Only Crossing Options

				Economy							
				Capital Expenditure (CAPEX): Construction, land acquisition, temporary works		Operational Costs (OPEX): (IÉ or other entities), Technology advancements and future proofing/obsolescence		Train Operations Functionality/Economic Benefit		Traffic functionality and associated economic activities and opportunities	
Works Description	Summary of Requirements	Option Number	Description of Option	Qualitative appraisal of potential infrastructure costs of proposed options	Rationale	Qualitative appraisal of potential ongoing infrastructure maintenance costs of proposed options	Rationale	Qualitative appraisal of potential ongoing operational costs of proposed options	Rationale	Qualitative appraisal of potential wider benefits of proposed options	Rationale
				Estimate high level cost of construction of option. Extent and type of 3rd party lands required permanently. Extent and type of 3rd party land required temporarily for temporary works during construction.		Cost to maintain the infrastructure over the whole life. Effects of infrastructure maintenance to services. Provision of ways of undertaking routine inspections and maintenance activities while minimising the effect on service to customers		Potential improvement or deterioration of the operation conditions of the line (reduction or increase of the risk of interruption of service). Increased DART service improving connectivity and economy (leading to increased competition in economy, increased output of firms, increased tax revenue).		Potential benefit to vehicular traffic flows in the vicinity of the works during construction and associated economic activities and opportunities in the vicinity. Consideration of duration of traffic disruption and length of diversions. To minimise the impacts on traffic and transportation during the construction and operational stages.	
MCA 3: Local Infrastructure Options for the Pedestrian/Cycle Crossing at Sandymount Avenue.	To provide an appropriate level of vehicular access for all modes to facilitate access to/from Sandymount Village and neighbouring areas for all modes To provide an appropriate level of accessibility at a local level for pedestrians and cyclists To provide an appropriate level of accessibility for emergency services (Fire Brigades, Hospitals) in terms of catchment and response time	**SM-P-4**	New Footbridge with Stair & Lift Access		Option SM-P-4 has a comparative advantage over Option SM-P-6 under the 'CAPEX' sub-criteria The differences between the options is greater than 25% and therefore considered as a comparative difference based on the high level of the cost estimate		Option SM-P-4 has a comparative disadvantage over Option SM-P-6 under the 'Operational Costs (OPEX)' sub-criteria Footbridges tend to have a higher maintenance cost when compared to subways This is largely due to maintenance on footbridges having a higher interface with the live railway, which require isolation of the lines for some activities Use of non-conductive materials should be used and all materials should be adequately bonded to help mitigate the risks in undertaking maintenance activities Should glass be considered as part of the solid parapet to provide visibility for user comfort, a safe methodology should be in place for glass cleaning which will require the isolation of the lines Footbridges do not require the same level of drainage and prevention of flooding as subways do and can be further protected through provision of a roof structure overhead Services integration should be carefully considered as part of the cable management system Services should be combined into CMS where possible and run above structure and behind finishes		All Options are comparable under the 'Train Operations' sub-criteria All options meet the Train Service Specification		All Options are comparable under the 'Traffic' sub-criteria The impacts of closing the level crossing are the same for all options The diversion of general traffic to other crossing locations in addition to the modification of the directional system will disrupt traffic flow during the construction and operational stage
		SM-P-6	New Subway with Stair & Lift Access		Option SM-P-6 has a comparative disadvantage over Option SM-P-4 under the 'CAPEX' sub-criteria The differences between the options is greater than 25% and therefore considered as a comparative difference based on the high level of the cost estimate		Option SM-P-6 has a comparative advantage over Option SM-P-4 under the 'Operational Costs (OPEX)' sub-criteria Subways tend to have a lower maintenance cost when compared to footbridges due to nature of the crossing having minimal interface with the live railway Therefore structural inspections and maintenance can be carried out without requiring isolation of the lines Subways require more maintenance of drainage and prevention of flooding than a footbridge due to the sub-surface crossing Water ingress should be managed so that it is drained away safely, and should be concealed behind ceiling finishes or wall panels Panels should be opened at regular intervals in order to allow access for inspection, monitoring and maintenance Pumps to manage and remove water ingress should be considered where necessary Service integration should be contained within wall panels for ease of access		All Options are comparable under the 'Train Operations' sub-criteria All options meet the Train Service Specification		All Options are comparable under the 'Traffic' sub-criteria The impacts of closing the level crossing are the same for all options The diversion of general traffic to other crossing locations in addition to the modification of the directional system will disrupt traffic flow during the construction and operational stage

Safety										
Employer's Safety		Public Safety		Landscape and Visual Qualitative		Biodiversity		Noise and Vibration		
Qualitative appraisal on the safety impacts on IÉ or railway staff	**Rationale**	**Qualitative appraisal on the safety impacts on the public (road/rail/cycle/pedestrian)**	**Rationale**	**Appraisal of landscape and visual impacts of options based on the sensitive viewpoints**	**Rationale**	**Qualitative appraisal on the impact on biodiversity**	**Rationale**	**Qualitative appraisal of the potential noise and vibration impact**	**Rationale**
To reduce safety risks associated with construction maintenance and operations To reduce the potential for incidents or near-misses for IÉ/construction staff		To reduce safety risks associated with passengers at platforms, public adjacent to the railway and road, pedestrian and cycle users at level crossings To reduce the potential for accidents for members of the public/passengers on railway infrastructure To reduce the potential for conflict between rail and road users		To avoid / minimise impact on designated amenities, landscapes, protected trees or views To avoid / minimise visual impact on properties & amenities To avoid / minimise removal of trees / hedgerows To avoid / minimise impact from light pollution To provide opportunities to enhance the local amenity and green infrastructure		To consider effects on biodiversity of the area and/, such as impacts on specific flora or fauna, or on defined habitats To provide opportunities to enhance biodiversity To ensure that impacts on nature conservation resources are prevented and mitigated These can occur through direct loss or damage to habitat or specific species, creation of barriers to population movement or indirect effects resulting from, for example, changes in water quality of levels, air quality or noise and light levels		To provide a solution which ensures minimum levels of noise and vibration	
	All Options are comparable under the 'Employer's Safety' sub-criteria It is not envisaged that IÉ staff will be responsible for carrying out activities in relation to maintaining, inspecting or monitoring the new assets		All Options are comparable under the 'Public Safety' sub-criteria Both options eliminate the level crossing risk by completely closing the crossing While footbridges do not have the common perceptions on security that subways do, they have similarities that need to be considered Areas should feel open and be well lit, avoiding corners and changes in direction where possible in order to open up clear lines of site, and avoid blind spots They should be at least partially transparent from 1m above floor level, and enclosed passageways on footbridges should be minimised The use of glazing on decks and stairs can open up visual connectivity, reduce the feeling of claustrophobia and increase passive surveillance and the perception of security Lighting should provide uniform intensity and coverage, and allow all passengers to read information and signage clearly at all times of day		Option SM-P-4 has a significantly comparative disadvantage over Option SM-P-6 under the 'Landscape and Visual' sub-criteria There is a considerable visual impact to Sandymount Station and surrounding area due to the close proximity of the footbridge which will represent a prominent visual element There is a greater potential impact for loss of privacy and lighting from the footbridge on the residential premises on Sandymount Avenue, in particular No 30 & 31 Sandymount Avenue, 1, 2 & 3 Wilfield and Saints Annes 2 Wilfield Road		Option SM-P-4 has a comparative advantage over Option SM-P-6 under the 'Biodiversity' sub-criteria The level crossing is located c 120m from a cricket club and grounds Bird species, such as brent geese, curlew and oystercatcher use these habitats for inland foraging during the winter periods Many of these species are SCI species from nearby European sites in Dublin Bay and along the eastern coastline The works are within the ZoI of these areas, with the potential for noise, vibration and lighting impacts on SCI bird species Foundation works will be required to construct the footbridge, however, less excavation is required when compared to constructing the subway, thereby requiring a shorter construction duration The construction of the footbridge is likely to impact less on biodiversity in the area The reduced construction duration will reduce the amount of disturbance, and noise or vibration impacts on local wildlife However, during the operational stage, the footbridge is likely to have an increased amount of lighting, and noise or vibration impacts		All Options are comparable under the 'Noise and Vibration' sub-criteria During the construction stage it is expected that Option SM-P-4 should have a reduced impact in relation to noise & vibration, due to the shorter construction duration During the operational stage, it is expected that Option SM-P-4 is expected to result in higher noise impacts due to the elevated crossing
	All Options are comparable under the 'Employer's Safety' sub-criteria It is not envisaged that IÉ staff will be responsible for carrying out activities in relation to maintaining, inspecting or monitoring the new assets		All Options are comparable under the 'Public Safety' sub-criteria Both options eliminate the level crossing risk by completely closing the crossing A common perception of subways is that these spaces are dark and oppressive Maximising visibility by providing clear lines of sight, avoiding corners and changes in direction, wide passageways and keeping ceilings as high as possible create a more expansive fell that improves the perception of security Good lighting is crucial in subway spaces Artificial lighting should have good colour rendering, and provide uniform intensity and coverage, at all times of day Natural lighting should be used wherever possible, and this helps to improve the perception of security and creates a connection with the outside When natural light is maximised at routes in and out of subways such as over a stair, natural light can assist with intuitive wayfinding		Option SM-P-6 has a significantly comparative advantage over Option SM-P-4 under the 'Landscape and Visual' sub-criteria Due to the underground connection, there is minimal visual impact to Sandymount Station and the surrounding area with only the lift shafts extend above street level The potential impact for loss of privacy and lighting from the subway on the residential premises on Sandymount Avenue is significantly reduced		Option SM-P-6 has a comparative disadvantage over Option SM-P-4 under the 'Biodiversity' sub-criteria The level crossing is located c 120m from a cricket club and grounds Bird species, such as brent geese, curlew and oystercatcher use these habitats for inland foraging during the winter periods Many of these species are SCI species from nearby European sites in Dublin Bay and along the eastern coastline The works are within the ZoI of these areas, with the potential for noise, vibration and lighting impacts on SCI bird species A greater amount of excavation is required to construct the subway, compared to constructing the footbridge, thereby requiring a longer construction duration Potential impacts on the groundwater body would also be a consideration, with the underground construction required for the subway, and subsequently potential impacts on groundwater dependent habitats and species in the surrounding habitat and within European sites nearby		All Options are comparable under the 'Noise and Vibration' sub-criteria During the construction stage it is expected that Option SM-P-6 should have an increased impact in relation to noise & vibration, due to the longer construction duration During the operational stage, it is expected that Option SM-P-6 is expected to result in lower noise impacts due to the sub-service crossing

Environment

Water Resources		Archaeology, Architectural and Cultural Heritage		Geology & Soils		Agricultural and Non-agricultural		Air Quality & Climate Change	
Qualitative appraisal on the potential impacts to surface ground or coastal waters	**Rationale**	**Qualitative appraisal of the potential impacts of proposed options on potential sub surface archaeology and impact on foundations and above ground elements of architectural heritage**	**Rationale**	**Qualitative appraisal of the potential of the proposed options on waste and material resources including the reuse of site won materials.**	**Rationale**	**Qualitative appraisal of impacts on valued resources either from a human or natural origin with value arising for economic or cultural reasons. These assets can be existing utilities or non-renewable resources**	**Rationale**	**Qualitative appraisal of air quality and climate impacts both on the operational and construction phases**	**Rationale**
To minimise the impact or provide opportunities to enhance the quality of surface waters and associated floodplains, ground waters and coastal waters		The construction, presence and operation of transport infrastructure can impact directly on such cultural heritage resources through physical impacts resulting from direct loss or damage, or indirectly through changes in setting, noise and vibration levels air quality, and water levels To minimise the impact on cultural heritage such as on below ground archaeological remains, historic buildings (individual and areas), and historic landscapes and parks		To consider the impacts on designated areas of geological interest, unstable natural ground and ground contamination To consider the impacts on agricultural soil and sensitive or vulnerable soils and material resources, including the reuse of site won materials		Qualitative appraisal of impacts on valued resources either from a human or natural origin with value arising for economic or cultural reasons These assets can be existing utilities or non-renewable resources		Impacts of Construction Traffic Improvements in air quality through use of EMUs over DMUs Improvements in greenhouse gas emission through modal shift from road to rail Improvements in greenhouse gas emission through use of EMUs over DMUs Reduction in greenhouse gas emissions Preservation or enhancement the local air quality	
	All Options are comparable under the 'Water Resource' sub-criteria		Option SM-P-4 has a comparative advantage over Option SM-P-6 under the 'Archaeology, Architectural and Cultural Heritage' sub-criteria Construction of a footbridge requires less excavation, when compared to that of a subway, and therefore has less potential to reveal previously undisturbed archaeological deposits There are no recorded monuments located at the proposed works		Option SM-P-4 has a comparative advantage over Option SM-P-6 under the 'Geology & Soils' sub-criteria The proposed works for Option SM-P-4 consist of the construction of a footbridge with both stair and lift access with an overall approximate footprint of 55 84m x 3 5m and a height of 6 00m above street level Pile foundations will likely be required to support the structure overhead, which should be less intrusive to the existing geology and soils than the extent of excavation required for a subway Additionally, the reduced excavation of made ground and natural materials decreases the potential for management of contaminated materials		All Options are comparable under the 'Agricultural and Non-agricultural' sub-criteria		All Options are comparable under the 'Air Quality & Climate Change' sub-criteria The impacts of closing the level crossing are the same for all options, including reduction in operational traffic in the area and the type of rolling stock used on the line Option SM-P-6 is expected to have a longer construction duration which will increase construction traffic, however this is not considered significant enough to be considered a comparative advantage over Option SM-P-4
	All Options are comparable under the 'Water Resource' sub-criteria Opportunities to enhance the quality of surface waters and associated floodplains could be considered in the design of the subway water management system if necessary		Option SM-P-6 has a comparative disadvantage over Option SM-P-4 under the 'Archaeology, Architectural and Cultural Heritage' sub-criteria Construction of a subway requires more excavation, when compared to that of a footbridge, and therefore there is a greater potential to reveal previously undisturbed archaeological deposits There are no recorded monuments located at the proposed works		Option SM-P-6 has a comparative disadvantage over Option SM-P-4 under the 'Geology & Soils' sub-criteria The proposed works for Option SM-P-6 consist of the construction of a subway with both stair and lift access with an overall approximate footprint of 47 43m x 4 50m and a depth to floor of 3 45m below street level Excavation works will be required, thereby generating comparatively significant surplus earthworks materials, both made ground and natural materials Due to the limited reuse options, these materials would require recovery or off site disposal Additionally, the stability of the railway, roads, structures and services adjacent to the subway may be impacted due to the presence of made ground, soft ground (alluvial deposit and soft marine sediments) and gravels present at and within the vicinity of the site		All Options are comparable under the 'Agricultural and Non-agricultural' sub-criteria		All Options are comparable under the 'Air Quality & Climate Change' sub-criteria The impacts of closing the level crossing are the same for all options, including reduction in operational traffic in the area and the type of rolling stock used on the line Option SM-P-6 is expected to have a longer construction duration which will increase construction traffic, however this is not considered significant enough to be considered a comparative advantage over Option SM-P-4

Accessibility & Social Inclusion				Integration					
Accessibility		Social Inclusion		Adaptability in the Future		Transport Integration		Land Use Integration	
Qualitative appraisal of capacity of options to facilitate the movement of people (either within, on to or across the rail system)	**Rationale**	**Qualitative appraisal of capacity of options to provide ease of access for the mobility and visually impaired**	**Rationale**	**Qualitative appraisal of capacity of options to cater for future projects or aspirations**	**Rationale**	**Qualitative appraisal of the options and their impact on integration with other transport modes**	**Rationale**	**Qualitative appraisal of the options and their impact on integration with land use policies**	**Rationale**
Capacity of options to facilitate the movement of people (either within, on to or across the rail system) Impact on the wellbeing of the passenger and public Positive impact on passenger and public experience Improve accessibility to key facilities, such as employment, education, transport and healthcare to satisfy transport demand for all trip types		Positive impact towards vulnerable groups Improvement of accessibility to public transport facilities, in particular from deprived geographic areas		Allowance for future internal transport links within Ireland		Similarity of systems with other DART+ Programmes The solution proposed should integrate with other transport systems such as DART+ West, Metrolink and light rail lines, local and national traffic road systems, walkways, and cycleways		Integration with land use policies and objectives Integration with regional and local land use plans Adhesion to regional and local plans and policies	
	Option SM-P-4 has a comparative disadvantage over Option SM-P-6 under the 'Accessibility' sub-criteria The design of stairs is very important Poorly designed stairs can create a barrier for a large proportion of passengers including the frail elderly and those with cognitive, sensory and mobility disabilities The footbridge worsens the passenger flow and accessibility as the vertical displacement (6 00m) is increased by 75%, in comparison with a subway (3 45m) This results in an increased stair length of 50% (30 8m), in comparison with a subway (20m)		All Options are comparable under the 'Social Inclusion' sub-criteria All options provide unrestricted movements for pedestrians and cyclists Lifts are an essential feature for people who are unable to negotiate steps, including wheelchair users and some ambulant disabled people where the change in level is greater than 2 m and where there is no space to provide a suitable ramp Lifts are also helpful for older people and families with young children Passengers with luggage should always have the option to use lifts rather than stairs and escalators, for safety reasons Consideration should be given to providing two lifts either side of the crossing to ensure sufficient redundancy is provided in the event of a lift failing		All Options are comparable under the 'Adaptability in the Future' sub-criteria All options have the same impacts to vehicle crossing closure and provide unrestricted pedestrian/cycle crossings		All Options are comparable under the 'Transport Integration' sub-criteria All options provide the same integration with other transport systems		All Options are comparable under the 'Land Use Integration' sub-criteria All options comply with policies to increase use of public transport Both options have approximately the same footprint
	Option SM-P-6 has a comparative advantage over Option SM-P-4 under the 'Accessibility' sub-criteria The design of stairs is very important Poorly designed stairs can create a barrier for a large proportion of passengers including the frail elderly and those with cognitive, sensory and mobility disabilities The subway offers greater benefits to the passenger flow and accessibility as the vertical displacement (3 45m) is reduced by 40%, in comparison with a footbridge (6 00m) This results a reduced stair length of 33% (20 0m), in comparison with a subway (30 8m)		All Options are comparable under the 'Social Inclusion' sub-criteria All options provide unrestricted movements for pedestrians and cyclists Lifts are an essential feature for people who are unable to negotiate steps, including wheelchair users and some ambulant disabled people where the change in level is greater than 2 m and where there is no space to provide a suitable ramp Lifts are also helpful for older people and families with young children Passengers with luggage should always have the option to use lifts rather than stairs and escalators, for safety reasons Consideration should be given to providing two lifts either side of the crossing to ensure sufficient redundancy is provided in the event of a lift failing		All Options are comparable under the 'Adaptability in the Future' sub-criteria All options have the same impacts to vehicle crossing closure and provide unrestricted pedestrian/cycle crossings		All Options are comparable under the 'Transport Integration' sub-criteria All options provide the same integration with other transport systems		All Options are comparable under the 'Land Use Integration' sub-criteria All options comply with policies to increase use of public transport Both options have approximately the same footprint

				Physical Activity	
Geographical Integration		**Government Policy Integration**		**Walking/Cycling Opportunities**	
Qualitative appraisal of the options and their impact on integration with geographical polices	**Rationale**	**Qualitative appraisal of the options and their impact on integration with geographical and government polices**	**Rationale**	**Qualitative appraisal of the options and their impact to enable walking and cycling opportunities in a safer environment for the communities along the route**	**Rationale**
Integration with land use policies and objectives Integration with regional and local land use plans		Integration with national and international plans and policies		To enable walking and cycling opportunities in a safer environment in the communities along the route To create a healthy environment conducive to active travel	
	All Options are comparable under the 'Geographical Integration' sub-criteria. All options comply with policies to increased use of public transport.		All Options are comparable under the 'Government Policy Integration' sub-criteria. All options comply with policies to increased use of public transport.		All Options are comparable under the 'Walking/Cycling Opportunities' sub-criteria. An unrestricted connection will be provided for pedestrians and cyclists across the railway. Provision of bicycle wheeling ramps will make stairs accessible to cyclists by enabling them to go up or down staircases without having to physically carry their bike. While it may be less desirable for cyclists to dismount when using the stairs, this benefits vulnerable users which may be hindered by fast moving mounted cyclists using the crossing. Therefore creating healthy environment conducive to active travel for all users.
	All Options are comparable under the 'Geographical Integration' sub-criteria. All options comply with policies to increased use of public transport.		All Options are comparable under the 'Government Policy Integration' sub-criteria. All options comply with policies to increased use of public transport.		All Options are comparable under the 'Walking/Cycling Opportunities' sub-criteria. An unrestricted connection will be provided for pedestrians and cyclists across the railway. Provision of bicycle wheeling ramps will make stairs accessible to cyclists by enabling them to go up or down staircases without having to physically carry their bike. While it may be less desirable for cyclists to dismount when using the stairs, this benefits vulnerable users which may be hindered by fast moving mounted cyclists using the crossing. Therefore creating healthy environment conducive to active travel for all users.

Appendix B.5: Sydney Parade Pedestrian / Cyclist Only Crossing Options

				Economy							
				Capital Expenditure (CAPEX): Construction, land acquisition, temporary works		Operational Costs (OPEX): (IÉ or other entities), Technology advancements and future proofing/obsolescence		Train Operations Functionality/Economic Benefit		Traffic functionality and associated economic activities and opportunities	
Works Description	Summary of Requirements	Option Number	Description of Option	Qualitative appraisal of potential infrastructure costs of proposed options	Rationale	Qualitative appraisal of potential ongoing infrastructure maintenance costs of proposed options	Rationale	Qualitative appraisal of potential ongoing operational costs of proposed options	Rationale	Qualitative appraisal of potential wider benefits of proposed options	Rationale
				Estimate high level cost of construction of option. Extent and type of 3rd party lands required permanently. Extent and type of 3rd party land required temporarily for temporary works during construction.		Cost to maintain the infrastructure over the whole life. Effects of infrastructure maintenance to services. Provision of ways of undertaking routine inspections and maintenance activities while minimising the effect on service to customers		Potential improvement or deterioration of the operation conditions of the line (reduction or increase of the risk of interruption of service). Increased DART service improving connectivity and economy (leading to increased competition in economy, increased output of firms, increased tax revenue).		Potential benefit to vehicular traffic flows in the vicinity of the works during construction and associated economic activities and opportunities in the vicinity. Consideration of duration of traffic disruption and length of diversions. To minimise the impacts on traffic and transportation during the construction and operational stages.	
MCA 4: Local Infrastructure Options for the Pedestrian/Cycle Crossing at Sydney Parade Avenue.	To provide an appropriate level of vehicular access for all modes to facilitate access to/from Sandymount Village and neighbouring areas for all modes To provide an appropriate level of accessibility at a local level for pedestrians and cyclists To provide an appropriate level of accessibility for emergency services (Fire Brigades, Hospitals) in terms of catchment and response time	**SP-P-4**	New Footbridge with Stair & Lift Access		Option SP-P-4 has a comparative advantage over Option SP-P-6 under the 'CAPEX' sub-criteria The differences between the options is greater than 25% and therefore considered as a comparative difference based on the high level of the cost estimate		Option SP-P-4 has a comparative disadvantage over Option SP-P-6 under the 'Operational Costs (OPEX)' sub-criteria Footbridges tend to have a higher maintenance cost when compared to subways This is largely due to maintenance on footbridges having a higher interface with the live railway, which require isolation of the lines for some activities Use of non-conductive materials should be used and all materials should be adequately bonded to help mitigate the risks in undertaking maintenance activities Should glass be considered as part of the solid parapet to provide visibility for user comfort, a safe methodology should be in place for glass cleaning which will require the isolation of the lines Footbridges do not require the same level of drainage and prevention of flooding as subways do and can be further protected through provision of a roof structure overhead Services integration should be carefully considered as part of the cable management system Services should be combined into CMS where possible and run above structure and behind finishes		All Options are comparable under the 'Train Operations' sub-criteria All options meet the Train Service Specification		All Options are comparable under the 'Traffic' sub-criteria The impacts of closing the level crossing are the same for all options The diversion of general traffic to other crossing locations in addition to the modification of the directional system will disrupt traffic flow during the construction and operational stage Modifications to the connection of Ailesbury Gardens to Sydney Parade Avenue are required for both options to make provision for stair landings This may require closure of the junction or CPO of private land to realign the road junction
		SP-P-6	New Subway with Stair & Lift Access		Option SP-P-6 has a comparative disadvantage over Option SP-P-4 under the 'CAPEX' sub-criteria The differences between the options is greater than 25% and therefore considered as a comparative difference based on the high level of the cost estimate		Option SP-P-6 has a comparative advantage over Option SP-P-4 under the 'Operational Costs (OPEX)' sub-criteria Subways tend to have a lower maintenance cost when compared to footbridges due to nature of the crossing having minimal interface with the live railway Therefore structural inspections and maintenance can be carried out without requiring isolation of the lines Subways require more maintenance of drainage and prevention of flooding than a footbridge due to the sub-surface crossing Water ingress should be managed so that it is drained away safely, and should be concealed behind ceiling finishes or wall panels Panels should be opened at regular intervals in order to allow access for inspection, monitoring and maintenance Pumps to manage and remove water ingress should be considered where necessary Service integration should be contained within wall panels for ease of access		All Options are comparable under the 'Train Operations' sub-criteria All options meet the Train Service Specification		All Options are comparable under the 'Traffic' sub-criteria The impacts of closing the level crossing are the same for all options The diversion of general traffic to other crossing locations in addition to the modification of the directional system will disrupt traffic flow during the construction and operational stage Modifications to the connection of Ailesbury Gardens to Sydney Parade Avenue are required for both options to make provision for stair landings This may require closure of the junction or CPO of private land to realign the road junction

Safety										
Employer's Safety		Public Safety		Landscape and Visual Qualitative		Biodiversity		Noise and Vibration		
Qualitative appraisal on the safety impacts on IÉ or railway staff	**Rationale**	**Qualitative appraisal on the safety impacts on the public (road/rail/cycle/pedestrian)**	**Rationale**	**Appraisal of landscape and visual impacts of options based on the sensitive viewpoints**	**Rationale**	**Qualitative appraisal on the impact on biodiversity**	**Rationale**	**Qualitative appraisal of the potential noise and vibration impact**	**Rationale**
To reduce safety risks associated with construction maintenance and operations To reduce the potential for incidents or near-misses for IÉ/construction staff		To reduce safety risks associated with passengers at platforms, public adjacent to the railway and road, pedestrian and cycle users at level crossings To reduce the potential for accidents for members of the public/passengers on railway infrastructure To reduce the potential for conflict between rail and road users		To avoid / minimise impact on designated amenities, landscapes, protected trees or views To avoid / minimise visual impact on properties & amenities To avoid / minimise removal of trees / hedgerows To avoid / minimise impact from light pollution To provide opportunities to enhance the local amenity and green infrastructure		To consider effects on biodiversity of the area and/, such as impacts on specific flora or fauna, or on defined habitats To provide opportunities to enhance biodiversity To ensure that impacts on nature conservation resources are prevented and mitigated These can occur through direct loss or damage to habitat or specific species, creation of barriers to population movement or indirect effects resulting from, for example, changes in water quality of levels, air quality or noise and light levels		To provide a solution which ensures minimum levels of noise and vibration	
	All Options are comparable under the 'Employer's Safety' sub-criteria It is not envisaged that IÉ staff will be responsible for carrying out activities in relation to maintaining, inspecting or monitoring the new assets		All Options are comparable under the 'Public Safety' sub-criteria Both options eliminate the level crossing risk by completely closing the crossing While footbridges do not have the common perceptions on security that subways do, they have similarities that need to be considered Areas should feel open and be well lit, avoiding corners and changes in direction where possible in order to open up clear lines of site, and avoid blind spots They should be at least partially transparent from 1m above floor level, and enclosed passageways on footbridges should be minimised The use of glazing on decks and stairs can open up visual connectivity, reduce the feeling of claustrophobia and increase passive surveillance and the perception of security Lighting should provide uniform intensity and coverage, and allow all passengers to read information and signage clearly at all times of day		Option SP-P-4 has a significantly comparative disadvantage over Option SP-P-6 under the 'Landscape and Visual' sub-criteria There is a considerable visual impact to Sydney Parade Station and surrounding area due to the close proximity of the footbridge which will represent a prominent visual element The higher lift shafts will create overshadowing of the existing signal box There is a greater potential impact for loss of privacy and lighting from the footbridge on the residential premises on Sandymount Avenue, in particular No 2, 17 & 19 Sydney Parade Avenue, and Derlamogue 31 Ailesbury Park		Option SP-P-4 has a comparative disadvantage over Option SP-P-6 under the 'Biodiversity' sub-criteria The level crossing is located c 300m from Dublin Bay, and the designated sites within, namely; South Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA, and South Dublin Bay pNHA, which are designated for marine and intertidal habitats and overwintering birds These designated areas are of international and national biodiversity importance The works are within the ZoI of these areas, with the potential indirect impacts include construction related impacts (e g potential for water quality impacts or disturbance to birds) and new lighting which could impact on birds Foundation works will be required to construct the footbridge, however, less excavation is required when compared to constructing the subway, thereby requiring a shorter construction duration The construction of the footbridge is likely to impact less on biodiversity in the area The reduced construction duration will reduce the amount of disturbance, and noise or vibration impacts on local wildlife However, during the operational stage, the footbridge is likely to have an increased amount of lighting, and noise or vibration impacts		All Options are comparable under the 'Noise and Vibration' sub-criteria During the construction stage it is expected that Option SP-P-4 should have a reduced impact in relation to noise & vibration, due to the shorter construction duration During the operational stage, it is expected that Option SP-P-4 is expected to result in higher noise impacts due to the elevated crossing
	All Options are comparable under the 'Employer's Safety' sub-criteria It is not envisaged that IÉ staff will be responsible for carrying out activities in relation to maintaining, inspecting or monitoring the new assets		All Options are comparable under the 'Public Safety' sub-criteria Both options eliminate the level crossing risk by completely closing the crossing A common perception of subways is that these spaces are dark and oppressive Maximising visibility by providing clear lines of sight, avoiding corners and changes in direction, wide passageways and keeping ceilings as high as possible create a more expansive fell that improves the perception of security Good lighting is crucial in subway spaces Artificial lighting should have good colour rendering, and provide uniform intensity and coverage, at all times of day Natural lighting should be used wherever possible, and this helps to improve the perception of security and creates a connection with the outside When natural light is maximised at routes in and out of subways such as over a stair, natural light can assist with intuitive wayfinding		Option SP-P-6 has a significantly comparative advantage over Option SP-P-4 under the 'Landscape and Visual' sub-criteria Due to the underground connection, there is minimal visual impact to Sydney Parade Station and the surrounding area with only the lift shafts extend above street level The potential impact for loss of privacy and lighting from the subway on the residential premises on Sydney Parade Avenue is significantly reduced		Option SP-P-6 has a comparative disadvantage over Option SP-P-4 under the 'Biodiversity' sub-criteria The level crossing is located c 300m from Dublin Bay, and the designated sites within, namely; South Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA, and South Dublin Bay pNHA, which are designated for marine and intertidal habitats and overwintering birds These designated areas are of international and national biodiversity importance The works are within the ZoI of these areas, with the potential indirect impacts include construction related impacts (e g potential for water quality impacts or disturbance to birds) and new lighting which could impact on birds A greater amount of excavation is required to construct the subway, compared to constructing the footbridge, thereby requiring a longer construction duration Potential impacts on the groundwater body would also be a consideration, with the underground construction required for the subway, and subsequently potential impacts on groundwater dependent habitats and species in the surrounding habitat and within European sites nearby		All Options are comparable under the 'Noise and Vibration' sub-criteria During the construction stage it is expected that Option SP-P-6 should have an increased impact in relation to noise & vibration, due to the longer construction duration During the operational stage, it is expected that Option SP-P-6 is expected to result in lower noise impacts due to the sub-service crossing

Environment

Water Resources		Archaeology, Architectural and Cultural Heritage		Geology & Soils		Agricultural and Non-agricultural		Air Quality & Climate Change	
Qualitative appraisal on the potential impacts to surface ground or coastal waters	**Rationale**	**Qualitative appraisal of the potential impacts of proposed options on potential sub surface archaeology and impact on foundations and above ground elements of architectural heritage**	**Rationale**	**Qualitative appraisal of the potential of the proposed options on waste and material resources including the reuse of site won materials.**	**Rationale**	**Qualitative appraisal of impacts on valued resources either from a human or natural origin with value arising for economic or cultural reasons. These assets can be existing utilities or non-renewable resources**	**Rationale**	**Qualitative appraisal of air quality and climate impacts both on the operational and construction phases**	**Rationale**
To minimise the impact or provide opportunities to enhance the quality of surface waters and associated floodplains, ground waters and coastal waters		The construction, presence and operation of transport infrastructure can impact directly on such cultural heritage resources through physical impacts resulting from direct loss or damage, or indirectly through changes in setting, noise and vibration levels, air quality, and water levels To minimise the impact on cultural heritage such as on below ground archaeological remains, historic buildings (individual and areas), and historic landscapes and parks		To consider the impacts on designated areas of geological interest, unstable natural ground and ground contamination To consider the impacts on agricultural soil and sensitive or vulnerable soils and material resources, including the reuse of site won materials		Qualitative appraisal of impacts on valued resources either from a human or natural origin with value arising for economic or cultural reasons These assets can be existing utilities or non-renewable resources		Impacts of Construction Traffic Improvements in air quality through use of EMUs over DMUs Improvements in greenhouse gas emission through modal shift from road to rail Improvements in greenhouse gas emission through use of EMUs over DMUs Reduction in greenhouse gas emissions Preservation or enhancement the local air quality	
	All Options are comparable under the 'Water Resource' sub-criteria.		Option SP-P-4 has a comparative advantage over Option SP-P-6 under the 'Archaeology, Architectural and Cultural Heritage' sub-criteria. Construction of a footbridge requires less excavation, when compared to that of a subway, and therefore has less potential to reveal previously undisturbed archaeological deposits. There are no recorded monuments located at the proposed works. The proposed eastern lift is located very close to the Signal box which is part of the Sydney Parade station complex and also the boundary walls to the houses on Sydney Parade so there is potential for damage		Option SP-P-4 has a comparative advantage over Option SP-P-6 under the 'Geology & Soils' sub-criteria. The proposed works for Option SP-P-4 consist of the construction of a footbridge with both stair and lift access. Pile foundations will likely be required to support the structure overhead, which should be less intrusive to the existing geology and soils than the extent of excavation required for a subway. Additionally, the reduced excavation of made ground and natural materials decreases the potential for management of contaminated materials.		All Options are comparable under the 'Agricultural and Non-agricultural' sub-criteria.		All Options are comparable under the 'Air Quality & Climate Change' sub-criteria. The impacts of closing the level crossing are the same for all options, including reduction in operational traffic in the area and the type of rolling stock used on the line. Option SP-P-6 is expected to have a longer construction duration which will increase construction traffic, however this is not considered significant enough to be considered a comparative advantage over Option SP-P-4.
	All Options are comparable under the 'Water Resource' sub-criteria. Opportunities to enhance the quality of surface waters and associated floodplains could be considered in the design of the subway water management system if necessary.		Option SP-P-6 has a comparative disadvantage over Option SP-P-4 under the 'Archaeology, Architectural and Cultural Heritage' sub-criteria. Construction of a subway requires more excavation, when compared to that of a subway, and therefore there is a greater potential to reveal previously undisturbed archaeological deposits. There are no recorded monuments located at the proposed works. The proposed eastern lift is located very close to the Signal box which is part of the Sydney Parade station complex and also the boundary walls to the houses on Sydney Parade so there is potential for damage.		Option SP-P-6 has a comparative disadvantage over Option SP-P-4 under the 'Geology & Soils' sub-criteria. The proposed works for Option SP-P-6 consist of the construction of a subway with both stair and lift access. Excavation works will be required, thereby generating comparatively significant surplus earthworks materials, both made ground and natural materials. Due to the limited reuse options, these materials would require recovery or off site disposal. Additionally, the stability of the railway, roads, structures and services adjacent to the subway may be impacted due to the presence of made ground, soft ground (alluvial deposit and soft marine sediments) and gravels present at and within the vicinity of the site.		All Options are comparable under the 'Agricultural and Non-agricultural' sub-criteria.		All Options are comparable under the 'Air Quality & Climate Change' sub-criteria. The impacts of closing the level crossing are the same for all options, including reduction in operational traffic in the area and the type of rolling stock used on the line. Option SP-P-6 is expected to have a longer construction duration which will increase construction traffic, however this is not considered significant enough to be considered a comparative advantage over Option SP-P-4.

Accessibility & Social Inclusion				Integration					
Accessibility		Social Inclusion		Adaptability in the Future		Transport Integration		Land Use Integration	
Qualitative appraisal of capacity of options to facilitate the movement of people (either within, on to or across the rail system)	**Rationale**	**Qualitative appraisal of capacity of options to provide ease of access for the mobility and visually impaired**	**Rationale**	**Qualitative appraisal of capacity of options to cater for future projects or aspirations**	**Rationale**	**Qualitative appraisal of the options and their impact on integration with other transport modes**	**Rationale**	**Qualitative appraisal of the options and their impact on integration with land use policies**	**Rationale**
Capacity of options to facilitate the movement of people (either within, on to or across the rail system) Impact on the wellbeing of the passenger and public Positive impact on passenger and public experience Improve accessibility to key facilities, such as employment, education, transport and healthcare to satisfy transport demand for all trip types		Positive impact towards vulnerable groups Improvement of accessibility to public transport facilities, in particular from deprived geographic areas		Allowance for future internal transport links within Ireland		Similarity of systems with other DART+ Programmes The solution proposed should integrate with other transport systems such as DART+ West, Metrolink and light rail lines, local and national traffic road systems, walkways, and cycleways		Integration with land use policies and objectives Integration with regional and local land use plans Adhesion to regional and local plans and policies	
	Option SP-P-4 has a comparative disadvantage over Option SP-P-6 under the 'Accessibility' sub-criteria. The design of stairs is very important. Poorly designed stairs can create a barrier for a large proportion of passengers including the frail elderly and those with cognitive, sensory and mobility disabilities. The footbridge worsens the passenger flow and accessibility as the vertical displacement (6.45m) is increased by 100%, in comparison with a subway (3 15m). This results in an increased stair length of 100% (36.4m), in comparison with a subway (17.4m).		All Options are comparable under the 'Social Inclusion' sub-criteria. All options provide unrestricted movements for pedestrians and cyclists. Lifts are an essential feature for people who are unable to negotiate steps, including wheelchair users and some ambulant disabled people where the change in level is greater than 2 m and where there is no space to provide a suitable ramp. Lifts are also helpful for older people and families with young children. Passengers with luggage should always have the option to use lifts rather than stairs and escalators, for safety reasons. Consideration should be given to providing two lifts either side of the crossing to ensure sufficient redundancy is provided in the event of a lift failing.		All Options are comparable under the 'Adaptability in the Future' sub-criteria. All options have the same impacts to vehicle crossing closure and provide unrestricted pedestrian/cycle crossings.		All Options are comparable under the 'Transport Integration' sub-criteria. All options provide the same integration with other transport systems.		Option SP-P-4 has a comparative disadvantage over Option SP-P-6 under the 'Land Use Integration' sub-criteria. All options comply with policies to increase use of public transport. Option SP-P-4 has a footprint approx. 10% larger than that of Option SP-P-6. It also creates obstacles on the site which limits potential for future land use adaptability.
	Option SP-P-6 has a comparative advantage over Option SP-P-4 under the 'Accessibility' sub-criteria. The design of stairs is very important. Poorly designed stairs can create a barrier for a large proportion of passengers including the frail elderly and those with cognitive, sensory and mobility disabilities. The subway offers greater benefits to the passenger flow and accessibility as the vertical displacement (2.85m) is reduced by 50%, in comparison with a footbridge (7.05m). This results a reduced stair length of 50% (17.4m), in comparison with a subway (36.4m).		All Options are comparable under the 'Social Inclusion' sub-criteria. All options provide unrestricted movements for pedestrians and cyclists. Lifts are an essential feature for people who are unable to negotiate steps, including wheelchair users and some ambulant disabled people where the change in level is greater than 2 m and where there is no space to provide a suitable ramp. Lifts are also helpful for older people and families with young children. Passengers with luggage should always have the option to use lifts rather than stairs and escalators, for safety reasons. Consideration should be given to providing two lifts either side of the crossing to ensure sufficient redundancy is provided in the event of a lift failing.		All Options are comparable under the 'Adaptability in the Future' sub-criteria. All options have the same impacts to vehicle crossing closure and provide unrestricted pedestrian/cycle crossings.		All Options are comparable under the 'Transport Integration' sub-criteria. All options provide the same integration with other transport systems.		Option SP-P-6 has a comparative advantage over Option SP-P-4 under the 'Land Use Integration' sub-criteria. All options comply with policies to increase use of public transport. Option SP-P-6 has a footprint approx. 10% smaller than that of Option SP-P-4. With the exception of the openings for the stairs to the subway, there is minimal obstacles introduced on the site which offers greater potential for future land use adaptability.

				Physical Activity	
Geographical Integration		**Government Policy Integration**		**Walking/Cycling Opportunities**	
Qualitative appraisal of the options and their impact on integration with geographical polices	**Rationale**	**Qualitative appraisal of the options and their impact on integration with geographical and government polices**	**Rationale**	**Qualitative appraisal of the options and their impact to enable walking and cycling opportunities in a safer environment for the communities along the route**	**Rationale**
Integration with land use policies and objectives Integration with regional and local land use plans		Integration with national and international plans and policies		To enable walking and cycling opportunities in a safer environment in the communities along the route To create a healthy environment conducive to active travel	
	All Options are comparable under the 'Geographical Integration' sub-criteria. All options comply with policies to increased use of public transport.		All Options are comparable under the 'Government Policy Integration' sub-criteria. All options comply with policies to increased use of public transport.		All Options are comparable under the 'Walking/Cycling Opportunities' sub-criteria. An unrestricted connection will be provided for pedestrians and cyclists across the railway. Provision of bicycle wheeling ramps will make stairs accessible to cyclists by enabling them to go up or down staircases without having to physically carry their bike. While it may be less desirable for cyclists to dismount when using the stairs, this benefits vulnerable users which may be hindered by fast moving mounted cyclists using the crossing. Therefore creating healthy environment conducive to active travel for all users.
	All Options are comparable under the 'Geographical Integration' sub-criteria. All options comply with policies to increased use of public transport.		All Options are comparable under the 'Government Policy Integration' sub-criteria. All options comply with policies to increased use of public transport.		All Options are comparable under the 'Walking/Cycling Opportunities' sub-criteria. An unrestricted connection will be provided for pedestrians and cyclists across the railway. Provision of bicycle wheeling ramps will make stairs accessible to cyclists by enabling them to go up or down staircases without having to physically carry their bike. While it may be less desirable for cyclists to dismount when using the stairs, this benefits vulnerable users which may be hindered by fast moving mounted cyclists using the crossing. Therefore creating healthy environment conducive to active travel for all users.

Appendix B.6: Merrion Gates Pedestrian / Cyclist Only Crossing Options

				Economy							
				Capital Expenditure (CAPEX): Construction, land acquisition, temporary works		Operational Costs (OPEX): (IÉ or other entities), Technology advancements and future proofing/obsolescence		Train Operations Functionality/Economic Benefit		Traffic functionality and associated economic activities and opportunities	
Works Description	**Summary of Requirements**	**Option Number**	**Description of Option**	**Qualitative appraisal of potential infrastructure costs of proposed options**	**Rationale**	**Qualitative appraisal of potential ongoing infrastructure maintenance costs of proposed options**	**Rationale**	**Qualitative appraisal of potential ongoing operational costs of proposed options**	**Rationale**	**Qualitative appraisal of potential wider benefits of proposed options**	**Rationale**
				Estimate high level cost of construction of option Extent and type of 3rd party lands required permanently Extent and type of 3rd party land required temporarily for temporary works during construction		Cost to maintain the infrastructure over the whole life Effects of infrastructure maintenance to services Provision of ways of undertaking routine inspections and maintenance activities while minimising the effect on service to customers		Potential improvement or deterioration of the operation conditions of the line (reduction or increase of the risk of interruption of service) Increased DART service improving connectivity and economy (leading to increased competition in economy, increased output of firms, increased tax revenue)		Potential benefit to vehicular traffic flows in the vicinity of the works during construction and associated economic activities and opportunities in the vicinity Consideration of duration of traffic disruption and length of diversions To minimise the impacts on traffic and transportation during the construction and operational stages	
MCA 5: Local Infrastructure Options for the Pedestrian/Cycle Crossing at Merrion Gate.	To provide an appropriate level of vehicular access for all modes to facilitate access to/from Sandymount Village and neighbouring areas for all modes. To provide an appropriate level of accessibility at a local level for pedestrians and cyclists. To provide an appropriate level of accessibility for emergency services (Fire Brigades, Hospitals) in terms of catchment and response time.	**MG-P-2**	New Footbridge with Compressed Ramp Access		Option MG-P-2 has a comparative disadvantage over the other options under the 'CAPEX' sub-criteria. The differences between the options is greater than 30% and therefore considered as a comparative difference based on the high level of the cost estimate.		Option MG-P-2 has a comparative advantage over the other options under the 'Operational Costs (OPEX)' sub-criteria. Footbridges tend to have a higher maintenance cost when compared to subways. This is largely due to maintenance on footbridges having a higher interface with the live railway, which require isolation of the lines for some activities. Use of non-conductive materials should be used and all materials should be adequately bonded to help mitigate the risks in undertaking maintenance activities. Should glass be considered as part of the solid parapet to provide visibility for user comfort, a safe methodology should be in place for glass cleaning which will require the isolation of the lines. Replacing lifts with ramp access removes the redundancy and maintenance risks associated with lifts. Footbridges do not require the same level of drainage and prevention of flooding as subways do and can be further protected through provision of a roof structure overhead. Services integration should be carefully considered as part of the cable management system. Services should be combined into CMS where possible and run above structure and behind finishes.		All Options are comparable under the 'Train Operations' sub-criteria. All options meet the Train Service Specification.		All Options are comparable under the 'Traffic' sub-criteria. The impacts of closing the level crossing are the same for all options. The diversion of general traffic to other crossing locations in addition to the modification of the directional system will disrupt traffic flow during the construction and operational stage.
		MG-P-3	New Footbridge with Non-Linear Ramp Access		Option MG-P-3 has a significant comparative disadvantage over the other options under the 'CAPEX' sub-criteria. This is the most expensive options, nearly double the cost of the stair & lift options, and therefore considered as a significant comparative difference based on the high level of the cost estimate.		Option MG-P-3 has a comparative advantage over the other options under the 'Operational Costs (OPEX)' sub-criteria. Footbridges tend to have a higher maintenance cost when compared to subways. This is largely due to maintenance on footbridges having a higher interface with the live railway, which require isolation of the lines for some activities. Use of non-conductive materials should be used and all materials should be adequately bonded to help mitigate the risks in undertaking maintenance activities. Should glass be considered as part of the solid parapet to provide visibility for user comfort, a safe methodology should be in place for glass cleaning which will require the isolation of the lines. Replacing lifts with ramp access removes the redundancy and maintenance risks associated with lifts. Footbridges do not require the same level of drainage and prevention of flooding as subways do and can be further protected through provision of a roof structure overhead. Services integration should be carefully considered as part of the cable management system. Services should be combined into CMS where possible and run above structure and behind finishes.		All Options are comparable under the 'Train Operations' sub-criteria. All options meet the Train Service Specification.		All Options are comparable under the 'Traffic' sub-criteria. The impacts of closing the level crossing are the same for all options. The diversion of general traffic to other crossing locations in addition to the modification of the directional system will disrupt traffic flow during the construction and operational stage.
		MG-P-4	New Footbridge with Stair & Lift Access		Option MG-P-4 has a significant comparative advantage over the other options under the 'CAPEX' sub-criteria. The differences between the options is approx. 50% and therefore considered as a comparative difference based on the high level of the cost estimate.		Option MG-P-4 has a comparative disadvantage over the other options under the 'Operational Costs (OPEX)' sub-criteria. Footbridges tend to have a higher maintenance cost when compared to subways. This is largely due to maintenance on footbridges having a higher interface with the live railway, which require isolation of the lines for some activities. Use of non-conductive materials should be used and all materials should be adequately bonded to help mitigate the risks in undertaking maintenance activities. Should glass be considered as part of the solid parapet to provide visibility for user comfort, a safe methodology should be in place for glass cleaning which will require the isolation of the lines. Footbridges do not require the same level of drainage and prevention of flooding as subways do and can be further protected through provision of a roof structure overhead. Services integration should be carefully considered as part of the cable management system. Services should be combined into CMS where possible and run above structure and behind finishes.		All Options are comparable under the 'Train Operations' sub-criteria. All options meet the Train Service Specification.		All Options are comparable under the 'Traffic' sub-criteria. The impacts of closing the level crossing are the same for all options. The diversion of general traffic to other crossing locations in addition to the modification of the directional system will disrupt traffic flow during the construction and operational stage.
		MG-P-6	New Subway with Stair & Lift Access		Option MG-P-6 has a significant comparative advantage over the other options under the 'CAPEX' sub-criteria. The differences between the options is greater than 40% and therefore considered as a comparative difference based on the high level of the cost estimate.		Option MG-P-6 has a comparative disadvantage over the other options under the 'Operational Costs (OPEX)' sub-criteria. Subways tend to have a lower maintenance cost when compared to footbridges due to nature of the crossing having minimal interface with the live railway. Therefore structural inspections and maintenance can be carried out without requiring isolation of the lines. Subways require more maintenance of drainage and prevention of flooding than a footbridge due to the sub-surface crossing. Water ingress should be managed so that it is drained away safely, and should be concealed behind ceiling finishes or wall panels. Panels should be opened at regular intervals in order to allow access for inspection, monitoring and maintenance. Pumps to manage and remove water ingress should be considered where necessary. Service integration should be contained within wall panels for ease of access.		All Options are comparable under the 'Train Operations' sub-criteria. All options meet the Train Service Specification.		All Options are comparable under the 'Traffic' sub-criteria. The impacts of closing the level crossing are the same for all options. The diversion of general traffic to other crossing locations in addition to the modification of the directional system will disrupt traffic flow during the construction and operational stage.

Safety				Enviro									
Employer's Safety		Public Safety		Landscape and Visual Qualitative		Biodiversity		Noise and Vibration		Water Resources			
Qualitative appraisal on the safety impacts on IÉ or railway staff	Rationale	Qualitative appraisal on the safety impacts on the public (road/rail/cycle/pedestrian)	Rationale	Appraisal of landscape and visual impacts of options based on the sensitive viewpoints	Rationale	Qualitative appraisal on the impact on biodiversity	Rationale	Qualitative appraisal of the potential noise and vibration impact	Rationale	Qualitative appraisal on the potential impacts to surface ground or coastal waters	Rationale		
To reduce safety risks associated with construction maintenance and operations To reduce the potential for incidents or near-misses for IÉ/construction staff		To reduce safety risks associated with passengers at platforms, public adjacent to the railway and road, pedestrian and cycle users at level crossings To reduce the potential for accidents for members of the public/passengers on railway infrastructure To reduce the potential for conflict between rail and road users		To avoid / minimise impact on designated amenities, landscapes, protected trees or views To avoid / minimise visual impact on properties & amenities To avoid / minimise removal of trees / hedgerows To avoid / minimise impact from light pollution To provide opportunities to enhance the local amenity and green infrastructure		To consider effects on biodiversity of the area and/, such as impacts on specific flora or fauna, or on defined habitats To provide opportunities to enhance biodiversity To ensure that impacts on nature conservation resources are prevented and mitigated These can occur through direct loss or damage to habitat or specific species, creation of barriers to population movement or indirect effects resulting from, for example, changes in water quality of levels, air quality or noise and light levels		To provide a solution which ensures minimum levels of noise and vibration		To minimise the impact or provide opportunities to enhance the quality of surface waters and associated floodplains, ground waters and coastal waters			
	All Options are comparable under the 'Employer's Safety' sub-criteria It is not envisaged that IÉ staff will be responsible for carrying out activities in relation to maintaining, inspecting or monitoring the new assets.		All Options are comparable under the 'Public Safety' sub-criteria. Both options eliminate the level crossing risk by completely closing the crossing. While footbridges do not have the common perceptions on security that subways do, they have similarities that need to be considered. Areas should feel open and be well lit, avoiding corners and changes in direction where possible in order to open up clear lines of site, and avoid blind spots. They should be at least partially transparent from 1m above floor level, and enclosed passageways on footbridges should be minimised. The use of glazing on decks and stairs can open up visual connectivity, reduce the feeling of claustrophobia and increase passive surveillance and the perception of security. Lighting should provide uniform intensity and coverage, and allow all passengers to read information and signage clearly at all times of day.		Option MG-P-2 has a significant comparative disadvantage over the other options under the 'Landscape and Visual' sub-criteria. There is considerable visual impact to St. Marys Apartments located on the west side of Merrion Road creating a prominent visual barrier to the coast. The ramps will create overshadowing of the single story residential properties at 278 & 280 Merrion Road and 207 Strand Mews. There is a greater potential impact for loss of privacy and lighting from the footbridge on the residential premises in the area.		Option MG-P-2 has a comparative disadvantage over the other options under the 'Biodiversity' sub-criteria. This option extends into the boundaries of the South Dublin Bay SAC, is metres away from the South Dublin Bay pNHA, and 30m away from the South Dublin Bay and River Tolka Estuary SPA. Potential direct impacts include works within the designated site boundaries, potentially involving habitat removal as a result of the ramp access. Potential indirect impacts include construction related impacts (e.g. potential for water quality impacts or disturbance to birds) new lighting, and collision risks which could impact on birds. The elevated ramp in close proximity of the adjacent SPA, which is a nationally and internationally important area for wintering and breeding birds, collision risk during operation would be a significant concern here.		All Options are comparable under the 'Noise and Vibration' sub-criteria. During the construction stage it is expected that Option MG-P-4 should have a reduced impact in relation to noise & vibration, due to the shorter construction duration. During the operational stage, the footbridge options are expected to result in higher noise impacts due to the elevated crossing, however it is not considered that this will be to the extent as to significantly differentiate between these options and Option MG-		All Options are comparable under the 'Water Resource' sub-criteria.	
	All Options are comparable under the 'Employer's Safety' sub-criteria It is not envisaged that IÉ staff will be responsible for carrying out activities in relation to maintaining, inspecting or monitoring the new assets.		All Options are comparable under the 'Public Safety' sub-criteria. Both options eliminate the level crossing risk by completely closing the crossing. While footbridges do not have the common perceptions on security that subways do, they have similarities that need to be considered. Areas should feel open and be well lit, avoiding corners and changes in direction where possible in order to open up clear lines of site, and avoid blind spots. They should be at least partially transparent from 1m above floor level, and enclosed passageways on footbridges should be minimised. The use of glazing on decks and stairs can open up visual connectivity, reduce the feeling of claustrophobia and increase passive surveillance and the perception of security. Lighting should provide uniform intensity and coverage, and allow all passengers to read information and signage clearly at all times of day.		Option MG-P-3 has a significant comparative disadvantage over the other options under the 'Landscape and Visual' sub-criteria. There is significant visual impact to St. Marys Apartments located on the west side of Merrion Road creating a prominent visual barrier to the coast. The ramps will create overshadowing of the single story residential properties at 278 & 280 Merrion Road and 207 Strand Mews. There is a greater potential impact for loss of privacy and lighting from the footbridge on the residential premises in the area.		Option MG-P-3 has a significant comparative disadvantage over the other options under the 'Biodiversity' sub-criteria. This option extends even further into the SAC, but the potential impacts would be considered comparative to Option MG-P-2. Potential direct impacts include works within the designated site boundaries, potentially involving habitat removal as a result of the ramp access. Potential indirect impacts include construction related impacts (e.g. potential for water quality impacts or disturbance to birds) new lighting, and collision risks which could impact on birds. The elevated ramp in close proximity of the adjacent SPA, which is a nationally and internationally important area for wintering and breeding birds, collision risk during operation would be a significant concern here.		All Options are comparable under the 'Noise and Vibration' sub-criteria. During the construction stage it is expected that Option MG-P-4 should have a reduced impact in relation to noise & vibration, due to the shorter construction duration. During the operational stage, the footbridge options are expected to result in higher noise impacts due to the elevated crossing, however it is not considered that this will be to the extent as to significantly differentiate between these options and Option MG-		All Options are comparable under the 'Water Resource' sub-criteria. All Options are comparable under the 'Water Resource' sub-criteria.	
	All Options are comparable under the 'Employer's Safety' sub-criteria It is not envisaged that IÉ staff will be responsible for carrying out activities in relation to maintaining, inspecting or monitoring the new assets.		All Options are comparable under the 'Public Safety' sub-criteria. Both options eliminate the level crossing risk by completely closing the crossing. While footbridges do not have the common perceptions on security that subways do, they have similarities that need to be considered. Areas should feel open and be well lit, avoiding corners and changes in direction where possible in order to open up clear lines of site, and avoid blind spots. They should be at least partially transparent from 1m above floor level, and enclosed passageways on footbridges should be minimised. The use of glazing on decks and stairs can open up visual connectivity, reduce the feeling of claustrophobia and increase passive surveillance and the perception of security. Lighting should provide uniform intensity and coverage, and allow all passengers to read information and signage clearly at all times of day.		Option MG-P-4 has a comparative disadvantage over the other options under the 'Landscape and Visual' sub-criteria. There is a considerable visual impact to the surrounding area due to the close proximity of the footbridge which will represent a prominent visual element. There is a greater potential impact for loss of privacy and lighting from the footbridge on the residential premises on Sandymount Avenue, in particular No. 18, 18B and the Hermitage 22 Strand Mews.		Option MG-P-4 has a significant comparative advantage over the other options under the 'Biodiversity' sub-criteria. This option has a significant comparative advantage over other options due to construction and operation related impacts. This option does not extend into any designated site, although is in close proximity to the designated sites in Dublin Bay (less than 10m). However, although there is potential for indirect impacts on the nearby designated sites, it is likely to be at a lesser degree than other options, and significantly so. Indirect impacts would include the potential for water quality impacts and/or disturbance to birds during construction, and collision risk and disturbance to birds from lighting and an increase in the public traffic during operation. The construction of this would only cause temporary disturbance due to the less complicated nature of the works over other options.		All Options are comparable under the 'Noise and Vibration' sub-criteria. During the construction stage it is expected that Option MG-P-4 should have a reduced impact in relation to noise & vibration, due to the shorter construction duration. During the operational stage, the footbridge options are expected to result in higher noise impacts due to the elevated crossing, however it is not considered that this will be to the extent as to significantly differentiate between these options and Option MG-		All Options are comparable under the 'Water Resource' sub-criteria.	
	All Options are comparable under the 'Employer's Safety' sub-criteria It is not envisaged that IÉ staff will be responsible for carrying out activities in relation to maintaining, inspecting or monitoring the new assets.		All Options are comparable under the 'Public Safety' sub-criteria. Both options eliminate the level crossing risk by completely closing the crossing. A common perception of subways is that these spaces are dark and oppressive. Maximising visibility by providing clear lines of sight, avoiding corners and changes in direction, wide passageways and keeping ceilings as high as possible create a more expansive fell that improves the perception of security. Good lighting is crucial in subway spaces. Artificial lighting should have good colour rendering, and provide uniform intensity and coverage, at all times of day. Natural lighting should be used whereve possible, and this helps to improve the perception of security and creates a connection with the outside. When natural light is maximised at routes in and out of subways such as over a stair, natura light can assist with intuitive wayfinding.		Option MG-P-6 has a significant comparative advantage over the other options under the 'Landscape and Visual' sub-criteria. Due to the underground connection, there is minimal visual impact to the surrounding area with only the lift shafts extend above street level. The potential impact for loss of privacy and lighting from the subway on the residential premises on Strand Road and Merrion Road is significantly reduced.		Option MG-P-6 has a comparative disadvantage over the other options under the 'Biodiversity' sub-criteria. This option does not extend into any designated site, although is in close proximity to the designated sites in Dublin Bay (less than 10m). This option would require a higher level of construction activities for installing the subway than other options. Indirect impacts would include the potential for water quality impacts and/or disturbance to birds during construction, and disturbance to birds from lighting and an increase in the public traffic during operation. Potential impacts on the groundwater body would also be a consideration, with the underground construction required for the subway, and subsequently potential impacts on groundwater dependent habitats and species in the surrounding habitat and within European sites nearby.		All Options are comparable under the 'Noise and Vibration' sub-criteria. During the construction stage it is expected that Option MG-P-4 should have a reduced impact in relation to noise & vibration, due to the shorter construction duration. During the operational stage, the footbridge options are expected to result in higher noise impacts due to the elevated crossing, however it is not considered that this will be to the extent as to significantly differentiate between these options and Option MG-		All Options are comparable under the 'Water Resource' sub-criteria. Opportunities to enhance the quality of surface waters and associated floodplains could be considered in the design of the subway water management system if necessary.	

nment								Accessibility & Social Inclusion			
Archaeology, Architectural and Cultural Heritage		Geology & Soils		Agricultural and Non-agricultural		Air Quality & Climate Change		Accessibility		Social Inclusion	
Qualitative appraisal of the potential impacts of proposed options on potential sub surface archaeology and impact on foundations and above ground elements of architectural heritage	**Rationale**	**Qualitative appraisal of the potential of the proposed options on waste and material resources including the reuse of site won materials.**	**Rationale**	**Qualitative appraisal of impacts on valued resources either from a human or natural origin with value arising for economic or cultural reasons. These assets can be existing utilities or non-renewable resources**	**Rationale**	**Qualitative appraisal of air quality and climate impacts both on the operational and construction phases**	**Rationale**	**Qualitative appraisal of capacity of options to facilitate the movement of people (either within, on to or across the rail system)**	**Rationale**	**Qualitative appraisal of capacity of options to provide ease of access for the mobility and visually impaired**	**Rationale**
The construction, presence and operation of transport infrastructure can impact directly on such cultural heritage resources through physical impacts resulting from direct loss or damage, or indirectly through changes in setting, noise and vibration levels, air quality, and water levels To minimise the impact on cultural heritage such as on below ground archaeological remains, historic buildings (individual and areas), and historic landscapes and parks		To consider the impacts on designated areas of geological interest, unstable natural ground and ground contamination To consider the impacts on agricultural soil and sensitive or vulnerable soils and material resources, including the reuse of site won materials		Qualitative appraisal of impacts on valued resources either from a human or natural origin with value arising for economic or cultural reasons These assets can be existing utilities or non-renewable resources		Impacts of Construction Traffic Improvements in air quality through use of EMUs over DMUs Improvements in greenhouse gas emission through modal shift from road to rail Improvements in greenhouse gas emission through use of EMUs over DMUs Reduction in greenhouse gas emissions Preservation or enhancement the local air quality		Capacity of options to facilitate the movement of people (either within, on to or across the rail system) Impact on the wellbeing of the passenger and public Positive impact on passenger and public experience Improve accessibility to key facilities, such as employment, education, transport and healthcare to satisfy transport demand for all trip types		Positive impact towards vulnerable groups Improvement of accessibility to public transport facilities, in particular from deprived geographic areas	
	Option MG-P-2 has a comparative advantage over the other options. Construction of a footbridge requires less excavation, when compared to that of a subway. However, the increased number of piled foundations required (when compared to Option MG-P-4 due to the inclusion of ramps) has the potential to reveal previously undisturbed archaeological deposits, albeit less likely than that of excavation.		Option MG-P-2 has a comparative advantage over the other options under the 'Geology & Soils' sub-criteria. A greater number of pile foundations will likely be required to support the structure overhead, which should be less intrusive to the existing geology and soils than the extent of excavation required for a subway. Additionally, the reduced excavation of made ground and natural materials decreases the potential for management of contaminated materials. However, part of the proposed footprint falls within the boundary of an SAC (South Dublin Bay, Site Code: 000210) and additional land take is needed in comparison with the other options.		All Options are comparable under the 'Agricultural and Non-agricultural' sub-criteria.		All Options are comparable under the 'Air Quality & Climate Change' sub-criteria. The impacts of closing the level crossing are the same for all options, including reduction in operational traffic in the area and the type of rolling stock used on the line. Option MG-P-6 is expected to have a longer construction duration which will increase construction traffic, however this is not considered significant enough to be considered a comparative advantage over the other options.		Option MG-P-2 has a comparative disadvantage over the other options under the 'Accessibility' sub-criteria. The design of stairs and ramps are very important. Poorly designed stairs and ramps can create a barrier for a large proportion of passengers including the frail elderly and those with cognitive, sensory and mobility disabilities. The footbridge worsens the passenger flow and accessibility as the vertical displacement (5.7m) is increased by 65%, in comparison with a subway (3.45m). This results in an increased stair length of 50% (29.8m), in comparison with Option MG-P-6 (20.2m). This results in a decreased ramp length of 45% (154.4), in comparison with Option MG-P-3 (285.4m).		Option MG-P-2 and MG-P-3 have a comparative disadvantage over Options MG-P-4 and MG-P-6 under the 'Social Inclusion' sub-criteria. All options provide unrestricted movements for pedestrians and cyclists. Lifts are an essential feature for people who are unable to negotiate steps, including wheelchair users and some ambulant disabled people where the change in level is greater than 2 m and where there is no space to provide a suitable ramp. Lifts are also helpful for older people and families with young children. Passengers with luggage should always have the option to use lifts rather than stairs and escalators, for safety reasons. Consideration should be given to providing two lifts either side of the crossing to ensure sufficient redundancy is provided in the event of a lift failing.
	Option MG-P-3 has a comparative disadvantage over the other options. Construction of a footbridge requires less excavation, when compared to that of a subway. However, the increased number of piled foundations required (when compared to Option MG-P-2 due to the inclusion of longer ramps) has the potential to reveal previously undisturbed archaeological deposits, albeit less likely than that of excavation.		Option MG-P-3 has a significant comparative disadvantage over the other option under the 'Geology & Soils' sub-criteria. The proposed works comprise a ramped crossing with stairs and lift access and have an overall footprint of approximately 140m by 40m. The option has the largest overall footprint and a significant additional land take is needed in comparison with the other options. The proposed option is on the coastline with a portion of the proposed structure located within a region prone to erosion; some works will also be required on the foreshore thereby requiring consultation with the Department+AC14m part of the SAC.		All Options are comparable under the 'Agricultural and Non-agricultural' sub-criteria.		All Options are comparable under the 'Air Quality & Climate Change' sub-criteria. The impacts of closing the level crossing are the same for all options, including reduction in operational traffic in the area and the type of rolling stock used on the line. Option MG-P-6 is expected to have a longer construction duration which will increase construction traffic, however this is not considered significant enough to be considered a comparative advantage over the other options.		Option MG-P-3 has a significant comparative disadvantage over other options under the 'Accessibility' sub-criteria. The design of stairs and ramps are very important. Poorly designed stairs and ramps can create a barrier for a large proportion of passengers including the frail elderly and those with cognitive, sensory and mobility disabilities. The footbridge worsens the passenger flow and accessibility as the vertical displacement (5.7m) is increased by 65%, in comparison with a subway (3.45m). This results in an increased stair length of 50% (29.8m), in comparison with Option MG-P-6 (20.2m). This results in an increased ramp length of 80% (285.4), in comparison with Option MG-P-2 (154.4m).		Option MG-P-2 and MG-P-3 have a comparative disadvantage over Options MG-P-4 and MG-P-6 under the 'Social Inclusion' sub-criteria. All options provide unrestricted movements for pedestrians and cyclists. Lifts are an essential feature for people who are unable to negotiate steps, including wheelchair users and some ambulant disabled people where the change in level is greater than 2 m and where there is no space to provide a suitable ramp. Lifts are also helpful for older people and families with young children. Passengers with luggage should always have the option to use lifts rather than stairs and escalators, for safety reasons. Consideration should be given to providing two lifts either side of the crossing to ensure sufficient redundancy is provided in the event of a lift failing.
	Option MG-P-4 have a significant comparative advantage over the other options under the 'Archaeology, Architectural and Cultural Heritage' sub-criteria. The construction of a footbridge requires less excavation, when compared to that of a subway.		Option MG-P-4 has a significant comparative advantage over the other option under the 'Geology & Soils' sub-criteria. This option is the least intrusive from a geology and soils perspective and will require less modification to the level crossing and surrounding environment. Pile foundations will likely be required to support the structure overhead, which should be less intrusive to the existing geology and soils than the extent of excavation required for a subway. Additionally, the reduced excavation of made ground and natural materials decreases the potential for management of contaminated materials.		All Options are comparable under the 'Agricultural and Non-agricultural' sub-criteria.		All Options are comparable under the 'Air Quality & Climate Change' sub-criteria. The impacts of closing the level crossing are the same for all options, including reduction in operational traffic in the area and the type of rolling stock used on the line. Option MG-P-6 is expected to have a longer construction duration which will increase construction traffic, however this is not considered significant enough to be considered a comparative advantage over the other options.		Option MG-P-4 has a comparative advantage over the other options under the 'Accessibility' sub-criteria. The design of stairs and ramps are very important. Poorly designed stairs and ramps can create a barrier for a large proportion of passengers including the frail elderly and those with cognitive, sensory and mobility disabilities. The footbridge worsens the passenger flow and accessibility as the vertical displacement (5.7m) is increased by 65%, in comparison with a subway (3.45m). This results in an increased stair length of 65% (33.2m), in comparison with Option MG-P-6 (20.2m).		Option MG-P-4 and MG-P-6 have a comparative advantage over Options MG-P-2 and MG-P-3 under the 'Social Inclusion' sub-criteria. All options provide unrestricted movements for pedestrians and cyclists. Lifts are an essential feature for people who are unable to negotiate steps, including wheelchair users and some ambulant disabled people where the change in level is greater than 2 m and where there is no space to provide a suitable ramp. Lifts are also helpful for older people and families with young children. Passengers with luggage should always have the option to use lifts rather than stairs and escalators, for safety reasons. Consideration should be given to providing two lifts either side of the crossing to ensure sufficient redundancy is provided in the event of a lift failing.
	Option MG-P-6 has a significant comparative disadvantage over the other options. The construction of a subway requires more excavation, when compared to that of a footbridge, and therefore there is a greater potential to reveal previously undisturbed archaeological deposits.		Option MG-P-2 has a comparative disadvantage over the other options under the 'Geology & Soils' sub-criteria. The proposed option consists of the construction of a subway with both stair and lift access with an overall approximate footprint of 49.1m x 5m and a minimum headroom of 2.6m. Therefore, excavation works will be required, thereby generating comparatively significant surplus earthworks, both made ground and natural materials. Due to the limited reuse options, these materials would require recovery or off site disposal. Additionally, the stability of the railway, roads, structures and services adjacent to the subway may be impacted due to the presence of made ground, soft ground (alluvial deposit and soft marine sediments) and gravels present at and within the vicinity of the site.		All Options are comparable under the 'Agricultural and Non-agricultural' sub-criteria.		All Options are comparable under the 'Air Quality & Climate Change' sub-criteria. The impacts of closing the level crossing are the same for all options, including reduction in operational traffic in the area and the type of rolling stock used on the line. Option MG-P-6 is expected to have a longer construction duration which will increase construction traffic, however this is not considered significant enough to be considered a comparative advantage over the other options.		Option MG-P-6 has a significant comparative advantage over the other options under the 'Accessibility' sub-criteria. The design of stairs and ramps are very important. Poorly designed stairs and ramps can create a barrier for a large proportion of passengers including the frail elderly and those with cognitive, sensory and mobility disabilities. The subway offers greater benefits to the passenger flow and accessibility as the vertical displacement (3.45m) is reduced by 35%, in comparison with a footbridge (5.7m). This results a reduced stair length of 40% (20.2m), in comparison with Option MG-P-4 (33.2m).		Option MG-P-4 and MG-P-6 have a comparative advantage over Options MG-P-2 and MG-P-3 under the 'Social Inclusion' sub-criteria. All options provide unrestricted movements for pedestrians and cyclists. Lifts are an essential feature for people who are unable to negotiate steps, including wheelchair users and some ambulant disabled people where the change in level is greater than 2 m and where there is no space to provide a suitable ramp. Lifts are also helpful for older people and families with young children. Passengers with luggage should always have the option to use lifts rather than stairs and escalators, for safety reasons. Consideration should be given to providing two lifts either side of the crossing to ensure sufficient redundancy is provided in the event of a lift failing.

Integration										Physical Activity	
Adaptability in the Future		Transport Integration		Land Use Integration		Geographical Integration		Government Policy Integration		Walking/Cycling Opportunities	
Qualitative appraisal of capacity of options to cater for future projects or aspirations	**Rationale**	**Qualitative appraisal of the options and their impact on integration with other transport modes**	**Rationale**	**Qualitative appraisal of the options and their impact on integration with land use policies**	**Rationale**	**Qualitative appraisal of the options and their impact on integration with geographical polices**	**Rationale**	**Qualitative appraisal of the options and their impact on integration with geographical and government polices**	**Rationale**	**Qualitative appraisal of the options and their impact to enable walking and cycling opportunities in a safer environment for the communities along the route**	**Rationale**
Allowance for future internal transport links within Ireland		Similarity of systems with other DART+ Programmes The solution proposed should integrate with other transport systems such as DART+ West, Metrolink and light rail lines, local and national traffic road systems, walkways, and cycleways		Integration with land use policies and objectives Integration with regional and local land use plans Adhesion to regional and local plans and policies		Integration with land use policies and objectives Integration with regional and local land use plans		Integration with national and international plans and policies		To enable walking and cycling opportunities in a safer environment in the communities along the route To create a healthy environment conducive to active travel	
	All Options are comparable under the 'Adaptability in the Future' sub-criteria. All options have the same impacts to vehicle crossing closure and provide unrestricted pedestrian/cycle crossings.		All Options are comparable under the 'Transport Integration' sub-criteria. All options provide the same integration with other transport systems.		Option MG-P-2 has a comparative disadvantage over the other options under the 'Land Use Integration' sub-criteria. All options comply with policies to increase use of public transport. Option MG-P-2 has a footprint approx. 5 times larger than that of Option MG-P-6. It also creates obstacles on the site which limits potential for future land use adaptability.		All Options are comparable under the 'Geographical Integration' sub-criteria. All options comply with policies to increased use of public transport.		All Options are comparable under the 'Government Policy Integration' sub-criteria. All options comply with policies to increased use of public transport.		All Options are comparable under the 'Walking/Cycling Opportunities' sub-criteria. An unrestricted connection will be provided for pedestrians and cyclists across the railway. While it may be more desirable for cyclists not to dismount when using the ramps, consideration must be given to vulnerable users which may be hindered by fast moving mounted cyclists using the crossing. Therefore creating healthy environment conducive to active travel for all users.
	All Options are comparable under the 'Adaptability in the Future' sub-criteria. All options have the same impacts to vehicle crossing closure and provide unrestricted pedestrian/cycle crossings.		All Options are comparable under the 'Transport Integration' sub-criteria. All options provide the same integration with other transport systems.		Option MG-P-3 has significant comparative disadvantage over the other options under the 'Land Use Integration' sub-criteria. All options comply with policies to increase use of public transport. Option MG-P-3 has a footprint approx. 6 times larger than that of Option MG-P-6. It also creates obstacles on the site which limits potential for future land use adaptability.		All Options are comparable under the 'Geographical Integration' sub-criteria. All options comply with policies to increased use of public transport.		All Options are comparable under the 'Government Policy Integration' sub-criteria. All options comply with policies to increased use of public transport.		All Options are comparable under the 'Walking/Cycling Opportunities' sub-criteria. An unrestricted connection will be provided for pedestrians and cyclists across the railway. While it may be more desirable for cyclists not to dismount when using the ramps, consideration must be given to vulnerable users which may be hindered by fast moving mounted cyclists using the crossing. Therefore creating healthy environment conducive to active travel for all users.
	All Options are comparable under the 'Adaptability in the Future' sub-criteria. All options have the same impacts to vehicle crossing closure and provide unrestricted pedestrian/cycle crossings.		All Options are comparable under the 'Transport Integration' sub-criteria. All options provide the same integration with other transport systems.		Option MG-P-4 has a comparative advantage over the other options under the 'Land Use Integration' sub-criteria. All options comply with policies to increase use of public transport. Option MG-P-4 has approx. the same footprint of Option MG-P-6 Option MG-P-4 has a rsignificantly educed footprint in comparison to Option MG-P-2 and Option MG-P-3.		All Options are comparable under the 'Geographical Integration' sub-criteria. All options comply with policies to increased use of public transport.		All Options are comparable under the 'Government Policy Integration' sub-criteria. All options comply with policies to increased use of public transport.		All Options are comparable under the 'Walking/Cycling Opportunities' sub-criteria. An unrestricted connection will be provided for pedestrians and cyclists across the railway. Provision of bicycle wheeling ramps will make stairs accessible to cyclists by enabling them to go up or down staircases without having to physically carry their bike. While it may be less desirable for cyclists to dismount when using the stairs, this benefits vulnerable users which may be hindered by fast moving mounted cyclists using the crossing. Therefore creating healthy environment conducive to active travel for all users.
	All Options are comparable under the 'Adaptability in the Future' sub-criteria. All options have the same impacts to vehicle crossing closure and provide unrestricted pedestrian/cycle crossings.		All Options are comparable under the 'Transport Integration' sub-criteria. All options provide the same integration with other transport systems.		Option MG-P-6 has a comparative advantage over the other options under the 'Land Use Integration' sub-criteria. All options comply with policies to increase use of public transport. Option MG-P-4 has approx. the same footprint of Option MG-P-6. With the exception of the openings for the stairs to the subway, there is minimal obstacles introduced on the site which offers greater potential for future land use adaptability. Option MG-P-6 has a significantly reduced footprint in comparison to Option MG-P-2 and Option MG-P-3.		All Options are comparable under the 'Geographical Integration' sub-criteria. All options comply with policies to increased use of public transport.		All Options are comparable under the 'Government Policy Integration' sub-criteria. All options comply with policies to increased use of public transport.		All Options are comparable under the 'Walking/Cycling Opportunities' sub-criteria. An unrestricted connection will be provided for pedestrians and cyclists across the railway. Provision of bicycle wheeling ramps will make stairs accessible to cyclists by enabling them to go up or down staircases without having to physically carry their bike. While it may be less desirable for cyclists to dismount when using the stairs, this benefits vulnerable users which may be hindered by fast moving mounted cyclists using the crossing. Therefore creating healthy environment conducive to active travel for all users.

Appendix B.7: Merrion Gates Full Crossing Options

				Economy							
				Capital Expenditure (CAPEX): Construction, land acquisition, temporary works		Operational Costs (OPEX): (IÉ or other entities), Technology advancements and future proofing/obsolescence		Train Operations Functionality/Economic Benefit		Traffic functionality and associated economic activities and opportunities	
Works Description	**Summary of Requirements**	**Option Number**	**Description of Option**	**Qualitative appraisal of potential infrastructure costs of proposed options**	**Rationale**	**Qualitative appraisal of potential ongoing infrastructure maintenance costs of proposed options**	**Rationale**	**Qualitative appraisal of potential ongoing operational costs of proposed options**	**Rationale**	**Qualitative appraisal of potential wider benefits of proposed options**	**Rationale**
				Estimate high level cost of construction of option. Extent and type of 3rd party lands required permanently. Extent and type of 3rd party land required temporarily for temporary works during construction.		Cost to maintain the infrastructure over the whole life. Effects of infrastructure maintenance to services. Provision of ways of undertaking routine inspections and maintenance activities while minimising the effect on service to customers.		Potential improvement or deterioration of the operation conditions of the line (reduction or increase of the risk of interruption of service). Increased DART service improving connectivity and economy (leading to increased competition in economy, increased output of firms, increased tax revenue).		Potential benefit to vehicular traffic flows in the vicinity of the works during construction and associated economic activities and opportunities in the vicinity. Consideration of duration of traffic disruption and length of diversions. To minimise the impacts on traffic and transportation during the construction and operational stages.	
MCA6: Local Infrastructure Options for the Vehicular Crossing at Merrion Gate.	To provide an appropriate level of vehicular access for all modes to facilitate access to/from Sandymount Village and neighbouring areas for all modes. To provide an appropriate level of accessibility at a local level for pedestrians and cyclists. To provide an appropriate level of accessibility for emergency services (Fire Brigades, Hospitals) in terms of catchment and response time.	**MG-V-5a**	New Overpass - 2-way Vehicular Crossing North of Level Crossing.		Option MG-P-5a has a significant comparative disadvantage over Option MG-V-5b under the 'CAPEX' sub-criteria. This is the most expensive options, approx. 30% more than Option MG-V-5b, and therefore considered as a significant comparative difference based on the high level of the cost estimate.		Option MG-V-5a has a comparative disadvantage over Option MG-V-5b under the 'Operational Costs (OPEX)' sub-criteria. An overpass tends to have a higher maintenance cost when compared to an underpass. This is largely due to maintenance on an overpass having a higher interface with the live railway, which require isolation of the lines for some activities. Use of non-conductive materials should be used and all materials should be adequately bonded to help mitigate the risks in undertaking maintenance activities. Should glass be considered as part of the solid parapet to provide visibility for user comfort, a safe methodology should be in place for glass cleaning which will require the isolation of the lines. An overpass does not require the same level of drainage and prevention of flooding as an underpasses does and can be further protected through provision of a roof structure overhead. Services integration should be carefully considered as part of the cable management system. Services should be combined into CMS where possible and run above structure and behind finishes.		All Options are comparable under the 'Train Operations' sub-criteria. All options meet the Train Service Specification.		All Options are comparable under the 'Traffic' sub-criteria. The impacts of closing the level crossing are the same for all options. The diversion of general traffic to other crossing locations in addition to the modification of the directional system will disrupt traffic flow during the construction and operational stage.
		MG-V-5b	New Underpass - 2-way Vehicular Crossing North of Level Crossing.		Option MG-V-5b has a significant comparative advantage over Option MG-V-5a under the 'CAPEX' sub-criteria. The differences between the options is greater than 30% and therefore considered as a significant comparative difference based on the high level of the cost estimate.		Option MG-V-5b has a comparative advantage over Option MG-V-5a under the 'Operational Costs (OPEX)' sub-criteria. An underpass tends to have a lower maintenance cost when compared to an overpass due to nature of the crossing having minimal interface with the live railway. Therefore structural inspections and maintenance can be carried out without requiring isolation of the lines. An underpass requires more maintenance of drainage and prevention of flooding than an overpass due to the sub-surface crossing. Water ingress should be managed so that it is drained away safely, and should be concealed behind ceiling finishes or wall panels. Panels should be opened at regular intervals in order to allow access for inspection, monitoring and maintenance. Pumps to manage and remove water ingress should be considered where necessary. Service integration should be contained within wall panels for ease of access.		All Options are comparable under the 'Train Operations' sub-criteria. All options meet the Train Service Specification.		All Options are comparable under the 'Traffic' sub-criteria. The impacts of closing the level crossing are the same for all options. The diversion of general traffic to other crossing locations in addition to the modification of the directional system will disrupt traffic flow during the construction and operational stage.

Safety									
Employer's Safety		**Public Safety**		**Landscape and Visual Qualitative**		**Biodiversity**		**Noise and Vibration**	
Qualitative appraisal on the safety impacts on IÉ or railway staff	**Rationale**	**Qualitative appraisal on the safety impacts on the public (road/rail/cycle/pedestrian)**	**Rationale**	**Appraisal of landscape and visual impacts of options based on the sensitive viewpoints**	**Rationale**	**Qualitative appraisal on the impact on biodiversity**	**Rationale**	**Qualitative appraisal of the potential noise and vibration impact**	**Rationale**
To reduce safety risks associated with construction maintenance and operations. To reduce the potential for incidents or near-misses for IÉ/construction staff.		To reduce safety risks associated with passengers at platforms, public adjacent to the railway and road, pedestrian and cycle users at level crossings. To reduce the potential for accidents for members of the public/passengers on railway infrastructure. To reduce the potential for conflict between rail and road users.		To avoid / minimise impact on designated amenities, landscapes, protected trees or views. To avoid / minimise visual impact on properties & amenities. To avoid / minimise removal of trees / hedgerows. To avoid / minimise impact from light pollution. To provide opportunities to enhance the local amenity and green infrastructure.		To consider effects on biodiversity of the area and/, such as impacts on specific flora or fauna, or on defined habitats. To provide opportunities to enhance biodiversity. To ensure that impacts on nature conservation resources are prevented and mitigated. These can occur through direct loss or damage to habitat or specific species, creation of barriers to population movement or indirect effects resulting from, for example, changes in water quality of levels, air quality or noise and light levels.		To provide a solution which ensures minimum levels of noise and vibration.	
	All Options are comparable under the 'Employer's Safety' sub-criteria. It is not envisaged that IÉ staff will be responsible for carrying out activities in relation to maintaining, inspecting or monitoring the new assets.		All Options are comparable under the 'Public Safety' sub-criteria. Both options eliminate the level crossing risk by completely closing the crossing.		Option MG-V-5a has a significantly comparative disadvantage over Option MG-V-5b under the 'Landscape and Visual' sub-criteria. There is a considerable visual impact to the surrounding area in close proximity of the overpass. The overpass will represent the most prominent visual element in this area, introducing a visual barrier to Our Lady Queen of Peace Church which could be considered to have cultural importance. There is a greater potential impact for loss of privacy and lighting from the overpass on the residential premises in Ailesbury Mews, and the commercial properties on Merrion Road and Merrion Hall.		Option MG-V-5a has a comparative advantage over Option MG-V-5b under the 'Biodiversity' sub-criteria. Both options would likely have potential indirect impacts on adjacent European and National sites in Dublin Bay, i.e. potential for water quality impacts and/or disturbance to birds during construction, and collision risk and disturbance to birds from lighting and an increase in the public traffic during operation. This option is proposed in an area that is already quite urban, and has multistorey buildings adjacent to the works location, so collision risk may not be a significant impact, depending on the height of the overbridge (height not specified on drawings). It is assumed the level of construction would be to a lesser degree and would take less time than construction of an underpass.		Option MG-V-5a has a comparative disadvantage over Option MG-V-5b under the 'Noise and Vibration' sub-criteria. During the construction stage it is expected that Option MG-V-5a should have a reduced impact in relation to noise & vibration, due to the shorter construction duration. During the operational stage, it is expected that Option MG-V-5a is expected to result in comparatively higher noise impacts due to the elevated crossing.
	All Options are comparable under the 'Employer's Safety' sub-criteria. It is not envisaged that IÉ staff will be responsible for carrying out activities in relation to maintaining, inspecting or monitoring the new assets.		All Options are comparable under the 'Public Safety' sub-criteria. Both options eliminate the level crossing risk by completely closing the crossing.		Option MG-V-5b has a significantly comparative advantage over Option MG-V-5a under the 'Landscape and Visual' sub-criteria. Due to the underground connection, there is minimal visual impact to the surrounding area. The potential impact for loss of privacy and lighting from the underpass on the residential premises on the residential premises in Ailesbury Mews, and the commercial properties on Merrion Road and Merrion Hall.e is significantly reduced.		Option MG-V-5b has a comparative disadvantage over Option MG-V-5a under the 'Biodiversity' sub-criteria. Both options would likely have potential indirect impacts on adjacent European and National sites in Dublin Bay, i.e. potential for water quality impacts and/or disturbance to birds during construction, and collision risk and disturbance to birds from lighting and an increase in the public traffic during operation. As this option involves an underpass and would require excavations into the ground, potential impacts on the groundwater body would require consideration. Subsequently there could be potential impacts on groundwater dependent habitats and species in the surrounding habitat and within European sites nearby. It is assumed this option would have a higher level of impact due to the nature of the works, and would potentially generate a greater level of noise, vibration and would have a longer construction time than the overpass.		Option MG-V-5b has a comparative advantage over Option MG-V-5a under the 'Noise and Vibration' sub-criteria. During the construction stage it is expected that Option MG-V-5b should have an increased impact in relation to noise & vibration, due to the longer construction duration. During the operational stage, it is expected that Option MG-V-5b is expected to result in lower noise impacts due to the sub-service crossing.

Environment

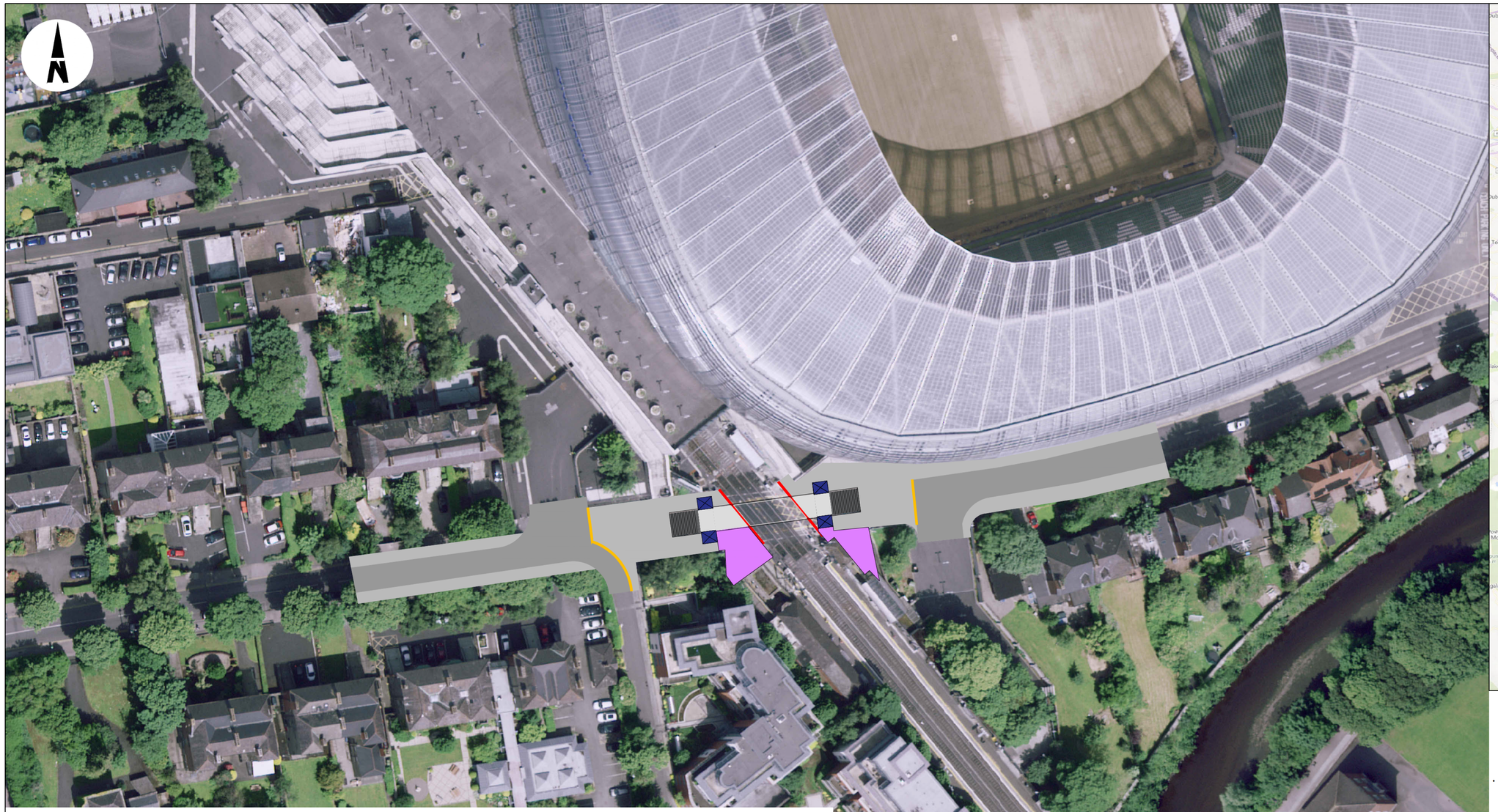
Water Resources		Archaeology, Architectural and Cultural Heritage		Geology & Soils		Agricultural and Non-agricultural		Air Quality & Climate Change	
Qualitative appraisal on the potential impacts to surface ground or coastal waters	**Rationale**	**Qualitative appraisal of the potential impacts of proposed options on potential sub surface archaeology and impact on foundations and above ground elements of architectural heritage**	**Rationale**	**Qualitative appraisal of the potential of the proposed options on waste and material resources including the reuse of site won materials.**	**Rationale**	**Qualitative appraisal of impacts on valued resources either from a human or natural origin with value arising for economic or cultural reasons. These assets can be existing utilities or non-renewable resources**	**Rationale**	**Qualitative appraisal of air quality and climate impacts both on the operational and construction phases**	**Rationale**
To minimise the impact or provide opportunities to enhance the quality of surface waters and associated floodplains, ground waters and coastal waters.		The construction, presence and operation of transport infrastructure can impact directly on such cultural heritage resources through physical impacts resulting from direct loss or damage, or indirectly through changes in setting, noise and vibration levels, air quality, and water levels. To minimise the impact on cultural heritage such as on below ground archaeological remains, historic buildings (individual and areas), and historic landscapes and parks.		To consider the impacts on designated areas of geological interest, unstable natural ground and ground contamination. To consider the impacts on agricultural soil and sensitive or vulnerable soils and material resources, including the reuse of site won materials.		Qualitative appraisal of impacts on valued resources either from a human or natural origin with value arising for economic or cultural reasons. These assets can be existing utilities or non-renewable resources.		Impacts of Construction Traffic. Improvements in air quality through use of EMUs over DMUs. Improvements in greenhouse gas emission through modal shift from road to rail. Improvements in greenhouse gas emission through use of EMUs over DMUs. Reduction in greenhouse gas emissions. Preservation or enhancement the local air quality.	
	All Options are comparable under the 'Water Resource' sub-criteria. For fluvial flooding, the underpass would have a slight advantage as it would provide fluvial flood storage. For coastal flooding, the overbridge would have a slight advantage as the underpass storage is not seen as beneficial for coastal flooding.		Option MG-V-5a has a comparative advantage over Option MG-V-5b under the 'Archaeology, Architectural and Cultural Heritage' sub-criteria. There are no recorded monuments located at the proposed works. This option requires less excavation and therefore there is a greater potential to reveal previously undisturbed archaeological deposits. It is less preferable to a proposed overhead connection. There are no architectural heritage features in the immediate vicinity which are likely to be impacted by the proposal		Option MG-V-5a has a significant comparative advantage over Option MG-V-5b under the 'Geology & Soils' sub-criteria. The proposed works comprise the construction of a two-way vehicular overbridge with stair and lift access with an overall approximate footprint of 250m x 13m. As such, this option is comparatively less intrusive from a geology and soils perspective to the surrounding environment. Furthermore, this option involves minimal excavation of made ground (including potential contaminated materials) and natural materials.		All Options are comparable under the 'Agricultural and Non-agricultural' sub-criteria.		All Options are comparable under the 'Air Quality & Climate Change' sub-criteria. The impacts of closing the level crossing are the same for all options, including reduction in operational traffic in the area and the type of rolling stock used on the line. Option MG-V-5b is expected to have a longer construction duration which will increase construction traffic, however this is not considered significant enough to be considered a comparative advantage over Option MG-V-5a.
	All Options are comparable under the 'Water Resource' sub-criteria. For fluvial flooding, the underpass would have a slight advantage as it would provide fluvial flood storage. For coastal flooding, the overbridge would have a slight advantage as the underpass storage is not seen as beneficial for coastal flooding.		Option MG-V-5b has a comparative disadvantage over Option MG-V-5a under the 'Archaeology, Architectural and Cultural Heritage' sub-criteria. There are no recorded monuments located at the proposed works. This option requires more excavation and therefore there is a greater potential to reveal previously undisturbed archaeological deposits. It is less preferable to a proposed overhead connection. There are no architectural heritage features in the immediate vicinity which are likely to be impacted by the proposal		Option MG-V-5b has a significant comparative disadvantage over Option MG-V-5a under the 'Geology & Soils' sub-criteria. The proposed works for Option MG-V-5b consist of the construction of a two-way vehicular underpass crossing with approximate overall footprint of 250m x 14m and a minimum headroom of 5.3m. As such, significant excavation works will be needed thereby generating comparatively significant surplus earthworks materials associated with made ground and natural materials. Due to the limited reuse options, these materials would require recovery or off site disposal. Additionally, the stability of the railway, roads, structures and services adjacent to the underpass may be impacted due to the presence of made ground and soft ground associated with historic/stream.		All Options are comparable under the 'Agricultural and Non-agricultural' sub-criteria.		All Options are comparable under the 'Air Quality & Climate Change' sub-criteria. The impacts of closing the level crossing are the same for all options, including reduction in operational traffic in the area and the type of rolling stock used on the line. Option MG-V-5b is expected to have a longer construction duration which will increase construction traffic, however this is not considered significant enough to be considered a comparative advantage over Option MG-V-5a.

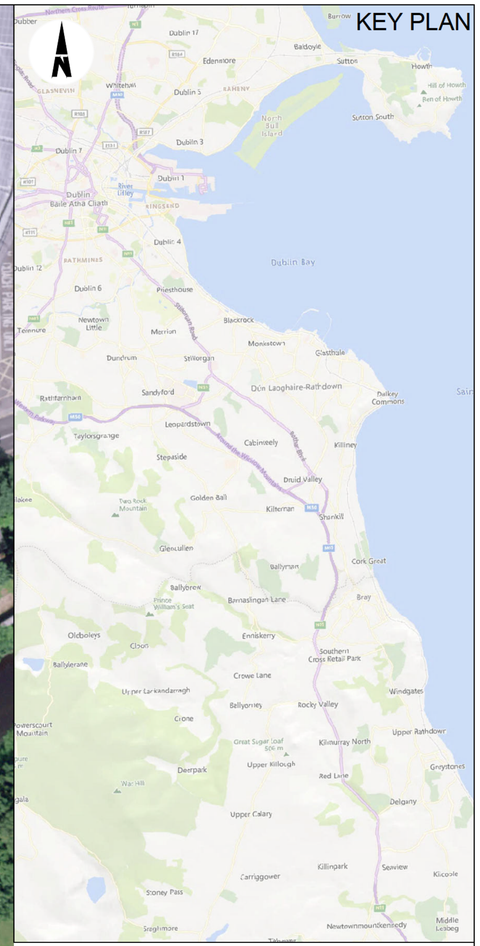
Accessibility & Social Inclusion				Integration					
Accessibility		Social Inclusion		Adaptability in the Future		Transport Integration		Land Use Integration	
Qualitative appraisal of capacity of options to facilitate the movement of people (either within, on to or across the rail system)	**Rationale**	**Qualitative appraisal of capacity of options to provide ease of access for the mobility and visually impaired**	**Rationale**	**Qualitative appraisal of capacity of options to cater for future projects or aspirations**	**Rationale**	**Qualitative appraisal of the options and their impact on integration with other transport modes**	**Rationale**	**Qualitative appraisal of the options and their impact on integration with land use policies**	**Rationale**
Capacity of options to facilitate the movement of people (either within, on to or across the rail system). Impact on the wellbeing of the passenger and public. Positive impact on passenger and public experience. Improve accessibility to key facilities, such as employment, education, transport and healthcare to satisfy transport demand for all trip types.		Positive impact towards vulnerable groups Improvement of accessibility to public transport facilities, in particular from deprived geographic areas.		Allowance for future internal transport links within Ireland.		Similarity of systems with other DART+ Programmes. The solution proposed should integrate with other transport systems such as DART+ West, Metrolink and light rail lines, local and national traffic road systems, walkways, and cycleways.		Integration with land use policies and objectives. Integration with regional and local land use plans. Adhesion to regional and local plans and policies.	
	All Options are comparable under the 'Accessibility ' sub-criteria. All options provide unrestricted movements for pedestrians and cyclists along the length of the new road alignment.		All Options are comparable under the 'Social Inclusion' sub-criteria. All options provide unrestricted movements for pedestrians and cyclists.		All Options are comparable under the 'Adaptability in the Future' sub-criteria. All options have the same impacts to vehicle crossing closure and provide unrestricted pedestrian/cycle crossings.		All Options are comparable under the 'Transport Integration' sub-criteria. All options provide the same integration with other transport systems.		Option MG-V-5a has a comparative disadvantage over Option MG-V-5b under the 'Land Use Integration' sub-criteria. All options comply with policies to increase use of public transport. Both options have a comparative footprint. Option MG-V-5a creates obstacles on the site which limits potential for future land use adaptability.
	All Options are comparable under the 'Accessibility ' sub-criteria. All options provide unrestricted movements for pedestrians and cyclists along the length of the new road alignment.		All Options are comparable under the 'Social Inclusion' sub-criteria. All options provide unrestricted movements for pedestrians and cyclists.		All Options are comparable under the 'Adaptability in the Future' sub-criteria. All options have the same impacts to vehicle crossing closure and provide unrestricted pedestrian/cycle crossings.		All Options are comparable under the 'Transport Integration' sub-criteria. All options provide the same integration with other transport systems.		Option MG-V-5b has a comparative advantage over Option MG-V-5a under the 'Land Use Integration' sub-criteria. All options comply with policies to increase use of public transport. Both options have a comparative footprint. With the exception of the openings for the ramps to the underpass, Option MG-V-5b has minimal obstacles introduced on the site which offers greater potential for future land use adaptability.

				Physical Activity	
Geographical Integration		**Government Policy Integration**		**Walking/Cycling Opportunities**	
Qualitative appraisal of the options and their impact on integration with geographical polices	**Rationale**	**Qualitative appraisal of the options and their impact on integration with geographical and government polices**	**Rationale**	**Qualitative appraisal of the options and their impact to enable walking and cycling opportunities in a safer environment for the communities along the route**	**Rationale**
Integration with land use policies and objectives. Integration with regional and local land use plans.		Integration with national and international plans and policies.		To enable walking and cycling opportunities in a safer environment in the communities along the route. To create a healthy environment conducive to active travel.	
	All Options are comparable under the 'Geographical Integration' sub-criteria. All options comply with policies to increased use of public transport.		All Options are comparable under the 'Government Policy Integration' sub-criteria. All options comply with policies to increased use of public transport.		All Options are comparable under the 'Walking/Cycling Opportunities' sub-criteria. An unrestricted connection will be provided for pedestrians and cyclists across the railway.
	All Options are comparable under the 'Geographical Integration' sub-criteria. All options comply with policies to increased use of public transport.		All Options are comparable under the 'Government Policy Integration' sub-criteria. All options comply with policies to increased use of public transport.		All Options are comparable under the 'Walking/Cycling Opportunities' sub-criteria. An unrestricted connection will be provided for pedestrians and cyclists across the railway.

Appendix C: Preliminary Preferred Option Sketch

Appendix C.1: Lansdowne Road Pedestrian / Cyclist Crossing Option





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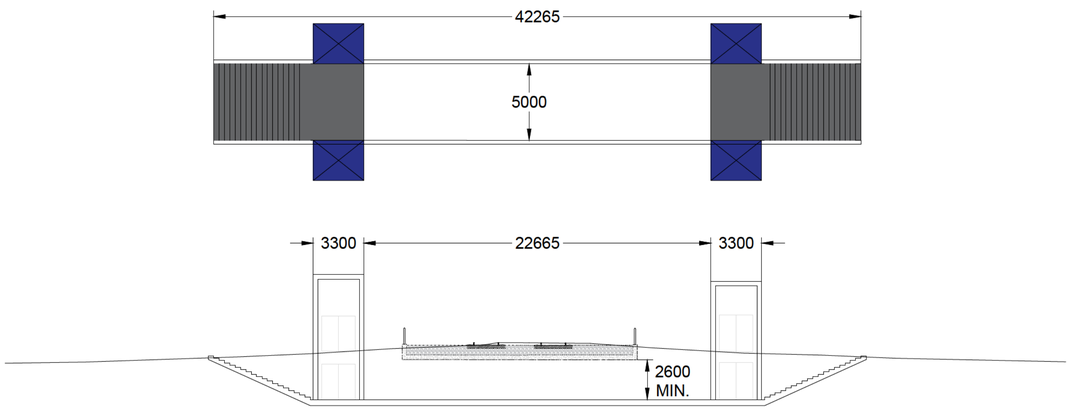
LEGEND :

- BARRIER
- BOLLARDS
- ROAD LAYOUT
- FOOTPATH LAYOUT
- WORKS TO STATION ACCESS

INDICATIVE CROSS SECTION



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DART+ Coastal South

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Engineering Designer: ARUP

Date	Scale	Drawn	Checked	Approved
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Project Code	Originator Code	QMS Code
D+WP56	ARP	280275-00

Project Title: **DART+ COASTAL SOUTH**

Drawing Title: EMERGING PREFERRED OPTION
LANSDOWNE ROAD
PEDESTRIAN CYCLIST CROSSING

Drawing File Name	Sheet Number	Status	Rev
D+WP56-ARP-P2-SL-DR-CH-00006	06 of 20	S3	P01

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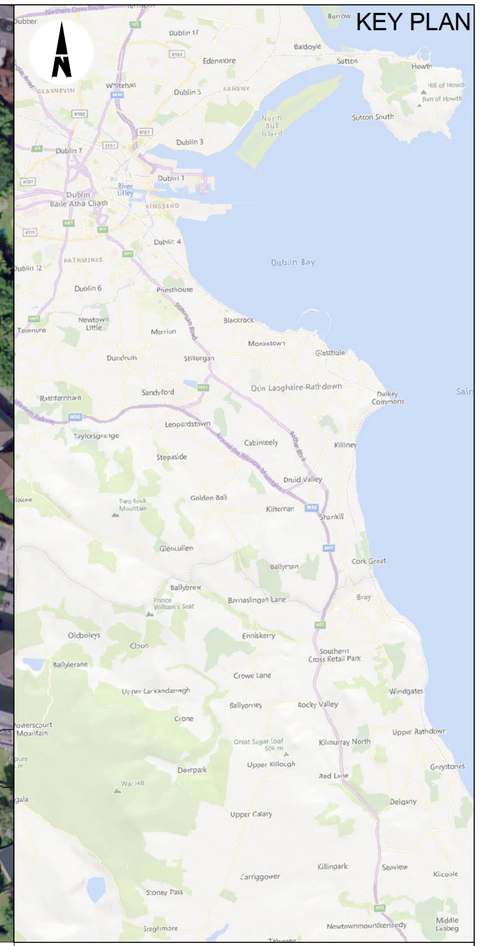
Appendix C.2: Serpentine Avenue Full Crossing Option



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LEGEND :

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- BOLLARDS
- ROAD LAYOUT
- FOOTPATH LAYOUT
- WORKS TO STATION ACCESS
- RETAINING WALL

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Engineering Designer: ARUP

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D+WP56	ARP	280275-00

Project Title: **DART+ COASTAL SOUTH**

Drawing Title: EMERGING PREFERRED OPTION
SERPENTINE AVENUE
FULL CROSSING

Drawing File Name	Sheet Number	Status	Rev
D+WP56-ARP-P2-SL-DR-CH-000001	01 of 01	S3	P01

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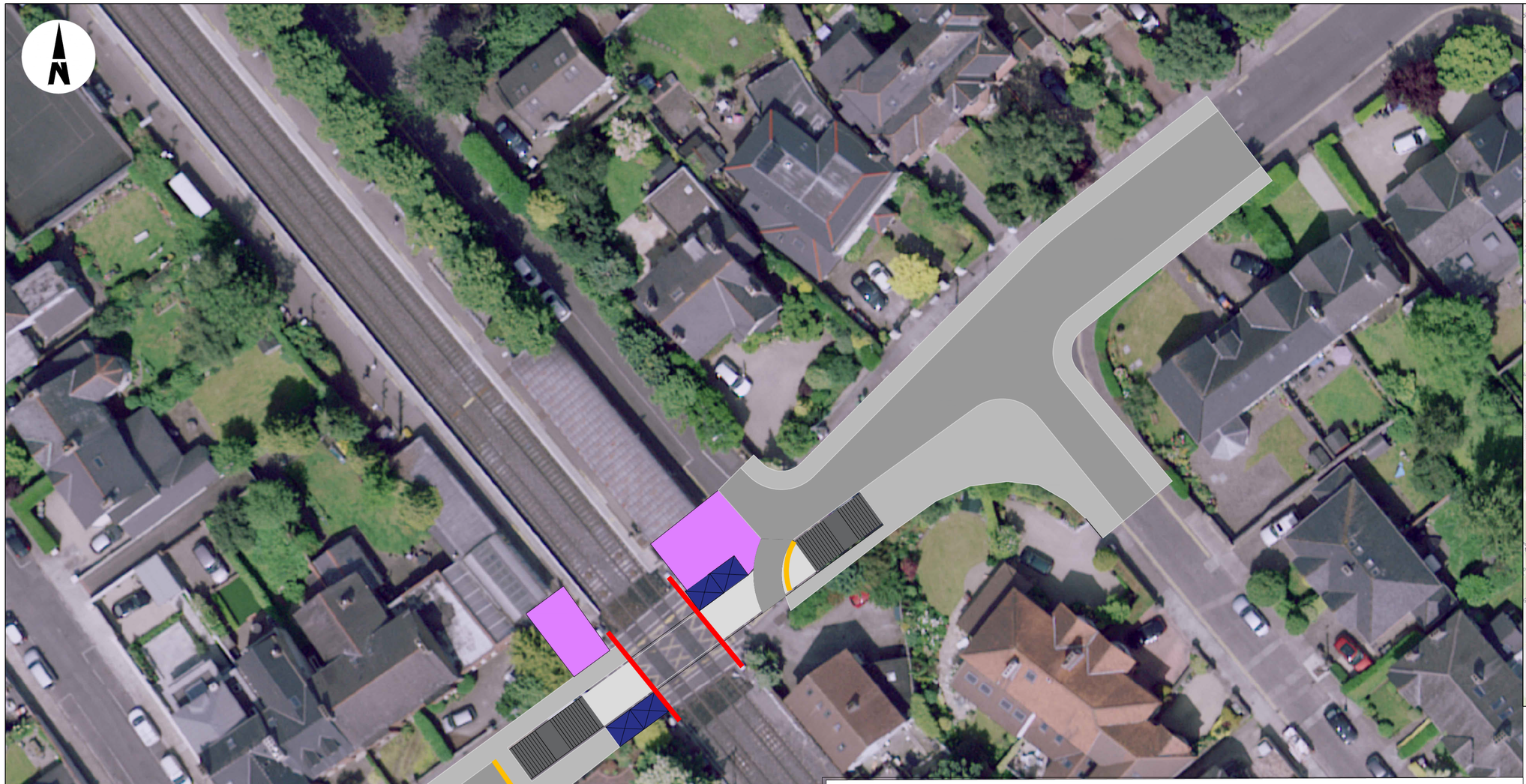
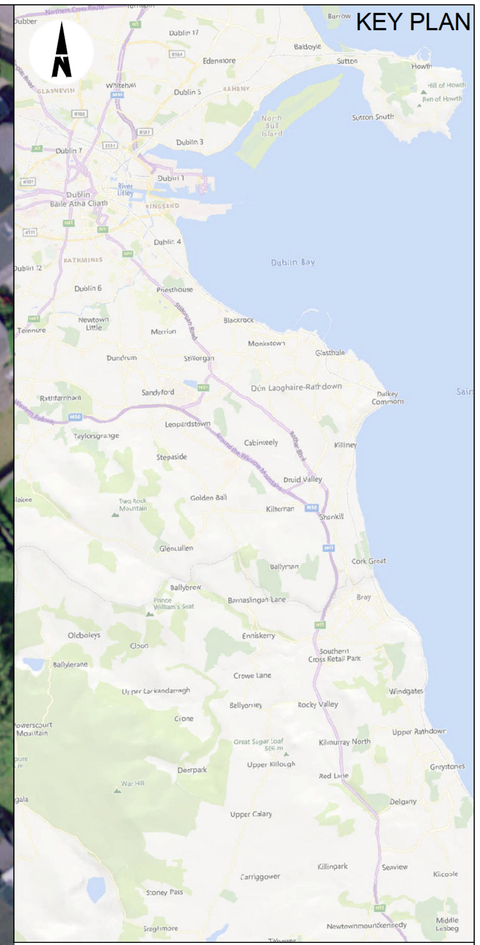
Appendix C.3: Sandymount Avenue Pedestrian / Cyclist Crossing Option





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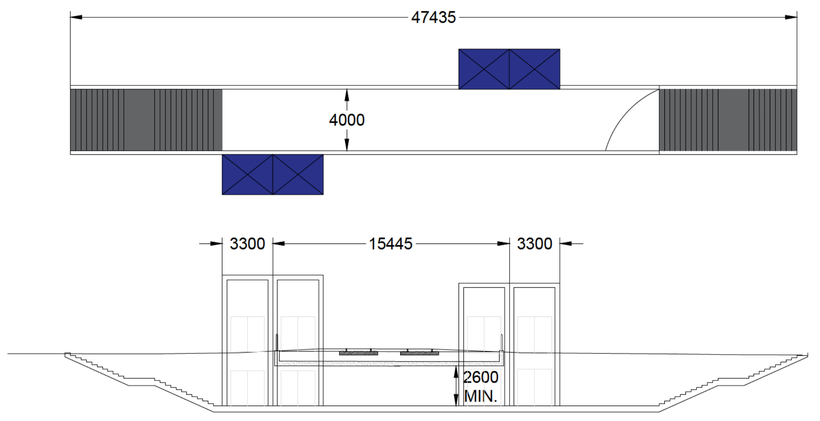

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- ROAD LAYOUT
- FOOTPATH LAYOUT
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Project Code	Originator Code	QMS Code
D+WP56	ARP	280275-00

Project Title: **DART+ COASTAL SOUTH**

Drawing Title: EMERGING PREFERRED OPTION
SANDYMOUNT AVENUE
PEDESTRIAN CYCLIST CROSSING

Drawing File Name	Sheet Number	Status	Rev
D+WP56-ARP-P2-SL-DR-CH-00007	01 of 01	S3	P01

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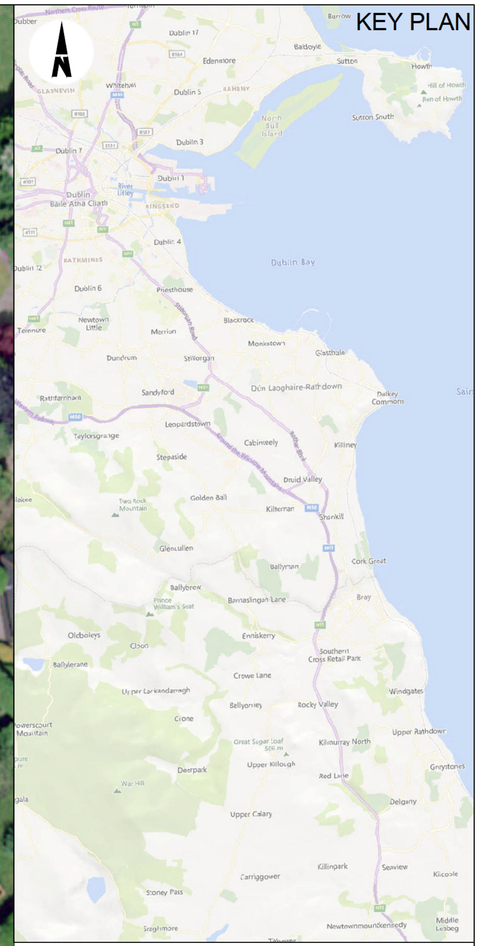
Appendix C.4: Sydney Parade Pedestrian / Cyclist Crossing Option



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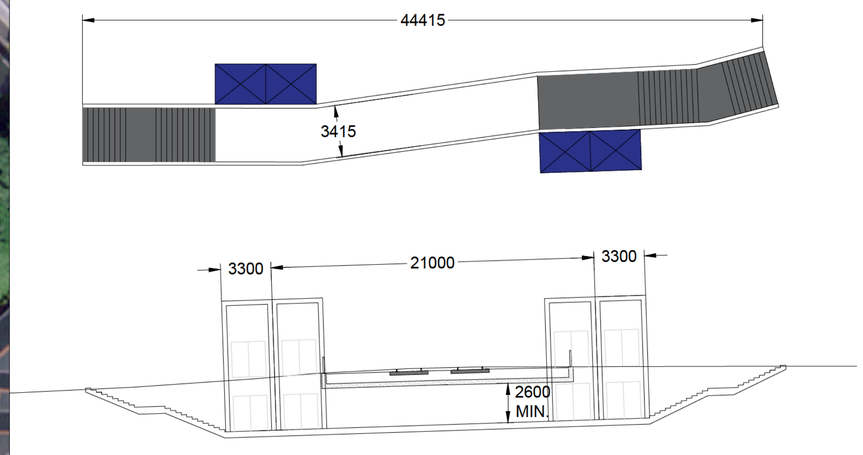

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LEGEND :

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- BOLLARDS
- ROAD LAYOUT
- FOOTPATH LAYOUT
- WORKS TO STATION ACCESS

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D+WP56	ARP	280275-00

Project Title: **DART+ COASTAL SOUTH**

Drawing Title: EMERGING PREFERRED OPTION
SYDNEY PARADE AVENUE
PEDESTRIAN CYCLIST CROSSING

Drawing File Name	Sheet Number	Status	Rev
D+WP56-ARP-P2-SL-DR-CH-00008	01 of 01	S3	P01

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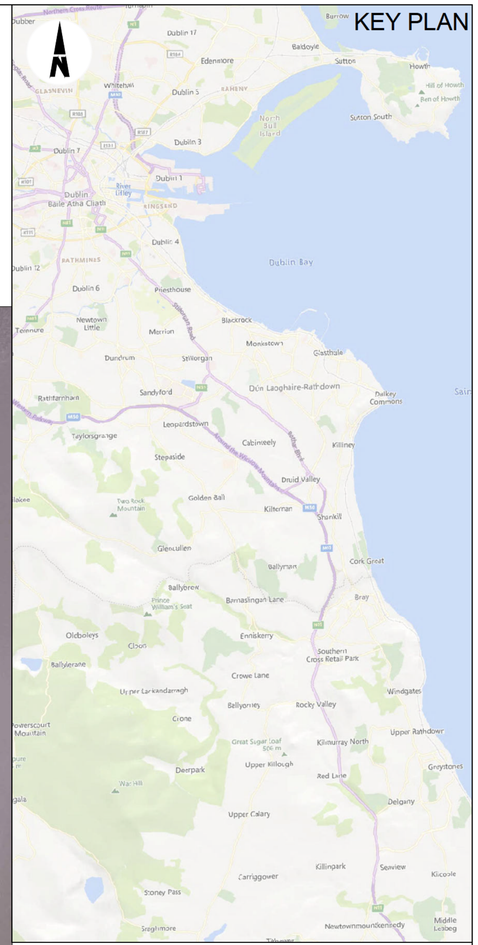
Appendix C.5: Merrion Gates Full Crossing Option

INDICATIVE CROSS SECTION

KEY PLAN



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- ROAD LAYOUT
- FOOTPATH LAYOUT
- WORKS TO STATION ACCESS
- CYCLE WAY
- RETAINING WALL

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Project Code	Originator Code	QMS Code
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Project Title: **DART+ COASTAL SOUTH**

Drawing Title: EMERGING PREFERRED OPTION
MERRION GATES
FULL CROSSING

Drawing File Name	Sheet Number	Status	Rev
D+WP56-ARP-P2-SL-DR-CH-00009	01 of 01	S3	P01

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Appendix D: Transport Assessment

Appendix D.1: Multi-Modal Transport Assessment

Pedestrian Impact

Estimated pedestrian travel times and distances were extracted from Google Maps for the following two scenarios:

Scenario 1: Open Level Crossings - assuming the existing situation where pedestrians and cyclists are able to cross at the five level crossings when the barriers are open.

Scenario 2: Closed Level Crossings – assuming all five level crossings are closed to pedestrian and cyclist movement, with no alternative infrastructure provided.

For illustration purposes pedestrian travel times and distances were measured from a point west of the railway line, near the level crossing, to the Sandymount village on the east of the railway line. The alternative route option, should all five level crossings be closed, was assumed to be via Bath Avenue.

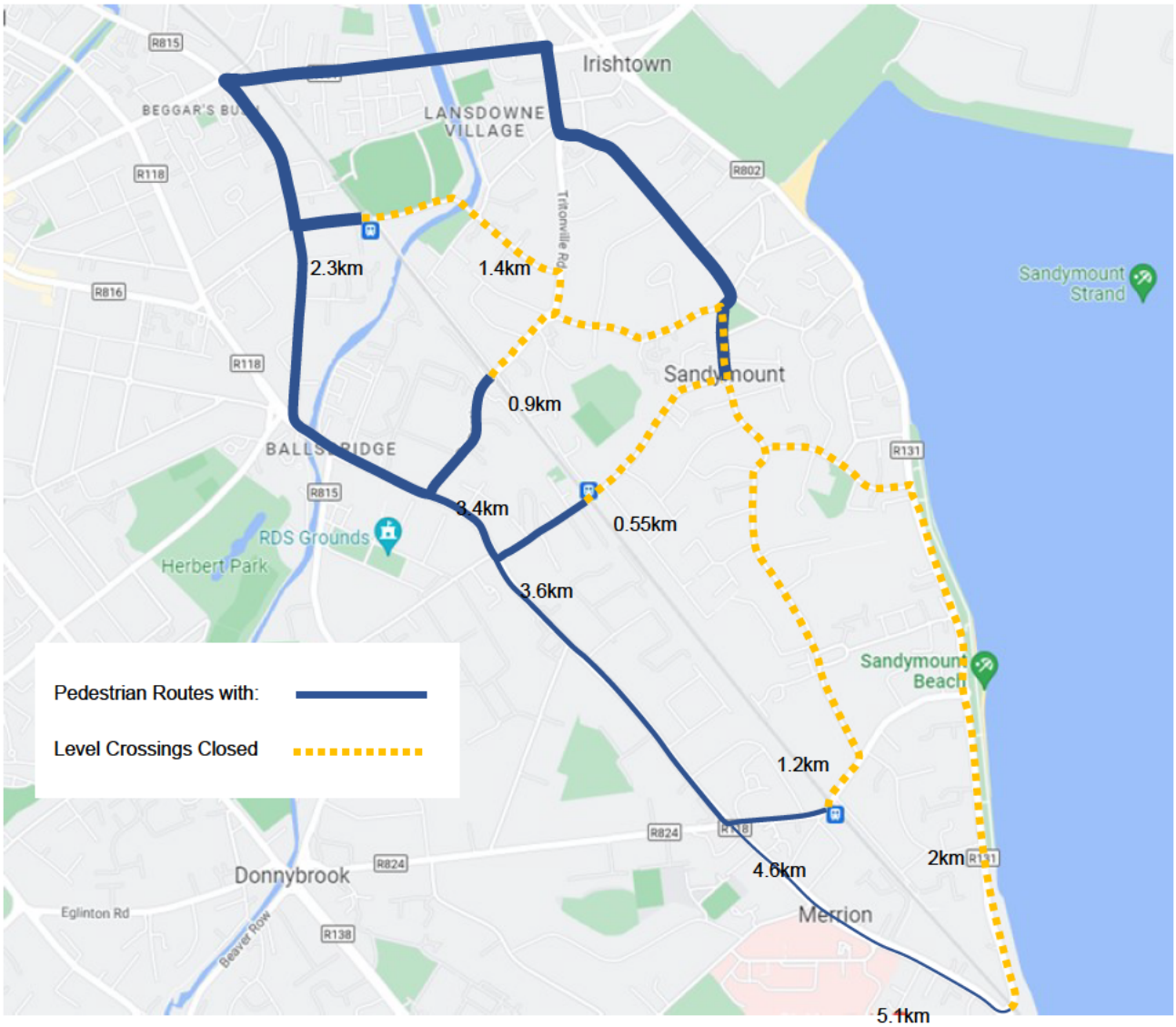

Table D-1 Pedestrian Travel Time and Distance

From Level Crossing	To Sandymount Village via. Bath Avenue				Increase	
	Open		Closed		Open vs. Closed	
	Distance (km)	Time (mins)	Distance (km)	Time (mins)	Additional km	Additional mins
Lansdowne Road (XR001)	1.4	17	2.3	29	0.9	12
Serpentine Ave. (XR002)	0.9	11	3.4	42	2.5	31
Sandymount Ave. (XR003)	0.55	6	3.6	44	3.1	38
Sydney Parade Ave. (XR004)	1.2	15	4.6	57	3.4	42
Merrion Gates (XR005)	2	25	5.1	63	3.1	38

The analyses show a doubling or tripling of travel times and distances in from most points, should all five level crossings be closed to pedestrians and cyclists. The travel time and distance from Sandymount level crossing to Sandymount village would increase from around 550m to 3.6km resulting in a seven-fold increase in travel times and distance.

Number and Location of Vehicular Crossings

To minimise the impacts to residents in the area there is a need to maintain some vehicular connectivity across the DART line in the Sandymount area. Unrestricted crossings would only have a marginal impact in terms of delays and queueing and is therefore preferable, from a purely road-based traffic point of view.

Due to construction limitations a number of scenario tests were carried out to determine the number and location of unrestricted crossings that need to be provided to achieve a similar level of vehicular accessibility across the railway line as is currently available. The different permutations of scenarios are listed in the Table D-2 below.

Table D-2 Vehicle Crossing Permutations

Scenario	Description	Lansdowne	Serpentine	Sandymount	Sydney Parade	Merrion Gates
0	Existing Situation	Restricted	Restricted	Restricted	Restricted	Restricted
1	One Unrestricted Crossing	Unrestricted	Closed	Closed	Closed	Closed
2		Closed	Unrestricted	Closed	Closed	Closed
3		Closed	Closed	Unrestricted	Closed	Closed
4		Closed	Closed	Closed	Unrestricted	Closed
5		Closed	Closed	Closed	Closed	Unrestricted
6	Two Unrestricted Crossings	Unrestricted	Unrestricted	Closed	Closed	Closed
7		Unrestricted	Closed	Unrestricted	Closed	Closed
8		Unrestricted	Closed	Closed	Unrestricted	Closed
9		Unrestricted	Closed	Closed	Closed	Unrestricted
10		Closed	Unrestricted	Unrestricted	Closed	Closed
11		Closed	Unrestricted	Closed	Unrestricted	Closed
12		Closed	Unrestricted	Closed	Closed	Unrestricted
13		Closed	Closed	Unrestricted	Unrestricted	Closed
14		Closed	Closed	Unrestricted	Closed	Unrestricted
15		Closed	Closed	Closed	Unrestricted	Unrestricted
16	Impact of Closure	Increased restrictions	Increased restrictions	Increased restrictions	Increased restrictions	Increased restrictions
17		Closed	Closed	Closed	Closed	Closed
18		Unrestricted	Unrestricted	Unrestricted	Unrestricted	Unrestricted

Two-way traffic volume at the five level crossings were modelled and added to ascertain the total traffic volume crossing the railway line in the Sandymount area, for each scenario, as shown in the Table D-3 below.

For reference the rail crossing traffic volume for Scenarios 16, 17 and 18 are also provided in the table, however these options have been discounted on the basis of safety and operational considerations, the need for vehicle connectivity and construction limitations.

Table D-3 Two-Way Traffic Volume

Scenario	Description	Scenario	Traffic Volume (2019 AM peak hour)
0	Existing Situation - Restricted	S0	2716
1	One Unrestricted Crossing	S1	804
2		S2	1005
3		S3	1034
4		S4	1239
5		S5	1436
6	Two Unrestricted Crossings	S6	1491
7		S7	1478
8		S8	1752
9		S9	2098
10		S10	1435
11		S11	1704
12		S12	2208
13		S13	1512
14		S14	1965
15		S15	1944
16	Increased Restrictions	S16	2449
17	Closed	S17	0
18	Unrestricted	S18	2821

The outputs show that the existing situation (Scenario 0) attracts 2,716 passenger car units (pcus) in the morning peak hour. Four closed level crossings and one unrestricted level crossing (Scenario 1 to 5) reduces the Sandymount area's rail crossing traffic volume to between 804 and 1,436. Three closed level crossings and two unrestricted level crossing (Scenario 6 to 15) reduces the Sandymount area's rail crossing traffic volume to between 1,435 and 2,208.

Two unrestricted level crossings at Serpentine Avenue and Merrion Gates (Scenario 12) attracts 2,208 pcus, which is the closest to the existing situation (Scenario 0). This is considered the most adequate scenario with regards to traffic impact, as it is the one that will likely maintain the desired level of connectivity, whilst avoiding traffic impact by either diversion of trips to the north of the Sandymount area, or by potentially, inducing additional traffic as a result of unrestricted crossings, especially during off peak times. General network constraints are currently limiting induced traffic at peak times, however the potential for induced traffic would be unlocked with unrestricted grade-separated crossings.

The provision of two unrestricted level crossings at Serpentine Avenue and Merrion Gates would ensure a similar level of vehicular accessibility is maintained across the railway line, with a reduced impact network wide and in the immediate study area in terms of queueing and delays.

The provision of only one unrestricted level crossing would reduce connectivity to work, school, college, and local amenities. The number of alternative route options to cross into the Sandymount area from either the Donnybrook fire station or the Dublin fire station would be reduced. It could also lead to a more pronounced impact in terms of the increase in volumes along the M50, North Strand Road and local roads such as Merrion Road, Northumberland Road, Shelbourne Road, and Bath Avenue.

Appendix D.2: Option Shortlisting Against Programme Objectives and Requirements

Appendix E: Level Crossing Assessment

Appendix E.1: Level Crossings

Introduction

This document summarises the level crossings assessment for the Southern Line. This section of line includes five level crossings in close proximity between stations, these are Lansdowne Road, Serpentine Avenue, Sandymount Avenue, Sydney Parade and Merrion. The study aims to understand the impact of increasing the DART service level on the operation and opening times of the level crossing on these routes to inform the traffic analysis study. The study is focused on the AM Peak when the rail and road traffic levels are highest.

Future Service Specification

Future Train Services

As part of the DART+ Coastal South programme of service expansion, IÉ intends to increase the number of services on the DART network from 6tph to 12tph. This forms part of the Train Service Specification (TSS), which is the 'desired' number of train services to have on each branch of the DART network (i.e., trains per hour per direction (TPHPD)). This report adopts version TSS1C.

The changes represent a substantial increase in capacity, both in frequency and size of individual services. Changes to the service and operating condition of the line creates the need to assess any impact on the barrier opening times and its associated effects on vehicles, pedestrians, and cyclists. The proposed services as part of DART+ Coastal South are shown in Figure E-1.

Figure E-1: DART+ Coastal South Services

Level Crossing Operation

Arup modelled the five level crossings on the section of track between Grand Canal Dock and Booterstown on the DART+ Coastal South route, as shown in Figure E-2, which will experience increased barrier closures with an increased train frequency in RailSys software, using the program's integrated level crossing function. All trains are assumed to be DART EMU (Electric Multiple Unit) trainsets, with 30 second station dwells, stopping at all stations.

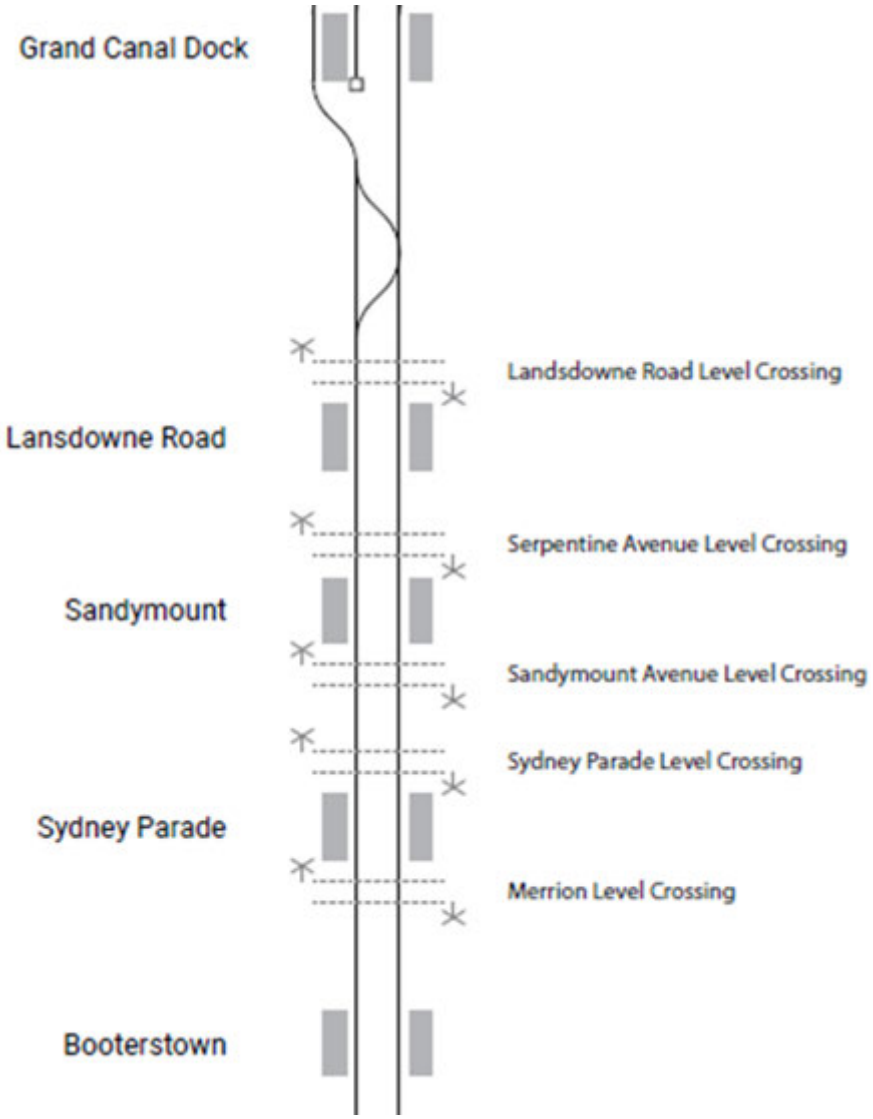

Figure E-2 Level Crossing Schematic

The proximity of these five level crossings mean that the trigger points overlap, and this must be considered as a system rather than five individual locations. The modelling assumes that all level crossings are automatic and require safe closure before the signals can be set for the approaching train. Between barrier closures it assumed that the road would need to be open for a minimum of 90 seconds, otherwise the barriers will remain down, and the crossing closed. The crossing is assumed to begin to open once the train passes a clearance point, assumed to be 10 metres beyond the level crossing, and the barriers are assumed to take 8 seconds to open.

Strike in Point (passing) – the point at which a train triggers the start of the level crossing barrier closure procedure for passing trains is assumed as 792m before the signal providing a green aspect for the train to proceed to the level crossing, typically 3 signals R, Y, G. Where the next signal is less than 792 metres the Strike in Point is placed 1m beyond that signal. Approach speed is assumed at line speed of 95 kph and timed for non-stopping services.

Strike in Point (stopping) – the point at which a train triggers the start of the level crossing barrier closure procedure for stopping trains is assumed at agreed locations to replicate NTA Indication point. (Typically to allow for station dwell and signal clearance).

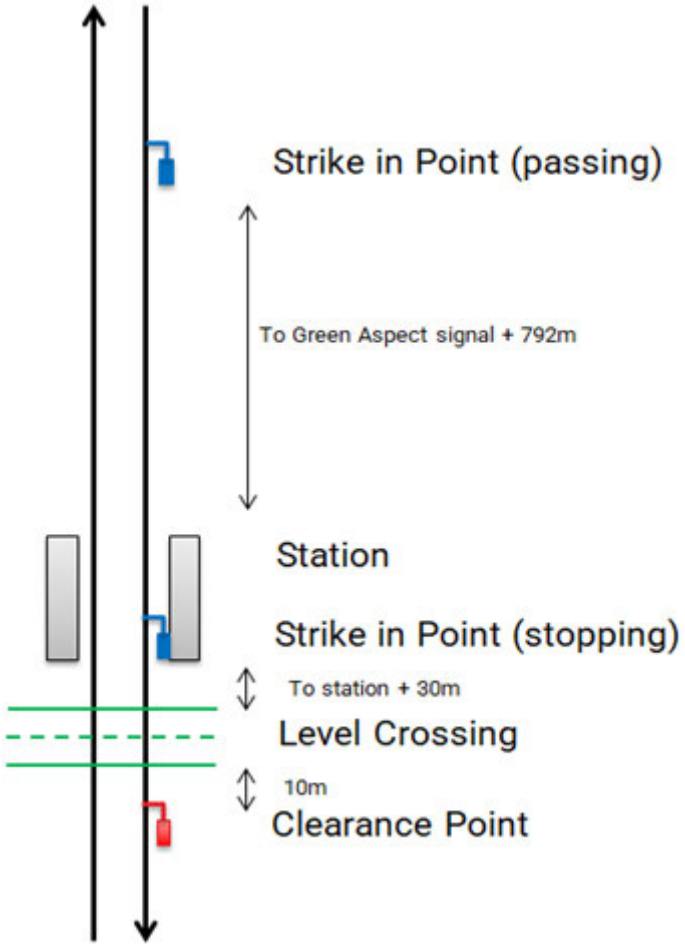

Figure E-3: Example schematic for strike in and clearance points

Methodology

The methodology used to undertake this study was a combination of RailSys simulation modelling and spreadsheet analysis of results. The following activities were undertaken:

- Updating the RailSys infrastructure model with the Level crossing details including strike in and clearance points.
- Running the standard hour TSS1C timetable in single dynamic simulation
- Extracting individual level crossing opening and closing time

- Compiling results in excel to assess the minimum opening criteria of 90s to determine the number and duration of crossing opening over the standard hour.

The following additional assumptions are made in the analysis:

- The TSS1C peak service standard hour timetable assumes all trains stop at all stations
- The signalling reflects the proposed design as provided by IDOM in the RailSys model
- A minimum opening criterion of 90s is assumed between two closures. (It is noted that minimum opening times as short as 20s have been recorded in the existing situation, however, the criterion of 90s is used to rationalise the increased frequency impacts over the hour).

All RailSys modelling was undertaken using the IDOM RailSys model, no optimisation of the signalling for the level crossing functionality has been carried out. This is because of the relatively short distance between level crossings where no upgrades to the signalling system would offer the opportunity to improve barrier opening times.

Level Crossings Assessment

Results

The results from the analysis are summarised showing three pieces of information:

- The number of barriers opening – the number of times per hour that the barriers are open, this excludes the occasions where there is the possibility of opening for less than 90s where it is assumed that the barrier stays closed.
- The total time the level crossing is closed within the assessed standard hour.
- The total time the level crossing is opened within the assessed standard hour.

Table E-1 summarises the barrier results of the proposed train frequency in the AM Period. At full-service frequency during the AM peak (08:00 – 09:00) the barriers are forecast to be down almost continually.

Table E-1 Proposed Level Crossing opening times with new train service

Level Crossing	AM Peak (8:00-9:00)		
	Barrier Openings (No.)	Total Closure Duration (%)	Total Open Duration (%)
Lansdowne Road (XR001)	0	100%	0%
Serpentine Ave. (XR002)	14	49%	51%
Sandymount Ave. (XR003)	3	81%	19%
Sydney Parade Ave. (XR004)	3	83%	17%
Merrion Gates (XR005)	14	40%	60%

Theoretically, if the timetable operated with an ideal scenario, where no delays to services occurred and all services operated to the second as set out in TSS1C, then Level Crossings at Lansdowne Road, Sandymount avenue and Sydney Parade Avenue would effectively be closed due to the frequency at which the barriers would have to remain down.

It is noted that these results are very sensitive to the specific TSS1C timetable design and alternative timetable structures may see different impacts at different crossings.

It is difficult to advise which crossing may be closed as relying on opening times modelled with TSS1C would not be the case in a future timetable or realistic based on service performance. At best, it would significantly limit future timetable development and services passing at this location.

To test this a modified TSS1C has been created where the services in the up direction have all be retimed by 2 minutes, half of the typical peak service headway. This gives the opportunity to see the impact on the results for each of the crossings when the timetable is varied.

The results in the table below show that opening numbers increase and decrease

Table E-2 Crossing Sensitivity Analysis

Level Crossing	AM Peak (8:00-9:00)		
	Barrier Openings (No.)	Total Closure Duration (%)	Total Open Duration (%)
Lansdowne Road (XR001)	2	94%	6%
Serpentine Ave. (XR002)	10	56%	44%
Sandymount Ave. (XR003)	3	81%	19%
Sydney Parade Ave. (XR004)	2	92%	8%
Merrion Gates (XR005)	5	76%	24%

When assuming a 2 minute retime, it is noted that the closure duration doubles at Merrion Gate and increases at Serpentine Avenue. Using the sensitivity analysis, it is prudent to assume the lowest number of openings from either the TSS1C or modified versions, understanding that there could be a timetable solution that provides even lower numbers than those shown.

Conclusions

To conclude TSS1C shows that whilst some openings at Serpentine Avenue and Merrion Gates appear feasible, this is only in the scenario where the TSS1C timetable operates to the second and suffers no delays anywhere on the route. This is not practical, and it is shown that factoring in delay scenarios, which are likely as part of day-to-day operation of the service, have a significant effect on the other level crossing opening durations.

The reduced opening times, in addition to the significant effect of delay on the opening duration variance, increases the risk of further performance delay on to the network as a direct result of the level crossings. It should be assumed that all level crossings will likely be effectively closed (barriers down). In all cases the opening times will be sensitive to the timetable structure. It is noted that the assessment does not consider variations of future timetables, yet to be confirmed, and the impact on the level crossings.

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CONTENTS

1. INTRODUCTION 1

1.1 Packages of work 1

1.2 References 1

1.3 Option Assessment Approach 2

2. EXISTING SITUATION 4

2.1 Overview 4

2.2 Level Crossing Operation 7

2.3 Structures 8

2.4 Permanent Way and Tracks 21

2.5 Ground Conditions 21

2.6 Environmental 21

2.6.1 Traffic and Transportation 22

2.6.2 Landscape and visual impact 23

2.6.3 Archaeology and cultural heritage 24

2.6.4 Architectural Heritage 24

2.6.5 Noise and vibration 24

2.6.6 Air quality and climate 25

2.6.7 Agricultural and non-agricultural 25

2.6.8 Geology and soils 25

2.6.9 Water resources 25

2.6.10 Biodiversity 26

2.7 Utilities 27

3. REQUIREMENTS 32

3.1 Specific requirements 32

3.2 Design Standards 32

3.2.1 Headroom Design Standards 34

4. CONSTRAINTS 36

4.1 Technical 36

4.1.1 Level Crossing Operations 36

4.1.2 Permanent Way and Track 36

4.1.3 Geotechnical 36

4.1.4 Structures 36

4.1.5 Utilities 36

4.2 Environmental 37

4.2.1 Traffic and transportation 37

4.2.2 Landscape and visual quality 37
4.2.3 Archaeology, Architectural and cultural heritage 38
4.2.4 Noise and vibration 38
4.2.5 Air quality and climate 38
4.2.6 Agricultural and non-agricultural 38
4.2.7 Geology & soils 39
4.2.8 Water resources 39
4.2.9 Biodiversity 39
4.3 Planning 39
5. OPTIONS 42
5.1 Longlist of vehicle options 42
5.1.1 Option V0 43
5.1.2 Option V1 43
5.1.3 Option V2 43
5.1.4 Option V3.1 44
5.1.5 Option V3.2 45
5.1.6 Option V3.3 47
5.1.7 Option V4.1 49
5.1.8 Option V4.2 51
5.1.9 Option V4.3 53
5.1.10 Option V4.4 55
5.1.11 Option V4.5 56
5.1.12 Option V5.1 57
5.1.13 Option V5.2 59
5.2 Sifting of Longlist of Vehicle Options 60
5.3 Summary of Longlisting Sifting of Vehicle Options 64
5.4 Longlist of pedestrian and cyclist options 65
5.4.1 Option P0 66
5.4.2 Options P1.1 and P1.2 66
5.4.3 Options P1.3 and P1.4 68
5.4.4 Options P2.1 and P2.2 68
5.4.5 Options P2.3 and P2.4 68
5.4.6 Options P3.1 and P3.2 69
5.4.7 Option P4 71
5.5 Sifting of Longlist of Pedestrian and Cyclist Options 71

5.6 Summary of Longlisting Sifting of Pedestrian and Cyclist Options 81
5.7 Shortlisted options 83
5.7.1 Shortlist of Vehicle Options 83
5.7.2 Shortlist of Pedestrian/Cyclist Options 87
5.8 Multi-Criteria Analysis 90
5.8.1 Methodology 90
5.8.2 MCA summary for vehicle options 91
5.8.3 MCA summary for pedestrian/cyclist options 98
6. SUMMARY AND CONCLUSION 105
6.1 Non-preferred options 105
6.1.1 Vehicle Options 105
6.1.2 Pedestrian & Cyclist Options 105
6.1.3 Combined Vehicle and Pedestrian and Cyclist Option (V5.1) 105
6.2 Emerging preferred option 106
6.3 Key risks/next steps 106
APPENDIX A 107
MCA Matrix – Vechicle Options 107
MCA Matrix – Pedestrian & Cyclist Options 108
APPENDIX B 109
Emerging Preferred Option sketches 109
APPENDIX C 110
Greater Dublin Cycle Network Plan for the Bray Area. 110

Figures

Figure 2-1 Aerial view of Bray Level Crossing and immediate surroundings (source: OSI aerial imagery) 5
Figure 2-2 View looking east across Bray Level Crossing – crossing open (source: IÉ) 6
Figure 2-3 View looking east across Bray Level Crossing – crossing closed (source: Arup) 7
Figure 2-4 Schematic of Bray Level Crossing control system 8
Figure 2-5 Existing vehicular crossings in the Bray area (typically underbridges unless noted otherwise) (source: OSI aerial imagery) 9
Figure 2-6 Harbour Road restricted underpass UBR138 (source: Arup) 10
Figure 2-7 Underbridge UBR140 at Seapoint Road (source: Arup) 11
Figure 2-8 Retaining wall on the eastern side of the underbridge UBR140 (Source: Arup) 12
Figure 2-9 View looking north at OBR140A (Source: IÉ) 13

Figure 2-10: View of western pier of UBR140A. (Source: IÉ) 14
Figure 2-11 Underbridge UBR142 at Albert Avenue (source: Arup) 15
Figure 2-12 Underbridge UBR143 at Sidmonton Avenue (source: Arup) 16
Figure 2-13 Underbridge UBR144 at Victoria Avenue (source: Arup)..... 17
Figure 2-14 Underbridge UBR145 at Convent Avenue (source: Arup) 18
Figure 2-15 Underbridge UBR146 at Putland Road (source: Arup) 19
Figure 2-16 View looking west along OBR141A (Source: IÉ) 20
Figure 2-17 View looking south at OBR141A (Source: IÉ)..... 20
Figure 2-18 Existing one-way system 22
Figure 2-19 Extract from Greater Dublin Cycle Network Plan (Source: nationaltransport.ie)..... 23
Figure 2-20 Map of Bray and nearby European sites (red hatch) 27
Figure 2-21 Utilities at Seapoint Road Under Rail Crossing 28
Figure 2-22 Utilities at Bray Level Crossing 28
Figure 2-23 Utilities at Albert Avenue Under Rail Crossing..... 29
Figure 2-24 Utilities at Sidmonton Avenue Under Rail Crossing 29
Figure 2-25 Utilities at Victoria Avenue Under Rail Crossing 30
Figure 2-26 Utilities at Convent Avenue Under Rail Crossing..... 30
Figure 2-27 Utilities at Putland Road Under Rail Crossing 31
Figure 4-1 Planned developments discussed through report..... 41
Figure 5-1 Optioneering Process for Bray Level Crossing 42
Figure 5-2 Option V3.1 plan..... 44
Figure 5-3 Option V3.2 plan..... 45
Figure 5-4 Option V3.2 – Proposed bridge modification and road lowering works at Seapoint Road 46
Figure 5-5 Option V3.3 plan..... 47
Figure 5-6 Option V3.3 - Proposed road lowering works at Albert Avenue 48
Figure 5-7 Option V4.1 plan..... 49
Figure 5-8 Option V4.1 – Proposed road lowering works at Sidmonton Avenue 50
Figure 5-9 Option V4.2 plan..... 51
Figure 5-10 Option V4.2 - Proposed road lowering works at Victoria Avenue 52
Figure 5-11 Option V4.3 plan..... 53
Figure 5-12 Option V.3 – Proposed Road lowering works at Convent Avenue..... 54
Figure 5-13 Option V4.4 plan..... 55
Figure 5-14 Option V4.5 plan..... 56
Figure 5-15 Option V5.1 plan..... 57
Figure 5-16 Option V5.1 - Proposed underpass at Quinsborough Road 58
Figure 5-17 Option V5.2 plan..... 59
Figure 5-18 Option V5.2 - Proposed underpass, north of Bray Harbour 60
Figure 5-19 Options P1.1 and P1.2 - Proposed location of new lift and access platform 66
Figure 5-20 Footbridge OBR140A at Quinsborough Road (source: Arup)..... 67

Figure 5-21 Option P1.3/1.4 plan 68
Figure 5-22 Options P3.1 and P3.2 - Pedestrian route from Bray Station to the seafront via Albert Walk 69
Figure 5-23 Options P3.1 and P3.2 Cyclist route from Bray Station to the seafront via Adelaide Road 70
Figure 5-24 Example of Wayfinding Signage (Source: fwdesign) 71
Figure 5-25 Option V3.2 83
Figure 5-26 Option V4.4 84
Figure 5-27 Option 5 infrastructure solution 85
Figure 5-28 Option 6 solution 86
Figure 5-29 Options P1.2 - Proposed location of new lift and access platform 87
Figure 5-30 Option P1.4 plan 88
Figure 5-31 Option b pedestrian (solid line) and cyclist (dashed line) solution 89
Figure 5-32 Plan and Cross Section of Footpath Widening at Albert Avenue 90
Figure 5-33 Location of A and B (source: OSI aerial imagery) 103

Tables

Table 1-1: List of key documents associated with this report 2
Table 3-1: Design Standards 32
Table 5-1: Longlist of vehicle options considered 43
Table 5-2: Sifting of Longlist of Vehicle Options (Options 0 to V3.2) 61
Table 5-3: Sifting of Longlist of Vehicle Options (Options V3.3 to V4.4) 62
Table 5-4: Sifting of Longlist of Vehicle Options (Options V4.5 to V5.2) 63
Table 5-5: Longlist sifting summary for vehicle options 64
Table 5-6: Longlist of pedestrian and cyclist options considered 65
Table 5-7: Sifting of longlist of pedestrian and cyclist options (Options P0 to P1.2) . 72
Table 5-8: Sifting of longlist of pedestrian and cyclist options (Options P1.3 to P2.1)74
Table 5-9: Sifting of longlist of pedestrian and cyclist options (Options P2.2 to P2.4)77
Table 5-10: Sifting of longlist of pedestrian and cyclist options (Options P3.1 to P4) 79
Table 5-11: Longlist sifting summary for pedestrian and cyclist options 81
Table 5-12: MCA Summary table for vehicle options 92
Table 5-13: Overall criteria MCA summary table 93
Table 5-14: Legend for MCA Summary Table 93
Table 5-15: MCA summary table for pedestrian/cyclist options 99
Table 5-16: Overall criteria MCA summary table 100
Table 5-17: Legend for MCA Summary Table 100

Abbreviations

Abbreviation	Definition
ABP	An Bord Pleanála
APIS	Authorisation for Placing in Service
APM	Aggregate Potential Mapping
CAF	Common Appraisal Framework
CAPEX	Capital expenditure
CCE	Chief Civil Engineer's Department
CCTV	Closed Circuit Television
CRR	Commission of Railway Regulation
cSAC	Candidate Special Area of Conservation
CTC	Central Traffic Control
DART	Dublin Area Rapid Transit
EMODnet	European Marine Observation and Date Network
EPA	Environmental Protection Authority
ESB	Electricity Supply Board
GHG	Greenhouse Gases
GSI	Geological Survey Ireland
GI	Ground Investigation
IÉ	Iarnród Éireann/Irish Rail
IEL	Industrial Emissions License
INF	Infrastructure
IPC	Integrated Pollution Control
IPPC	Integrated pollution prevention and control
LX	Level Crossing
MAI	Functional Subsystem Maintenance
MCA	Multi-criteria analysis
NHA	Natural Heritage Area
NIAH	National Inventory of Architectural Heritage
NTA	National Transport Authority
OHLE	Overhead Line Equipment
OPE	Functional Subsystem Operation and traffic management
OPEX	Operational expenditure
OPW	Office of Public Works

Abbreviation	Definition
DMURS	Design Manual for Urban Roads and Streets
Osi	Ordnance Survey Ireland
PAHs	Polycyclic Aromatic Hydrocarbons
pNHA	Proposed Natural Heritage Area
RMP	Record of Monuments and Places
RPS	Record of Protected Structures
SAAO	Special Amenity Area Orders
SAC	Special Area of Conservation
SPA	Special Protected Area
TII	Transport Infrastructure Ireland
tph	Trains per hour
tphpd	Trains per hour per direction
TPHs	Total petroleum Hydrocarbons
TSS	Train Service Specification
WFD	Water Framework Directive
ZAP	Zone of Archaeological Potential

1. INTRODUCTION

The purpose of the report is to assess and identify how an appropriate level of accessibility can be provided across the railway line when the frequency of the DART+ Coastal South service increases. The findings of this report will input to the Preliminary Option Selection Report. This report provides the technical assessment at Bray Level Crossing from option selection through to the Emerging Preferred Option, including the options considered and how an Emerging Preferred Option was chosen.

The report includes:

- An introduction and description of the study;
- A summary of the option assessment approach undertaken;
- A description of the existing situation;
- The relevant requirements;
- The relevant constraints;
- The option assessment containing:
  - Longlist of options;
  - Sifting of longlist of options;
  - Summary and details of the shortlisted options;
  - Multi-criteria analysis (MCA);
  - The Emerging Preferred Option.

1.1 Packages of work

The scope of work for DART+ Coastal South covers a wide range of interventions on the Southern Line needed to meet the Train Service Specification (TSS) requirements. To appropriately assess options against each other, the works have been split into separate work packages, as detailed in the separate annexes.

This report refers to the optioneering assessment for works at Bray Level Crossing. The scope is to consider the level of accessibility at the level crossing located at Quinsborough Road in Bray to achieve the TSS and maximise capacity. This report considers all feasible longlist options with a view to reducing them through sifting to produce a shortlist of options. The shortlist then goes forward to the MCA process to select the Emerging Preferred Option.

1.2 References

This report should be read in conjunction with the following related optioneering reports:

Table 1-1: List of key documents associated with this report

Title	Description
DART+ Coastal South Preliminary Option Selection Report – Main Report	This is the main report which summarises the optioneering process and the different packages of proposed works on the DART+ Coastal South project.
DART+ Coastal South Preliminary Option Selection Report – Executive Summary	This report summarises the main Preliminary Option Selection Report.
Emerging Preferred Option Maps	Includes drawings for each Emerging Preferred Option, to support the Preliminary Option Selection Report.
Policy Context	This presents a detailed review of the European, National, Regional and Local policy context for the DART+ Programme and the DART+ Coastal South Project
Useful Links	Useful links to documents/websites relating to the DART+ Coastal South project.
Constraints Report	This report reviews the DART+ Coastal South constraints
Technical Optioneering Report: Sandymount Area Level Crossings	The Technical Optioneering Report for the Sandymount area level crossings. The report addresses the level of accessibility at the level crossings in the area when an increased number of DART services is provided.
Technical Optioneering Report: Bray to Greystones Capacity Enhancements	The Technical Optioneering Report for the works between Bray and Greystones. The report addresses track and station modifications to allow for the increased number of DART services.
Technical Optioneering Report: Bray Level Crossing (this document)	The Technical Optioneering Report for the Bray level crossing. The report addresses the level of accessibility at the level crossing when an increased number of DART services is provided.
Technical Optioneering Report: Ennis Lane Level Crossing	The Technical Optioneering Report for the Ennis Lane level crossing. The report addresses the level of accessibility at the level crossing when an increased number of DART services is provided.

1.3 Option Assessment Approach

The proposed options at Bray have been assessed using the Department of Transport's Common Appraisal Framework for Transport Projects and Programmes (CAF) as the options have the potential to be geographically different from each other and have a material difference on external

parties or the environment. Further details can be found in the option selection process section of the Preliminary Option Selection Report.

2. EXISTING SITUATION

2.1 Overview

Bray Level Crossing (IÉ reference XR011) is situated to the north of Bray (Daly) Station (herein referred to as Bray Station) at approximate chainage 12mi 160yds. The crossing is one of the main routes to Bray seafront and Strand Road for non-high sides vehicles as well as providing a means of vehicular access to high clearance vehicles which are unable to use nearby underbridges due to restricted headroom. Additionally, the crossing provides step-free access for pedestrians and cyclists at this location, which is shared with vehicles. The nearest alternative step-free access across the rail corridor is at Albert Avenue underbridge (UBR142).

User numbers for the crossing are not currently available. Pedestrians that arrive by train could use the station footbridge. It is anticipated pedestrians using this route would arrive by bus or have Quinsborough Road as their nearest crossing.

An aerial view of the area immediately surrounding the level crossing is shown in Figure 2-1.

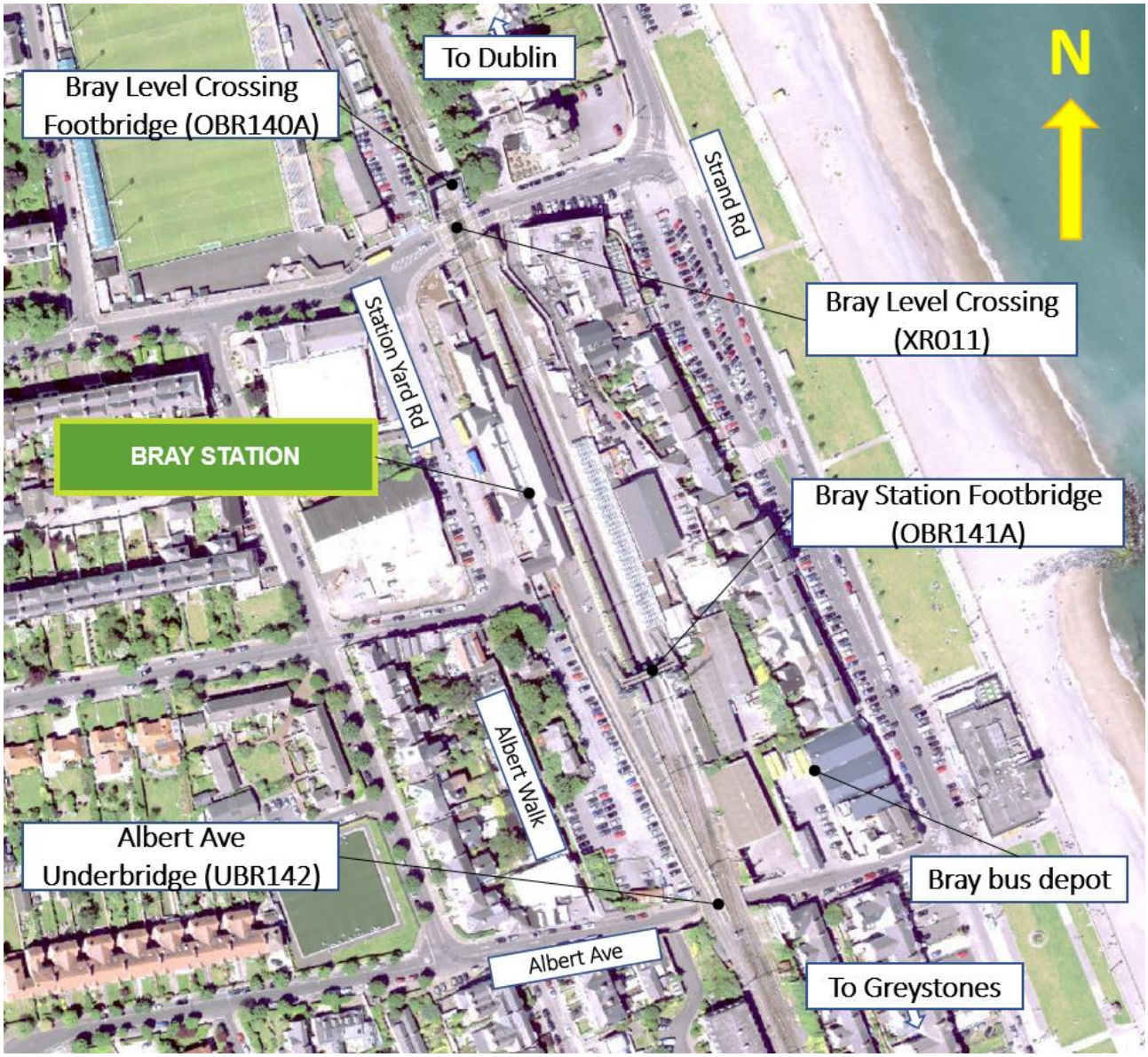


Figure 2-1 Aerial view of Bray Level Crossing and immediate surroundings (source: OSI aerial imagery)

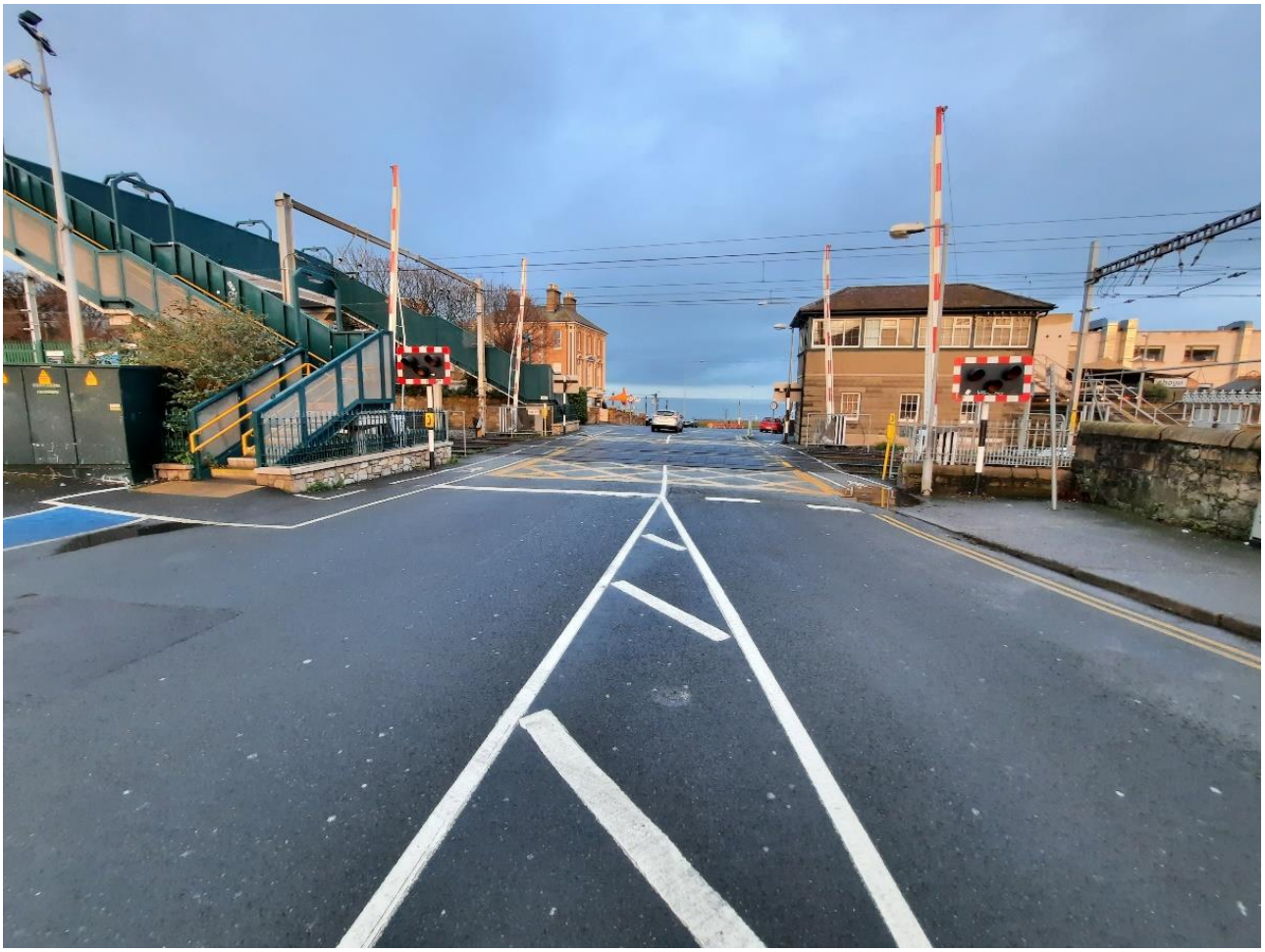


Figure 2-2 View looking east across Bray Level Crossing – crossing open (source: IÉ)

Figure 2-3 View looking east across Bray Level Crossing – crossing closed (source: Arup)

2.2 Level Crossing Operation

A level crossing is at an interface between a railway line and the public where a physical barrier is formed to prevent access to the railway line.

The Bray Level Crossing is known as a “railway worked” crossing which includes automatic barriers operated by the approaching train with CCTV (Closed circuit television) monitoring from the central traffic control located near Connolly Station. Such crossing designs are specifically for public roads to protect both vehicular and pedestrian traffic but are carefully designed to minimise impact on the train service by ensuring that the barriers are down well before the arrival of the train to avoid having to reduce train speed on approach.

The main components of the Bray Level Crossing control system with barriers are:

- Strike-in point: This is the point where the passage of a train is detected and initiates the warning and closing sequence of the level crossing barriers.
- Traffic light signals for vehicles: the visual signals which warn vehicles that the level crossing barriers are to be lowered due to impending presence of a train.
- Audible alarm system: acoustic signals warning vehicles of the impending presence of a train
- Barriers: physical barriers which lower to close the level crossing and prevent access into the level crossing clearance box.

- Stop signal: This is the signal which indicates to the train driver that the train can proceed or not through the level crossing. If the stop signal is red, it indicates that the level crossing might be obstructed for some reason and the train must stop immediately to maintain safety.

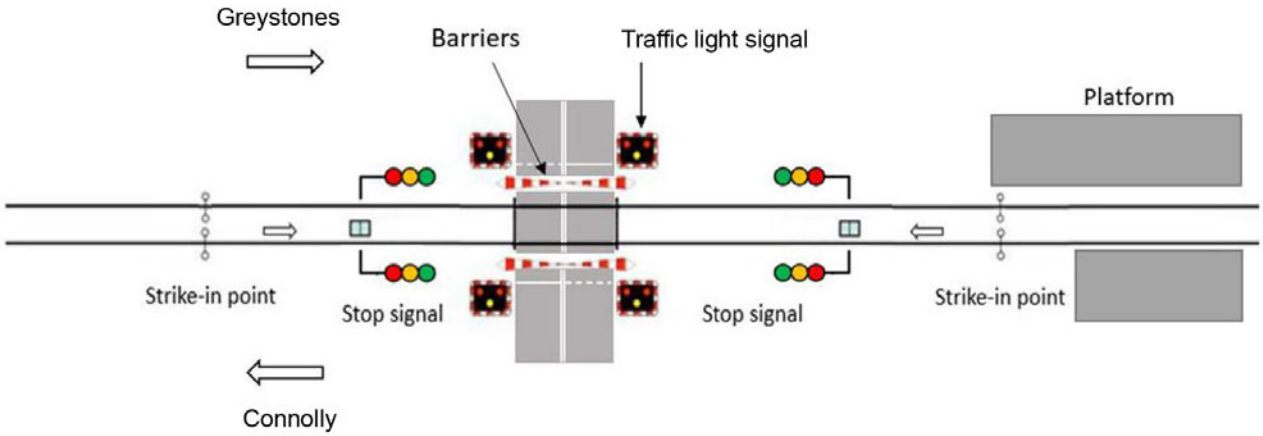


Figure 2-4 Schematic of Bray Level Crossing control system

2.3 Structures

There are seven underbridges across the railway line in the vicinity of Quinsborough Road (Bray level crossing), providing vehicular access to the seafront. These are summarised in Figure 2-5.

A Harbour Rd. *1 lane. 3.30m Clearance*

B Seapoint Rd. *2 lanes. 3.15m Clearance*

C Quinsborough Rd. LX & footbridge. *5m clearance at LX*

D Albert Ave. *1 lane. 3.11m Clearance.*

E Sidmonton Ave. *1 lane. 3.25m Clearance.*

F Victoria Ave. *1 lane. 3.5m Clearance.*

G Convent Ave. *1 lane. 3.5m Clearance.*

H Putland Rd. *1 lane. 4.69m Clearance.*

Figure 2-5 Existing vehicular crossings in the Bray area (typically underbridges unless noted otherwise) (source: OSI aerial imagery)

A. Harbour Road restricted underpass (UBR138) has a vertical clearance of 3.30m to the road below. The bridge comprises a single span steel trough superstructure supported on stone walled abutments. The road passage beneath the bridge is gated, restricting access to pedestrians, cyclists and authorised vehicles only.

Figure 2-6 Harbour Road restricted underpass UBR138 (source: Arup)

B. Seapoint Road (UBR140) is a stone arched underbridge with a clearance of 3.15m to the road below. The bridge was widened in 1983 by approximately 3.5m using precast concrete girders on its western side. Although the road is deemed to have 2 lanes, in practice it is used as 1 lane with traffic in both directions, with an informal give way system. This is primarily due to the available sightlines. The footpath beneath the structure is approximately 1.0m wide.

Figure 2-7 Underbridge UBR140 at Seapoint Road (source: Arup)

On the eastern side of the bridge is a significant retaining wall, as shown in Figure 2-8.

Figure 2-8 Retaining wall on the eastern side of the underbridge UBR140 (Source: Arup)

C. Quinsborough Road pedestrian footbridge (OBR140A). This bridge crosses the railway directly north of the level crossing, spans 14.7m and is formed of precast beams with metal parapets. Access is provided by stairs only.

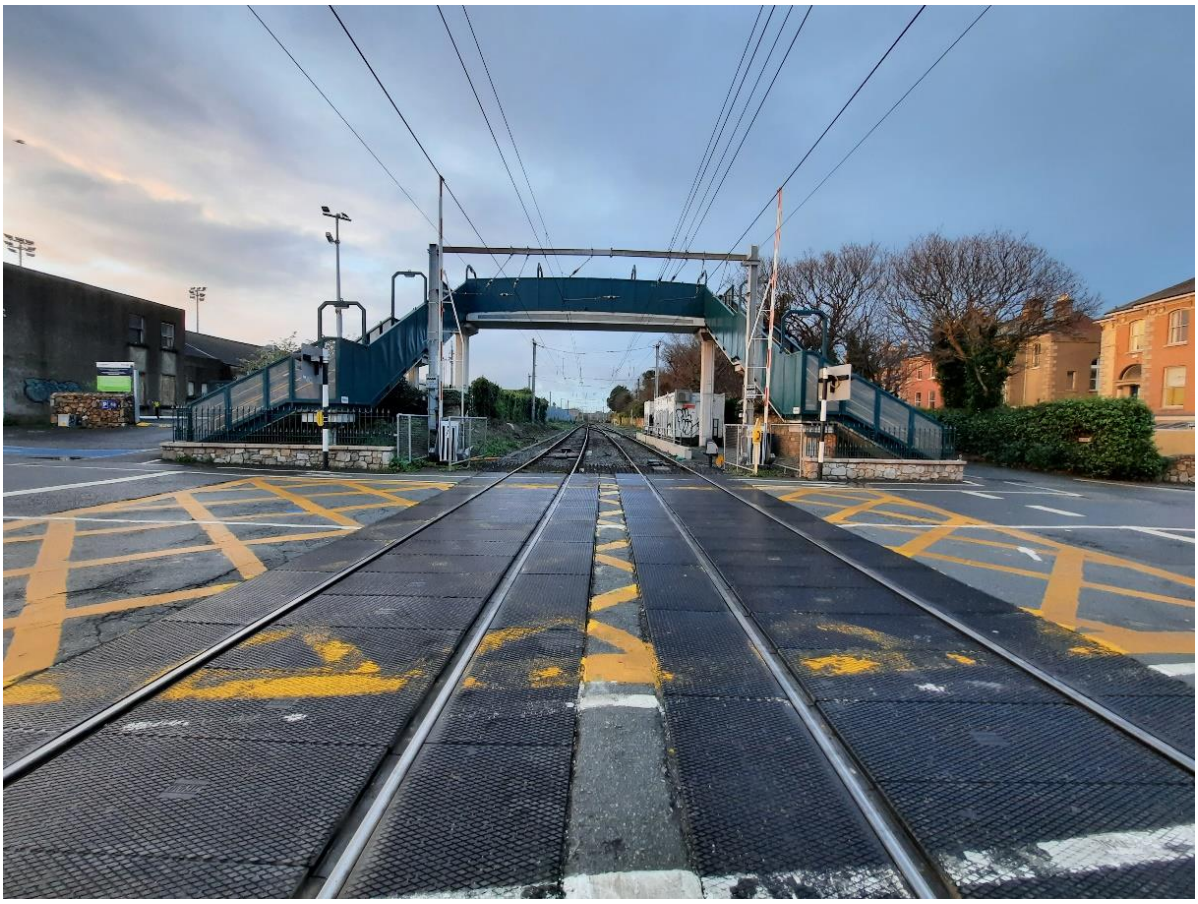


Figure 2-9 View looking north at OBR140A (Source: IÉ)

Figure 2-10: View of western pier of UBR140A. (Source: IÉ)

D. Albert Avenue (UBR142) is an underbridge with a vertical clearance of 3.11m to the road below and has a single lane of traffic running underneath it in the west to east direction. The bridge comprises a single span steel trough superstructure supported on stone walled abutments. It is noted that bus traffic for the depot currently travels against this one-way system on the eastern side of the railway for access purposes.

Figure 2-11 Underbridge UBR142 at Albert Avenue (source: Arup)

E. Sidmonton Avenue (UBR143) underbridge has a clearance of 3.25m to the road below and has a single lane of traffic running underneath it in the east to west direction. The bridge comprises a single span steel trough superstructure supported on stone walled abutments.

Figure 2-12 Underbridge UBR143 at Sidmonton Avenue (source: Arup)

F. Victoria Avenue (UBR144) underbridge has a clearance of 3.50m to the road below and has a single lane of traffic running underneath it, allowing two-way travel via a non-official shuttle arrangement. The bridge comprises a single span concrete slab deck superstructure supported on stone walled abutments .

Figure 2-13 Underbridge UBR144 at Victoria Avenue (source: Arup)

G. Convent Avenue (UBR145) underbridge has a clearance of 4.01m to the road below and has a single lane of traffic running underneath it in the west to east direction (two-way movements are permitted west of the rail line). The bridge comprises a single span concrete slab deck superstructure supported on stone walled abutments.

Figure 2-14 Underbridge UBR145 at Convent Avenue (source: Arup)

H. Putland Road (UBR146) underbridge has a clearance of 4.69m to the road below and has a single lane of traffic running underneath it in the east to west direction. The bridge comprises a single span steel girder superstructure supported on stone walled abutments.

Figure 2-15 Underbridge UBR146 at Putland Road (source: Arup)

In addition to the bridges discussed above, there is an additional footbridge at Bray Station (UBR141A) within the station confines. The footbridge is a 12.8m span steel truss bridge, accessed by both stairs and lifts either end. The station has entrances on both sides of the railway.

Figure 2-16 View looking west along OBR141A (Source: IÉ)

Figure 2-17 View looking south at OBR141A (Source: IÉ)

2.4 Permanent Way and Tracks

The railway at the level crossing consists of two tracks. The line speed is 65kph and is electrified.

Signalling is controlled from North East CTC at Connolly.

2.5 Ground Conditions

A review of historic mapping indicates that the land was originally agricultural fields (OSi 6" First Edition). The railway line and Bray Level Crossing are visible on later mapping from the later 19th century/early 20th century (OSi 25"). To the north of the level crossing, a platform, cattle pen and Martello Tower are noted, and a gas works and residential buildings are noted north of Seapoint Road. To the south of the level crossing, Bray Station is noted and is surrounded by residential and commercial buildings.

The Geological Survey Ireland (GSI) Quaternary sediment and Environmental Protection Authority (EPA) National Soil mapping show the presence of made ground at and within 250m from the site. The GSI bedrock mapping indicates that the site is underlain by greywacke and quartzite of the Bray Head formation and to the north of the level crossing indicates the presence of an anticlinal axis (running North-East to South-West in direction).

The EPA waterbodies map (2021) indicates that the River Dargle is located approximately 400m to the north of the site. GSI bedrock aquifer mapping indicates the presence of a poor aquifer (Bedrock which is Generally Unproductive except for Local Zones) and GSI groundwater vulnerability mapping indicates the site is of low vulnerability classification. GSI Groundwater wells and springs mapping shows the presence of some boreholes and springs in the vicinity of the site.

No historic pits, quarries or Integrated Pollution Prevention and Control (IPCC), Integrated Pollution Control (IPC) and Industrial Emissions License (IEL) facilities were identified within 250m from both sides of the railway line at the site. Furthermore, there is no EPA licenced waste facilities and discharge points under Water Framework Directive (WFD) Article 5 within the site extent.

Depth to bedrock mapping is not available for this area, however mapping immediately north of the River Dargle indicates depths up to 25m below ground level reducing to the west of the line.

No historic ground investigation is available for the site. Some information is available within the vicinity of the gas works to the north of Seapoint Road which indicates that the stratigraphy consists of made ground of an average thickness of 7.0m, coarse gravel with rounded cobbles, soft fibrous silts and very dense grey, brown gravel with cobbles and boulders. The latter is underlain by weathered rock at a depth of 20.8m, followed by weak to medium strong mudstone/siltstone at depth in the range 27.0-32.0m. Additionally, groundwater level at approximately 3.0m was noted.

A Ground Investigation (GI) to the south of the study area indicates the presence of Total petroleum Hydrocarbons (TPHs) and Polycyclic Aromatic Hydrocarbons (PAHs) which may have resulted from the potential spillage during creosote treatment of railway sleepers.

2.6 Environmental

The existing Bray Level crossings are located in the town of Bray which is in the north-eastern fringe of County Wicklow. The town is within the administrative area of Wicklow County Council. To the north of Harbour Road lies the boundary between County Wicklow and County Dublin. The area north of this lies within the administrative area of Dun Laoghaire – Rathdown County Council. The options assessed for this report lie wholly within Wicklow County Council.

The area surrounding the level crossings is well developed, with residential and commercial developments in the vicinity. Refer to Annex 3.1 Constraints Report for further details of the existing environment.

Bray Head SAC lies to the south of the level crossings area. A brief overview of the baseline environment, under key environmental criteria, is provided in the following sections.

2.6.1 Traffic and Transportation

Approximately 1,200 vehicle trips cross the rail line at Bray Level Crossing on a daily basis. The current vertical clearance at Quinsborough Road crossing is 5m and the crossing has two lanes allowing two-way traffic.

The existing vehicular traffic movement patterns are relevant such that any intervention considers and interfaces suitably with the current lane structure and one-way systems. The current traffic movement patterns for the underbridges are contained in section 2.3 and can be summarised as per the figure below.

Figure 2-18 Existing one-way system

For cyclists in the area there are number of routes they can used as defined in Greater Dublin Cycle Network Plan. Across Bray level crossing is a primary radial route which connects Bray Station with the Seafront. The figure below is an extract from the Greater Dublin Cycle Network Plan for Bray. The full map can be found in Appendix C.

Figure 2-19 Extract from Greater Dublin Cycle Network Plan (Source: nationaltransport.ie)

2.6.2 Landscape and visual impact

The works are all located in the developed urban area of Bray. Boundaries along roads are a mix of stone walls, walls and plantings and underpasses of the railway are defined by fine dressed stonework on approaching walls and at the underbridge (i.e. Harbour Road, Seapoint Road, Albert Avenue, Albert Avenue, Sidmonton Avenue, Victoria Avenue, Convent Avenue and Putland Road).

Existing residential properties define the majority of the extent of railway corridor through this area. Mature vegetation including trees is located along sections of boundary with the railway, including along parallel access lanes such as Royal Marine Park and Victoria Mews. The site and surrounding urban area is located within the lower sensitivity Bray 'Urban Area' on the Wicklow Landscape Category mapping. Protected 'Views and Prospects' are indicated south towards Bray Head along the seafront in Bray (east of the site area) and west along the mouth of the River Dargle in Bray (northeast of the site area).

There are no protected trees or groups of trees along the railway corridor. The nearest such listings are on Quinsborough Road and Florence Road west of the railway. Carlisle Grounds west of the railway and open space areas along the seafront east of the railway are highlighted as part of the green infrastructure network within Bray (Bray Municipal District Local Area Plan 2018 – 2024).

Land use zoning is primarily 'RE: Existing Residential' to the west of the railway and 'T: Tourism' to the east, with 'AOS: Active Open Space' at the Carlisle Grounds and 'GTH: Bray Gateway and Transport Hub' at Bray Railway Station.

2.6.3 Archaeology and cultural heritage

Bray is situated on the Dargle River and is divided into two sections: Little Bray on the north side of the river in Co. Dublin and Great Bray on the south side in Co. Wicklow. The placename derives from Bré - a hill or headland - an allusion to Bray Head, which rises 807 feet above sea level, just south of the town (Price 1957).

The proposed works are located outside and to the east of the zone of archaeological potential (ZAP) that surrounds the Historic Town of Bray (WI004-001).

Very little locational information is given for the stray finds listed in the National Museum of Ireland Topographical Files and many are simply provenanced to 'Bray'. They range in date from the Neolithic to the medieval period and compliment the monument evidence, suggesting a long period of archaeological activity in the environs of Bray.

One of the few Roman sites known in Ireland was discovered at what is now Esplanade Terrace in Bray town where, in 1835, several extended burials were found in a sandbank (WI004-004). Coins found with the skeletons included those of the emperors Hadrian (AD 177–138) and Trajan (AD 97–117). The skeletons were orientated east–west with a stone at each head (Davies 1998; Bradley and King 1989). This is the closest archaeological find to the railway being located 55m to the east of the railway line.

2.6.4 Architectural Heritage

There are a number of structures of Architectural Heritage in the vicinity to the proposed works including Bray Railway Station (RPS B80/73), the Hibernia Inn, Strand Rd. (RPS B86/79), The Bray Martello Tower (RMP WI004-002, RPS B85/78), The Battery, Strand Rd. (RPS B101/94), and a number of listed terraces, villas and buildings. Further information on the Architectural Heritage constraints within this area can be found in Annex 3.1 Constraints Report.

2.6.5 Noise and vibration

The proposed works locations are focused on the existing level crossing at Quinsborough Road, Bray, Co. Wicklow, with a number of options also including Seapoint Road, Putland Road, and the Albert Walk, all located in Bray. The existing acoustic environment includes noise and vibration from

trains in the existing rail corridor. Local traffic also contributes to noise in the area, although it is noted that traffic is currently distributed away from certain streets via the existing one-way system.

2.6.6 Air quality and climate

As defined in the air quality standards regulations (SI 180 of 2011), Bray is located in Zone C. Based on monitoring completed by the Environmental Protection Agency (EPA) in 2020, pollutant concentrations are in compliance with air quality standards in Zone C.

The main local sources of air pollution in Bray are traffic and home heating.

In 2021, the EPA reported that Greenhouse gas (GHG) emissions in Ireland decreased 3.6% in 2020. The decrease in emissions is reflected in most sectors with the exception of increases in residential, agriculture and public services. Despite the decrease, Ireland is still not on the pathway required to meet future targets and a climate neutral economy. These targets are set out in the Climate Action and Low Carbon Development Act 2015, as amended, which legally binds Ireland to net-Zero emissions no later than 2050, and to a 51% reduction in emissions by 2030.

2.6.7 Agricultural and non-agricultural

The environs around the potential works is non-agricultural land. Land in this area is pre-dominantly a mix of residential properties and commercial with the open space along the seafront to the east of the station on Strand Rd.

2.6.8 Geology and soils

No historical ground investigation information is available within the site. The expected ground conditions are detailed in Section 2.5.

The geological mapping for the area indicates that the soils and geology of the area comprise mainly of made ground and the underlying bedrock is greywacke and quartzite of the Bray Head formation; limestone derived gravels and boulder clay are likely present between the made ground and bedrock.

The Corine Land Cover 2018 categorises the land use in the area as artificial surfaces with continuous urban fabric. Moreover, part of the region within 250m from the site is classified as artificial surfaces with discontinuous urban fabric.

GSI Landslide Susceptibility mappings indicate that there are no landslide events recorded within the site extent and the latter is classified as made area. Aggregate Potential Mapping(APM) does not cover the site but indicates that the region located at 100m to the east is classed as low potential.

There is no EPA licenced waste facilities and discharge points under WFD Article 5 within the site extent.

The European Marine Observation and Date Network (EMODnet) geology map indicates that Bray Beach, which is located within 200m to the east of the study area, is classed as a region with coastal behaviour associated to erosion (coastal retrogradation) based on the coastal migration rate.

2.6.9 Water resources

Surface water bodies

The study area lies in the Dargle_040 river sub-basin which is in the Dargle_SC_010 river sub-catchment. The Dargle Estuary transitional waterbody (IE_EA_110_0100) is located approximately

250m to the northeast of the Quinsborough Road level crossing and discharges to the Southwestern Irish Sea - Killiney Bay (HA10) coastal waterbody. The coastal waterbody is part of the Bray Head SAC and pNHA located approximately 1.2km to the south of the Quinsborough Road level crossing. One of the conservation objectives of the Bray Head SAC relates to the physical structure: functionality and hydrological regime. The objective targets include no alteration to natural functioning of geomorphological and hydrological processes, including groundwater quality, due to artificial structures.

The Water Framework Directive (WFD, 2000/60/EC) "Ecological Status" of the Dargle_040 is Good and the waterbody is Not at Risk of failing to reach its objectives. The Dargle Estuary is unassigned and under review, indicating that its water quality is not monitored. The Southwestern Irish Sea - Killiney Bay (HA10) coastal waterbody is classified as High status and Not at Risk of failing to achieve its objectives. The minimum WFD objectives for a water body are to achieve at least Good status (or Good potential for artificial/ highly modified water bodies) and no deterioration of existing status.

Groundwater

The site is underlain by greywacke and quartzite which is part of the Bray Head Formation. The Tober Colleen formation is classified as a Poor (Pl) Aquifer which is Generally Unproductive except in Local Zones. The groundwater vulnerability at the site is low. There are no significant karst features identified near the site.

The study area lies within the Wicklow groundwater body (IE_EA_G_076). The Wicklow groundwater body is currently at Good WFD Status for the 2013-2018 monitoring cycle and currently Under Review with regard to achieving its WFD objectives.

There are no high yielding water supply springs and wells i.e. public water supplies or group water scheme supplies within the study area. No Source Protection Zones associated with public or group groundwater supply schemes are located with the site.

Flooding

Historical flooding has been assessed by examining reports and maps from the Office of Public Work's (OPW) National Flood Hazard mapping. The area is currently under review in terms of river and coastal flood extents. The River Dargle, 250m to the north of the Quinsborough Road level crossing and 150m north of Seapoint Road, has flooded several times in the past, with records showing historic flooding in August 1905, September 1931, November 1965 and most recently in August 1986 during Hurricane Charlie. The reports do not indicate flooding at the Quinsborough Road level crossing. However, the flood extents during the August 1986 event inundated Seapoint Housing Estate, only 30m from Seapoint Road. A flood defence scheme was implemented in 2017 to reduce the risk of flooding along the River Dargle, which outlets into Bray Harbour approximately 400 m north of the level crossing.

The coastal waterfront is 130m east of the crossings, and as such there could be risk of coastal inundation. In 2002, there was coastal flooding on Strand Road, 140m northeast of Putland Road crossing.

2.6.10 Biodiversity

The study area is within the townland of Bray, and comprise of man-made structures, bridges, and associated infrastructure.

The nearest European site to the proposed works area is the Bray Head Special Area of Conservation (SAC), located c. 1.4km south of the level crossing (furthest location), and c. 400m from the closest possible works location on the Putland Road.

Figure 2-20 Map of Bray and nearby European sites (red hatch)

2.7 Utilities

Utility records have been gathered from the utility providers in the area. IÉ have not yet provided their lineside cable information and as such shall be excluded from these records. The following utility companies have infrastructure within the area of interest:

- Eir;
- BT Ireland;
- Virgin Media;
- Gas Networks Ireland;
- ESB; and
- Irish Water.

All utility records should be considered indicative only and must be verified prior to any intrusive works occurring.

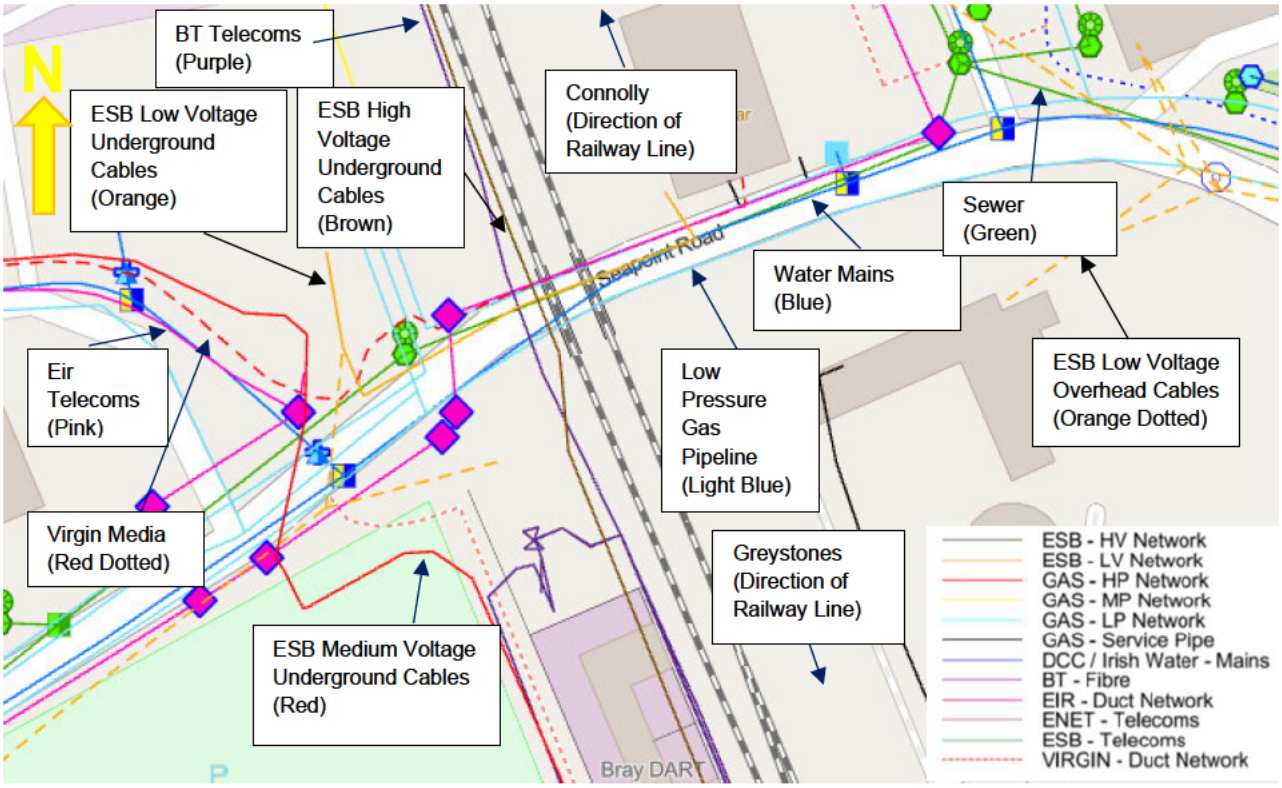


Figure 2-21 Utilities at Seapoint Road Under Rail Crossing

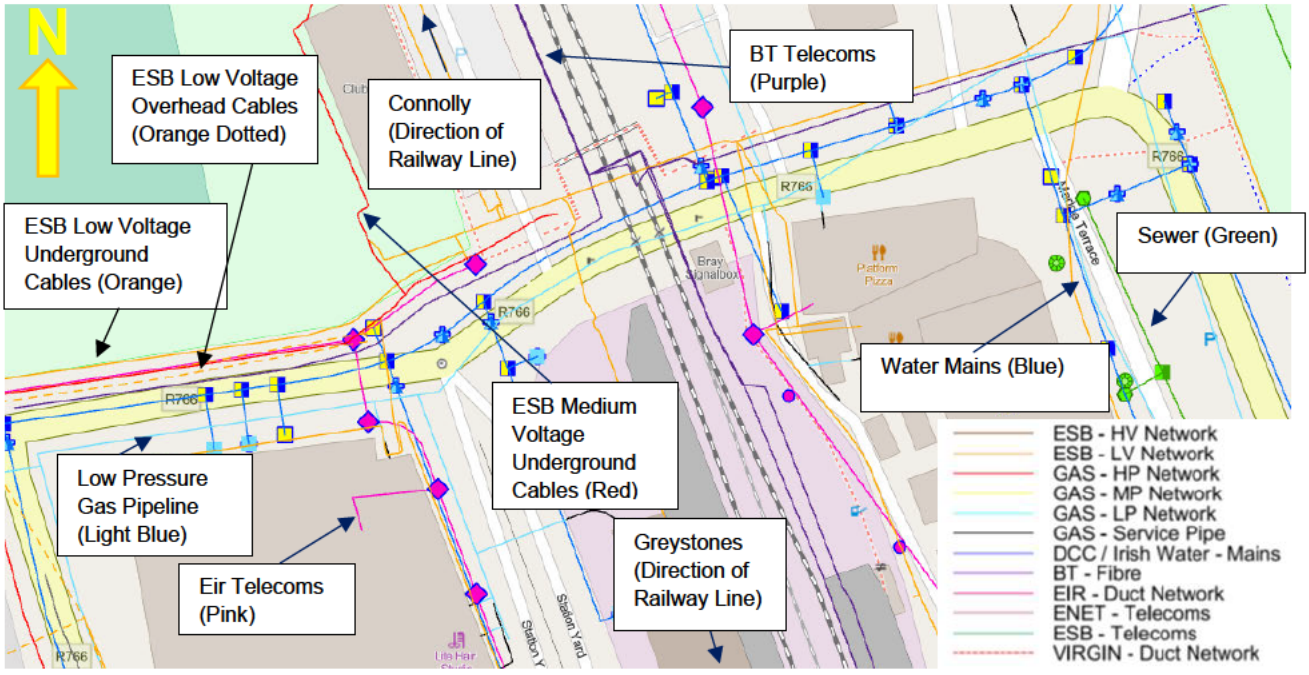


Figure 2-22 Utilities at Bray Level Crossing

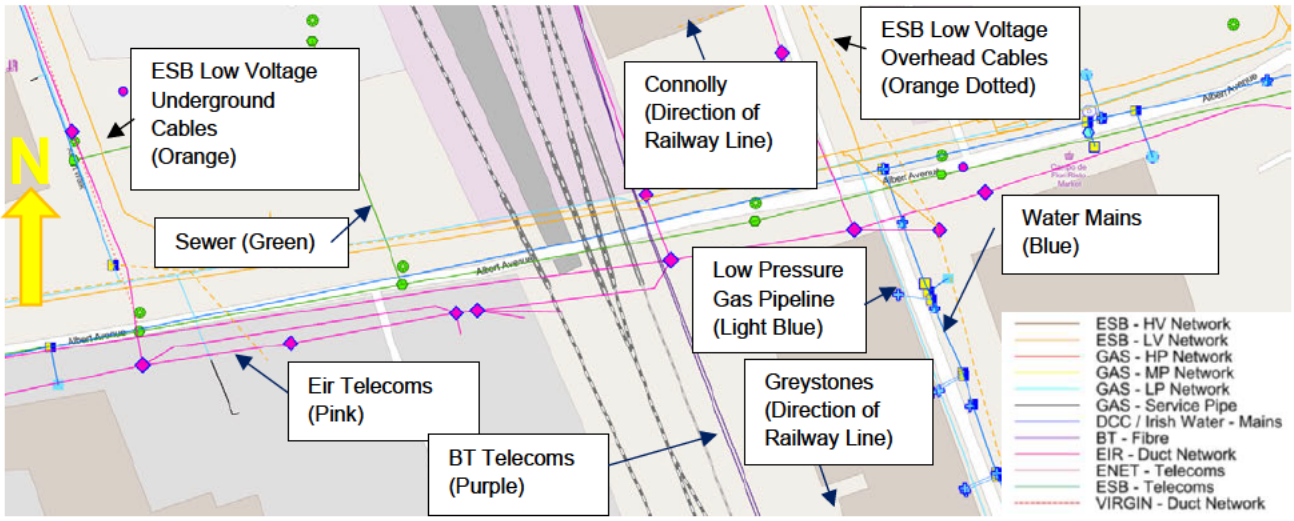


Figure 2-23 Utilities at Albert Avenue Under Rail Crossing

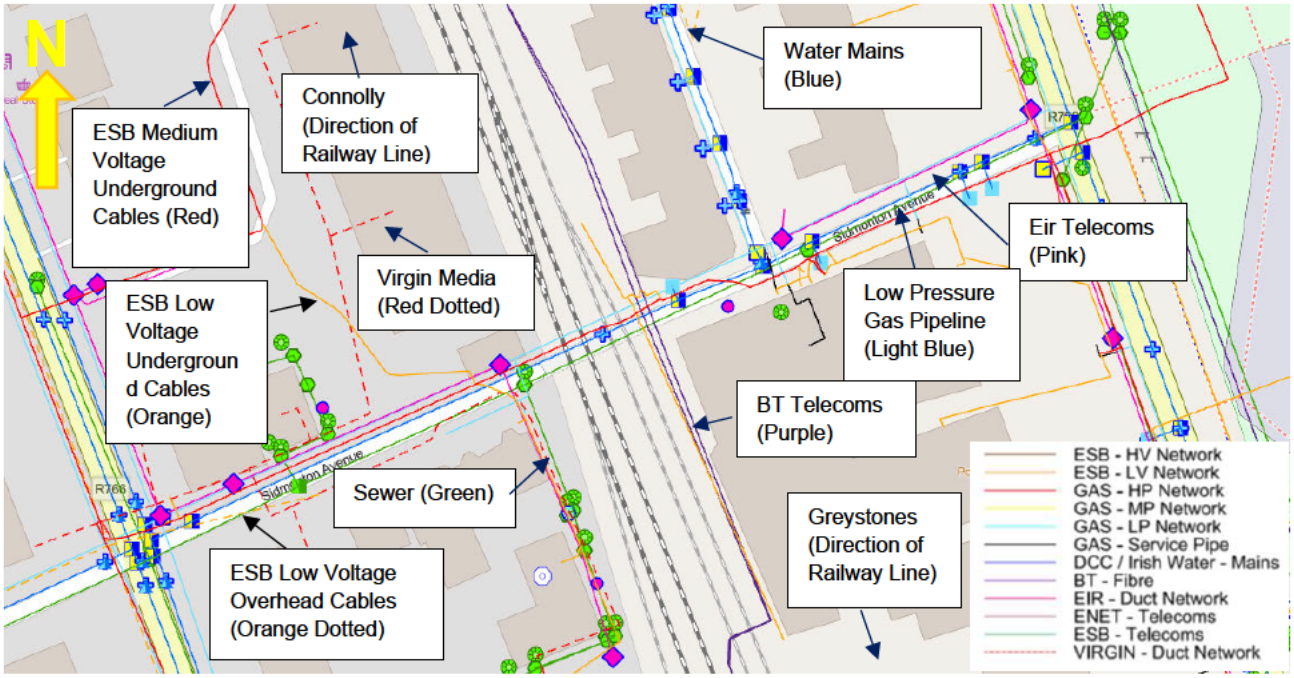


Figure 2-24 Utilities at Sidmonton Avenue Under Rail Crossing

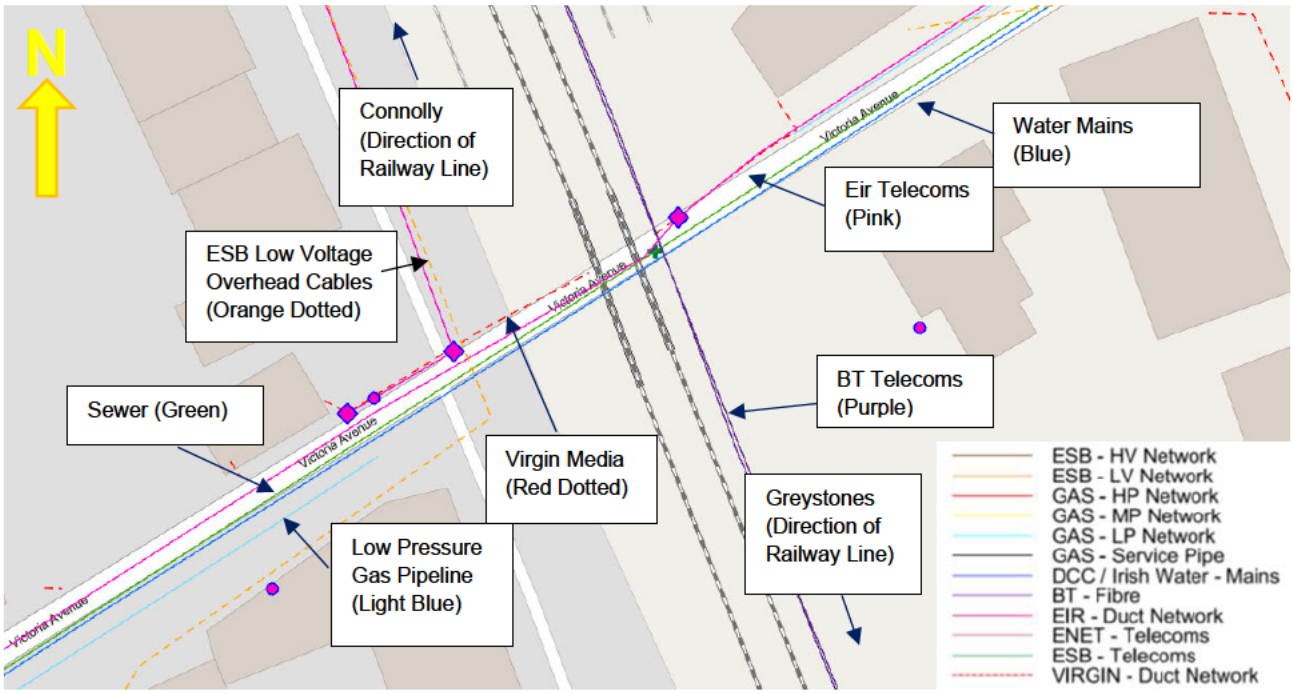


Figure 2-25 Utilities at Victoria Avenue Under Rail Crossing

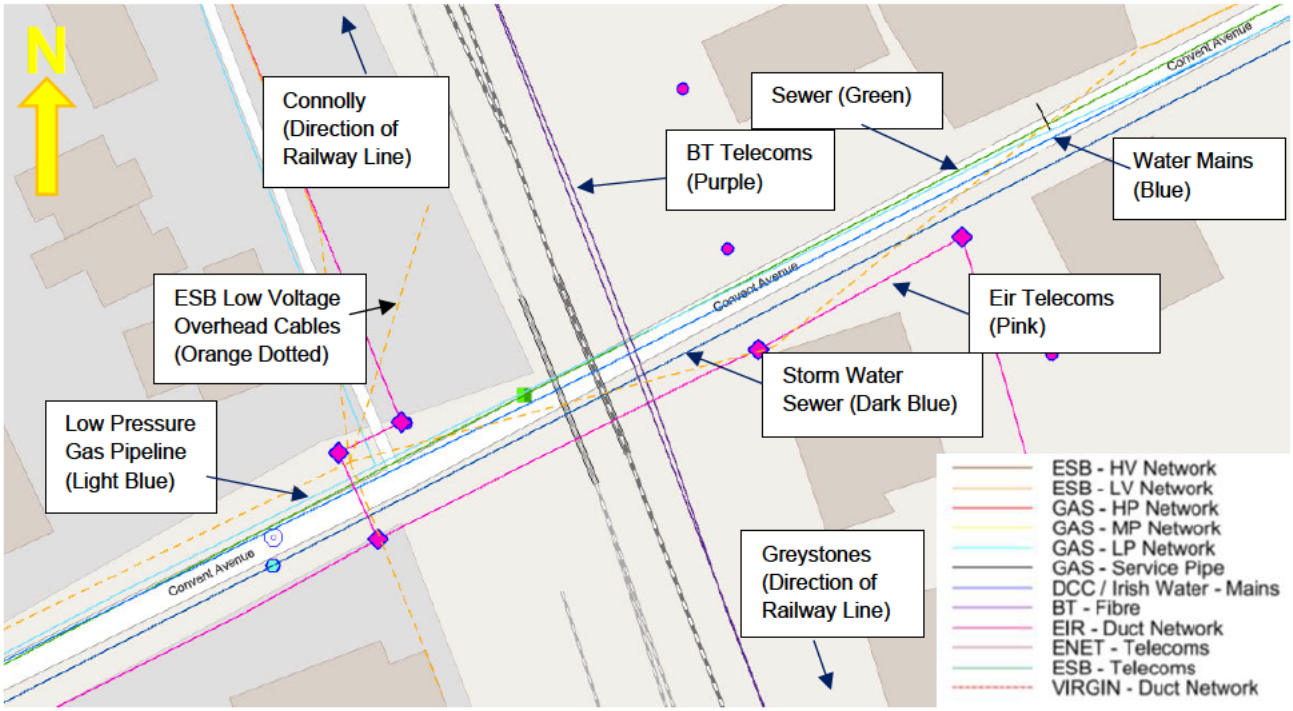


Figure 2-26 Utilities at Convent Avenue Under Rail Crossing

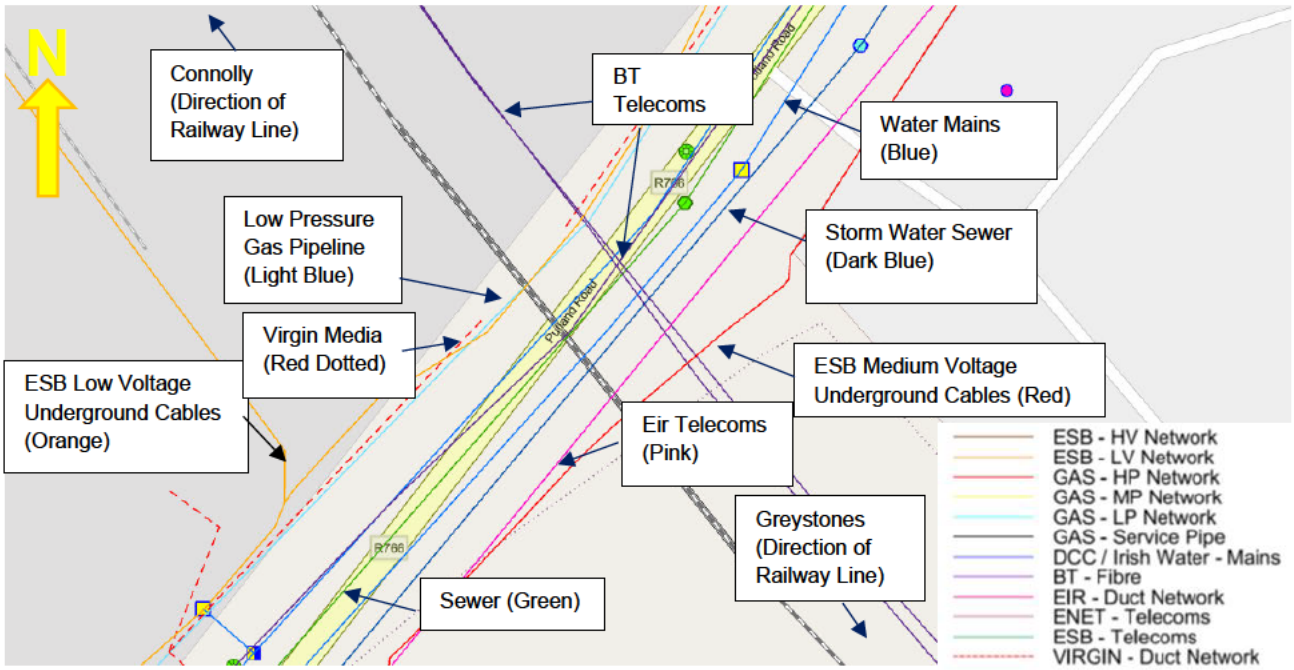


Figure 2-27 Utilities at Putland Road Under Rail Crossing

3. REQUIREMENTS

The project objective to increase rail capacity in the area whilst meeting the requirement to provide an appropriate level of accessibility across the rail corridor through Bray provides the fundamental challenge of this study.

There are currently 6 trains per hour per direction (tphpd) at peak times which equates to the Bray level crossing to be closed for 34 minutes in the hour. The rail traffic is to increase from 6 to 12 tphpd during peak hours which will result in significant increase in the barrier closure times to the point that they will be down almost continuously.

Of particular note is the fact that the existing level crossing provides the only access onto the seafront for high clearance vehicles and these will be particularly impacted by the increased barrier closure time.

3.1 Specific requirements

There are no specific requirements relating to crossing opening times however the following project requirements have been determined:

- to provide an appropriate level of vehicular access for all modes to facilitate access to/from the Bray Seafront;
- to provide an appropriate level of accessibility at a local level for pedestrians and cyclists; and
- to provide an appropriate level of accessibility for emergency services (Fire Brigades, Hospitals) in terms of catchment and response time.

3.2 Design Standards

Table 3-1 contains some of the applicable standards that will be used to develop the design. This list of standards is not exhaustive and other standards may be used.

Prior to completing the detailed design, Arup will undertake a detailed risk assessment in accordance with The Commission of Railway Regulation (CRR) mandatory requirements as set out within the documents listed below:

- CRR-G-009-G: Guideline for the Process of Authorisation for Placing in Service of Railway Sub Systems; and
- CRR-G-009-G Sections 2.2.3 – 2.2.4: Guideline providing List of Parameters and Requirements for Authorisation for Placing in Service (APIS) of Heavy Rail INF & related OPE/MAI Parameters.

Table 3-1: Design Standards

Source	Description	Comments
Government of Ireland	Transport Act 1950	Section 15 - general duties of CIÉ
Government of Ireland	Railway Safety Act 2005 (the 2005 Act)	Section 36 – general duties of a railway organisation

Source	Description	Comments
Dept. of Public Expenditure and Reform	National Development Plan (2018-2027)	
European Commission Regulation	EU/1299/2014	Technical Specification for Interoperability for the 'Infrastructure' subsystem
European Commission Regulation	EU/1302/2014	Technical Specification for Interoperability for the "rolling stock subsystem - Locomotives and passenger rolling stock"
TII	DN-GEO-03040	Subways for Pedestrians and Pedal Cyclists Layout and Dimensions (previously TD36).
TII	DN-GEO-03036	Cross Sections and Headroom
Irish Rail	I-PWY-1101	Requirements for Track and Structures Clearances
Irish Rail	CCE-TMS-300	Track Construction Requirements and Tolerances
Irish Rail	CCE-TMS-340	Horizontal Curvature Design
Irish Rail	CCE-TMS-341	Vertical Curvature Design
Irish Rail	CCE-TMS-344	Requirements for Undertrack Crossings and Pressure Pipelines
Irish Rail	CCE-TMS-345	Engineering Requirements for Passenger Platforms and Barrow Paths
Irish Rail	CCE-TMS-410	Civil Engineering Structures Design Standard
Irish Rail	CCE-TRK-SPN-007	Specification for Track Ballast
Irish Rail	CCE-TRK-SPN-021	Specification for Permanent Way Signs
Irish Rail	MAY-MDC-ELE-DART-SP-E-0002	Electricity Functional Specifications System-Wide

Source	Description	Comments
Irish Rail	MAY-MDC-TEL-DART-SP-Y-0001	Telecommunications Generic Functional Requirement Specification DART Wide
Irish Rail	MAY-MDC-SIG-DART-SP-E-0001	Signalling Functional Requirements Specifications System-Wide
Irish Rail	MAY-MDC-LVP-DART-SP-E-0001	SET Electricity Functional Specifications System-Wide for LV Power

3.2.1 Headroom Design Standards

As noted earlier the existing level crossing is the only location that can currently cater for high sided vehicles accessing the seafront. Therefore, a number of the proposed options described in Section 5 involve increasing the headroom at existing bridges currently provided in the Bray area.

The applicable standards for determining the minimum headroom for vehicular underbridges/underpasses are as follows:

- DN-GEO-03036 Cross Sections and Headroom, May 2019;
- DMURS May 2019; and

Whilst the DMURS remain silent about minimum headroom at structures, The DN-GEO-03036 Chapter 6, defines minimum headroom for maintained structures as 5.03m and new structures 5.30m. However, the standard allows for lower headroom provision if agreed with the relevant Road, Railway Authority.

It must be noted that on the 1st of November 2013, the Irish government limited the maximum height of any vehicle on Irish roads – including HGVs – to 4.65 metres (Reference: gov.ie - Maximum vehicle heights to change on November 1st (www.gov.ie))

The design team considered two options:

- **Option 1** - Obtain agreement with the relevant overseeing organisation and use 4.7m minimum headroom. If required, additional clearance of a maximum of 0.16m would have to be provided for sag radius compensation as defined in Table 6.2 of DN-GEO-03036. This option would allow for a maximum of 4.65m high vehicles movement.

  To limit the risk of damage to the structure due to vehicle strike, the most appropriate method of structure protection will be determined at preliminary design.
- **Option 2** - Obtain agreement with the relevant overseeing organisation and bus services provider. Implement vehicle height restriction of 4.40m. If required, additional clearance of a maximum of 0.16m would have to be provided for sag radius compensation as defined in Table 6.2 of DN-GEO-03036. This option would restrict the movement of vehicles higher than double-decker buses and emergency vehicles.

Option 1 is the preferred option. It will allow for a maximum of 4.65m high vehicles, authorised by the government on Irish roads.

This option would require consultation and agreement with bus services providers, emergency services, relevant road authorities, and other third parties, which would have to be carried out at later design stages.

Options in this report consider, where necessary, achieving the increased headroom by lowering road levels. It should be noted that raising bridges is not feasible given the complexity of raising track through the station and the gradient limits for rail meaning the works extents would be very significant.

4. CONSTRAINTS

4.1 Technical

This section describes the constraints that are relevant to this package of work.

4.1.1 Level Crossing Operations

The presence of the Bray level crossing is a key constraint to meeting capacity and frequency increase. With the proposed frequency of service increasing from 6 tphpd to 12 tphpd, the level crossing barrier down times will be almost continuous.

4.1.2 Permanent Way and Track

The permanent way arrangement through the level crossing is constrained by the platform to the south and the existing rail corridor and bridges to the north. There is no room for any change in vertical or horizontal track alignment through the level crossing due to the proximity of Bray station platforms.

4.1.3 Geotechnical

Based on the desk study information retrieved from historic ground investigations, there is the risk of contamination due to the presence of made ground as highlighted in existing ground investigations and with respect to the historic and industrial use of the site as a railway. Subsequently, material excavated during the works may not be suitable for reuse on site and, subject to testing, may require disposal or recovery to a suitably licensed facility.

As such, a site-specific ground investigation is a prerequisite at the location of the proposed works to investigate the current ground and groundwater conditions. Limited information on depth to bedrock, groundwater and geo-environmental is currently available.

4.1.4 Structures

The existing structures through the Bray area comprise several historical bridges, many of them still retaining the original stone masonry abutments. These bridges provide access beneath the railway line and have limited vertical clearances ranging from 3.1m to 4.7m. They comprise single span structures with limited lateral clearance between abutment walls, ranging from 4.8m to 6.2m. Historical information for these bridges, including as-built drawings, is limited. There is no information on the existing foundations for these bridges.

The large stone masonry retaining wall to the east of Seapoint Road bridge is considered a significant constraint to any substantial road alterations in this area.

4.1.5 Utilities

Existing utilities are a constraining factor to the project when considering the various design options. It is often cheaper, easier, and quicker for a project to change the design than to divert a utility. Existing utilities should be taken into consideration from an early stage in the project, and where possible worked around and only diverted where necessary.

Utility locations should be taken into consideration when constructing or designing bridges, underpasses, or automatic barrier crossings, as this may require utilities in the area to be diverted. Any construction work taking place in the vicinity of the level crossings, or underpasses, must take

the existing lineside and telecommunication cables into consideration. Appropriate arrangements must be made with Irish Rail, BT Ireland, ESB, Virgin Media, Gas Networks Ireland, Irish Water, and Eir.

Currently the known utilities in the vicinity are the telecommunication cables, lineside cables associated with the railway, electrical cabling overground and underground, gas pipes, sewer pipes and stormwater pipes.

4.2 Environmental

For an overview of the existing environmental constraints for DART+ Coastal South refer to Annex 3.1 Constraints Report.

Section 2.6 above describes the baseline environment for the various options being considered under this package of work. Building on this information, the key constraints associated with the options being considered, under the various environmental criteria, are summarised below.

4.2.1 Traffic and transportation

The potential closure of Bray Level Crossing presents some mobility and accessibility constraints to high clearance vehicles as all the alternatives are underbridges, some of which with relatively low height restrictions. This includes access to the businesses and public amenities along the Bray seafront and a Dublin Bus depot which requires high clearance for double-decker buses. Pedestrian and cycling accessibility are also key constraints, with the level crossing serving to provide a level, step-free access across the rail corridor, directly adjacent to Bray Station.

The level crossing also offers an alternative for access to the Bray Station platforms. However, the station is not reliant on the level crossing, as it includes grade-separated connection between the two platforms. This is provided within the station and available only to rail patrons.

Any works to underbridges to accommodate high clearance vehicles will have to consider potential changes to the current one-way system operational both through them and along Strand Road. All of the underbridges are in densely populated residential environments, with associated property access and parking constraints.

Accessibility to emergency services in terms of minimum response time is also a constraint. The impact on traffic in terms of additional delays or queueing should also be considered. The integration with any planned schemes in the area, for example the Bray Transport Interchange (see section 4.3) should be taken into consideration.

4.2.2 Landscape and visual quality

The following features are of landscape and visual quality and sensitivity:

- the urban – and primarily residential and commercial – nature of the railway corridor;
- dressed stonework on approach walls and underbridges of the railway;
- existing vegetation along sections of the railway corridor;
- open spaces along Strand Road;
- the proximity to Carlisle sports grounds / open space and war memorial on Quinsborough Road; and
- protected ‘Views and Prospects’ - indicated south towards Bray Head along the seafront in Bray (east of the site area) and west along the mouth of the River Dargle in Bray (northeast of the site area).

4.2.3 Archaeology, Architectural and cultural heritage

Despite the changing nature of Bray, the threat of violent upheaval had not entirely dissolved. During the Napoleonic Wars, three Martello Towers were erected between Ballybrack and Bray and two at Bray itself. These imposing towers were built between 1804 and 1806 in response to the perceived threat of invasion of England via Ireland. Twenty-one towers were built between Balbriggan and Bray, each with overlapping fields of artillery fire. Their design was based on a tower at Cape Mortella in Corsica that was captured by the British in 1793. Each tower cost £1,800 to erect (Bennett 1991). A martello tower (WI004-002) is located off Strand Road to the north of the bridge at Quinsborough Road.

Partly as a result of its new status as a popular tourist destination, Bray grew rapidly during the late 18th and early 19th centuries, aided by the expansion of the railway from Dublin to Bray in July 1854. By 1816, houses had been constructed on both sides of Main Street as far as the pound. The first edition Ordnance Survey map of 1838 depicts what Davies has described as 'a solidly-based if largely one-street town ... with relatively few gardens or extensive back plots'. By 1838, there was a Protestant and Catholic national school, several private schools and a free charity school. There was a substantial Roman Catholic chapel (now the Holy Redeemer Church) on the site of the original chapel that had been built c.1784.

Ireland entered the railway age in 1834 with the establishment of the Dublin to Kingstown line, and on 10 July 1854, the Dublin-Bray railway line opened for business. The work was supervised by the celebrated railway engineer, William Dargan. Dargan is also remembered as one of the chief architects of the 'new' town of Bray that was planned as a seaside resort in the fashion of those found in England and Wales. In 1852, Bray's most prominent entrepreneur, John Quin, entered into a bargain with the Dublin and Wicklow Railway Co. in which he made lands along the coast available for the railway in return for a new forty-foot-wide road from Main Street to the seashore, parallel with the existing Quin's Road. This new road (later named Quinsborough Road) became the new artery between the 'old' Bray and the new.

By the late nineteenth century, Bray had more of the feel of an English seaside resort than an Irish town. Indeed, it was often referred to from 1860 onwards as the 'Brighton of Ireland'. The main development of the town took place between the arrival of the railway and the turn of the twentieth century when the number of buildings grew from 668 (1851) to 1,614 (1901) and the population of the town more than doubled.

4.2.4 Noise and vibration

Based on a desktop study, constraints to the works include adjacent receptors such as dwellings, and recreational spaces, that are sensitive to noise and vibration.

Noise from trains is not expected to change due to the level crossing works. Road traffic noise will change depending on the solution adopted and the potential associated redistribution of traffic.

4.2.5 Air quality and climate

There are several residential receptors in the vicinity of the potential works which need to be considered during the options assessment. There are potential impacts on nearby receptors from construction activities. Redistributed traffic may also impact air quality.

4.2.6 Agricultural and non-agricultural

No constraints have been identified.

4.2.7 Geology & soils

Based on the historic and industrial use of the site as a railway, there are likely to be some sources of contamination within the upper strata throughout the study area.

Another constraint is the location of National Inventory of Architectural Heritage (NIAH) and Recorded Monument sites within 250m of the site.

Additionally, the site is immediately adjacent a region considered as susceptible to erosion.

4.2.8 Water resources

The constraints to the development in terms of water resources include the Dargle Estuary transitional waterbody, Southwestern Irish Sea - Killiney Bay (HA10) coastal waterbody and the protected Bray Head SAC and pNHA. The OPW flood maps of the area do not indicate risk of flooding, however they are currently under review.

The underlying Poor aquifer is also considered to be a constraint, however, as it is considered to be of low importance, any impact on the aquifer is considered to be imperceptible and therefore it will not be considered within the MCA. The constraints identified may be impacted by changes to the hydrogeological and hydrological regime or as a result of changes in water quality.

4.2.9 Biodiversity

There are no European sites at risk as a result of the proposed works at any of the locations due to the distance between the works and Bray Head SAC, the localised nature of the works, and the qualifying interests of this SAC, i.e., terrestrial habitats not at risk of water quality impacts.

Potential ecological constraints include:

- Potential for roosting bats in bridges and retaining masonry walls
- Vegetation [redacted]
- Interactions with the underlying groundwater body which has the potential for impacts [redacted]
- Changes to the hydrological regime as a result of run-off from proposed activities into the receiving environment

4.3 Planning

The proposed development is located with the Bray Municipal District Local Area Plan 2018-2024. The purpose of this plan is to put in place a land use framework that will guide the future sustainable development of the Bray Municipal District.

The Plan states the following in relation to the area around DART station:

“Bray is well connected by a high-quality public transport system, centred at the Bray DART Station. The town suffer severe traffic congestion at times. While improvements have been made to make the central area more pedestrian friendly, the town could benefit from further improvements. It is a priority of the Planning Authority to facilitate development that contributes to the improvement of the overall appearance of the area around Bray Railway Station, to increase the density and mix of uses in this area and to provide clear pedestrian/cyclist links between this area and the town centre and seafront area. This area is the gateway and transportation hub of this major town and the general

appearance, aesthetic appeal and range of uses promoted in this area should be reflective of this significant role."

Policy BT1 states:

"To promote Bray town centre as the **primary** retailing and commercial sector location in the town. Retailing will be promoted as the core function of the town centre. Bray Town Centre consists of the area of land which is zoned 'TC: Town Centre Uses', which extends in a north/south direction from the Dublin Road to Market Square, and in an easterly direction, encompassing Quinsborough Road, Florence Road, Bray Dart Station and part of Novara Avenue. It is the area of the town that provides a broad range of facilities and services and which fulfils a function as a focus for both the population of Bray and public transport."

In relation to Roads and Transportation, the Plan states, inter alia:

"In particular, this plan has been crafted with the following goals in mind:

To promote development that facilitates the delivery of improved local transport links within towns (such as feeder buses to train stations), between towns and in rural areas;

To promote development that delivers improvements to public transport services, in particular the upgrading of the Dublin – Rosslare train line, improved DART Services, bringing the Luas or other mass transit to Bray and Fassaroe and the development of improved bus services."

Policies PT2 and P4 are particularly relevant:

> *"**PT2** To support and facilitate the implementation of measures to improve overall accessibility, public transport and walking / cycling opportunities within the Municipal District and between the Municipal District and other centres of population and activity identified in the Bray and Environs Local Transport Study, currently being undertaken by the NTA, Wicklow County Council and TII.*
>
> *"**PT4** To continue to work with Iarnrod Eireann and the NTA on the improvement of mainline train and DART services into Bray station."*

In relation to Bray Head, the Plan states that it is an area of local, National and European importance, and as such is afforded strict protection due to its designation under the EU Habitats Directive as a 'Candidate Special Area of Conservation' (cSAC) and as a proposed 'Natural Heritage Area' (NHA).

The area is also a site of geological and geomorphologic importance.

Bray Head is recognised as an area of enormous recreational and social value and is frequented regularly by the town's residents and visitors. Care must be taken to ensure that the damaging effects of overuse, in terms of erosion and pollution are mitigated, and to ensure that the area is sustainably managed for its future conservation and preservation.

In order to protect Bray Head from the harmful effects of overuse, Bray Head has been designated as a Special Amenity Area'. Special Amenity Area Orders (SAOO) are made for areas of outstanding beauty or areas of special recreational value, having regard to any benefits for nature conservation. The SAAO states the objectives of the planning authority in relation to the preservation and/or enhancement of the character or special features of Bray Head, including objectives for the prevention and/or limitation of development in the area.

The SAAO enhances the protection afforded to the area as one of outstanding natural beauty by promoting it as an important recreational and education resource. The SAAO also acts as a stimulus to improve environmental quality by enhancing environmental diversity and the area's natural and manmade heritage.

There are no policies, objectives or designated areas that would be directly impacted by The DART + South Coastal project at the Bray and Ennis Lane Level Crossings.

The following planned developments are discussed through this report:

- The **Bray Sustainable Transport Bridge** – planned crossing of the River Dargle from Harbour Road to Seapoint Road, west of the railway line. The bridge will be open to pedestrians, cyclists, and bus traffic, with future possibility for a Luas route;
- The **Bray Transport Interchange project** – regeneration of the existing forecourt at Bray Station to better facilitate interchange between key modes of walking, cycling, taxi, bus and railway, along with provision of high-quality public realm space; and
- A new mixed use development on the site of the former Bray Golf Club (Local Area Plan ref SLO 3) with the potential of 1,000 future units, with a number of associated planning applications.

Their approximate extents are summarised in the figure below.

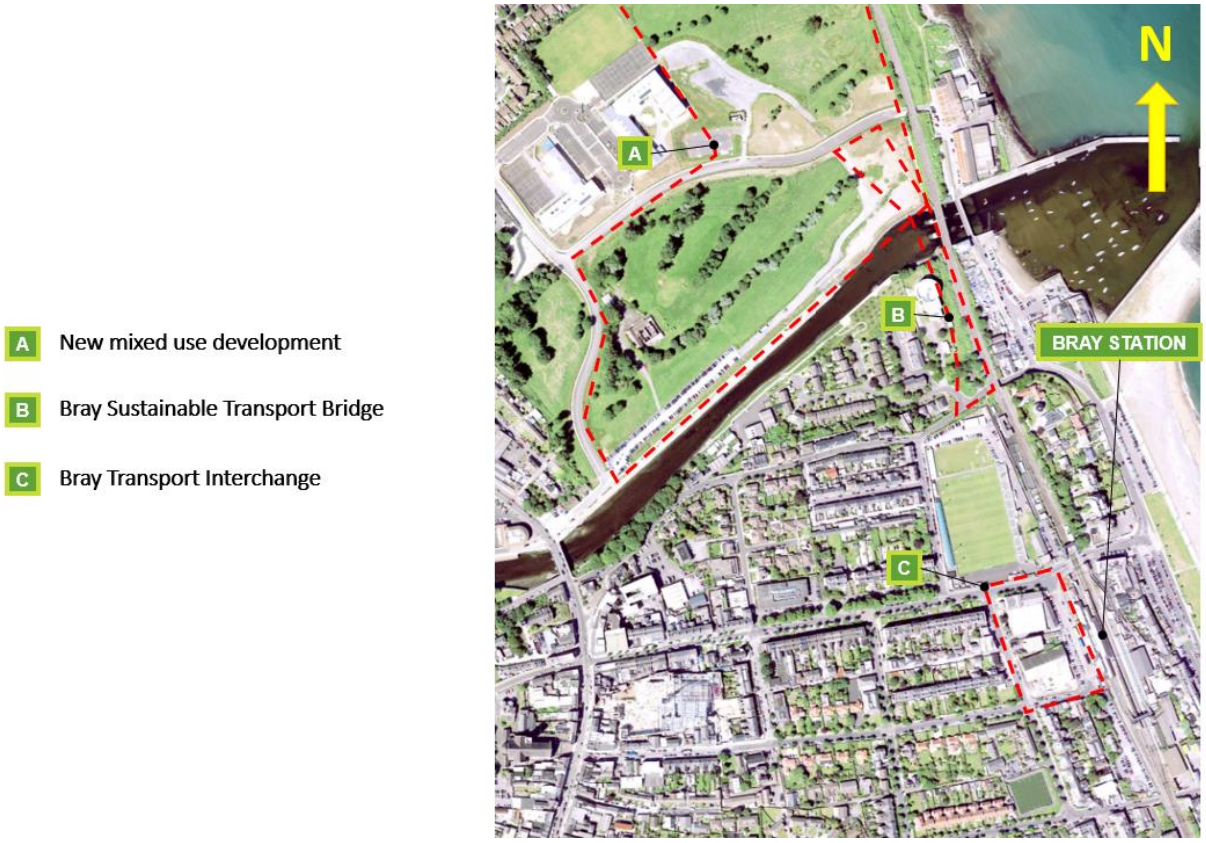


Figure 4-1 Planned developments discussed through report

5. OPTIONS

The options for works to and around the level crossing in Bray have been split into two categories:

1. For providing access for vehicles (particularly high clearance vehicles),
2. For pedestrians and cyclists.

Options are created separately for each category and subjected to the longlist sifting process to create a shortlist for each. An MCA was carried out for each shortlist to provide an EPO for both vehicles and pedestrians/cyclists. These EPOs were then combined to create the EPO for the Bray Level Crossing. Figure 5-1 explains the process diagrammatically.

There is an option which provides a combined solution for the vehicle and pedestrian/ cyclist crossing. This will be considered within the solutions for the vehicle options and additional commentary will be provided at the EPO selection stage to assess it as a combined solution.

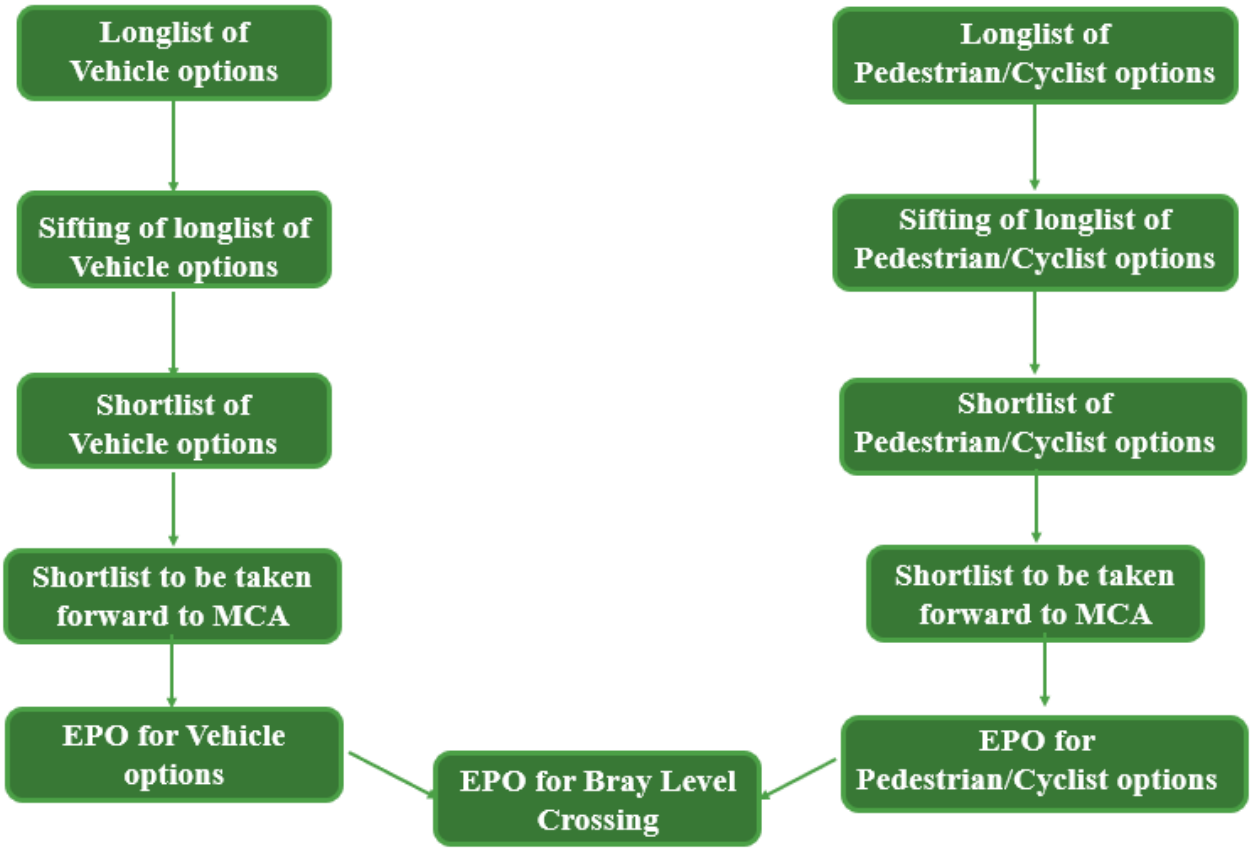


Figure 5-1 Optioneering Process for Bray Level Crossing

5.1 Longlist of vehicle options

This section describes the options which have been considered for vehicles. A more detailed technical description of the works is included for the shortlisted options.

Within the option descriptions, the term “crossroads” is used frequently. This term refers to the group of roads which run perpendicular between Strand Road and Meath Road.

The options which have been considered are summarised in Table 5-1 below.

Table 5-1: Longlist of vehicle options considered

Option	Description
V0	Do-nothing: keep crossing open
V1	Keep crossing open for high clearance vehicles/emergency vehicles only and provide signage showing other vehicles alternative routes.
V2	Close crossing and remove any requirements for high sided vehicles to cross to the seafront except in special circumstances by using Putland Road.
V3.1	Close crossing and modify existing crossroad North of River Dargle to provide clearance.
V3.2	Close crossing and modify existing crossroad at Seapoint Road to provide clearance.
V3.3	Close crossing and modify existing crossroad at Albert Avenue to provide clearance.
V4.1	Close crossing and modify existing crossroad at Sidmonton Avenue and directional system on Strand Road.
V4.2	Close crossing and modify existing crossroad at Victoria Avenue and directional system on Strand Road.
V4.3	Close crossing and modify existing crossroad at Convent Avenue and directional system on Strand Road.
V4.4	Close crossing and modify directional system on Strand Road and Putland Road.
V4.5	Close crossing and modify existing crossroad at Seapoint Road and directional system on Strand Road.
V5.1	Close crossing and construct new underpass at Quinsborough Road.
V5.2	Close crossing and reconstruct Harbour Road underpass (UBR138).

5.1.1 Option V0

This option is the 'Do-nothing' option and comprises no infrastructure intervention, along with leaving the crossing open in its current condition following the DART+ Coastal South project.

5.1.2 Option V1

This option involves no additional infrastructure. The crossing is kept as "open" for high clearance / emergency vehicles only. Signage is provided to direct other vehicles to the seafront via alternative routes.

5.1.3 Option V2

This option involves closing the crossing and removing requirements for high clearance vehicles to cross to the seafront without permissions and prior organisation. It is proposed that such vehicles could cross to the seafront under special circumstances by using Putland Road. This would only be under special circumstances because under normal operation Putland road only accommodates traffic in one direction. Special circumstances could include crane access to the seafront and crossings to be organised in advance with IÉ.

5.1.4 Option V3.1

This option involves closing the crossing along with modification to an existing crossroad to facilitate access for high clearance vehicles. Currently Harbour Road restricted underpass (UBR138) is closed to vehicles and the approach east of the railway is narrow. There is 3.3m of vertical clearance at the underbridge on this private road. It is proposed to lower the road here to provide 4.7m vertical clearance. The existing bridge is only wide enough for traffic in one direction. Traffic lights would be installed on Harbour Road in and around the underbridge to formalise any two-way movements. This option could impact the planned local development on the site of the former Bray Golf Course North West of the crossing. There is the potential that additional road capacity upgrades will be required elsewhere to cater for increased traffic demand and that works are required to the existing bridge over the river Dargle.

Figure 5-2 Option V3.1 plan

5.1.5 Option V3.2

This option is similar to V3.1 in that it also proposes closing the level crossing along with modification to an existing crossroad to facilitate access for high clearance vehicles. This option would increase clearance at Underbridge UBR140 (Seapoint Road) through a combination of modifying the bridge superstructure and lowering the road to improve headroom from 3.15m to 4.7m. The existing bridge is only wide enough for traffic in one direction. Traffic signal controls will be installed either side of the bridge to create a 1-way shuttle. Traffic signal locations to be confirmed at preliminary design. There is the potential that additional road capacity upgrades will be required elsewhere to cater for increased traffic demand.

Figure 5-3 Option V3.2 plan

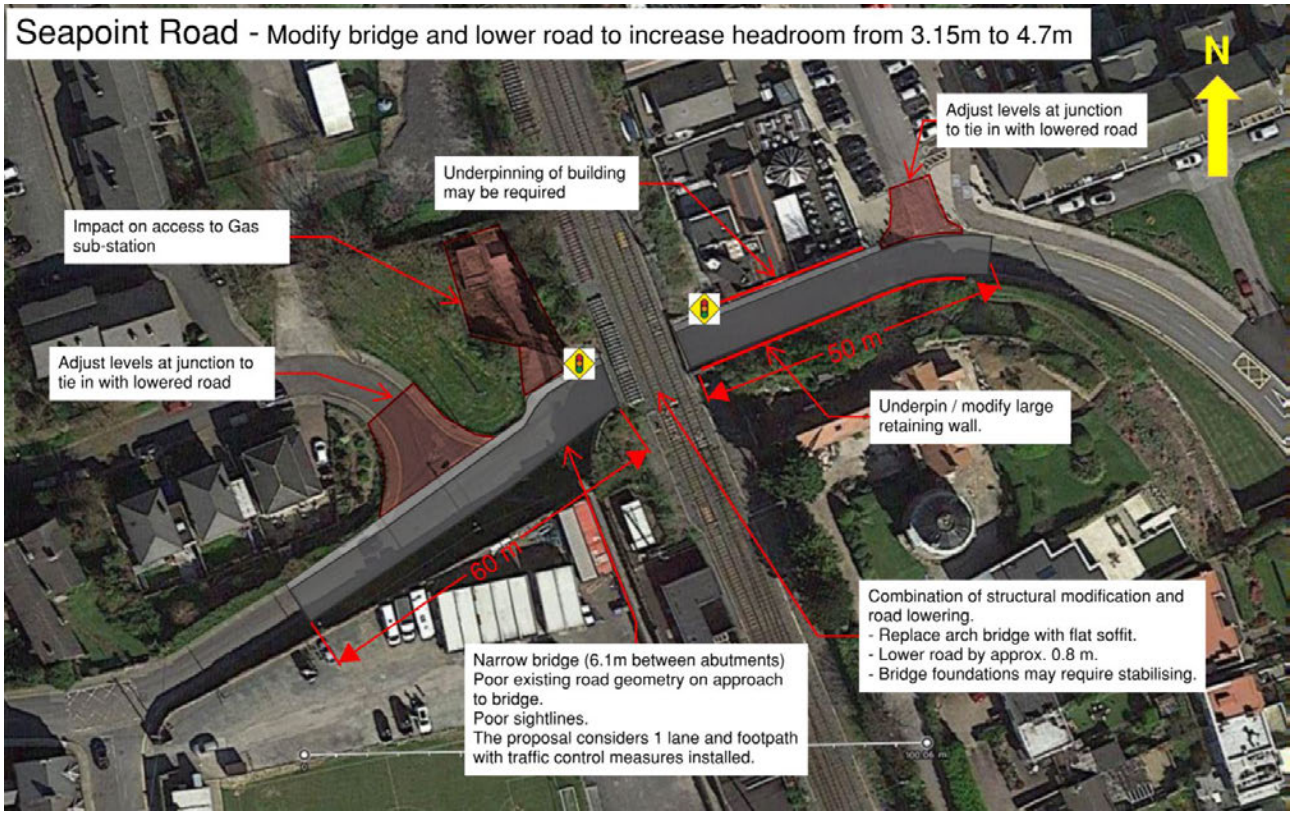


Figure 5-4 Option V3.2 – Proposed bridge modification and road lowering works at Seapoint Road

5.1.6 Option V3.3

This option is similar to V3.1 and V3.2 in that it also proposes closing the level crossing along with modification to an existing crossroad to facilitate access for high clearance vehicles. The option here would increase clearance at Underbridge UBR142 on Albert Avenue by lowering the highway to improve headroom from 3.11m to 4.7m. There is the potential that additional road capacity upgrades will be required elsewhere to cater for increased traffic demand.

Bus traffic for the depot currently travels against the existing one-way system on the eastern side of the railway for access purposes. The diversion of high clearance vehicles to Albert Avenue has the potential to increase traffic numbers at this location. Therefore it is recommended that a shuttle system is implemented to improve the safe operation of this arrangement.

Figure 5-5 Option V3.3 plan

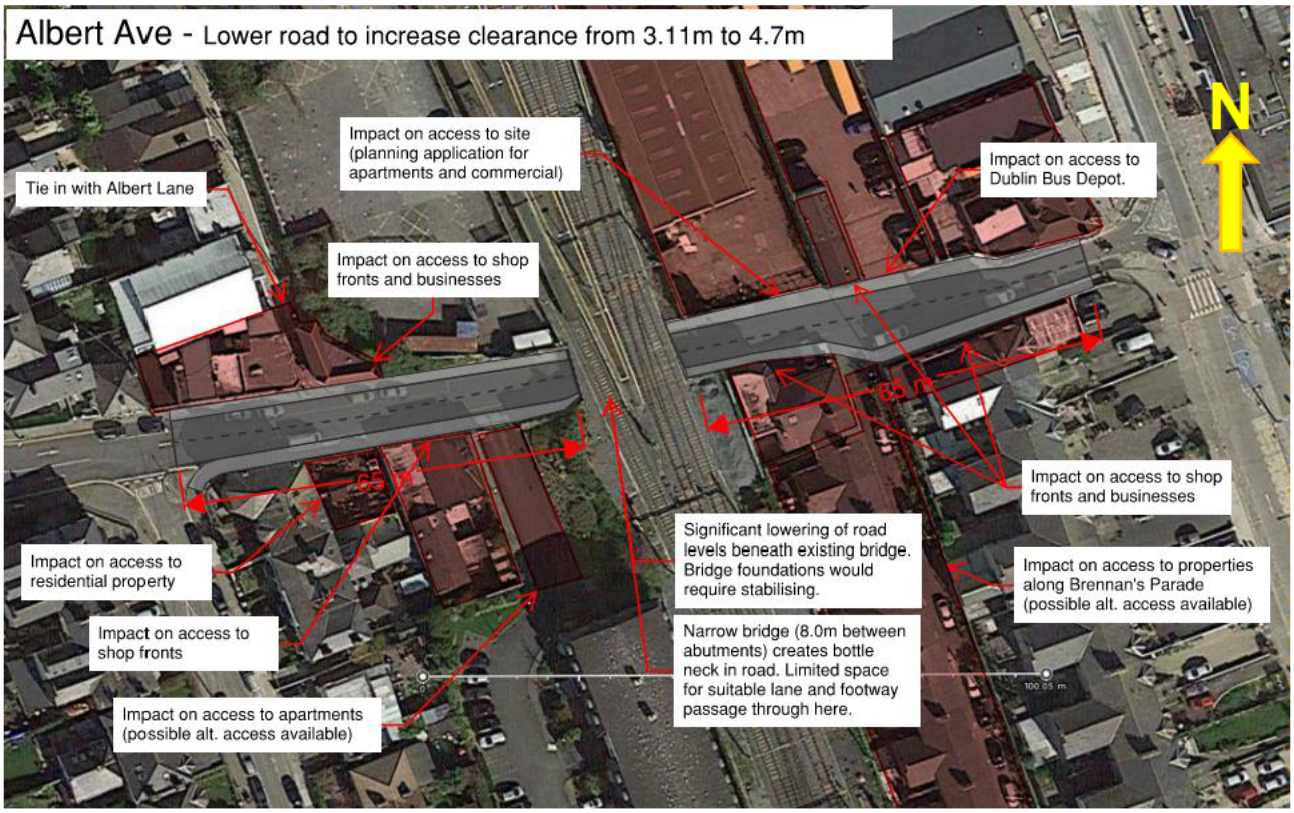


Figure 5-6 Option V3.3 - Proposed road lowering works at Albert Avenue

5.1.7 Option V4.1

This option involves closing the existing level crossing along with modification to an existing crossroad to facilitate access for high clearance vehicles. Sidmonton Avenue would be lowered, improving the clearance at Underbridge UBR143 from 3.25m to 4.7m. Sidmonton Avenue would require a directional change from one-way westbound to one-way eastbound. This would enable high clearance vehicles to enter the seafront at this point and exit at Putland Road. A short section of Strand Road would therefore need to be changed from a one-way section to a two-way section to allow access to the Bus Depot on Albert Avenue. There is the potential that additional road capacity upgrades will be required elsewhere to cater for increased traffic demand.

Figure 5-7 Option V4.1 plan

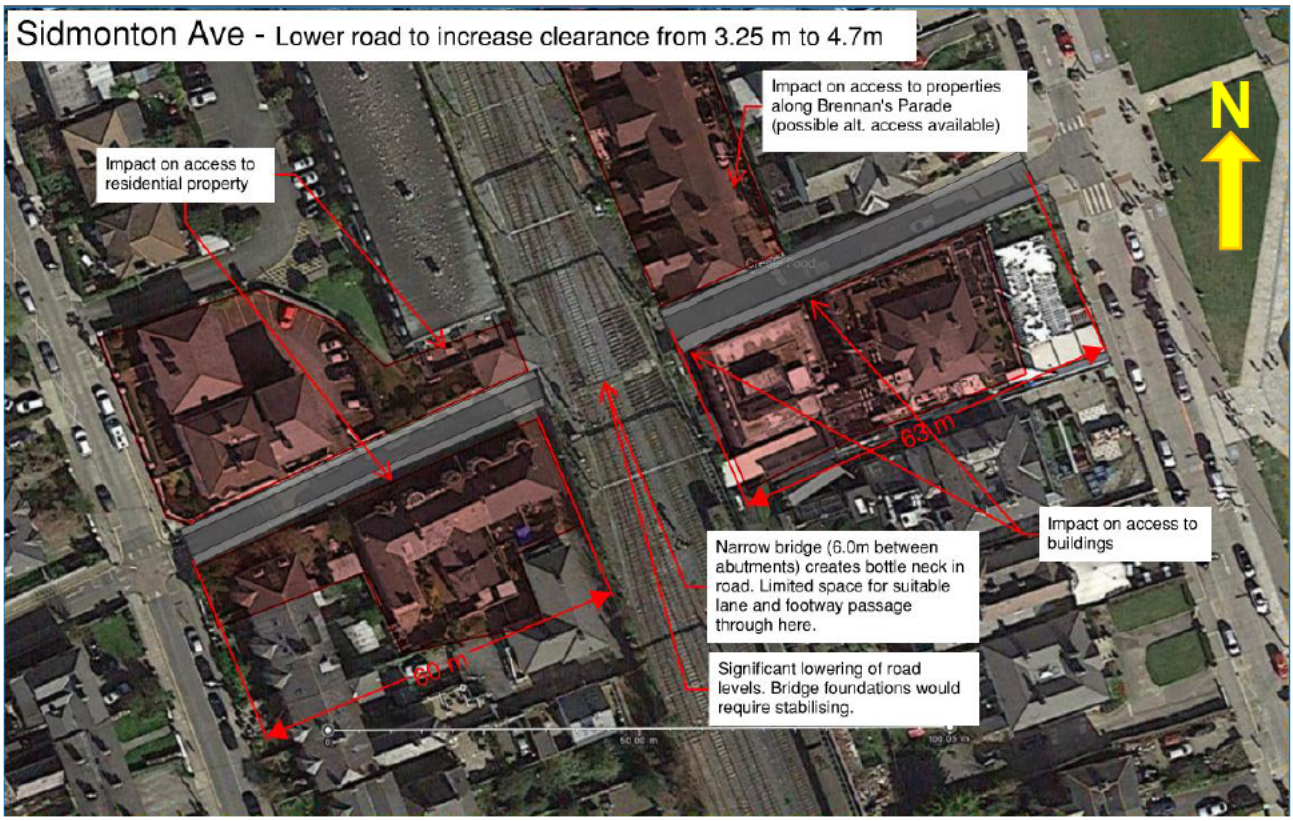


Figure 5-8 Option V4.1 – Proposed road lowering works at Sidmonton Avenue

5.1.8 Option V4.2

This option is similar to V4.1 but instead proposes to lower the road on Victoria Avenue, improving clearance to Underbridge UBR144 from 3.5m to 4.7m. A slightly longer section of Strand Road would be made two-way. The existing bridge has a single lane of traffic running underneath it, allowing two-way travel via a non-official shuttle arrangement. Traffic lights would be installed on Victoria Avenue to formalise any two-way movements. There is the potential that additional road capacity upgrades will be required elsewhere to cater for increased traffic demand.

Figure 5-9 Option V4.2 plan

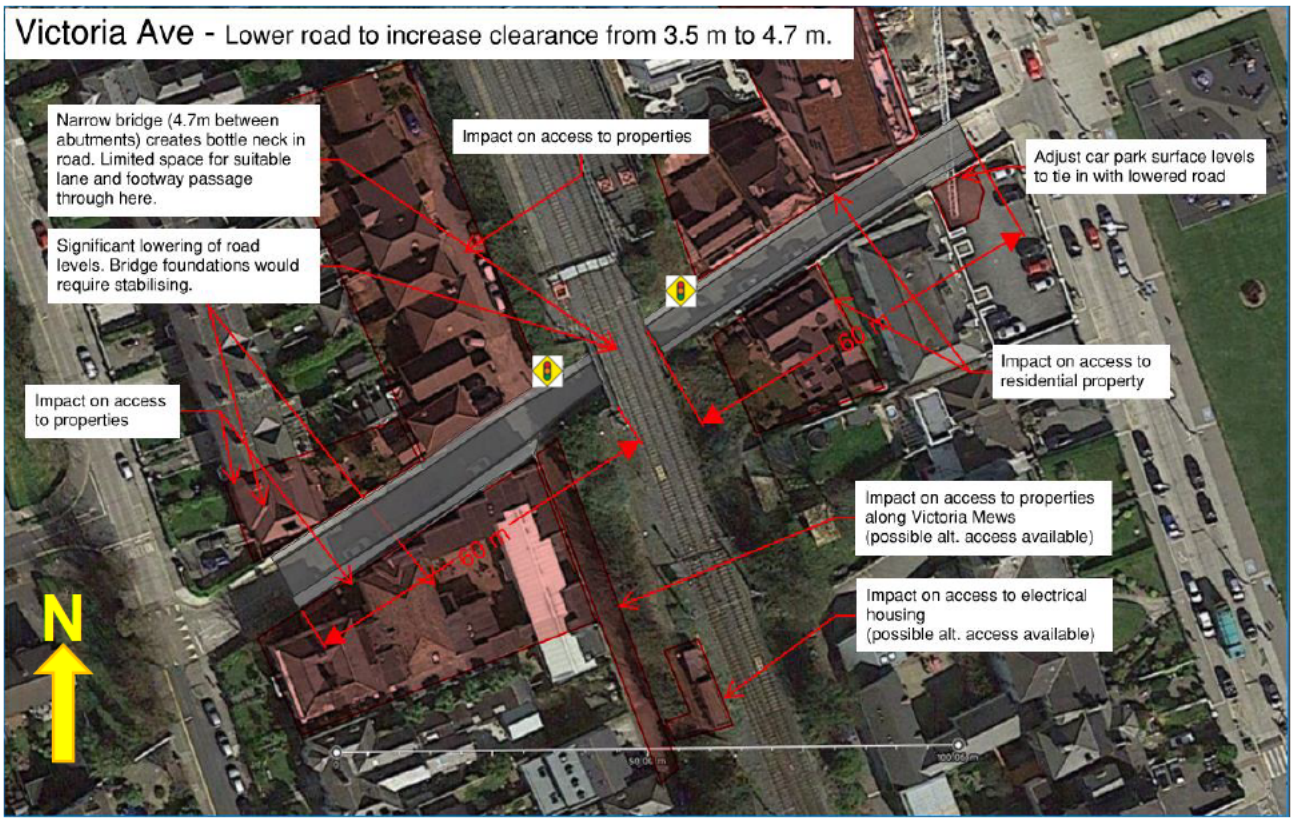


Figure 5-10 Option V4.2 - Proposed road lowering works at Victoria Avenue

5.1.9 Option V4.3

This option is similar to options V4.1 and V4.2 but instead proposes to lower the road on Convent Avenue, improving clearance at Underbridge UBR145 from 4.0m to 4.7m. A slightly longer section of Strand Road than previous options would be made two-way. East of the railway line, and under the existing bridge, there is a single lane of traffic in the west to east direction. Two-way movements are permitted west of the rail line. This option would introduce two-way movements both sides of the railway structure. Traffic signal controls will be installed either side of the bridge to create a 1-way shuttle because the width of the bridge can only accommodate 1 lane. There is the potential that additional road capacity upgrades will be required elsewhere to cater for increased traffic demand.

Figure 5-11 Option V4.3 plan

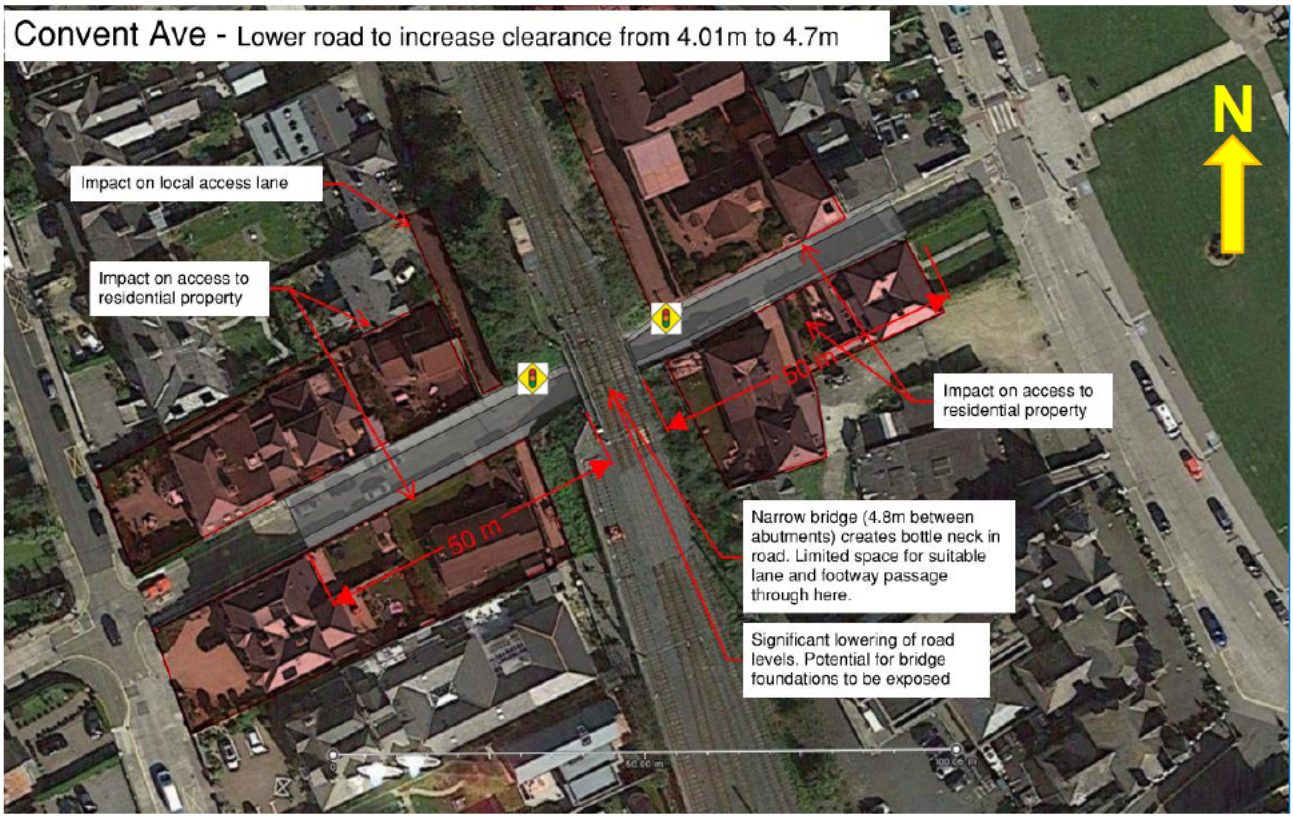


Figure 5-12 Option V.3 – Proposed Road lowering works at Convent Avenue

5.1.10 Option V4.4

This option is similar to other V4 options in that it proposes altering sections of Strand Road to be two-way. Putland Road is currently one way westbound. It would require a directional change to allow eastbound and westbound movements in order for high clearance vehicles to both enter and exit the seafront at this point. The existing bridge is only wide enough for traffic in one direction therefore traffic lights would be installed on Putland Road to formalise these two-way movements. As the clearance at Underbridge UBR146 (Putland Road) is 4.69m, no changes to the current headroom are presented. There is the potential that additional road capacity upgrades will be required elsewhere to cater for increased traffic demand.

Figure 5-13 Option V4.4 plan

5.1.11 Option V4.5

Instead of making sections of Strand Road two-way, this option proposes to make Strand Road one-way southbound to accommodate inbound high clearance vehicles. High clearance vehicular access would need to be provided at Seapoint Road by improving clearance at Underbridge UBR140 from 3.15m to 4.7m. This would be achieved by structure modification and road lowering similar to that outlined in option V3.2. There is the potential that additional road capacity upgrades will be required elsewhere to cater for increased traffic demand.

Traffic lights are not required, like in V3.2, because traffic would be one way.

Figure 5-14 Option V4.5 plan

5.1.12 Option V5.1

This option involves replacement of Bray Level Crossing with a new shared vehicular and pedestrian underpass. The underpass would have suitable clearance for emergency/high-clearance vehicles. The vertical road alignment required to install an underpass at this location would require a depressed sag curve. This would introduce a potential flooding risk that would need to be mitigated. A sump and pumping arrangement may be required if it is not possible to drain by gravity into an appropriate drainage network in the near vicinity.

An overbridge is not possible here due to the level difference down to Strand Road.

Figure 5-15 Option V5.1 plan

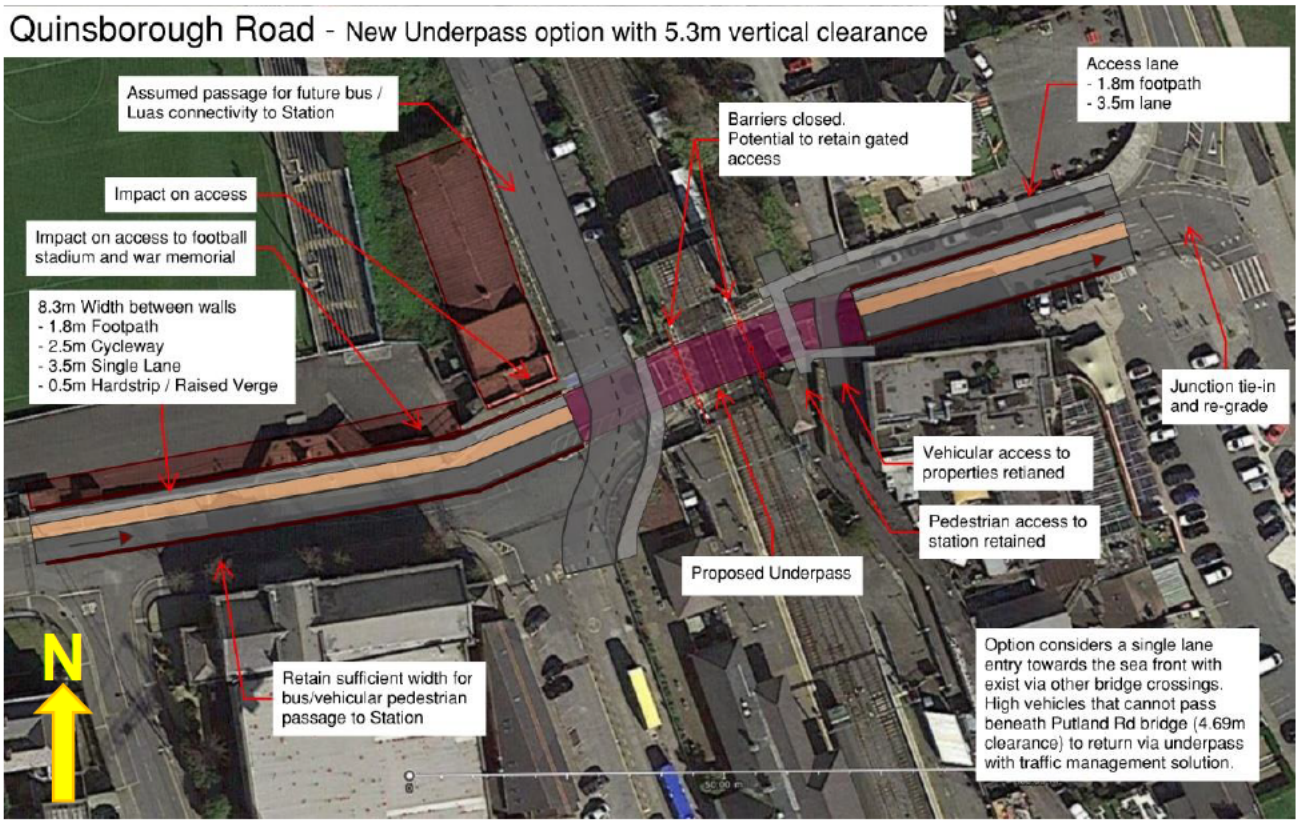


Figure 5-16 Option V5.1 - Proposed underpass at Quinsborough Road

5.1.13 Option V5.2

This option proposes closure of the level crossing along with reconstruction of Underbridge UBR138 (Harbour Road restricted underpass). The new underpass would be constructed providing 4.7m clearance and wide enough for two-way traffic. With this option, there will be impacts to the planned local development on the site of the former Bray Golf Course and Bray Sustainable Transport Bridge and large excavations/retaining wall structures required to construct the underpass. These factors contribute to determining the clearance height available for the underpass. There is the potential that additional road capacity upgrades will be required elsewhere to cater for increased traffic demand and that works will be required to the existing road bridge over the River Dargle.

Figure 5-17 Option V5.2 plan

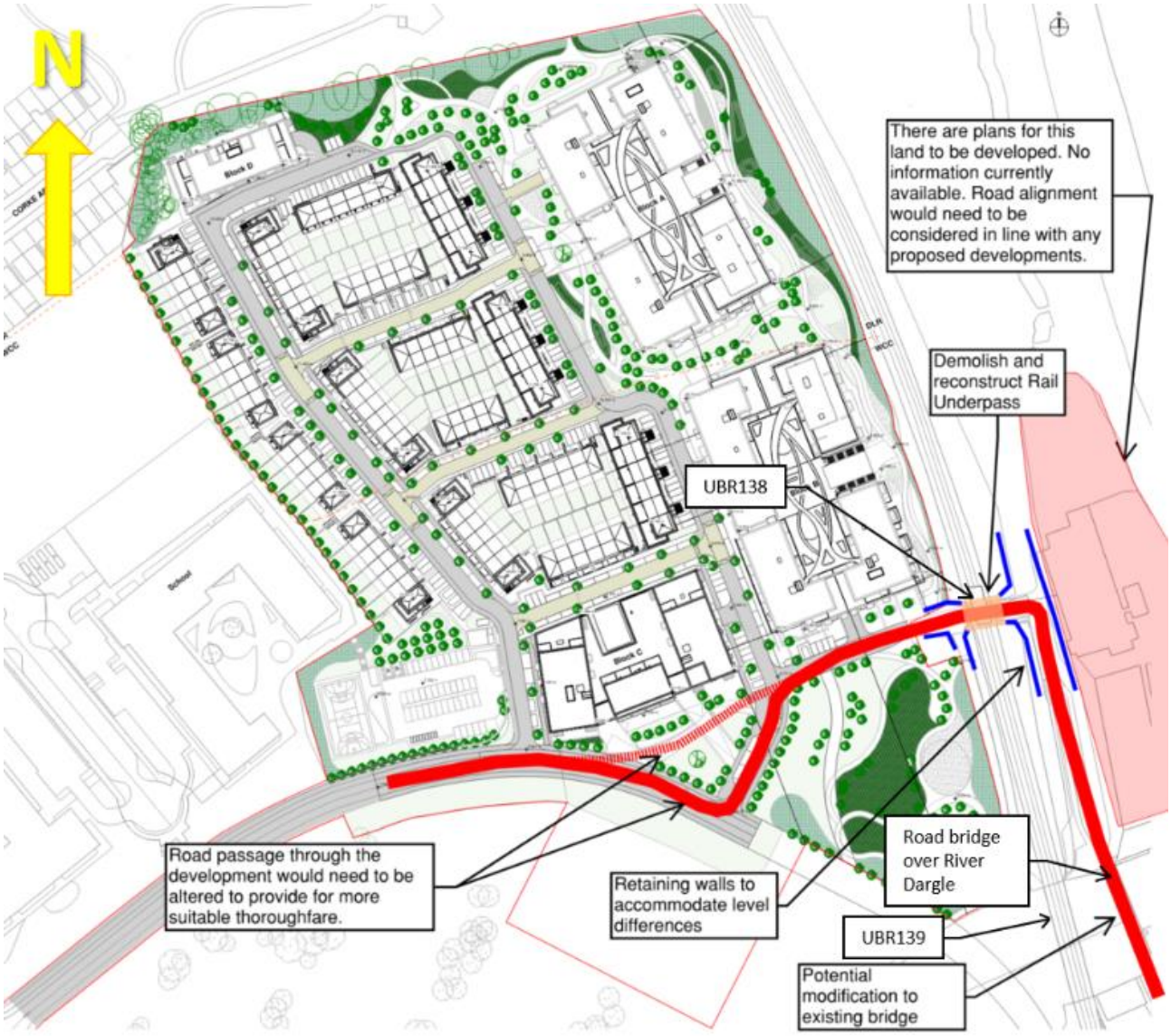


Figure 5-18 Option V5.2 - Proposed underpass, north of Bray Harbour

5.2 Sifting of Longlist of Vehicle Options

The sifting considers the project objectives and requirements which each option presented will be assessed on its ability to meet.

In the vehicle option sift, when assessing the accessibility at a local level for cyclists and pedestrians, it has been assumed that an appropriate option from the sifting of pedestrian/ cyclist options will be implemented to deliver this requirement. Subsequently all options pass for this factor and it is not a differentiator.

The results of this sifting process are presented in Table 5-2, Table 5-3 and Table 5-4.

Table 5-2: Sifting of Longlist of Vehicle Options (Options 0 to V3.2)

Project objectives and requirements	Description	Option V0 – Do nothing: Keep crossing open		Option V1 - No additional infrastructure: Keep crossing open for high clearance vehicles only/emergency vehicles only and include signage showing other vehicles alternative routes		Option V2 – Close crossing and remove any requirements for high sided vehicles to cross to the seafront except in special circumstances by using Putland Road		Option V3.1 – Close crossing and modify existing crossroads to provide clearance: Harbour Road		Option V3.2 – Close crossing and modify existing crossroads to provide clearance: Seapoint Road	
		Pass/ fail	Rationale	Pass/fail	Rationale	Pass/fail	Rationale	Pass/fail	Rationale	Pass/fail	Rationale
Project objective	To deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Fail	Lack of TSS reliability due to risk of disruption from emergency services closing the crossing and by pedestrian/cyclists misusing the crossing due to the crossing being almost constantly down.	Fail	Lack of TSS reliability due to risk of disruption from emergency services closing the crossing and by pedestrian/cyclists misusing the crossing due to the crossing being almost constantly down.	Pass	Delivers the TSS	Pass	Delivers the TSS	Pass	Delivers the TSS
Project objective	To deliver solutions which improve the passenger experience where passenger infrastructure interventions are required to meet the planned increase in DART service frequency.	Pass	No change from existing	Pass	No significant improvements to passenger experience	Pass	No significant improvements to passenger experience	Pass	No significant improvements to passenger experience	Pass	No significant improvements to passenger experience
Project objective	To deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works	Pass	Minimal impacts	Pass	Minimal impacts	Pass	Minimal impacts	Pass	Minimal impacts	Pass	Minimal impacts
Project objective	To identify cost-effective solutions from a capital, operations, and maintenance perspective.	Pass	No capital cost expenditure	Pass	Minimal capital cost expenditure – cost of signage	Pass	No capital cost expenditure	Pass	Cost of lowering the road north of River Dargle	Pass	Cost of lowering Seapoint Road to provide required clearance
Project objective	To minimise adverse impacts on the natural and built environment associated with the construction, operation and maintenance of the project.	Pass	No works during construction, no change to operations	Pass	No major works during construction, no change to operations (installing signage)	Pass	No works during construction, no change to operations	Fail	A new development has been submitted to planning which has partly been granted. The impacts on this development and landowners to the east will be significant	Pass	Impact to the built environment
Project objective	To minimise adverse impacts on existing rail services, road users and landowners associated with the construction, operation and maintenance of the project	Pass	No works during construction, no change to operations	Pass	No works during construction, no change to operations	Pass	No works during construction, no change to operations	Pass	Road would not be in use during construction and road users would have to find alternative routes	Pass	Minimal impact to landowners
Project objective	To provide efficient and cost-effective integration of systems with the other DART+ Programme projects.	Pass	No new systems required	Pass	No integration issues identified at this stage	Pass	No integration issues identified at this stage	Pass	No integration issues identified at this stage	Pass	No integration issues identified at this stage
Project requirement	To provide an appropriate level of vehicular access for all modes to facilitate access to/ from the Bray Seafront	Fail	The barrier will be down almost continually with increased number of trains per hour and therefore access to the seafront for high sided vehicles is almost non-existent.	Fail	The barrier will be down almost continually with increased number of trains per hour and therefore access to the seafront for high sided vehicles is almost non-existent.	Pass	Access to the Bray Seafront is maintained by alternative routes	Pass	Access to the Bray Seafront is maintained by alternative routes	Pass	Access to the Bray Seafront is maintained by alternative routes
Project requirement	To provide an appropriate level of accessibility at a local level for pedestrians and cyclists	Pass	The barrier will be down more frequently with increased number of trains per hour. Access to the Bray Seafront is maintained	Pass	Access to the Bray Seafront is maintained by alternative routes	Pass	Access to the Bray Seafront is maintained by alternative routes	Pass	Access to the Bray Seafront is maintained by alternative routes	Pass	Access to the Bray Seafront is maintained by alternative routes
Project requirement	To provide an appropriate level of accessibility for emergency services (Fire Brigades, Hospitals) in terms of catchment and response time	Pass	The barrier will be down almost continually with increased number of trains per hour. However it is envisaged an arrangement could be made to allow emergency services through by communicating with train control and disrupting the rail service.	Pass	The barrier will be down almost continually with increased number of trains per hour. However it is envisaged an arrangement could be made to allow emergency services through by communicating with train control and disrupting the rail service.	Fail	No access is provided for emergency services (emergency services are not included under "special circumstances")	Pass	Access to the Bray Seafront is maintained by alternative routes	Pass	Access to the Bray Seafront is maintained

Table 5-3: Sifting of Longlist of Vehicle Options (Options V3.3 to V4.4)

Project objectives and requirements	Description	Option V3.3 – Close crossing and modify existing crossroads to provide clearance: Albert Avenue		Option V4.1 - Close crossing and modify existing crossroads and directional system on Strand Road: Sidmonton Avenue		Option V4.2 - Close crossing and modify existing crossroads and directional system on Strand Road: Victoria Avenue		Option V4.3 - Close crossing and modify existing crossroads and directional system on Strand Road: Convent Avenue		Option V4.4 - Close crossing and modify directional system on Strand Road and Putland Road	
		Pass/fail	Rationale	Pass/fail	Rationale	Pass/fail	Rationale	Pass/fail	Rationale	Pass/fail	Rationale
Project objective	To deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	**Pass**	Delivers the TSS	**Pass**	Delivers the TSS	**Pass**	Delivers the TSS	Pass	Delivers the TSS	Pass	Delivers the TSS
Project objective	To deliver solutions which improve the passenger experience where passenger infrastructure interventions are required to meet the planned increase in DART service frequency.	**Pass**	No significant improvements to passenger experience	**Pass**	No significant improvements to passenger experience	**Pass**	No significant improvements to passenger experience	Pass	No significant improvements to passenger experience	Pass	No significant improvements to passenger experience
Project objective	To deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works	**Pass**	Minimal impact	**Pass**	Minimal impacts	**Pass**	Minimal impact	**Pass**	Minimal impact	**Pass**	Minimal impact
Project objective	To identify cost-effective solutions from a capital, operations, and maintenance perspective.	**Pass**	Cost of lowering Albert Avenue to provide required clearance	**Pass**	Cost of lowering Sidmonton Avenue to provide required clearance. Cost of changing section on Strand Road to 2-way	**Pass**	Cost of lowering Victoria Avenue to provide required clearance. Cost of changing section on Strand Road to 2-way	Pass	Cost of lowering Convent Avenue to provide required clearance. Cost of changing section on Strand Road to 2-way	Pass	Cost of lowering Putland Road to provide required clearance. Cost of changing Putland Road and part of Stand Road to a 2-way system
Project objective	To minimise adverse impacts on the natural and built environment associated with the construction, operation and maintenance of the project.	**Pass**	Impacts to the built environment	**Pass**	Impacts to the built environment	**Pass**	Impacts to the built environment	**Pass**	Impacts to the built environment	**Pass**	Impacts to the built environment
Project objective	To minimise adverse impacts on existing rail services, road users and landowners associated with the construction, operation and maintenance of the project	**Fail**	Impact to landowners – access removed to neighbouring properties. This includes residential and commercial, including the bus depot	**Fail**	Impact to landowners – access removed to neighbouring properties; majority residential	**Fail**	Impact to landowners – access removed to neighbouring properties; majority residential	**Fail**	Impact to landowners – access removed to neighbouring properties; majority residential	**Pass**	Minimal impacts to landowners due to road direction changes
Project objective	To provide efficient and cost-effective integration of systems with the other DART+ Programme projects.	**Pass**	No integration issues identified at this stage	**Pass**	No integration issues identified at this stage	**Pass**	No integration issues identified at this stage	**Pass**	No integration issues identified at this stage	**Pass**	No integration issues identified at this stage
Project requirement	To provide an appropriate level of vehicular access for all modes to facilitate access to/ from the Bray Seafront	**Pass**	Access to the Bray Seafront is maintained by alternative routes	**Pass**	Access to the Bray Seafront is maintained by alternative routes	**Pass**	Access to the Bray Seafront is maintained by alternative routes	**Pass**	Access to the Bray Seafront is maintained by alternative routes	**Pass**	Access to the Bray Seafront is maintained by alternative routes
Project requirement	To provide an appropriate level of accessibility at a local level for pedestrians and cyclists	**Pass**	Access to the Bray Seafront is maintained by alternative routes	**Pass**	Access to the Bray Seafront is maintained by alternative routes	**Pass**	Access to the Bray Seafront is maintained by alternative routes	**Pass**	Access to the Bray Seafront is maintained by alternative routes	**Pass**	Access to the Bray Seafront is maintained by alternative routes
Project requirement	To provide an appropriate level of accessibility for emergency services (Fire Brigades, Hospitals) in terms of catchment and response time	**Pass**	Access to the Bray Seafront is maintained	**Pass**	Access to the Bray Seafront is maintained	**Pass**	Access to the Bray Seafront is maintained	**Pass**	Access to the Bray Seafront is maintained	**Pass**	Access to the Bray Seafront is maintained

Table 5-4: Sifting of Longlist of Vehicle Options (Options V4.5 to V5.2)

Project objectives and requirements	Description	Option V4.5 - Close crossing and modify existing crossroads and directional system on Strand Road: Seapoint Road		Option V5.1 – New underpass at Quinsborough Road		Option V5.2 – Close crossing and reconstruct Harbour Road underpass (UBR138)	
		Pass/fail	Rationale	Pass/fail	Rationale	Pass/fail	Rationale
Project objective	To deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	**Pass**	Delivers the TSS	**Pass**	Delivers the TSS	**Pass**	Delivers the TSS
Project objective	To deliver solutions which improve the passenger experience where passenger infrastructure interventions are required to meet the planned increase in DART service frequency.	**Pass**	No significant improvements to passenger experience	**Pass**	No significant improvements to passenger experience	**Pass**	No significant improvements to passenger experience
Project objective	To deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works	**Pass**	Minimal impact	**Pass**	Minimal impact	**Pass**	Minimal impact
Project objective	To identify cost-effective solutions from a capital, operations, and maintenance perspective.	**Pass**	Cost of lowering Putland and Seapoint Road to provide required clearance Cost of changing a section of Stand Road to 2-way	**Pass**	Cost of new underpass structure – including ramp structures to the underpass Potential cost associated with the impacting properties	**Pass**	Cost of underpass structure which would include new retaining structure Costs associated with the potential modifications to the existing road bridge
Project objective	To minimise adverse impacts on the natural and built environment associated with the construction, operation and maintenance of the project.	**Pass**	Impacts to the built environment	**Pass**	Impacts to the built environment	**Fail**	Alterations required to the current road built for the development. The impacts on this development and landowners to the east will be significant.
Project objective	To minimise adverse impacts on existing rail services, road users and landowners associated with the construction, operation and maintenance of the project	**Pass**	Limited impact to landowners	**Pass**	Impacts to Bray Wanderers Football club stadium and neighbouring commercial properties	**Fail**	A new development has been submitted to planning which has partly been granted. The impacts on this development and landowners to the east will be significant.
Project objective	To provide efficient and cost-effective integration of systems with the other DART+ Programme projects.	**Pass**	No integration issues identified at this stage	**Pass**	No integration issues identified at this stage	**Pass**	No integration issues identified at this stage
Project requirement	To provide an appropriate level of vehicular access for all modes to facilitate access to/ from the Bray Seafront	**Pass**	Access to the Bray Seafront is maintained by alternative routes	**Pass**	Access to the Bray Seafront is maintained by alternative routes	**Pass**	Access to the Bray Seafront is maintained by alternative routes
Project requirement	To provide an appropriate level of accessibility at a local level for pedestrians and cyclists	**Pass**	Access to the Bray Seafront is maintained by alternative routes	**Pass**	Access to the Bray Seafront is maintained by alternative routes	**Pass**	Access to the Bray Seafront is maintained by alternative routes
Project requirement	To provide an appropriate level of accessibility for emergency services (Fire Brigades, Hospitals) in terms of catchment and response time	**Pass**	Access to the Bray Seafront is maintained	**Pass**	Access to the Bray Seafront is maintained	**Pass**	Access to the Bray Seafront is maintained

5.3 Summary of Longlisting Sifting of Vehicle Options

The outcome of the longlist sifting for vehicle options is summarised in Table 5-5.

Table 5-5: Longlist sifting summary for vehicle options

Option	Description	Pass/Fail	Rationale for Fail
V0	Do-nothing	FAIL	Lack of access to the seafront for high sided vehicles Lack of TSS reliability to accommodate emergency services crossing.
V1	No additional infrastructure: Keep crossing "open" for high clearance vehicles only/emergency vehicles only and include signage showing other vehicles alternative routes	FAIL	Lack of access to the seafront for high sided vehicles Lack of TSS reliability to accommodate emergency services crossing.
V2	Close crossing and remove any requirements for high sided vehicles to cross to the seafront except in special circumstances by using Putland Road	FAIL	No access is provided for emergency services (emergency services are not included under "special circumstances")
V3.1	Close crossing and modify existing crossroads to provide clearance: North of River Dargle	FAIL	A new development has been submitted to planning which could affect the validity of this option.
V3.2	Close crossing and modify existing crossroads to provide clearance: Seapoint Road	PASS	Meets project objectives and requirements
V3.3	Close crossing and modify existing crossroads to provide clearance: Albert Avenue	FAIL	Impact to landowners – access removed to neighbouring properties. This includes residential and commercial, including the bus depot
V4.1	Close crossing and modify existing crossroads and directional system on Strand Road: Sidmonton Avenue	FAIL	Impact to landowners – access removed to neighbouring properties; majority residential
V4.2	Close crossing and modify existing crossroads and directional system on Strand Road: Victoria Avenue	FAIL	Impact to landowners – access removed to neighbouring properties; majority residential
V4.3	Close crossing and modify existing crossroads and directional system on Strand Road: Convent Avenue	FAIL	Impact to landowners – access removed to neighbouring properties; majority residential
V4.4	Close crossing and modify directional system on Strand Road and Putland Road	PASS	Meets project objectives and requirements

Option	Description	Pass/Fail	Rationale for Fail
V4.5	Close crossing and modify existing crossroads and directional system on Strand Road: Seapoint Road	PASS	Meets project objectives and requirements
V5.1	New underpass at Quinsborough Road (close crossing)	PASS	Meets project objectives and requirements
V5.2	Close crossing and reconstruct Harbour Road underpass (UBR138)	FAIL	A new development has been submitted to planning which significantly affects the validity of this option.

5.4 Longlist of pedestrian and cyclist options

The options which have been considered are summarised in Table 5-6 below. User numbers for the crossing are not currently available. Pedestrians that arrive by train could use the station footbridge. It is anticipated pedestrians using this route would arrive by bus or have Quinsborough Road as their nearest crossing.

Table 5-6: Longlist of pedestrian and cyclist options considered

Option	Description
P0	Do-nothing: keep crossing open
P1.1	Modify existing pedestrian bridge at Quinsborough Rd: Keep crossing open, with existing pedestrian bridge and add lifts
P1.2	Modify existing pedestrian bridge at Quinsborough Rd: Close crossing and keep existing pedestrian bridge and add lifts
P1.3	Modify existing pedestrian bridge at Quinsborough Rd: Keep crossing open, with existing pedestrian bridge and add ramps
P1.4	Modify existing pedestrian bridge at Quinsborough Rd: Close crossing and keep existing pedestrian bridge and add ramps
P2.1	New infrastructure: Keep crossing open, with a new pedestrian overbridge with lifts
P2.2	New infrastructure: Close crossing, with a new pedestrian overbridge with lifts
P3.1	Provide general road improvement at Bray (Daly) Station to direct pedestrians/cyclists to the seafront: Keep crossing open
P3.2	Provide general road improvement at Bray (Daly) Station to direct pedestrians/cyclists to the seafront: Close crossing
P4	New underpass at Quinsborough Road

5.4.1 Option P0

This option is the 'Do-nothing' option and comprises no infrastructure intervention, along with leaving the crossing open in its current condition following the DART+ Coastal South project.

5.4.2 Options P1.1 and P1.2

These options involve modification to Overbridge OBR140A (Quinsborough Road pedestrian footbridge) by retrofitting two lifts to either side. Two lifts have been provided to allow for redundancy i.e. if one lift is out of order/requires maintenance, the other lift can be used by the public to cross the railway. The lifts are sized such that a bicycle can fit in the lift, although it is noted that there are other routes across the railway corridor which cyclists can use should they not want to use the lift for crossing. The only difference between options is that P1.1 is associated with keeping the level crossing open and P1.2 is associated with the level crossing being closed for pedestrians and cyclists.

Figure 5-19 Options P1.1 and P1.2 - Proposed location of new lift and access platform

Figure 5-20 Footbridge OBR140A at Quinsborough Road (source: Arup)

5.4.3 Options P1.3 and P1.4

Similar to options P1.1 and P1.2, these options involve modification to Overbridge OBR140A (Quinsborough Road pedestrian footbridge). Instead of lifts, shared access ramps would be provided to cater for pedestrians and cyclists, alongside the existing stairs. The ramps are designed with a 1:20 gradient with gives an overall length of 125m for each side of the railway corridor. Due to the length of the ramp, there will be impacts on the Signalling and Traction Depot Building.

The only difference between P1.3 and P1.4 is that the first proposes to keep the crossing open, and the latter proposes to close it.

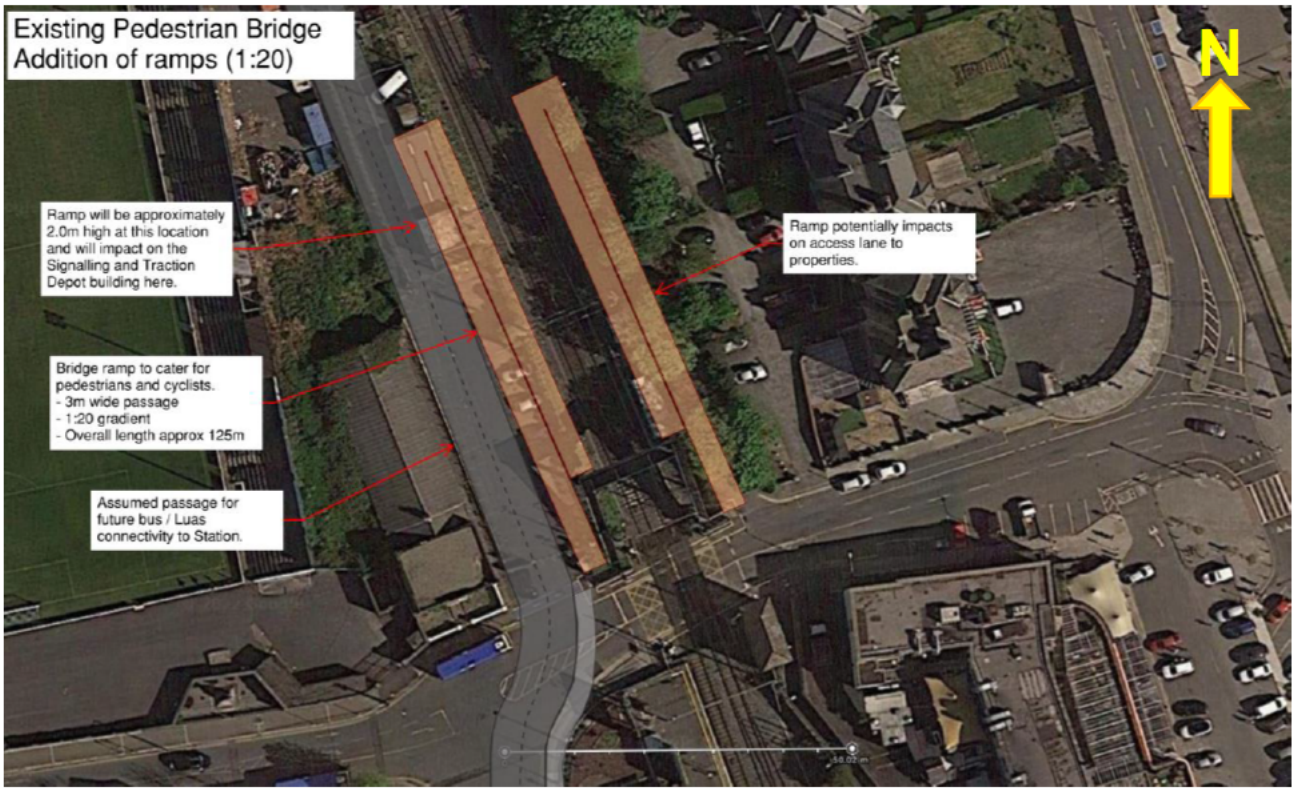


Figure 5-21 Option P1.3/1.4 plan

5.4.4 Options P2.1 and P2.2

These options involve construction of a new pedestrian bridge with lifts at Quinsborough Road to replace the existing pedestrian footbridge. P2.1 and P2.2 propose keeping the crossing open and closing the crossing respectively.

5.4.5 Options P2.3 and P2.4

These options involve construction of a new pedestrian bridge with ramps at Quinsborough Road to replace the existing pedestrian footbridge. P2.3 and P2.4 propose keeping the crossing open and closing the crossing respectively.

5.4.6 Options P3.1 and P3.2

These options involve provision of general road improvements at Bray (Daly) Station which would direct pedestrians and cyclists to the seafront. Pedestrians will be directed to use Albert Walk (Figure 5-22 and cyclists can use Adelaide Rd (Figure 5-23). Both routes connect to Albert Avenue then onto Bray seafront on Strand Rd. For cyclists coming from Quinsborough Road, the dashed line in Figure 5-23 shows the alternative route for those cyclists to reach the seafront. Note these routes realign the feeder connection route as shown on the Greater Dublin Cycle Network Plan.

P3.1 and P3.2 propose keeping the crossing open and closing the crossing respectively.

Improvements are proposed at both Albert Walk and Albert Avenue for these options. At Albert Walk the footpath will be resurfaced to ensure the levels are even for pedestrian. Consideration will be given to provision of rest spots along the route in the form of seating. At Albert Avenue, the footpath at the underbridge (northern side) will be widened to approximately 2.2m, noting exact widths vary along the footpath. Cyclists will continue to share the one-way road with vehicles. Other improvements will be included such as additional wayfinding from the level crossing to direct pedestrians and cyclists to Strand Road (see Figure 5-24 for an example).

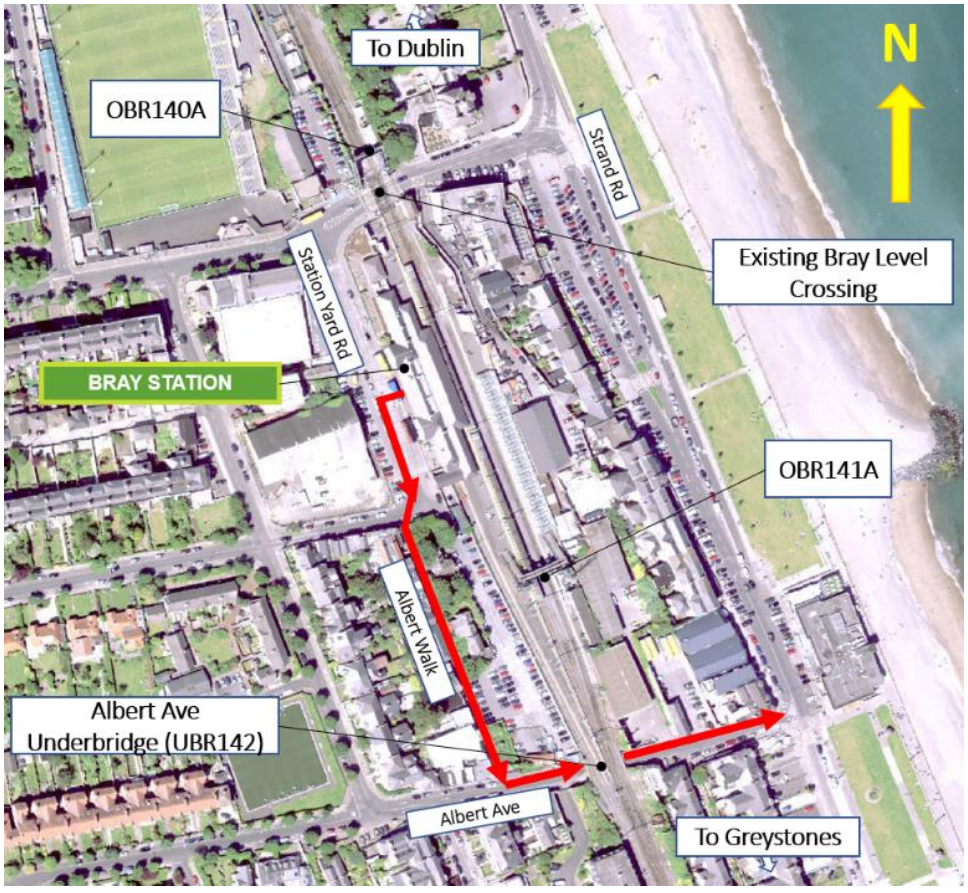


Figure 5-22 Options P3.1 and P3.2 - Pedestrian route from Bray Station to the seafront via Albert Walk

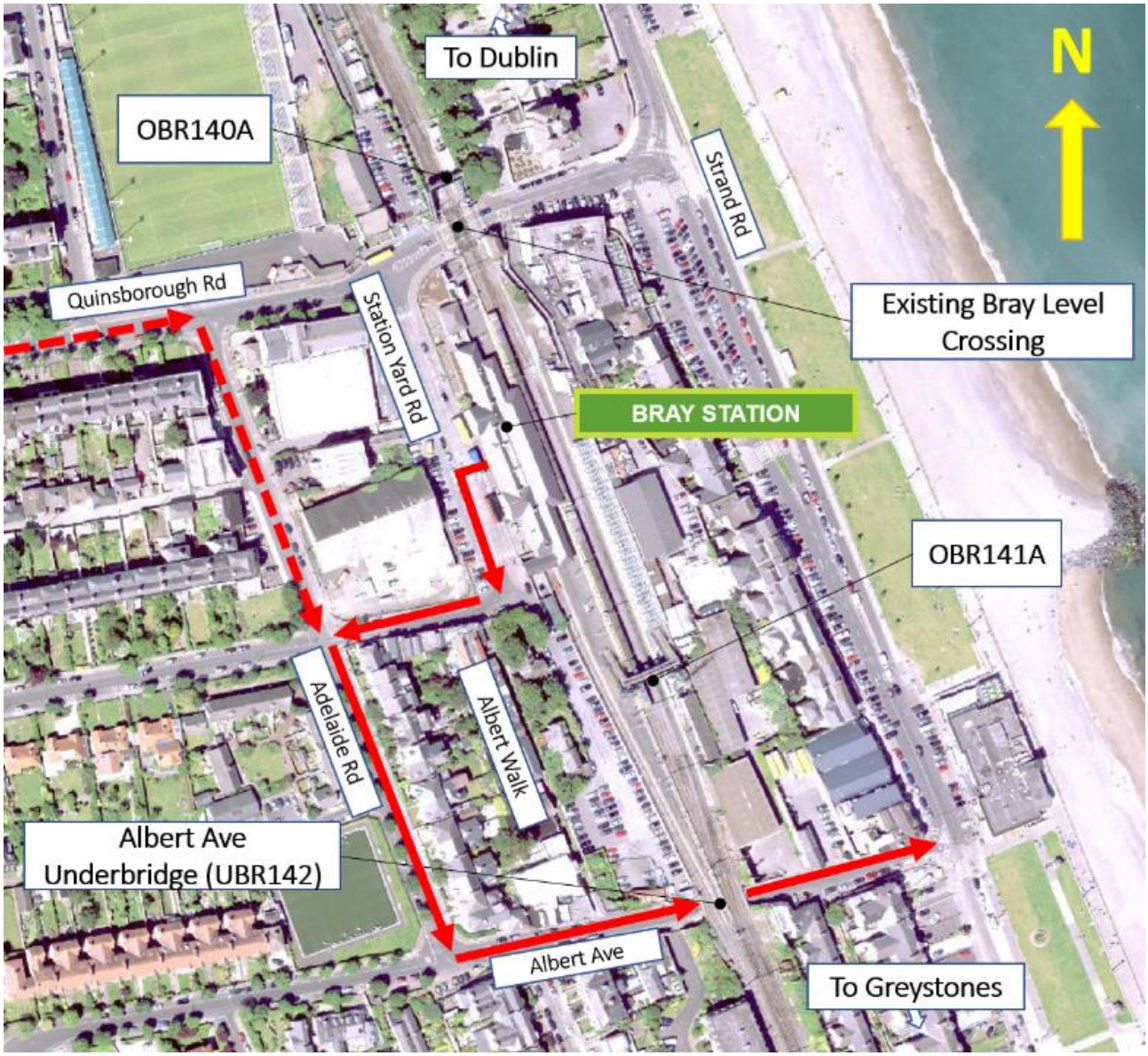


Figure 5-23 Options P3.1 and P3.2 Cyclist route from Bray Station to the seafront via Adelaide Road

Figure 5-24 Example of Wayfinding Signage (Source: fwdesign)

5.4.7 Option P4

This option is equivalent to vehicle option V5.1 and involves replacement of the Bray Level Crossing with a new underpass in its location on Quinsborough Road. The underpass would cater for both vehicular and pedestrian/cyclist traffic.

5.5 Sifting of Longlist of Pedestrian and Cyclist Options

The sifting considers the project objectives and requirements which each option presented will be assessed on its ability to meet.

In the pedestrian and cyclist option sift, when assessing the accessibility for vehicles it has been assumed that an appropriate option from the sifting of vehicle options will be implemented to deliver this requirement. This has been assumed whether the level crossing remains open or is closed. Subsequently all options pass for this factor and it is not a differentiator.

The results of this sifting process are presented in Table 5-7, Table 5-8, Table 5-9 and Table 5-10.

Table 5-7: Sifting of longlist of pedestrian and cyclist options (Options P0 to P1.2)

Project objectives and requirements	Description	Option P0 - Do nothing: Keep crossing open		Option P1.1 - Modify existing bridge at Quinsborough Rd: Keep crossing open, with existing pedestrian bridge and add lifts		Option P1.2 - Modify existing bridge at Quinsborough Rd: Close crossing and keep existing pedestrian bridge and add lifts	
		Pass/ fail	Rationale	Pass/ fail	Rationale	Pass/ fail	Rationale
Project objective	To deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Fail	Lack of TSS reliability due to risk of disruption from emergency services closing the crossing and by pedestrian/cyclists misusing the crossing due to the crossing being almost constantly down.	Fail	Lack of TSS reliability due to risk of disruption from emergency services closing the crossing and by pedestrian/cyclists misusing the crossing due to the crossing being almost constantly down.	Pass	Delivers the TSS
Project objective	To deliver solutions which improve the passenger experience where passenger infrastructure interventions are required to meet the planned increase in DART service frequency.	Pass	No change from existing	Pass	No significant improvements to passenger experience	Pass	No significant improvements to passenger experience
Project objective	To deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works	Pass	Minimal impacts	Pass	No integration issues identified at this stage	Pass	No integration issues identified at this stage
Project objective	To identify cost-effective solutions from a capital, operations, and maintenance perspective.	Pass	No capital cost expenditure	Pass	Costs associated with installing lifts at each end of the bridge, plus the cost of maintaining / manning the lifts	Pass	Costs associated with installing lifts at each end of the bridge, plus the cost of maintaining / manning the lifts
Project objective	To minimise adverse impacts on the natural and built environment associated with the construction, operation and maintenance of the project.	Pass	No works during construction, no change to operations	Pass	Minimal impacts	Pss	Minimal impacts

Project objectives and requirements	Description	Option P0 - Do nothing: Keep crossing open		Option P1.1 - Modify existing bridge at Quinsborough Rd: Keep crossing open, with existing pedestrian bridge and add lifts		Option P1.2 - Modify existing bridge at Quinsborough Rd: Close crossing and keep existing pedestrian bridge and add lifts	
		Pass/ fail	Rationale	Pass/ fail	Rationale	Pass/ fail	Rationale
Project objective	To minimise adverse impacts on existing rail services, road users and landowners associated with the construction, operation and maintenance of the project	Pass	No works during construction, no change to operations	Pass	Minimal impacts , no change to operations	Pass	Minimal impacts, no change to operations
Project objective	To provide efficient and cost-effective integration of systems with the other DART+ Programme projects.	Pass	No new systems required	Pass	No integration issues identified at this stage	Pass	No integration issues identified at this stage
Project requirement	To provide an appropriate level of vehicular access for all modes to facilitate access to/ from the Bray Seafront	Pass	Access addressed in vehicle options. No impact. Access to the Bray Seafront is maintained by alternative routes	Pass	Access addressed in vehicle options. No impact. Access to the Bray Seafront is maintained by alternative routes	Pass	Access to the Bray Seafront is maintained by alternative routes
Project requirement	To provide an appropriate level of accessibility at a local level for pedestrians and cyclists	Fail	Barrier down more frequently with increased TPH. Alternate routes would be as existing with no upgrades.	Fail	Accessibility is provided through the provision of the lifts however this is a more onerous route than the level crossing and, with barrier down more frequently, pedestrian/cyclists could misuse the crossing. Safety risk.	Pass	Access to the Bray Seafront is maintained
Project requirement	To provide an appropriate level of accessibility for emergency services (Fire Brigades, Hospitals) in terms of catchment and response time	Pass	Not applicable to pedestrians/ cyclists	Pass	Emergency service access addressed in vehicle options. No impact.	Pass	Emergency service access addressed in vehicle options. No impact.

Table 5-8: Sifting of longlist of pedestrian and cyclist options (Options P1.3 to P2.1)

Project objectives and requirements	Description	Option P1.3 - Modify existing bridge at Quinsborough Rd: Keep crossing open, with existing pedestrian bridge and add ramps		Option P1.4 - Modify existing bridge at Quinsborough Rd: Close crossing and keep existing pedestrian bridge and add ramps		Option P2.1 - New infrastructure: Keep crossing open, with a new overbridge with lifts	
		Pass/fail	Rationale	Pass/fail	Rationale	Pass/fail	Rationale
Project objective	To deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Fail	Lack of TSS reliability due to risk of disruption from emergency services closing the crossing and risk of disruption by pedestrian/cyclists misusing the crossing due to the crossing being almost constantly down.	Pass	Delivers the TSS	Fail	Lack of TSS reliability due to risk of disruption from emergency services closing the crossing and risk of disruption by pedestrian/cyclists misusing the crossing due to the crossing being almost constantly down.
Project objective	To deliver solutions which improve the passenger experience where passenger infrastructure interventions are required to meet the planned increase in DART service frequency.	Pass	No significant improvements to passenger experience	Pass	No significant improvements to passenger experience	Pass	No significant improvements to passenger experience
Project objective	To deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works	Pass	Minimal impacts	Pass	Minimal impacts	Pass	Minimal impacts
Project objective	To identify cost-effective solutions from a capital, operations, and maintenance perspective.	Pass	Costs associated constructing ramps at each end of the bridge.	Pass	Costs associated constructing ramps at each end of the bridge.	Pass	Cost of new bridge structure
Project objective	To minimise adverse impacts on the natural and built environment	Pass	No major construction works	Pass	No major construction works	Fail	No suitable location – excessive land take required to implement option

Project objectives and requirements	Description	Option P1.3 - Modify existing bridge at Quinsborough Rd: Keep crossing open, with existing pedestrian bridge and add ramps		Option P1.4 - Modify existing bridge at Quinsborough Rd: Close crossing and keep existing pedestrian bridge and add ramps		Option P2.1 - New infrastructure: Keep crossing open, with a new overbridge with lifts	
		Pass/fail	Rationale	Pass/fail	Rationale	Pass/fail	Rationale
	associated with the construction, operation and maintenance of the project.						
Project objective	To minimise adverse impacts on existing rail services, road users and landowners associated with the construction, operation and maintenance of the project	Pass	Minimal impacts, no change to operations	Pass	Minimal impacts, no change to operations	Pass	Potential impacts to rail service during construction (weekend closure for example)
Project objective	To provide efficient and cost-effective integration of systems with the other DART+ Programme projects.	Pass	No integration issues identified at this stage	Pass	No integration issues identified at this stage	Pass	No integration issues identified at this stage
Project requirement	To provide an appropriate level of vehicular access for all modes to facilitate access to/ from the Bray Seafront	Pass	Access addressed in vehicle options. No impact. Access to the Bray Seafront is maintained by alternative routes	Pass	Access addressed in vehicle options. No impact. Access to the Bray Seafront is maintained by alternative routes	Pass	Access addressed in vehicle options. No impact. Access to the Bray Seafront is maintained by alternative routes
Project requirement	To provide an appropriate level of accessibility at a local level for pedestrians and cyclists	Fail	Accessibility is provided through the provision of the ramps however this is a more onerous route than the level crossing and, with barrier down more frequently, pedestrian/cyclists could misuse the crossing. Safety risk.	Pass	Access to the Bray Seafront is maintained	Fail	Accessibility is provided through the provision of the lifts however this is a more onerous route than the level crossing and, with barrier down more frequently, pedestrian/cyclists could misuse the crossing. Safety risk.

Project objectives and requirements	Description	Option P1.3 - Modify existing bridge at Quinsborough Rd: Keep crossing open, with existing pedestrian bridge and add ramps		Option P1.4 - Modify existing bridge at Quinsborough Rd: Close crossing and keep existing pedestrian bridge and add ramps		Option P2.1 - New infrastructure: Keep crossing open, with a new overbridge with lifts	
		Pass/fail	Rationale	Pass/fail	Rationale	Pass/fail	Rationale
Project requirement	To provide an appropriate level of accessibility for emergency services (Fire Brigades, Hospitals) in terms of catchment and response time	Pass	Emergency service access addressed in vehicle options. No impact.	Pass	Emergency service access addressed in vehicle options. No impact.	Pass	Emergency service access addressed in vehicle options. No impact.

Table 5-9: Sifting of longlist of pedestrian and cyclist options (Options P2.2 to P2.4)

Project objectives and requirements	Description	Option P2.2 - New infrastructure: Close crossing, with a new overbridge with lifts		Option P2.3 - New infrastructure: Keep crossing open, with a new overbridge with ramps		Option P2.4 - New infrastructure: Close crossing, with a new overbridge with ramps	
		Pass/ fail	Rationale	Pass/ fail	Rationale	Pass/ fail	Rationale
Project objective	To deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Pass	Delivers the TSS	Fail	Lack of TSS reliability due to risk of disruption from emergency services closing the crossing and by pedestrian/cyclists misusing the crossing due to the crossing being almost constantly down.	Pass	Delivers the TSS
Project objective	To deliver solutions which improve the passenger experience where passenger infrastructure interventions are required to meet the planned increase in DART service frequency.	Pass	No change from existing	Pass	No change from existing	Pass	No change from existing
Project objective	To deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works	Pass	Minimal impacts	Pass	Minimal impacts	Pass	Minimal impacts
Project objective	To identify cost-effective solutions from a capital, operations, and maintenance perspective.	Pass	Cost of new bridge structure	Pass	Cost of new bridge structure	Pass	Cost of new bridge structure
Project objective	To minimise adverse impacts on the natural and built environment associated with the construction, operation and maintenance of the project.	Fail	No suitable location – excessive land take required to implement option	Fail	No suitable location – excessive land take required to implement option	Fail	No suitable location – excessive land take required to implement option

Project objectives and requirements	Description	Option P2.2 - New infrastructure: Close crossing, with a new overbridge with lifts		Option P2.3 - New infrastructure: Keep crossing open, with a new overbridge with ramps		Option P2.4 - New infrastructure: Close crossing, with a new overbridge with ramps	
		Pass/ fail	Rationale	Pass/ fail	Rationale	Pass/ fail	Rationale
Project objective	To minimise adverse impacts on existing rail services, road users and landowners associated with the construction, operation and maintenance of the project	Pass	Potential impacts to rail service during construction (weekend closure for example)	Pass	Potential impacts to rail service during construction (weekend closure for example)	Pass	Potential impacts to rail service during construction (weekend closure for example)
Project objective	To provide efficient and cost-effective integration of systems with the other DART+ Programme projects..	Pass	No new systems required	Pass	No new systems required	Pass	No new systems required
Project requirement	To provide an appropriate level of vehicular access for all modes to facilitate access to/ from the Bray Seafront	Pass	Access addressed in vehicle options. No impact. Access to the Bray Seafront is maintained by alternative routes	Pass	Access addressed in vehicle options. No impact. Access to the Bray Seafront is maintained by alternative routes	Pass	Access addressed in vehicle options. No impact. Access to the Bray Seafront is maintained by alternative routes
Project requirement	To provide an appropriate level of accessibility at a local level for pedestrians and cyclists	Pass	Access to the Bray Seafront is maintained	Fail	Accessibility is provided through the provision of the ramps however this is a more onerous route than the level crossing and, with barrier down more frequently, pedestrian/cyclists could misuse the crossing. Safety risk..	Pass	Access to the Bray Seafront is maintained
Project requirement	To provide an appropriate level of accessibility for emergency services (Fire Brigades, Hospitals) in terms of catchment and response time	Pass	Emergency service access addressed in vehicle options. No impact.	Pass	Emergency service access addressed in vehicle options. No impact.	Pass	Emergency service access addressed in vehicle options. No impact.

Table 5-10: Sifting of longlist of pedestrian and cyclist options (Options P3.1 to P4)

Project objectives and requirements	Description	Option P3.1 - Provide general road improvement at Bray Station to direct pedestrians/cyclists to the seafront: Keep crossing open		Option P3.2 - Provide general road improvement at Bray Station to direct pedestrians/cyclists to the seafront: Close crossing		Option P4 - New underpass at Quinsborough Road	
		Pass/fail	Rationale	Pass/fail	Rationale	Pass/fail	Rationale
Project objective	To deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	Fail	Lack of TSS reliability due to risk of disruption from emergency services closing the crossing and risk of disruption by pedestrian/cyclists misusing the crossing due to the crossing being almost constantly down.	Pass	Delivers the TSS	Pass	Delivers the TSS
Project objective	To deliver solutions which improve the passenger experience where passenger infrastructure interventions are required to meet the planned increase in DART service frequency.	Pass	No significant improvements to passenger experience	Pass	No significant improvements to passenger experience	Pass	No significant improvements to passenger experience
Project objective	To deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works	Pass	Minimal impacts	Pass	Minimal impacts	Pass	Minimal impacts
Project objective	To identify cost-effective solutions from a capital, operations, and maintenance perspective.	Pass	Minimal capital cost expenditure – cost of signage	Pass	Minimal capital cost expenditure – cost of signage.	Pass	Cost of new underpass structure – including ramp structures to the underpass. Potential cost associated with the impacting properties
Project objective	To minimise adverse impacts on the natural and built environment associated with the construction, operation and maintenance of the project.	Pass	No major works during construction, no change to operations (installing signage, dropping kerbs etc)	Pass	No major works during construction, no change to operations (installing signage, dropping kerbs etc)	Pass	Impacts to the built environment
Project objective	To minimise adverse impacts on existing rail services, road users and landowners associated with the construction, operation and maintenance of the project	Pass	Minimal works during construction, no change to operations	Pass	Minimal works during construction, no change to operations	Pass	Impacts to Bray Wanderers Football club stadium and

Project objectives and requirements	Description	Option P3.1 - Provide general road improvement at Bray Station to direct pedestrians/cyclists to the seafront: Keep crossing open		Option P3.2 - Provide general road improvement at Bray Station to direct pedestrians/cyclists to the seafront: Close crossing		Option P4 - New underpass at Quinsborough Road	
		Pass/fail	Rationale	Pass/fail	Rationale	Pass/fail	Rationale
							neighbouring commercial properties
Project objective	To provide efficient and cost-effective integration of systems with the other DART+ Programme projects..	Pass	No integration issues identified at this stage	Pass	No integration issues identified at this stage	Pass	No integration issues identified at this stage
Project requirement	To provide an appropriate level of vehicular access for all modes to facilitate access to/ from the Bray Seafront	Pass	Access addressed in vehicle options. No impact. Access to the Bray Seafront is maintained by alternative routes	Pass	Access addressed in vehicle options. No impact. Access to the Bray Seafront is maintained by alternative routes	Pass	Access to the Bray seafront is maintained in this option
Project requirement	To provide an appropriate level of accessibility at a local level for pedestrians and cyclists	Fail	Accessibility is provided through the alternate route however this is a more onerous route than the level crossing and, with barrier down more frequently, pedestrian/cyclists could misuse the crossing. Safety risk.	Pass	Access to the Bray seafront is maintained by alternative routes	Pass	Access to the Bray seafront is maintained
Project requirement	To provide an appropriate level of accessibility for emergency services (Fire Brigades, Hospitals) in terms of catchment and response time	Pass	Emergency service access addressed in vehicle options. No impact.	Pass	Emergency service access addressed in vehicle options. No impact.	Pass	Emergency service access addressed in vehicle options. No impact.

5.6 Summary of Longlisting Sifting of Pedestrian and Cyclist Options

The outcome of the longlist sifting for pedestrian and cyclist options is summarised in Table 5-11.

Table 5-11: Longlist sifting summary for pedestrian and cyclist options

Option	Description	Pass/Fail	Rationale for Fail
P0	Do- Nothing: keep crossing open	FAIL	Lack of TSS reliability due to risk of disruption from emergency services closing the crossing and risk of disruption by pedestrian/cyclists misusing the crossing due to the crossing being almost constantly down.
P1.1	Modify existing pedestrian Bridge at Quinsborough Rd: Keep crossing open, with existing pedestrian bridge and add lifts	FAIL	Lack of TSS reliability due to risk of disruption from emergency services closing the crossing and risk of disruption by pedestrian/cyclists misusing the crossing due to the crossing being almost constantly down.
P1.2	Modify existing pedestrian Bridge at Quinsborough Rd: Close crossing and keep existing pedestrian bridge and add lifts	PASS	Meets project objectives and requirements
P1.3	Modify existing pedestrian Bridge at Quinsborough Rd: Keep crossing open, with existing pedestrian bridge and add ramps	FAIL	Lack of TSS reliability due to risk of disruption from emergency services closing the crossing and risk of disruption by pedestrian/cyclists misusing the crossing due to the crossing being almost constantly down.
P1.4	Modify existing pedestrian Bridge at Quinsborough Rd: Close crossing and keep existing pedestrian bridge and add ramps	PASS	Meets project objectives and requirements
P2.1	New infrastructure: Keep crossing open, with a new pedestrian overbridge with lifts	FAIL	No suitable location – excessive land take required to implement option Lack of TSS reliability due to risk of disruption from emergency services closing the crossing and risk of disruption by pedestrian/cyclists misusing the crossing due to the crossing being almost constantly down.
P2.2	New infrastructure: close crossing, with a new pedestrian overbridge with lifts	FAIL	No suitable location – excessive land take required to implement option
P2.3	New infrastructure: Keep crossing open, with a new pedestrian overbridge with ramps	FAIL	No suitable location – excessive land take required to implement option Lack of TSS reliability due to risk of disruption from emergency services closing the crossing and risk of disruption by pedestrian/cyclists misusing the crossing due to the crossing being almost constantly down.
P2.4	New infrastructure: close crossing, with a new pedestrian overbridge with ramps	FAIL	No suitable location – excessive land take required to implement option

Option	Description	Pass/Fail	Rationale for Fail
P3.1	Provide general road improvement at Bray (Daly) Station to direct pedestrians/cyclists to the seafront: Keep crossing open	**FAIL**	Lack of TSS reliability due to risk of disruption from emergency services closing the crossing and risk of disruption by pedestrian/cyclists misusing the crossing due to the crossing being almost constantly down.
P3.2	Provide general road improvement at Bray (Daly) Station to direct pedestrians/cyclists to the seafront: Close crossing	**PASS**	Meets project objectives and requirements
P4	New combined vehicular and pedestrian underpass at Quinsborough Road	**PASS**	Meets project objectives and requirements

5.7 Shortlisted options

The following sections describe the shortlisted options in further detail.

5.7.1 Shortlist of Vehicle Options

Option V3.2

This option results in the level crossing being closed, with modification to the existing Seapoint Road crossroads to provide clearance for high clearance vehicles. The combination of lowering the road and reconstruction of the arched section of the bridge will provide 4.7m headroom.

The existing bridge width can only accommodate 1 lane of traffic. Traffic signal controls will be installed either side of the bridge to create a 1-way shuttle. Traffic signal locations to be confirmed at preliminary design.

The road would need to be lowered by approximately 0.8m to achieve the required clearance. Underpinning will be required where there is a risk of destabilisation to adjacent structures. It is anticipated this will include the bridge foundations, and may include the Harbour bar north east of the structure and a protected retaining wall (The Battery) south east of the structure.

The road lowering could also impact utilities that are in the road. These would need to either be diverted or repositioned. The most notable utility being a 375mm diameter gravity sewer, with gas pipes, water pipes and power cables also needing to be checked and probably amended.

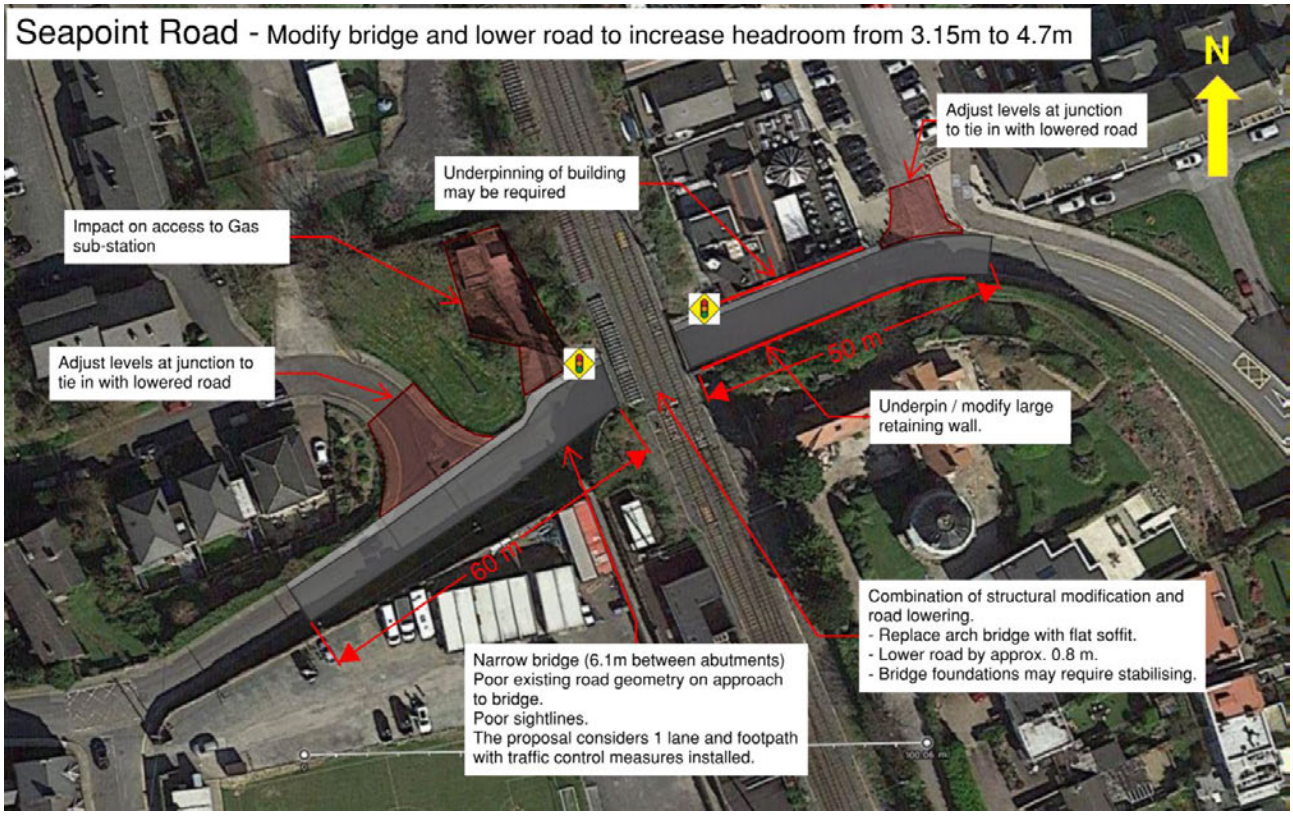


Figure 5-25 Option V3.2

Option V4.4

This option results in the level crossing being closed, with modifications to the directional system on Strand Road. Putland Road is currently one way westbound. It would require a directional change to allow two-way movements to allow high clearance vehicles to enter and exit the seafront at this point. The existing bridge is only wide enough for traffic in one direction. Traffic lights would be installed on Putland Road to formalise these two-way movements.

Strand Road is one way between Albert Avenue and Putland Road. A portion of recently extended green space on Putland Road will need to be removed to widen the road to introduce a 2 way system. This is likely to impact on parking provision and active travel opportunities for cyclists and pedestrians along the Strand Road. The works will extend for approximately 900m.

Figure 5-26 Option V4.4

Option V4.5

This option results in the level crossing being closed, with modifications to the existing Seapoint Road and directional system on Strand Road.

This option would require Seapoint Road to be lowered as described in v3.2. In addition, Strand Road would be reduced to one way between Sea point Road and Albert Road. This could create opportunities to create space for active travel or other projects but could impact vehicle journeys. Traffic lights are not required at Seapoint Road, like in v3.2, because it will be a one way system.

Figure 5-27 Option 5 infrastructure solution

Option V5.1

This option results in the level crossing being closed, with a new underpass provided at Quinsborough Road for both vehicles and pedestrians/cyclists.

However, this would involve extensive and significant highway and public realm works. The road would be lowered by approximately 6m with associated significant construction and post construction impacts to adjacent properties including the boundary of Carlisle sports Ground and Bray War Memorial. In addition, the future bus/ Luas connectivity to the station and the vehicular access to some of the properties on the eastern side would need to cross over the lowered Quinsborough road introducing additional structures.

The vertical road alignment required to install an underpass at this location would introduce a low point in the highway alignment. This could require pumped drainage if it is not possible to drain by gravity. This would introduce additional maintenance and operating costs and greater risk of flooding in extreme weather events.

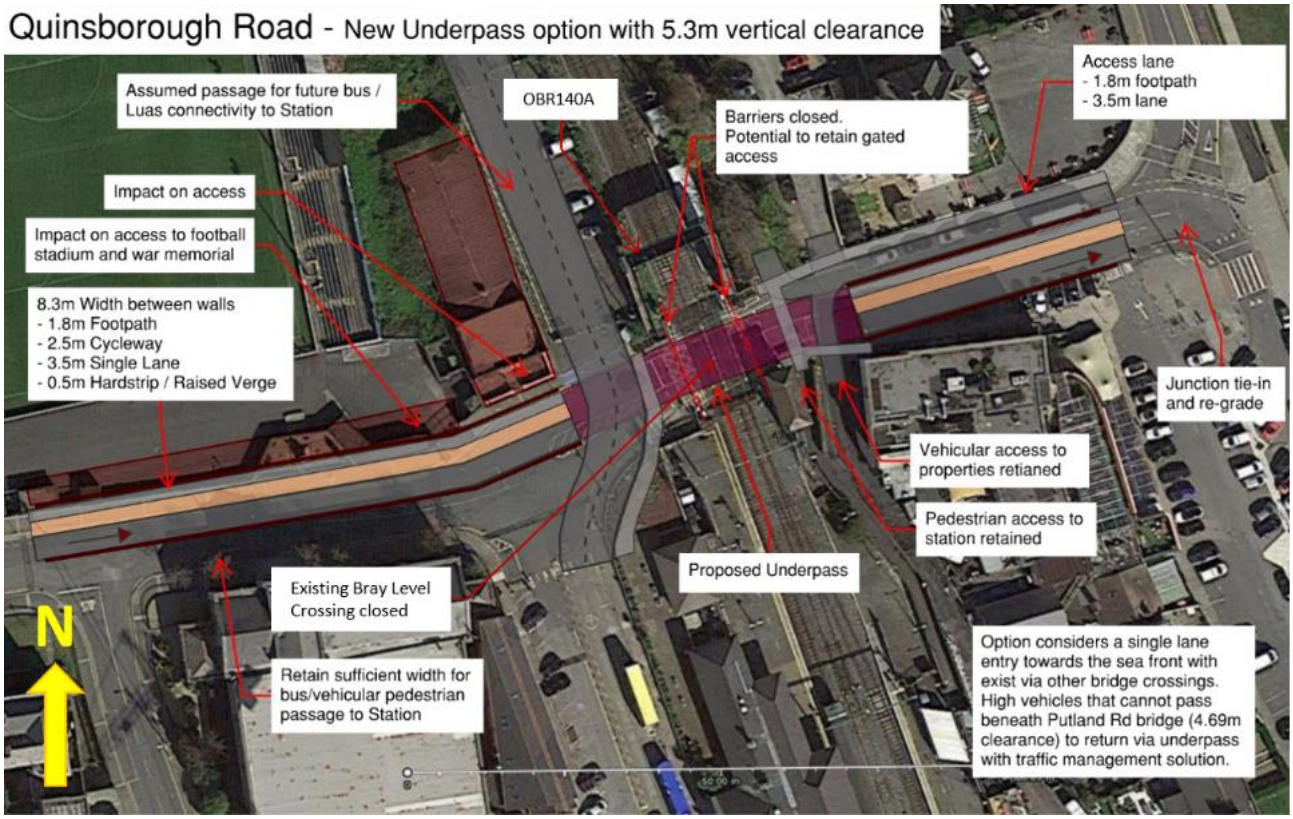


Figure 5-28 Option 6 solution

5.7.2 Shortlist of Pedestrian/Cyclist Options

Option P1.2

This option involves modifications to Overbridge OBR140A (Quinsborough Road pedestrian footbridge) by retrofitting new lifts to either side. The level crossing would be closed.

Two lifts have been provided to allow for redundancy and the lifts have been sized so a bicycle can fit in the lift. Cyclists may however choose to use one of the other alternate routes across the railway. Regular inspections and maintenance would be required for the lifts throughout their operation.

Figure 5-29 Options P1.2 - Proposed location of new lift and access platform

Option P1.4

This option involves modifications to Overbridge OBR140A (Quinsborough Road pedestrian footbridge). Shared access ramps would be provided to cater for pedestrians and cyclists, alongside the existing stairs. The ramps are designed with a 1:20 gradient which gives an overall length of 125m for each side of the railway corridor.

The ramps have a greater land take than some of the alternative options. Due to the length of the ramp, there will be impacts on the Signalling and Traction Depot Building and parking provision on the western side. There will be impacts to trees and vegetation as well as the boundary along the access lane at Royal Marine Park on the eastern side. Future bus/ Luas connectivity to the station should still be possible with this option despite the land take.

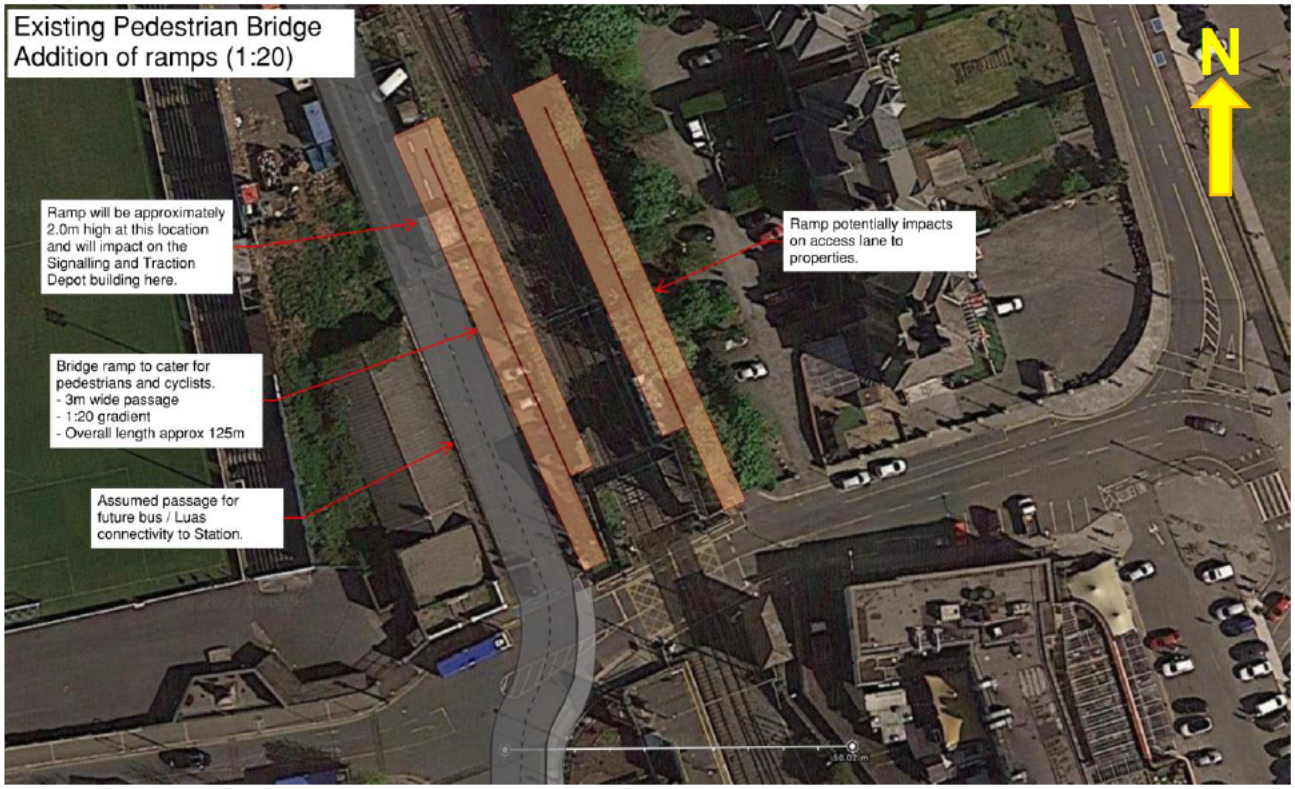


Figure 5-30 Option P1.4 plan

Option P3.2

This option involves provision of general road improvements at Bray (Daly) Station to direct pedestrians and cyclists to the seafront. Pedestrians will be directed to use Albert Walk and cyclists can use Adelaide Rd. Both routes connect to Albert Avenue then onto Bray seafront on Strand Rd. For cyclists that are coming from Quinsborough Road, the dashed line in Figure 5-31 shows the alternative route for those cyclists to reach the seafront.

Improvements will be made at both Albert Walk and Albert Avenue to improve the user experience along this route. At Albert Walk the footpath will be resurfaced to ensure the levels are even for pedestrians. Consideration will be given to provision of rest spots along the route in the form of seating. At Albert Avenue, the footpath at the underbridge (northern side) will be widened to approximately 2.2m, noting exact widths vary along the footpath, (see Figure 5-32) and the road width decreased to 3.0m (as per DMURS manual). With this increase width of footbath, it allows 2 wheelchairs to pass simultaneously. Cyclists will continue to share the one-way road with vehicles. Other improvements will be included such as additional wayfinding from the level crossing to direct pedestrians and cyclists to Strand Road.

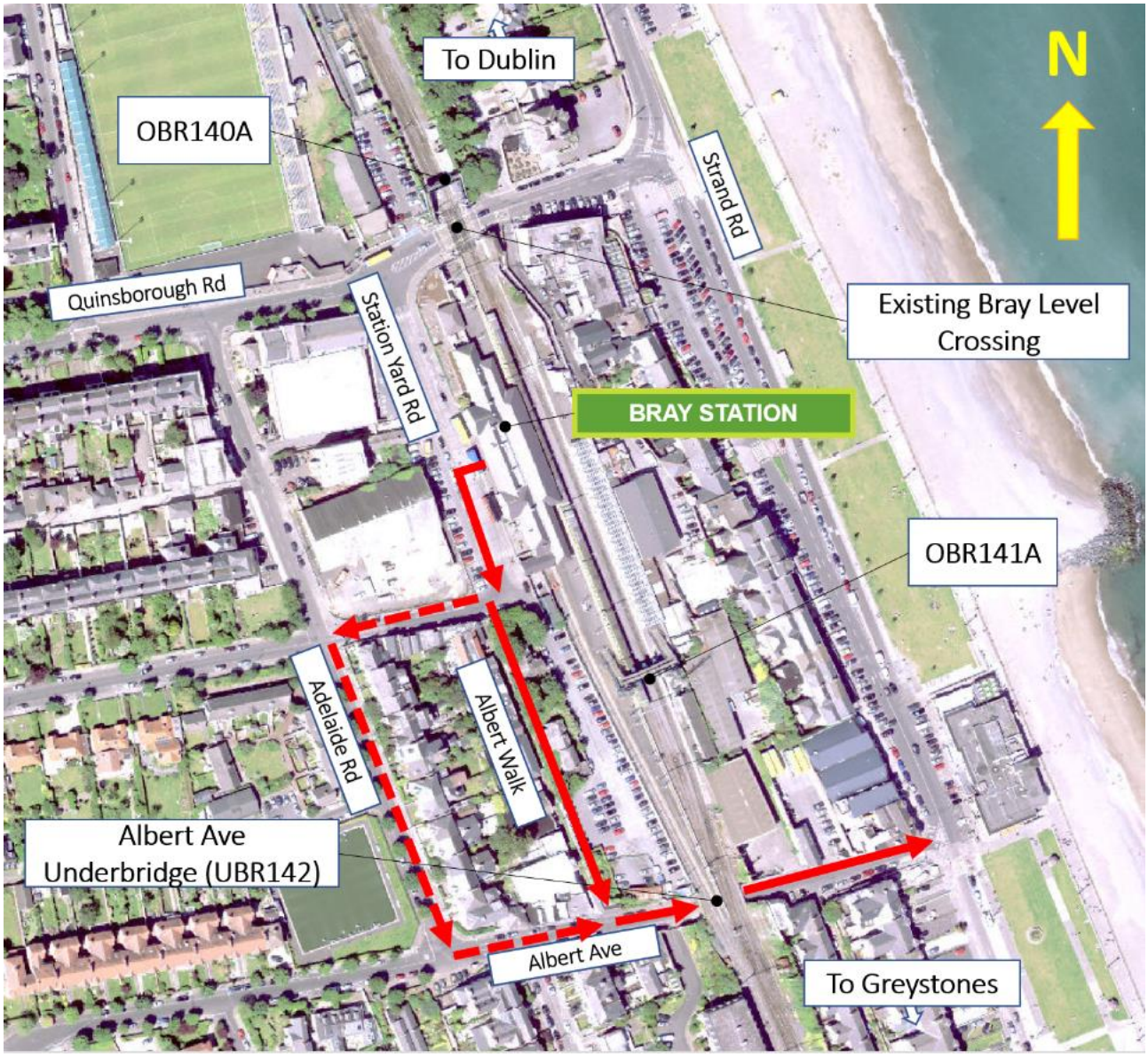


Figure 5-31 Option b pedestrian (solid line) and cyclist (dashed line) solution

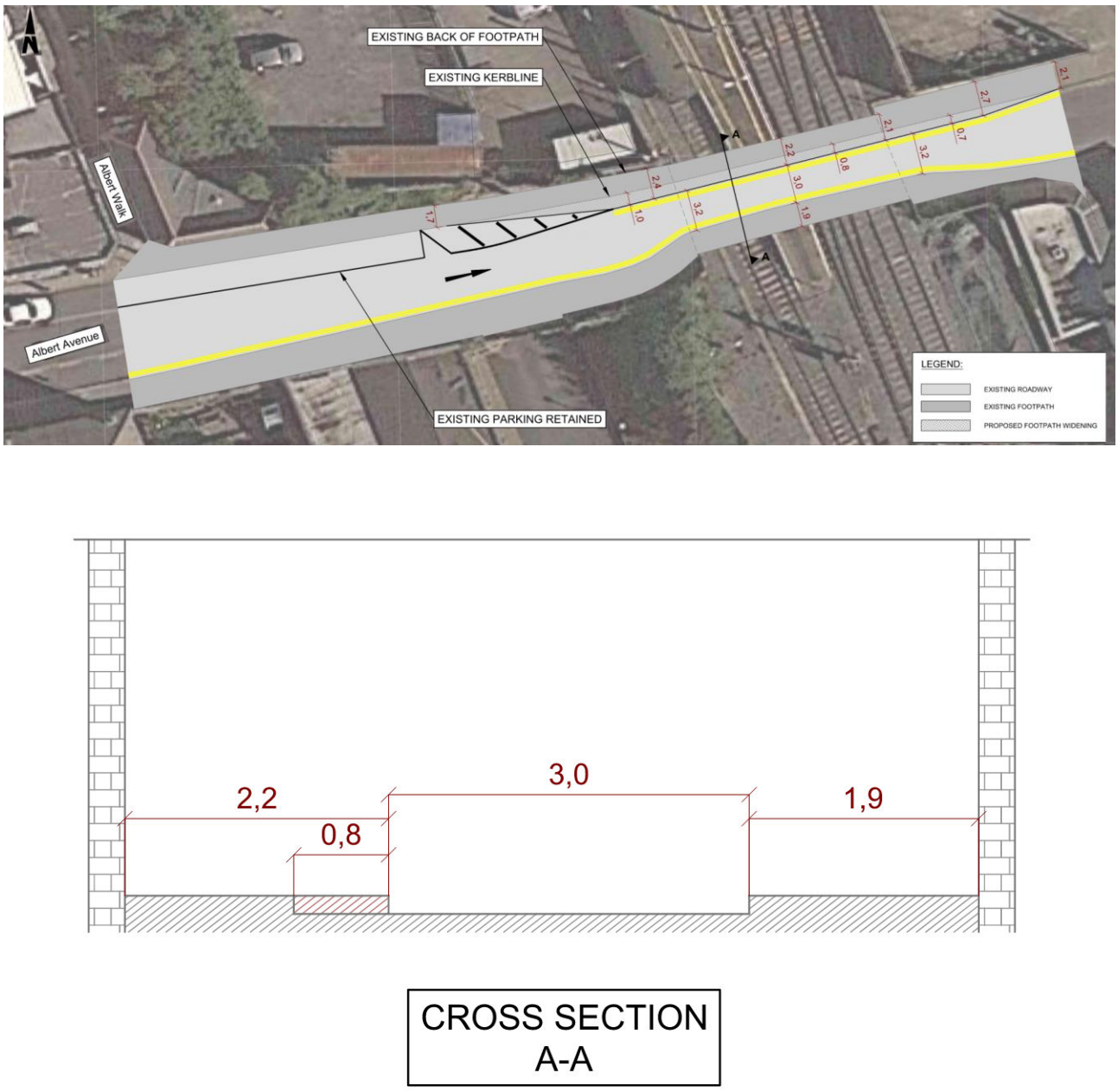


Figure 5-32 Plan and Cross Section of Footpath Widening at Albert Avenue

5.8 Multi-Criteria Analysis

5.8.1 Methodology

For each vehicle and pedestrian/cyclist shortlisted option, an assessment against the MCA criteria has been carried out. Each option has been relatively compared against each other based on the five-point colour coded ranking scale shown in Table 5-14. Two MCAs have been undertaken to take account of the shortlisted options for both vehicles and pedestrian/cyclists. Once the MCAs have been completed, the two EPOs will be combined to give an overall EPO for the Bray Level Crossing.

5.8.2 MCA summary for vehicle options

A Multi-Criteria Assessment table is presented in this section. This has been developed to reflect the relative rankings for all sub-criteria assessed for each of the options and is presented as a summary of the key issues considered.

A more detailed table is provided in a separate appendix with the full detailed rationale behind the scoring of each criterion and option.

Table 5-12: MCA Summary table for vehicle options

Criteria	Sub-Criteria	Option V3.2 Level crossing closed and modify existing crossroad at Seapoint Road to provide clearance.	Option V4.4 Level crossing closed and modify directional system on Strand Road.	Option V4.5 Level crossing closed and modify existing crossroad at Seapoint Road and directional system on Strand Road.	Option V5.1 New underpass at Quinsborough Road
Economy	CAPEX				1
	OPEX				
	Train operations functionality/economic benefit				
	Traffic functionality and associated economic activities and opportunities				
Safety	Employer's Safety				
	Public safety				
Environment	Landscape and Visual Quality				
	Biodiversity				
	Noise and Vibration				
	Water resources				
	Archaeology, Architectural and Cultural Heritage				
	Geology and Soils				
	Agricultural and non-agricultural				
	Air Quality & Climate Change				
Accessibility & Social Inclusion	Accessibility				
	Social Inclusion				
Integration	Adaptability in the future				
	With other transport systems				
	Land Use Integration				
	Government policy integration				
	Geographical integration				
Physical Activity	Walking/cycling opportunities	2	2	2	

Table 5-13: Overall criteria MCA summary table

Criteria Summary	Option V3.2	Option V4.4	Option V4.5	Option V5.1
Economy				
Safety				
Environment				
Accessibility & Social Inclusion				
Integration				
Physical Activity				

Table 5-14: Legend for MCA Summary Table

Significant comparative advantage over other options
Some comparative advantage over other options
Comparable to other options / neutral
Some comparative disadvantage over other options
Significant comparative disadvantage over other options

5.8.2.1 Economy

Economy has been divided into four sub-criteria which are considered below.

CAPEX

Option V5.1 has some disadvantages over all other options due to the extensive construction costs associated with forming a new underpass under Quinsborough Road. All other options have some advantages when compared with Option V5.1 due to the construction works being significantly less when compared to the construction of the underpass.

OPEX

During operation, Option V4.4 has some comparative advantages when compared to the other options as there are limited, if any, maintenance requirements for this option. Option V5.1 will require general maintenance of the underpass, in particular the drainage system. There may also be increased general maintenance required where we are lowering Seapoint Road for options V3.2 and V4.5 because there will be more traffic using that route. Hence these options have some comparative disadvantages when compared to Option V4.4.

Train operations functionality/economic benefits

All options are considered comparable from the perspective of train operations. All options allow the TSS to be met reliably.

Traffic functionality and associated economic activities and opportunities

In all options, except for V 5.1, the diversion of general traffic to other crossing locations will disrupt traffic flow during the operational stage.

Options V4.4 and V4.5 have significant comparative disadvantages over all other options due to the significant directional changes along Strand Road, which will disrupt traffic flow during the operational stage. There is also construction traffic associated with the option from enforcing the directional change. In addition there will be construction traffic associated with the bridge works and road lowering at Seapoint Road for V4.5.

Options V3.2 and V5.1 have significant comparative advantages over the other options due to the unrestricted access provided to the Bray Seafront. Construction traffic will be concentrated to the area around Seapoint Road or Quinsborough Road.

5.8.2.2 Safety

Safety has been divided into two sub-criteria which are considered below. It should be noted that all options are safe, but some will have the potential for greater residual risks to remain. This criterion considers relative advantages of each option on the criteria of safety.

Employer's Safety

As the majority of the options do not involve IÉ staff maintaining and monitoring, all options are comparable.

Public safety

All options involve the closure of the level crossing which removes the risk of harm for the public from crossing the level crossing and are therefore all considered comparable when it comes to public safety.

5.8.2.3 Environment

Section 4.2 sets out a description of the existing environment, under key environmental criteria, along with key constraints associated with this study area. Below is a summary of the key findings of the MCA under the various environmental criteria, with an emphasis on differentiating aspects for the options considered.

Landscape and Visual Quality

Option V4.4 requires minimal construction intervention. Therefore, this option avoids significant landscape and visual disturbance / impacts and is the most desirable option with significant comparative advantages over other options.

Options V3.2 and V4.5 require modifications to the section of Seapoint Road approaching and passing under the railway. V4.5 also includes works on Strand Road. Construction works at Seapoint Road include potential impacts to the underbridge structure (removal of the arched section of the bridge) and potential impacts on existing dressed stone retaining walls, the stepped access to the railway station, and the adjoining Harbour Bar property. These options have some comparative disadvantages in landscape and visual terms over other options.

Option V5.1 provides for a new underpass of the railway along Quinsborough Road. This requires major construction works lowering the road by c.6m with associated significant construction and post construction impacts for properties alongside including the boundary of Carlisle sports grounds, and Bray War Memorial. This option has significant comparative disadvantage in landscape and visual terms over other options.

Biodiversity

All options are seen to be comparable/neutral – construction works proposed for all options have potential impacts to the biodiversity i.e., where bridge modifications or underpass construction is proposed.

Noise and Vibration

Operational noise and vibration associated with trains on the rail corridor will be similar for all options.

Alarm signals associated with the level crossings, however, will change. Operational noise for all options will decrease as the alarm bells associated with the level crossing will be removed (since the level crossing is to be removed). Any alarms or horns associated with trains stopping at the station will still be in operation.

In terms of construction noise, Option V3.2 has significant comparative advantages over other options, as the construction works are limited to Seapoint Road, when compared to the longer extent of works along Strand Road. Option V4.5 scores slightly less favourably than Option V3.2 due to potential construction works on a section of Strand Road.

Option V5.1 (involving the construction of a new underpass) will have a higher level of noise and vibration than those options that only involve surface works (e.g., road improvement or bridge modifications). Options V4.4 has some comparable disadvantages due to the extent and length of construction time to carry out the works, located in front of a number of residential properties along the seafront.

Water Resources

There are no comparative differences between any of the options with regard to their impact on water resources. All options will have minimal impact on the groundwater and surface water constraints.

Options V3.2 and V4.5 require excavation beneath the Seapoint Road underbridge to allow for additional clearance of the underbridges. Option V5.1 requires excavation to allow for a new underpass at the Quinsborough Road level crossing. These options are likely to require retaining walls and may impact on the drainage within the area. However, although the area is predominantly hardstanding and the existing drainage is likely to be highly modified in the area, the impact to the downgradient waterbodies is expected to be minimal.

Furthermore, considering the setback distance of the proposed construction to downgradient waterbodies and the application of standard mitigation and best practice during construction and operation, it is assumed that with standard drainage measures in place to reduce the risk of run-off from the construction works there will be an imperceptible impact on the downgradient waterbodies and designated sites.

Archaeology, Architectural and Cultural heritage

The comparative differences across the options relate mainly to construction activities and the expected level of excavation and the potential to reveal buried archaeological remains.

Option V5.1 has been ranked as the option with some comparative disadvantages over the other options. The proposed works involve the construction of an underpass which will entail heavy civil engineering works, considerable amount of temporary works, deep excavation, and the construction of retaining walls all in a live rail environment. The latter will generate significant earth moving and increases the potential to reveal buried archaeological features and / or industrial heritage remains.

While options V3.2 and V4.5 will not impact on a recorded archaeological monument, there will be large-scale excavation works that include lowering of road levels at Seapoint Road. Stabilisation works will also have to occur to the bridges to ensure their structural integrity. The proposed underpinning will directly impact a protected structure, The Battery, a retaining wall on Strand Road (WCC RPS B101/94). The proposed underpinning on the north side of the road has the potential to impact the Harbour Bar, Seapoint Road which although not protected, dates to the 1830s. Overall, this generates some comparative disadvantage when considering other options.

Option V4.4 has some comparative advantage over the other options as it does not involve significant excavations for road lowering activities and does not impact any protected structures.

Geology and Soils

The comparative differences across the options relate mainly to construction activities and the expected interaction with the underlying geology and soils.

Option V5.1 has been ranked as the option with significant comparative disadvantages over the other options. The proposed works involve the construction of an underpass which will entail heavy civil engineering works, considerable amount of temporary works, deep excavation, and the construction of retaining walls all in a live rail environment. The latter will generate significant earthworks materials associated with potential contaminated land/made ground requiring recovery or disposal, on site or off site to appropriate facilities.

However, it must be highlighted that Option V3.2 and V4.5 are the least preferred after Option V5.1 from a geology and soils perspective. The finished road levels at Seapoint Road will be lowered by approximately 0.8m which will generate further earthworks materials. In the first location, where there is the risk of destabilisation of the existing retaining wall, underpinning will be required to undertake temporary works, and the foundations of the current masonry arch bridge may become unstable.

For Option V4.4, excavation works associated with the proposed road improvements will lead to the generation of minor earthworks and therefore, potential contamination to surrounding made ground. Option V4.4 is considered to have significant comparative advantages over the other options.

Agricultural and non-agricultural

There are no comparative differences between any of the options. All options do not impact any agricultural land, and therefore the options are deemed to be neutral.

Air quality and Climate

All options involve construction works in proximity to sensitive receptors, potentially generating air quality and climate impacts. However these impacts will be limited in the permanent case. On this basis the options are seen as comparable/neutral.

5.8.2.4 Accessibility and Social Inclusion

In terms of accessibility, Options V3.2 and V5.1 have minor impacts to vehicles whereas Option V4.4 and V4.5 involves directional changes along Stand Rd, which has minor disadvantages for vehicles.

For social inclusion Option V5.1 has some advantages over the other options as it provides unrestricted movements across the railway corridor for all modes of transport at the current location of the level crossing. All other options have some comparable disadvantages as vulnerable groups would need to use an alternative route to cross the railway corridor.

5.8.2.5 Integration

Integration has been assessed using the five sub-criteria described below.

Adaptability in the future

All options are comparable as all options do not impact on future internal transport links.

Transport integration

All options are comparable. Pedestrian integration with the existing Bray Station and parking and the planned Bray Transport Interchange remains possible. Public Transport vehicle integration with the planned Bray Sustainable Transport Bridge over the River Dargle and the Bray Bus Depot remains possible. Cyclist integration with the existing cycle network is possible.

Land use integration

Access to both east and west of the railway line will be maintained and there will be no impact on either land use zoning or development potential. However, Option V4.4 does have some comparative disadvantages as a portion of recently extended green space on the seafront will need to be removed to widen the road to introduce a 2-way system. Option 4.5 will also have some works on Strand Road to reduce a section to one way.

Geographical Integration

The various proposals for options for Bray Level Crossing comply with national and international policies to improve public transport services including DART services, encouraging modal shift and allowing for increased density of development in certain areas.

Government policy integration

The various proposals for options for Bray Level Crossings comply with regional and local policies to improve public transport services including DART services, encouraging modal shift and allowing for increased density of development in certain areas. There is no impact on existing land uses.

5.8.2.6 Physical Activity

The closure of the level crossing will reduce permeability and provide less options for pedestrians and cyclists. The underpass in Option 6 will provide an unrestricted connection for pedestrians and cyclists to access the Bray Seafront and therefore has some advantages over other options.

5.8.2.7 Construction Considerations

Option V5.1 is considered the most onerous option as it will require construction of a notable underground structure (finished road level approximately 6.5m below existing levels) in a constrained live urban rail environment. Significant piling, excavation and temporary works are envisaged to construct the underpass, as well as potential extended duration possessions.

Options that involve lowering the road levels at Seapoint Road (i.e. Options V3.2 and V4.5) are also considered onerous due to the proposed finished levels. To allow construction of the proposed road

pavement, excavations will be required. This will require notable underpinning works to prevent damage to the existing retaining wall, bridge and building foundations. There will also be a need to either divert or reposition a number of utilities running along the route, the most notable being a 375mm diameter gravity sewer, with gas pipes, water pipes and power cables also needing to be checked and probably amended. The extent of these works is difficult to judge at this stage. Furthermore, the bridge structure itself will need to be replaced above the springing points, this requiring a railway blockade to achieve.

Option V4.4 would involve extensive and significant highway and public realm works. Due to the physical length of works and proximity to residential properties, consideration would need to be given to phasing and maintaining suitable access.

5.8.3 MCA summary for pedestrian/cyclist options

A Multi-Criteria Assessment table is presented in this section (Table 5-15). This has been developed to reflect the relative rankings for all sub-criteria assessed for each of the options and is presented as a summary of the key issues considered.

A more detailed table is provided in a separate appendix with the fully detailed rationale behind the scoring of each criterion and option.

Table 5-15: MCA summary table for pedestrian/cyclist options

Criteria	Sub-Criteria	Option P1.2 Modify existing Bridge at Quinsborough Rd: Close crossing and keep existing pedestrian bridge and add lifts	Option P1.4 Modify existing Bridge at Quinsborough Rd: Close crossing and keep existing pedestrian bridge and add ramps	Option P3.2 Provide general road improvement at Bray (Daly) Station to direct pedestrians/cyclists to the seafront: Close crossing
Economy	CAPEX			
	OPEX			
	Train operations functionality/economic benefit			
	Traffic functionality and associated economic activities and opportunities			
Safety	Employer's Safety			
	Public safety			
Environment	Landscape and Visual Quality			
	Biodiversity			
	Noise and Vibration			
	Water resources			
	Archaeology, Architectural and Cultural Heritage			
	Geology and Soils			
	Agricultural and non-agricultural			
	Air Quality & Climate Change			
Accessibility & Social Inclusion	Accessibility			
	Social Inclusion			
Integration	Adaptability in the future			
	With other transport systems			
	Land Use Integration			
	Government policy integration			
	Geographical integration			
Physical Activity	Walking/cycling opportunities			

Table 5-16: Overall criteria MCA summary table

Criteria Summary	Option P1.2	Option P1.4	Option P3.2
Economy			
Safety			
Environment			
Accessibility & Social Inclusion			
Integration			
Physical Activity			

Table 5-17: Legend for MCA Summary Table

Significant comparative advantage over other options
Some comparative advantage over other options
Comparable to other options / neutral
Some comparative disadvantage over other options
Significant comparative disadvantage over other options

5.8.3.1 Economy

Economy has been divided into four sub-criteria which are considered below.

CAPEX

Option P3.2 has significant advantages when compared with all other options due to its minimal construction works proposed, limited to Albert Walk and the highway under Albert Avenue underbridge.

Options P1.2 and P1.4 have significant disadvantages when compared to Option 3.2 due to significant costs associated with the ramp and lift construction.

OPEX

Option P1.2 has some disadvantages when compared to the other options with regards to OPEX. Regular inspections will be required for the installation of lifts whereas limited maintenance will be needed for the alternative options.

Train operations functionality/economic benefits

All options are considered comparable from the perspective of train operations. All options allow the TSS to be reliably met.

Traffic functionality and associated economic activities and opportunities

All options are considered comparable from the perspective of traffic functionality. There will be construction traffic related to all options which will cause disruption but the level of disruption is seen as comparable between the options.

5.8.3.2 Safety

Safety has been divided into two sub-criteria which are considered below. It should be noted that all options are safe, but some will have the potential for greater residual risks to remain. This criterion considers relative advantages of each option in respect of safety criteria.

Employer's Safety

As the majority of the options do not involve IÉ staff maintaining and monitoring, all options are comparable.

Public safety

All options involve the closure of the level crossing which removes the risk of harm for the public from crossing the level crossing and are therefore all considered comparable when it comes to public safety.

5.8.3.3 Environment

Section 4.2 sets out a description of the existing environment, under key environmental criteria, along with key constraints associated with this study area. Below is a summary of the key findings of the MCA under the various environmental criteria, with an emphasis on differentiating aspects for the options considered.

Landscape and Visual Quality

Option P3.2 requires minimal construction intervention. This option has significant comparative advantage over other options with minimal interventions required and therefore, avoids significant impacts on the landscape or visual environment.

Option P1.2 has some comparative advantage over option P1.4 with potential significant landscape and visual impacts limited to provision of lifts to the existing pedestrian / cycle overbridge at Quinsborough Road.

Option P1.4 is the least favoured option with significant comparative disadvantage when compared with Option P3.2. This option includes the provision of ramps which will impact trees and vegetation as well as the boundary along the access lane at Royal Marine Park.

Biodiversity

All options are seen to be comparable/neutral – construction works proposed for all options have minimal potential impacts on biodiversity.

Noise and Vibration

Option P3.2 has some comparative advantages over the other options. Construction noise from road improvements may cause temporary impacts however they are limited and will continue for a shorter period of time when compared to the other options.

The other two options are comparable when considered against each other.

All options are neutral for operational noise.

Water Resources

There are no comparative differences between any of the options with regard to their impact on water resources. All options will have minimal impact on the groundwater and surface water constraints.

Archaeology, Architectural and Cultural heritage

All options are seen to be comparable/neutral – construction works proposed for all options have minimal potential impacts to archaeology, architectural and cultural heritage.

Options P1.2 and P1.4 involve modification of the existing bridge to construct lifts or ramps which will require excavation works where there is potential for below ground archaeological features/ industrial heritage remains to be revealed.

For Option P3.2 there is potential that kerbs which have a heritage value (although not protected) may be impacted by improvement works in the vicinity of Albert Walk and Albert Avenue. Where appropriate, the construction works should reinstate them as part of the final works. The magnitude of the potential impacts is not deemed great enough to make this option less favourable than the other pedestrian and cyclist options considered.

For the operational phase, all options are considered comparable/neutral.

Geology and Soils

Option P3.2 has comparative advantages over Options P1.2 and P1.4 for geology and soils. This option has minimal works associated with proposed road improvement works which may lead to the generation of minor earthworks. Therefore, there is less potential contamination to surrounding made ground.

Options P1.2 and P1.4 have a comparative disadvantage against Option P3.2 as they both have a greater amount of excavation works, therefore there is a greater potential for contamination in the surrounding made ground.

Agricultural and non-agricultural

There are no comparative differences between any of the options. None of the options impact any agricultural land, and therefore the options are deemed to be neutral.

Air quality and Climate

All options involve construction works which potentially generate air quality and climate impacts. Works at Quinsborough Road for Options P1.2 and P1.4 are not in the vicinity of sensitive receptors. Improvement works required for Option P3.2 are considered minor but will be in the vicinity of sensitive residential receptors. These impacts will be temporary and limited to the construction phase. As works required for Option P3.2 are less extensive, and therefore less likely to impact air quality, than the other options this option has some comparative advantage over the other options.

For the operational phase, all options are considered comparable/neutral.

5.8.3.4 Accessibility and Social Inclusion

For accessibility, the ability to cross the railway was assessed, where all options are seen as comparable. Due to the closure of the level crossing, pedestrians will continue to use the existing footbridge located directly next to the current level crossing. Cyclists have a number of alternative routes to cross the railway corridor - for example Seapoint Road and Albert Avenue. Depending on the option selected they could also use the lifts, ramps or alternative routes. On this basis options are comparable.

For social inclusion, travel distances across the railway corridor (i.e. from A to B in Figure 5-33) using alternative options were compared to understand the impact for vulnerable users. Option P1.2 of using the lifts and the existing footbridge equate to a travel distance of approximately 75m. This almost replicates the current travel distance for pedestrians/cyclists to cross the level crossing when the barriers are open and therefore has significant advantages over the other options.

Option P3.2 has significant disadvantages when compared to other options as it has the largest increase in travel distance of approximately 750m (to get from A to B). Due to the increased distance of travel, it will impact vulnerable groups (e.g. those with impaired mobility) accessing public transport and other facilities across the railway corridor. The provision of rest spots along the route and the level access alleviates the disadvantages of this option.

Option P1.4 also has significant disadvantages when compared to Option P1.2 as although the options are within the same vicinity, the distance travelled when using ramps is approximately 350m. Further, ramps can be considered disadvantageous to certain vulnerable groups due to their gradient.

Figure 5-33 Location of A and B (source: OSI aerial imagery)

5.8.3.5 Integration

Integration has been assessed using the five sub-criteria described below.

Adaptability in the future

All options are comparable as all options do not impact on future internal transport links.

Transport integration

All options are comparable. Pedestrian integration with the existing Bray Station and parking and the planned Bray Transport Interchange remains possible. Public transport vehicle integration with the planned Bray Sustainable Transport Bridge over the River Dargle and the Bray Bus Depot remains possible. Cyclist integration with the existing cycle network is possible.

Land use integration

All options are comparable as access to both east and west of the railway line will be maintained and there will be no impact on either land use zoning or development potential.

Geographical Integration

The various proposals for options for Bray Level Crossing comply with national and international policies to improve public transport services including DART services, encouraging modal shift and allowing for increased density of development in certain areas.

Government policy integration

The various options considered for Bray Level Crossing comply with regional and local policies to improve public transport services including DART services, encouraging modal shift and allowing for increased density of development in certain areas. There is no impact on existing land uses.

5.8.3.6 Physical Activity

With the closure of the level crossing for pedestrians and cyclists, there will still be a number of ways to cross the railway corridor which will allow for walking/cycling opportunities. There will need to be a change to the cycle plan route, however this change occurs, for all 3 options.

5.8.3.7 Construction Considerations

For the pedestrian and cyclist options P1.2 and P1.4 may require cranes and piling equipment to construct the lifts and ramps respectfully. The construction required at Albert Avenue (changing the width of footways and roads) is limited and will not require heavy construction methods.

6. SUMMARY AND CONCLUSION

6.1 Non-preferred options

6.1.1 Vehicle Options

- Options V4.4 is not preferred due to:
  - Works along Strand Road to make it two-way will be extensive and require significant highway and public realm works;
  - Direct impact to many properties along Strand Road; and
  - Significant impacts to accessibility and traffic functionality in the area.
- Option V4.5 is not preferred due to:
  - Significant impacts to traffic functionality in the area through making Strand Road one way between Sea point Road and Putland Road
  - Road lowering at Seapoint Road is required, as for V3.2, alongside additional works to Strand Road. No clear benefit from the additional works to Strand Road was reflected in the MCA, over V3.2.
- Option V5.1 is not preferred due to:
  - Extensive and significant highway and public realm works from the introduction of a new combined vehicle and pedestrian underpass.
  - Significant local impact on the area around the transport hub of Bray;
  - Large number of risks and interfaces with surrounding properties; and
  - Several negative environmental impacts, including noise and geology.

6.1.2 Pedestrian & Cyclist Options

- Option P1.4 and P1.2 are not preferred due to:
  - The construction works in the area surrounding Quinsborough Road with associated comparatively high construction and maintenance costs; and
  - Several negative environmental impacts, including landscape, noise and geology.

6.1.3 Combined Vehicle and Pedestrian and Cyclist Option (V5.1)

Option V5.1 provides a combined solution to the vehicle and pedestrian crossing through the provision of an underpass. It has been included in the vehicle options but it should also be considered as part of a combined vehicle and pedestrian solution.

V5.1 would provide a crossing in the same location as the existing level crossing. It is expected to be the preferred solution for traffic functionality, accessibility and social inclusion as it most closely replicates the existing provision. In addition the cost associated with the crossing is expected to be less than some of the combinations of vehicle and pedestrian and cyclist crossing solutions, particularly those including P1.4 and P1.2.

However, V5.1 has been discounted at this stage due to the scale of the works and impacts associated with the introduction of the new underpass. This includes significant construction works and post construction impacts to surrounding properties, in particular environmental impacts.

6.2 Emerging preferred option

From the vehicle options, Option V3.2 has been chosen as the emerging preferred. This option balances the cost of the works, the impacts to surrounding properties and the existing traffic functionality in the area.

Increasing the vertical clearance at Seapoint Road will be quite onerous, however it is still considered the preferred option because it provides a crossing for high clearance vehicles to enter and exit the sea front near Quinsborough Road. This option does not affect the traffic functionality along Strand Road and construction impacts will be focussed in the Seapoint Road area. Traffic signal controls will create a 1-way shuttle under the structure which will improve safety for all using the road to enter and exit the Bray seafront.

For the pedestrian/cyclist options, Option P3.2 has been chosen as the Emerging Preferred Option. It provides access to Bray seafront for pedestrians and cyclists using existing routes, either via Albert Walk for pedestrians and Adelaide Road for cyclists, to access Albert Avenue then onto the Bray seafront. In turn there are minimal impacts to the environment and this option has low construction and maintenance costs, when compared to the other options. This option does extend the length of the diversion route, for people who are unable to use the footbridge, if they are travelling to the opposite side of the existing crossing. However, improvements for pedestrians and cyclists will be provided along the route including resurfacing, wayfinding and adequate provision of rest areas.

Combining the vehicle, pedestrian and cyclist options, the EPO for Bray Level Crossing is to close the level crossing and:

- Modify Seapoint Road to provide clearance for vehicles: Providing traffic signal controls to create a 1-way shuttle will improve safety for all using the road to enter and exit the Bray seafront.
- Provide access to Bray seafront for pedestrians and cyclists using existing routes, either via Albert Walk for pedestrians and Adelaide Road for cyclists, to access Albert Avenue then onto the Bray seafront.

6.3 Key risks/next steps

The following key risks and next steps have been identified as:

- Engagement with local stakeholders, emergency services and Wicklow County Council;
- Assessment of local traffic to determine any local road upgrades/changes that maybe required to support the emerging preferred option;
- Utilities surveys, particularly in road lowering areas;
- Topographical survey of bridge and approach roads;
- Structural and ground investigations to bridge and retaining wall foundations;
- Evaluate any potential impacts on surrounding buildings;
- Assess the potential impacts on the protected structure, The Battery, a retaining wall on Strand Road (WCC RPS B101/94) and how these impacts can be mitigated; and
- Pedestrian counts and surveys to understand where people using the crossing are travelling to and how the proposed solutions will affect their journey.

Appendix A

MCA Matrix – Vechicle Options

Comparison Criteria Legend
Significant comparative advantage over other options
Some comparative advantage over other options
Comparable to other options / neutral
Some comparative disadvantage over other options
Significant comparative disadvantage over other options

				Economy							
				Capital Expenditure (CAPEX): Construction, land acquisition, temporary works		OPEX:operational costs (IÉ or other entities), Technology advancements and future proofing / obsolescence		Train Operations Functionality/Economic Benefit		Traffic functionality and associated economic activities and opportunities	
Works Description	Summary of requirements	Option Number	Description of Option	Qualitative appraisal of potential infrastructure costs of proposed options	Rationale	Qualitative appraisal of potential ongoing infrastructure maintenance costs of proposed options	Rationale	Qualitative appraisal of potential ongoing operational costs of proposed options	Rationale	Qualitative appraisal of potential wider benefits of proposed options	Rationale
				Estimate high level cost of construction of option Extent and type of 3rd party lands required permanently Extent and type of 3rd party land required temporarily for temporary works during construction		Cost to maintain the infrastructure over the whole life. Effects of infrastructure maintenance to services. Provision of ways of undertaking routine inspections and maintenance activities while minimising the effect on service to customers.		Potential improvement or deterioration of the operation conditions of the line (reduction or increase of the risk of interruption of service) Increased DART service improving connectivity and economy (leading to increased competition in economy, increased output of firms, increased tax revenue).		Potential benefit to vehicular traffic flows in the vicinity of the works during construction and associated economic activities and opportunities in the vicinity Consideration of duration of traffic disruption and length of diversions To minimise the impacts on traffic and transportation during the construction and operational stages	
		V3.2	Level crossing closed and modify existing crossroad at Seapoint Road to provide clearance.		Costs associated with lowering Seapoint Road, rebuilding part of the bridge structure, tie in with surrounding roads and modification to foundation supports for existing bridge and nearby structures (retaining wall, buildings).		A substantial lowering of Seapoint Rd will have an impact on the existing bridge, retaining wall and properties in the area. This exposes more structures to the need for potential future maintenance. The increased use of Seapoint Rd makes the road and associated network (drainage, lighting, surfacing etc) more in need of maintenance. Hence, this option is assessed to have a comparative disadvantage when compared to other options.		All options are considered comparable from the perspective of train operations. All options allow the TSS to be met.		The **diversion of general traffic to other crossing locations** will disrupt traffic flow during the operational stage. There will be no significant impact from construction traffic.
		V4.4	Level crossing closed and modify existing crossroads and directional system on Strand Road		Costs associated with changing the direction of traffic along Strand Rd: drainage, lighting, surfacing etc		Limited maintenance associated with changes to the directional traffic on Strand Road - the road and associated network (drainage, lighting, surfacing etc) may need more maintenance.		All options are considered comparable from the perspective of train operations. All options allow the TSS to be met.		The **diversion of general traffic to other crossing locations** in addition to the **modification of the directional system** will disrupt traffic flow during the operational stage. Construction traffic related to the construction of the directional change.
		V4.5	Level crossing closed and modify existing crossroad at Seapoint Road and directional system on Strand Road.		Costs associated with lowering Seapoint Road, rebuilding part of the bridge structure, tie in with surrounding roads and modification to foundation supports for existing bridge and nearby structures (retaining wall, buildings).		The lowering of Seapoint Rd will have an impact on the existing bridges and surrounding properties in the area. The increased use of these roads makes the services (drainage, lighting, surfacing etc) more in need of maintenance.		All options are considered comparable from the perspective of train operations. All options allow the TSS to be met.		The **diversion of general traffic to other crossing locations** in addition to the **modification of the directional system** will disrupt traffic flow during the operational stage. Construction traffic related to the modifications of the underbridges and the directional changes
		V5.1	New underpass at Quinsborough Road		This option requires substantial infrastructure costs. This option also requires some land acquisition from the adjacent football stadium.		This option closes the level crossing and removes the associated maintenance associated with a level crossing. *This option however introduces a new underpass structure which will need to be maintained. The drainage system in particular may attract additional maintenance costs.		All options are considered comparable from the perspective of train operations. All options allow the TSS to be met.		Induced traffic due to unrestricted access to the Bray Seafront may disrupt traffic flow during the operational stage, but can be addressed through mitigation measures. Construction traffic related to the **construction of the underpass** will access the construction site via the current level crossing and will therefore have some impact in terms of traffic disruption and diversion during construction stage.

Comparison Criteria Legend
Significant comparative advantage over other options
Some comparative advantage over other options
Comparable to other options / neutral
Some comparative disadvantage over other options
Significant comparative disadvantage over other options

				Safety			
				Employer's Safety		Public safety	
Works Description	Summary of requirements	Option Number	Description of Option	Qualitative appraisal on the safety impacts on IÉ or railway staff	Rationale	Qualitative appraisal on the safety impacts on the public (road/rail/cycle/pedestrian)	Rationale
				To reduce safety risks associated with construction maintenance and operations. To reduce the potential for incidents or near-misses for IÉ/construction staff.		To reduce safety risks associated with passengers at platforms, public adjacent to the railway and road, pedestrian and cycle users at level crossings. To reduce the potential for accidents for members of the public/passengers on railway infrastructure. To reduce the potential for conflict between rail and road users.	
		V3.2	Level crossing closed and modify existing crossroad at Seapoint Road to provide clearance.		Options do not involve IÉ staff maintaining/monitoring therefore all options are comparable		All options involve the closure of the level crossing which removes the risk of harm for the public from crossing the level crossing and are therefore comparable
		V4.4	Level crossing closed and modify existing crossroads and directional system on Strand Road		Options do not involve IÉ staff maintaining/monitoring therefore all options are comparable		All options involve the closure of the level crossing which removes the risk of harm for the public from crossing the level crossing and are therefore comparable
		V4.5	Level crossing closed and modify existing crossroad at Seapoint Road and directional system on Strand Road.		Options do not involve IÉ staff maintaining/monitoring therefore all options are comparable		All options involve the closure of the level crossing which removes the risk of harm for the public from crossing the level crossing and are therefore comparable
		V5.1	New underpass at Quinsborough Road		Options do not involve IÉ staff maintaining/monitoring therefore all options are comparable		All options involve the closure of the level crossing which removes the risk of harm for the public from crossing the level crossing and are therefore comparable

Comparison Criteria Legend
Significant comparative advantage over other options
Some comparative advantage over other options
Comparable to other options / neutral
Some comparative disadvantage over other options
Significant comparative disadvantage over other options

				Environment																			
				Landscape and Visual Qualitative		Biodiversity		Noise and Vibration		Water resources		Archaeology, Architectural and Cultural Heritage		Geology & Soils		Agricultural and non-agricultural		Air Quality & Climate Change	
Works Description	Summary of requirements	Option Number	Description of Option	Appraisal of landscape and visual impacts of options based on the sensitive viewpoints	Rationale	Qualitative appraisal on the impact on biodiversity	Rationale	Qualitative appraisal of the potential noise and vibration impact	Rationale	Qualitative appraisal on the potential impacts to surface ground or coastal waters	Rationale	Qualitative appraisal of the potential impacts of proposed options on potential sub surface archaeology and impact on foundations and above ground elements of architectural heritage	Rationale	Qualitative appraisal of the potential of the proposed options on waste and material resources including the reuse of site won materials.	Rationale	Qualitative appraisal of impacts on valued resources either from a human or natural origin with value arising for economic or cultural reasons. These assets can be existing utilities or non-renewable resources	Rationale	Qualitative appraisal of air quality and climate impacts both on the operational and construction phases	Rationale
				• To avoid / minimise impact on designated amenities, landscapes, protected trees or views. • To avoid / minimise visual impact on properties & amenities. • To avoid / minimise removal of trees / hedgerows. • To avoid / minimise impact from light pollution. • To provide opportunities to enhance the local amenity and green infrastructure.		To consider effects on biodiversity of the area and/, such as impacts on specific flora or fauna, or on defined habitats. To provide opportunities to enhance biodiversity. To ensure that impacts on nature conservation resources are prevented and mitigated. These can occur through direct loss or damage to habitat or specific species, creation of barriers to population movement or indirect effects resulting from, for example, changes in water quality of levels, air quality or noise and light levels.		•To provide a solution which ensures minimum levels of noise and vibration		•To minimise the impact or provide opportunities to enhance the quality of surface waters and associated floodplains, ground waters and coastal waters.		The construction, presence and operation of transport infrastructure can impact directly on such cultural heritage resources through physical impacts resulting from direct loss or damage, or indirectly through changes in setting, noise and vibration levels, air quality, and water levels. To minimise the impact on cultural heritage such as on below ground archaeological remains, historic buildings (individual and areas), and historic landscapes and parks.		To consider the impacts on designated areas of geological interest, unstable natural ground and ground contamination To consider the impacts on agricultural soil and sensitive or vulnerable soils and material resources, including the reuse of site won materials.		Qualitative appraisal of impacts on valued resources either from a human or natural origin with value arising for economic or cultural reasons. These assets can be existing utilities or non-renewable resources		Impacts of Construction Traffic. Improvements in air quality through use of EMUs over DMUs. Improvements in greenhouse gas emission through modal shift from road to rail. Improvements in greenhouse gas emission through use of EMUs over DMUs. Reduction in greenhouse gas emissions. Preservation or enhancement the local air quality.	
		V3.2	Level crossing closed and modify existing crossroad at Seapoint Road to provide clearance.		Some comparative disadvantage over other options with significant landscape and visual impacts associated with modifications to / lowering of the section of Seapoint Road approaching and underbridging the railway. Major impacts with the removal of the existing arched section of the underbridge structure and potential impacts to the dressed stone retaining walls, the stepped access to the railway station, and the adjoining Harbour Bar property.		All options are seen to be comparable/neutral – construction works proposed for all options have potential impacts to the biodiversity i.e. where bridge modifications or underpass construction is proposed. These impacts involve interactions with the railway bridges and as excavations will be required.		Construction noise and vibration for modifications to the underbridge at Seapoint Road No change in operational noise or vibration from current situation.		Minimal impact on the groundwater and surface water		No impact on recorded archaeological monuments. Large scale excavation works, involving the lowering of the road level, this increases the potential to reveal subsurface and/or buried archaeological remains. Possibility of destabilising the bridge, a cultural heritage feature. There is a potential impact on the bridge at Seapoint Road from the proposed road lowering to cater for height clearance vehicles lowering the highway. The proposed underpinning will directly impact a protected structure, The Battery, a Retaining Wall on Strand Road (WCC RPS B101/94). The proposed underpinning on the north side of the road has the potential to impact the Harbour Bar, Seapoint Road which although not protected, dates to the 1830s.		Generation of earthworks materials associated with the lowering of highways at Seapoint Road. Risk of destabilisation and slope failure associated with the retaining wall at Seapoint. Further assessment will be required to investigate underpinning as an appropriate method for undertaking temporary works within the area. There is the risk of destabilising the existing bridge foundations of the current masonry arch bridge due to significant lowering of road levels.		As all options do not impact any agricultural land, the options are deemed to be comparable.		Construction works not considered major at Quinsborough Road, no sensitive receptors located in close proximity. Significant construction works at Seapoint Road to lower road in proximity to sensitive receptors. Traffic redistributed onto links where sensitive receptors located.
		V4.4	Level crossing closed and modify existing crossroads and directional system on Strand Road		Significant comparative advantage over other options with minimal interventions required and therefore, avoids significant impacts on the landscape or visual environment.		All options are seen to be comparable/neutral – construction works proposed for all options have potential impacts to the biodiversity i.e. where bridge modifications or underpass construction is proposed. These impacts involve interactions with the railway bridges and as excavations will be required.		Construction noise and vibration along approx. 900m length of Strand Rd for a prolonged length of time. No change in operational noise or vibration from current situation.		Minimal impact on the groundwater and surface water		No impact on recorded archaeological monuments. This option does not involve significant excavations for road lowering activities and does not impact any protected structures		Minor excavation works associated with the proposed road improvement works leading to the generation of minor earthworks and therefore, potential contamination to surrounding made ground.		As all options do not impact any agricultural land, the options are deemed to be comparable.		Construction works not considered major at Quinsborough Road, no sensitive receptors located in close proximity. Will result in a significant redistribution of traffic onto residential streets.
		V4.5	Level crossing closed and modify existing crossroad at Seapoint Road and directional system on Strand Road.		Some comparative disadvantage over other options with significant landscape and visual impacts associated with modifications to / lowering of the section of Seapoint Road approaching and underbridging the railway. Major impacts with the removal of the existing arched section of the underbridge structure and potential impacts to the dressed stone retaining walls, the stepped access to the railway station, and the adjoining Harbour Bar property.		All options are seen to be comparable/neutral – construction works proposed for all options have potential impacts to the biodiversity i.e. where bridge modifications or underpass construction is proposed. These impacts involve interactions with the railway bridges and as excavations will be required.		Construction noise and vibration for modifications to the underbridge at Seapoint Road. No change in operational noise or vibration from current situation.		Minimal impact on the groundwater and surface water		No impact on recorded archaeological monuments. Large scale excavation works, involving lowering Seapoint Road, increases the potential to reveal subsurface and/or buried archaeological remains. Possibility of destabilising bridge, a cultural heritage feature. Potential impact on the bridge at Seapoint Road from proposed road lowering. Proposed underpinning will directly impact a protected structure, The Battery, a Retaining Wall on Strand Road (WCC RPS B101/94). The proposed underpinning on the north side of the road has the potential to impact the Harbour Bar, Seapoint Road which although not protected, dates to the 1830s.		Generation of earthworks materials associated with the lowering of highways at Seapoint Road. Risk of destabilisation and slope failure associated with the retaining wall at Seapoint. Further assessment will be required to investigate underpinning as an appropriate method for undertaking temporary works within the area. There is the risk of destabilising the existing bridge foundations of the current masonry arch bridge due to significant lowering of road levels.		As all options do not impact any agricultural land, the options are deemed to be comparable.		Construction works not considered major at Quinsborough Road, no sensitive receptors located in close proximity. Significant construction works at Seapoint Road to lower road in proximity to sensitive receptors. Will result in a significant redistribution of traffic onto residential streets.
		V5.1	New underpass at Quinsborough Road		Significant comparative disadvantage over other options with proposed underbridge of railway on Quinsborough Road. Lowering the road by c.6m with associated significant construction and post construction impacts for properties alongside including the boundary of Carlisle sports grounds, and Bray War Memorial.		All options are seen to be comparable/neutral – construction works proposed for all options have potential impacts to the biodiversity i.e. where bridge modifications or underpass construction is proposed. These impacts involve interactions with the railway bridges and as excavations will be required.		High levels of noise and vibration expected during construction. Decrease in operational noise as level crossing alarms won't be necessary, though this will also be true for all of the other options.		Minimal impact on the groundwater and surface water		No impact on recorded archaeological monuments. Large scale excavation works, involving the creation of an underpass and the removal of the existing bridge at Quinsborough Road/ Seapoint Road. There is no existing underpass in this location. Creating one has the potential to impact the signal box at Bray station and also the Hibernia Inn (WCC RPS B86/79)		Considerable amount of temporary works will be required. Construction of retaining wall and deep excavation which will generate considerable earthworks. Therefore, there is the possibility of contamination with surrounding made ground. Difficulties may arise due to proximity with the sea.		As all options do not impact any agricultural land, the options are deemed to be comparable.		Major construction works, however, no sensitive receptors located in proximity. Significant carbon emissions likely due to embodied carbon associated with the construction materials and works

Comparison Criteria Legend
Significant comparative advantage over other options
Some comparative advantage over other options
Comparable to other options / neutral
Some comparative disadvantage over other options
Significant comparative disadvantage over other options

				Accessibility & Social Inclusion			
				Accessibility		Social Inclusion	
Works Description	Summary of requirements	Option Number	Description of Option	Qualitative appraisal of capacity of options to facilitate the movement of people (either within, on to or across the rail system)	Rationale	Qualitative appraisal of capacity of options to provide ease of access for the mobility and visually impaired	Rationale
				Capacity of options to facilitate the movement of people (either within, on to or across the rail system) Impact on the wellbeing of the passenger and public. Positive impact on passenger and public experience. Improve accessibility to key facilities, such as employment, education, transport and healthcare to satisfy transport demand for all trip types.		Positive impact towards vulnerable groups Improvement of accessibility to public transport facilities, in particular from deprived geographic areas.	
		V3.2	Level crossing closed and modify existing crossroad at Seapoint Road to provide clearance.		Minor impacts to vehicles		Level crossing closed, with vulnerable groups having to use alternative routes to reach the Bray seafront.
		V4.4	Level crossing closed and modify existing crossroads and directional system on Strand Road		The directional changes to Strand Road has some disadvantages for vehicle users.		Level crossing closed, with vulnerable groups having to use alternative routes to reach the Bray seafront.
		V4.5	Level crossing closed and modify existing crossroad at Seapoint Road and directional system on Strand Road.		The directional changes to Strand Road has some disadvantages for vehicle users.		Level crossing closed, with vulnerable groups having to use alternative routes to reach the Bray seafront.
		V5.1	New underpass at Quinsborough Road		Minor impacts vehicles		Option provides unrestricted movements for pedestrians and cyclists and vehicle,

Comparison Criteria Legend
Significant comparative advantage over other options
Some comparative advantage over other options
Comparable to other options / neutral
Some comparative disadvantage over other options
Significant comparative disadvantage over other options

				Integration										Physical Activity	
				Adaptability in the future		Transport Integration		Land use integration		Geographical Integration		Government policy Integration		Walking / cycling opportunities	
Works Description	Summary of requirements	Option Number	Description of Option	Qualitative appraisal of capacity of options to cater for future projects or aspirations	Rationale	Qualitative appraisal of the options and their impact on integration with other transport modes	Rationale	Qualitative appraisal of the options and their impact on integration with land use policies	Rationale	Qualitative appraisal of the options and their impact on integration with geographical polices	Rationale	Qualitative appraisal of the options and their impact on integration with geographical and government polices	Rationale	Qualitative appraisal of the options and their impact to enable walking and cycling opportunities in a safer environment for the communities along the route	Rationale
				Allowance for future internal transport links within Ireland.		Similarity of systems with other DART+ Programmes. The solution proposed should integrate with other transport systems such as DART+ West, Metrolink and light rail lines, local and national traffic road systems, walkways, and cycleways.		Integration with land use policies and objectives; and Integration with regional and local land use plans Adhesion to regional and local plans and policies		Integration with land use policies and objectives Integration with regional and local land use plans		Integration with national and international plans and policies		To enable walking and cycling opportunities in a safer environment in the communities along the route. To create a healthy environment conducive to active travel	
		V3.2	Level crossing closed and modify existing crossroad at Seapoint Road to provide clearance.		All options are comparable as all options do not impact on future internal transport links.		Pedestrian integration with the existing Bray Station and Parking; and the planned Bray Transport Interchange remains possible. Public Transport vehicle integration with the planned River Dargle PT Bridge and the Bray Bus Depot remains possible. Cyclist integration with the existsing cycle network is possible.		Access to both north and south of the railway line will be maintained and there will be no impact on either land use zoning or development potential		The various proposals for options for Bray Level Crossing comply with national and international policies to improve public transport services including DART services, encouraging modal shift and allowing for increased density of development in certain areas.		The various proposals for options for Bray Level Crossing comply with regional and local policies to improve public transport services including DART services, encouraging modal shift and allowing for increased density of development in certain areas. There is no impact on existing land uses.		The closure of the level crossing for pedestrians and cyclists will reduce permeability and **provide less options for pedestrians and cyclists**.
		V4.4	Level crossing closed and modify existing crossroads and directional system on Strand Road		All options are comparable as all options do not impact on future internal transport links.		Pedestrian integration with the existing Bray Station and Parking; and the planned Bray Transport Interchange remains possible. Public Transport vehicle integration with the planned River Dargle PT Bridge and the Bray Bus Depot remains possible. Cyclist integration with the existsing cycle network is possible.		Option has some comparative disadvantages as a portion (approximately 900m) of recently extended green space on the seafront will need to be removed to widen the road to introduce a 2-way system.		The various proposals for options for Bray Level Crossing comply with national and international policies to improve public transport services including DART services, encouraging modal shift and allowing for increased density of development in certain areas.		The various proposals for options for Bray Level Crossing comply with regional and local policies to improve public transport services including DART services, encouraging modal shift and allowing for increased density of development in certain areas. There is no impact on existing land uses.		The closure of the level crossing for pedestrians and cyclists will reduce permeability and **provide less options for pedestrians and cyclists**.
		V4.5	Level crossing closed and modify existing crossroad at Seapoint Road and directional system on Strand Road.		All options are comparable as all options do not impact on future internal transport links.		Pedestrian integration with the existing Bray Station and Parking; and the planned Bray Transport Interchange remains possible. Public Transport vehicle integration with the planned River Dargle PT Bridge and the Bray Bus Depot remains possible. Cyclist integration with the existsing cycle network is possible.		Option has some comparative disadvantages as there are changes proposed to Strand Road.		The various proposals for options for Bray Level Crossing comply with national and international policies to improve public transport services including DART services, encouraging modal shift and allowing for increased density of development in certain areas.		The various proposals for options for Bray Level Crossing comply with regional and local policies to improve public transport services including DART services, encouraging modal shift and allowing for increased density of development in certain areas. There is no impact on existing land uses.		The closure of the level crossing for pedestrians and cyclists will reduce permeability and **provide less options for pedestrians and cyclists**.
		V5.1	New underpass at Quinsborough Road		All options are comparable as all options do not impact on future internal transport links.		Pedestrian integration with the existing Bray Station and Parking; and the planned Bray Transport Interchange remains possible through **improved unrestricted access**. Public Transport vehicle integration with the planned River Dargle PT Bridge and the Bray Bus Depot remains possible.		Access to both north and south of the railway line will be maintained and there will be no impact on either land use zoning or development potential		The various proposals for options for Bray Level Crossing comply with national and international policies to improve public transport services including DART services, encouraging modal shift and allowing for increased density of development in certain areas.		The various proposals for options for Bray Level Crossing comply with regional and local policies to improve public transport services including DART services, encouraging modal shift and allowing for increased density of development in certain areas. There is no impact on existing land uses.		**An unrestricted connection will be provided for pedestrians** to access the Bray Seafront.

MCA Matrix – Pedestrian & Cyclist Options

Comparison Criteria Legend
Significant comparative advantage over other options
Some comparative advantage over other options
Comparable to other options / neutral
Some comparative disadvantage over other options
Significant comparative disadvantage over other options

				Economy							
				Capital Expenditure (CAPEX): Construction, land acquisition, temporary works		OPEX:operational costs (IÉ or other entities), Technology advancements and future proofing / obsolescence		Train Operations Functionality/Economic Benefit		Traffic functionality and associated economic activities and opportunities	
Works Description	Summary of requirements	Option Number	Description of Option	Qualitative appraisal of potential infrastructure costs of proposed options	Rationale	Qualitative appraisal of potential ongoing infrastructure maintenance costs of proposed options	Rationale	Qualitative appraisal of potential ongoing operational costs of proposed options	Rationale	Qualitative appraisal of potential wider benefits of proposed options	Rationale
				Estimate high level cost of construction of option Extent and type of 3rd party lands required permanently Extent and type of 3rd party land required temporarily for temporary works during construction		Cost to maintain the infrastructure over the whole life. Effects of infrastructure maintenance to services. Provision of ways of undertaking routine inspections and maintenance activities while minimising the effect on service to customers.		Potential improvement or deterioration of the operation conditions of the line (reduction or increase of the risk of interruption of service) Increased DART service improving connectivity and economy (leading to increased competition in economy, increased output of firms, increased tax revenue).		Potential benefit to vehicular traffic flows in the vicinity of the works during construction and associated economic activities and opportunities in the vicinity Consideration of duration of traffic disruption and length of diversions To minimise the impacts on traffic and transportation during the construction and operational stages	
Southern Line: Bray Level Crossing - Quinsborough Road	To provide an appropriate level of vehicular access for all modes to facilitate access to/ from the Bray Seafront To provide an appropriate level of accessibility at a local level for pedestrians and cyclists To provide an appropriate level of accessibility for emergency services (Fire Brigades, Hospitals) in terms of catchment and response time	P1.2	Modify existing Bridge at Quinsborough Rd by constructing lifts		Costs associated with the inclusion of lifts to existing pedestrian bridge, including foundation works.		Regular inspections of the lifts wil be required. Increased use of the footbridge now the level crossing is closed therefore could require further maintenance.		All options are considered comparable from the perspective of train operations. All options allow the TSS to be met.		Construction traffic related to the construction of the pedestrian and cyclist overbridge lifts will access the construction site via the current level crossing and will therefore have some impact in terms of traffic disruption and diversion during construction stage.
		P1.4	Modify existing Bridge at Quinsborough Rd by constructing ramps		Costs associated with the inclusion of ramps to existing pedestrian bridge, including foundation works.		limited maintenance required for the ramps. Increased use of the footbridge now the level crossing is closed therefore could require further maintenance.		All options are considered comparable from the perspective of train operations. All options allow the TSS to be met.		Construction traffic related to the construction of the pedestrian and cyclist overbridge ramps will access the construction site via the current level crossing and will therefore have some impact in terms of traffic disruption and diversion during construction stage.
		P3.2	Provide general road improvement at Bray Station to direct pedestrians/cyclists to the seafront		Costs associated with alterations to Albert Avenue		Limited maintenance required for the road improveemnts however the increased use of Albert Avenue makes the road and associated network (drainage, lighting, surfacing etc) more in need of maintenance		All options are considered comparable from the perspective of train operations. All options allow the TSS to be met.		Construction traffic related to the roadworks under Albert Avenue bridge will have some impact in terms of traffic disruption and diversion during construction stage.

p1
Significant comparative advantage over other options
Some comparative advantage over other options
Comparable to other options / neutral
Some comparative disadvantage over other options
Significant comparative disadvantage over other options

				Safety			
				Employer's Safety		Public safety	
Works Description	Summary of requirements	Option Number	Description of Option	Qualitative appraisal on the safety impacts on IÉ or railway staff	Rationale	Qualitative appraisal on the safety impacts on the public (road/rail/cycle/pedestrian)	Rationale
				To reduce safety risks associated with construction maintenance and operations. To reduce the potential for incidents or near-misses for IÉ/construction staff.		To reduce safety risks associated with passengers at platforms, public adjacent to the railway and road, pedestrian and cycle users at level crossings. To reduce the potential for accidents for members of the public/passengers on railway infrastructure. To reduce the potential for conflict between rail and road users.	
Southern Line: Bray Level Crossing - Quinsborough Road	To provide an appropriate level of vehicular access for all modes to facilitate access to/ from the Bray Seafront To provide an appropriate level of accessibility at a local level for pedestrians and cyclists To provide an appropriate level of accessibility for emergency services (Fire Brigades, Hospitals) in terms of catchment and response time	P1.2	Modify existing Bridge at Quinsborough Rd by constructing lifts		Options do not involve IÉ staff maintaining/monitoring therefore all options are comparable		All options involve the closure of the level crossing which removes the risk of harm for the public from crossing the level crossing and are therefore comparable
		P1.4	Modify existing Bridge at Quinsborough Rd by constructing ramps		Options do not involve IÉ staff maintaining/monitoring therefore all options are comparable		All options involve the closure of the level crossing which removes the risk of harm for the public from crossing the level crossing and are therefore comparable
		P3.2	Provide general road improvement at Bray Station to direct pedestrians/cyclists to the seafront		Options do not involve IÉ staff maintaining/monitoring therefore all options are comparable		All options involve the closure of the level crossing which removes the risk of harm for the public from crossing the level crossing and are therefore comparable

p1
Significant comparative advantage over other options
Some comparative advantage over other options
Comparable to other options / neutral
Some comparative disadvantage over other options
Significant comparative disadvantage over other options

				Environment																	
				Landscape and Visual Qualitative		Biodiversity		Noise and Vibration		Water resources		Archaeology, Architectural and Cultural Heritage		Geology & Soils		Agricultural and non-agricultural		Air Quality & Climate Change	
Works Description	Summary of requirements	Option Number	Description of Option	Appraisal of landscape and visual impacts of options based on the sensitive viewpoints	Rationale	Qualitative appraisal on the impact on biodiversity	Rationale	Qualitative appraisal of the potential noise and vibration impact	Rationale	Qualitative appraisal on the potential impacts to surface ground or coastal waters	Rationale	Qualitative appraisal of the potential impacts of proposed options on potential sub surface archaeology and impact on foundations and above ground elements of architectural heritage	Rationale	Qualitative appraisal of the potential of the proposed options on waste and material resources including the reuse of site won materials.	Rationale	Qualitative appraisal of impacts on valued resources either from a human or natural origin with value arising for economic or cultural reasons. These assets can be existing utilities or non-renewable resources	Rationale	Qualitative appraisal of air quality and climate impacts both on the operational and construction phases	Rationale
				• To avoid / minimise impact on designated amenities, landscapes, protected trees or views. • To avoid / minimise visual impact on properties & amenities. • To avoid / minimise removal of trees / hedgerows. • To avoid / minimise impact from light pollution. • To provide opportunities to enhance the local amenity and green infrastructure.		To consider effects on biodiversity of the area and/, such as impacts on specific flora or fauna, or on defined habitats. To provide opportunities to enhance biodiversity. To ensure that impacts on nature conservation resources are prevented and mitigated. These can occur through direct loss or damage to habitat or specific species, creation of barriers to population movement or indirect effects resulting from, for example, changes in water quality of levels, air quality or noise and light levels.		•To provide a solution which ensures minimum levels of noise and vibration		•To minimise the impact or provide opportunities to enhance the quality of surface waters and associated floodplains, ground waters and coastal waters.		The construction, presence and operation of transport infrastructure can impact directly on such cultural heritage resources through physical impacts resulting from direct loss or damage, or indirectly through changes in setting, noise and vibration levels, air quality, and water levels. To minimise the impact on cultural heritage such as on below ground archaeological remains, historic buildings (individual and areas), and historic landscapes and parks.		To consider the impacts on designated areas of geological interest, unstable natural ground and ground contamination To consider the impacts on agricultural soil and sensitive or vulnerable soils and material resources, including the reuse of site won materials.		Qualitative appraisal of impacts on valued resources either from a human or natural origin with value arising for economic or cultural reasons. These assets can be existing utilities or non-renewable resources		Impacts of Construction Traffic. Improvements in air quality through use of EMUs over DMUs. Improvements in greenhouse gas emission through modal shift from road to rail. Improvements in greenhouse gas emission through use of EMUs over DMUs. Reduction in greenhouse gas emissions. Preservation or enhancement the local air quality.	
Southern Line: Bray Level Crossing - Quinsborough Road	To provide an appropriate level of vehicular access for all modes to facilitate access to/ from the Bray Seafront To provide an appropriate level of accessibility at a local level for pedestrians and cyclists To provide an appropriate level of accessibility for emergency services (Fire Brigades, Hospitals) in terms of catchment and response time	P1.2	Modify existing Bridge at Quinsborough Rd by constructing lifts		Some comparative advantage over other options with significant landscape and visual impacts limited to provision of lifts to existing pedestrian / cycle overbridge at Quinsborough Road		All options are seen to be comparable/neutral – construction works proposed for all options have potential impacts to the biodiversity		Construction noise from construction of the lifts to the existing footbridge		Minimal impact on the groundwater and surface water		No impact on recorded archaeological monuments. Modification of railway bridge at Quinsborough Road will take place. The east lift will potentially block the adjoining land. The existing bridge is not of heritage significance. The existing trees at Royal Marine Park will screen the proposed changes from the houses on Royal Marine Terrace, minimising visual impact.		Minor excavation works associated with the proposed lifts leading to the generation of minor earthworks and therefore, potential contamination to surrounding made ground.		As all options do not impact any agricultural land, the options are deemed to be comparable.		Construction works not considered major at Quinsborough Road, no sensitive receptors located in close proximity.
		P1.4	Modify existing Bridge at Quinsborough Rd by constructing ramps		Significant disadvantage over other options with landscape and visual impacts to provision of ramps to existing pedestrian / cycle overbridge at Quinsborough Road		All options are seen to be comparable/neutral – construction works proposed for all options have potential impacts to the biodiversity		Construction noise from construction of the ramps to the existing footbridge		Minimal impact on the groundwater and surface water		No impact on recorded archaeological monuments. Modification of railway bridge at Quinsborough Road will take place. The east ramp will potentially block the adjoining land. The existing bridge is not of heritage significance. The existing trees at Royal Marine Park will screen the proposed ramp from the houses on Royal Marine Terrace, minimising visual impact.		Minor excavation works associated with the proposed ramps leading to the generation of minor earthworks and therefore, potential contamination to surrounding made ground.		As all options do not impact any agricultural land, the options are deemed to be comparable.		Construction works not considered major at Quinsborough Road, no sensitive receptors located in close proximity.
		P3.2	Provide general road improvement at Bray Station to direct pedestrians/cyclists to the seafront		Significant comparative advantage over other options with minimal interventions required and therefore, avoids significant impacts on the landscape or visual environment.		All options are seen to be comparable/neutral – construction works proposed for all options have potential impacts to the biodiversity		Construction noise from road improvements however they are limited and will continue for a shorter period of time when compared to the other options.		Minimal impact on the groundwater and surface water		The proposed road improvements, such as lowered Kerbs have the potential to impact heritage kerbs at Bray Station, on Albert Walk and Albert Avenue. The deck of the bridge on Albert Avenue is modern and not of heritage significance but the supporting walls to the north and south are of heritage significance. The magnitude of the potential impact is not deemed great enough to make this option less favourable than the other options considered.		Minimal works associated with the proposed road improvement works which may lead to the generation of minor earthworks and therefore, potential contamination to surrounding made ground.		As all options do not impact any agricultural land, the options are deemed to be comparable.		Construction works considered minor, some sensitive receptors located in close proximity. Road improvements to direct pedestrians/cyclists is beneficial to encourage modal shift.

p1
Significant comparative advantage over other options
Some comparative advantage over other options
Comparable to other options / neutral
Some comparative disadvantage over other options
Significant comparative disadvantage over other options

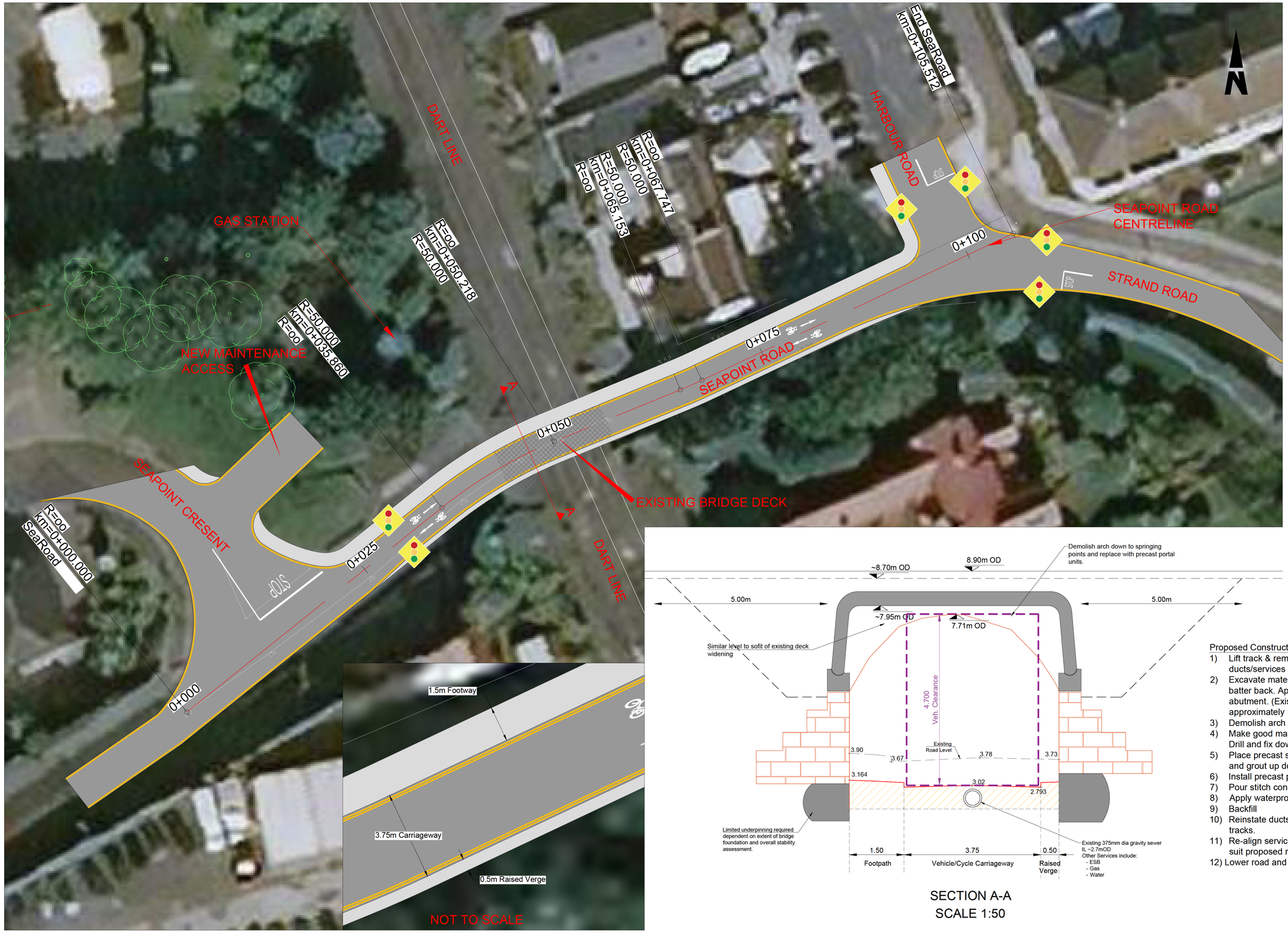
				Accessibility & Social Inclusion			
				Accessibility		Social Inclusion	
Works Description	Summary of requirements	Option Number	Description of Option	Qualitative appraisal of capacity of options to facilitate the movement of people (either within, on to or across the rail system)	Rationale	Qualitative appraisal of capacity of options to provide ease of access for the mobility and visually impaired	Rationale
				Capacity of options to facilitate the movement of people (either within, on to or across the rail system) Impact on the wellbeing of the passenger and public. Positive impact on passenger and public experience. Improve accessibility to key facilities, such as employment, education, transport and healthcare to satisfy transport demand for all trip types.		Positive impact towards vulnerable groups Improvement of accessibility to public transport facilities, in particular from deprived geographic areas.	
Southern Line: Bray Level Crossing - Quinsborough Road	To provide an appropriate level of vehicular access for all modes to facilitate access to/ from the Bray Seafront To provide an appropriate level of accessibility at a local level for pedestrians and cyclists To provide an appropriate level of accessibility for emergency services (Fire Brigades, Hospitals) in terms of catchment and response time	P1.2	Modify existing Bridge at Quinsborough Rd by constructing lifts		Due to the closure of the level crossing, pedestrians (who are able) will remain to use the existing footbridge located directly next to the currently level crossing. Cyclists have a number of alternative routes to cross the railway corridor - For example Seapoint Road and Albert Avenue, as well as using the lifts. On this basis option are comparable		With the level crossing closed, vulnerable groups having to use alternative routes to reach the Bray seafront. The use of lifts has significant advantages over the other options for vulnerable groups with the limited increase of distance needed to travel plus better connections to the station and buses which wait outside the station.
		P1.4	Modify existing Bridge at Quinsborough Rd by constructing ramps		Due to the closure of the level crossing, pedestrians (who are able) will remain to use the existing footbridge located directly next to the currently level crossing. Cyclists have a number of alternative routes to cross the railway corridor - For example Seapoint Road and Albert Avenue, as well as using the ramps. On this basis option are comparable		With the level crossing closed, vulnerable groups having to use alternative routes to reach the Bray seafront. The use of ramps has significant disadvantages for vulnerable groups with the increased increase of distance needed to travel. Also the ramps maybe seen as difficult to use due to their gradient for some vulnerable groups
		P3.2	Provide general road improvement at Bray Station to direct pedestrians/cyclists to the seafront		Due to the closure of the level crossing, pedestrians (who are able) will remain to use the existing footbridge located directly next to the currently level crossing. Cyclists have a number of alternative routes to cross the railway corridor - For example Seapoint Road and Albert Avenue. On this basis option are comparable		With the level crossing closed, vulnerable groups having to use alternative routes to reach the Bray seafront. The use of the alternative route has significant disadvantages over the other options for vulnerable groups with increased distance needed to travel.

p1
Significant comparative advantage over other options
Some comparative advantage over other options
Comparable to other options / neutral
Some comparative disadvantage over other options
Significant comparative disadvantage over other options

				Integration										Physical Activity	
				Adaptability in the future		Transport Integration		Land use integration		Geographical Integration		Government policy Integration		Walking / cycling opportunities	
Works Description	Summary of requirements	Option Number	Description of Option	Qualitative appraisal of capacity of options to cater for future projects or aspirations	Rationale	Qualitative appraisal of the options and their impact on integration with other transport modes	Rationale	Qualitative appraisal of the options and their impact on integration with land use policies	Rationale	Qualitative appraisal of the options and their impact on integration with geographical polices	Rationale	Qualitative appraisal of the options and their impact on integration with geographical and government polices	Rationale	Qualitative appraisal of the options and their impact to enable walking and cycling opportunities in a safer environment for the communities along the route	Rationale
				Allowance for future internal transport links within Ireland.		Similarity of systems with other DART+ Programmes. The solution proposed should integrate with other transport systems such as DART+ West, Metrolink and light rail lines, local and national traffic road systems, walkways, and cycleways.		Integration with land use policies and objectives; and Integration with regional and local land use plans Adhesion to regional and local plans and policies		Integration with land use policies and objectives Integration with regional and local land use plans		Integration with national and international plans and policies		To enable walking and cycling opportunities in a safer environment in the communities along the route. To create a healthy environment conducive to active travel	
Southern Line: Bray Level Crossing - Quinsborough Road	To provide an appropriate level of vehicular access for all modes to facilitate access to/ from the Bray Seafront To provide an appropriate level of accessibility at a local level for pedestrians and cyclists To provide an appropriate level of accessibility for emergency services (Fire Brigades, Hospitals) in terms of catchment and response time	P1.2	Modify existing Bridge at Quinsborough Rd by constructing lifts		All options are comparable as all options do not impact on future internal transport links.		Pedestrian integration with the existing Bray Station and Parking; and the planned Bray Transport Interchange remains possible. Public Transport vehicle integration with the planned River Dargle PT Bridge and the Bray Bus Depot remains possible. Cyclist integration with the existsing cycle network is possible.		Access to both east and west of the railway line will be maintained and there will be no impact on either land use zoning or development potential		The various proposals for options for Bray Level Crossing comply with national and international policies to improve public transport services including DART services, encouraging modal shift and allowing for increased density of development in certain areas.		The various proposals for options for Bray Level Crossing comply with regional and local policies to improve public transport services including DART services, encouraging modal shift and allowing for increased density of development in certain areas. There is no impact on existing land uses.		Due to the closure of the level crossing for pedestrians and cyclists there will still be a number of ways to cross the railway corridor which will allow for walking/cycling opportunities. There will need to be a change to the cycle plan route, however this change occurs for all 3 options.
		P1.4	Modify existing Bridge at Quinsborough Rd by constructing ramps		All options are comparable as all options do not impact on future internal transport links.		Pedestrian integration with the existing Bray Station and Parking; and the planned Bray Transport Interchange remains possible. Public Transport vehicle integration with the planned River Dargle PT Bridge and the Bray Bus Depot remains possible. Cyclist integration with the existsing cycle network is possible.		Access to both east and west of the railway line will be maintained and there will be no impact on either land use zoning or development potential		The various proposals for options for Bray Level Crossing comply with national and international policies to improve public transport services including DART services, encouraging modal shift and allowing for increased density of development in certain areas.		The various proposals for options for Bray Level Crossing comply with regional and local policies to improve public transport services including DART services, encouraging modal shift and allowing for increased density of development in certain areas. There is no impact on existing land uses.		Due to the closure of the level crossing for pedestrians and cyclists there will still be a number of ways to cross the railway corridor which will allow for walking/cycling opportunities. There will need to be a change to the cycle plan route, however this change occurs for all 3 options.
		P3.2	Provide general road improvement at Bray Station to direct pedestrians/cyclists to the seafront		All options are comparable as all options do not impact on future internal transport links.		Pedestrian integration with the existing Bray Station and Parking; and the planned Bray Transport Interchange remains possible. Public Transport vehicle integration with the planned River Dargle PT Bridge and the Bray Bus Depot remains possible. Cyclist integration with the existsing cycle network is possible.		Access to both east and west of the railway line will be maintained and there will be no impact on either land use zoning or development potential		The various proposals for options for Bray Level Crossing comply with national and international policies to improve public transport services including DART services, encouraging modal shift and allowing for increased density of development in certain areas.		The various proposals for options for Bray Level Crossing comply with regional and local policies to improve public transport services including DART services, encouraging modal shift and allowing for increased density of development in certain areas. There is no impact on existing land uses.		Due to the closure of the level crossing for pedestrians and cyclists there will still be a number of ways to cross the railway corridor which will allow for walking/cycling opportunities. There will need to be a change to the cycle plan route, however this change occurs for all 3 options.

Appendix B

Emerging Preferred Option sketches



SECTION A-A
SCALE 1:50

Proposed Construction Sequence:

1) Lift track & remove ballast. Temporarily relocate ducts/services at track level.
2) Excavate material to top of springing points batter back. Approx. 5 - 10m from front face of abutment. (Existing OHLE mast located approximately 10m from bridge abutment).
3) Demolish arch down to springing points
4) Make good masonry re-grout where necessary. Drill and fix dowel bars
5) Place precast support beam on bed of mortar and grout up dowel pockets.
6) Install precast portal deck units
7) Pour stitch concrete.
8) Apply waterproofing seals
9) Backfill
10) Reinstate ducts/services, place ballast and relay tracks.
11) Re-align services (ESB, Gas, Foul, Water) to suit proposed road levels.
12) Lower road and install foundation treatment.

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DART+ Coastal South

NTA Údarás Náisiúnta Iompair National Transport Authority

Tionscadal Éireann Project Ireland 2040

Rev	Date	Drn	Chk'd	App'd	Description
P01	18/11/2022	TA	KP	RS	FOR REVIEW

Client: Iarnród Éireann Irish Rail

Engineering Designer: ARUP

Date	Scale	Drawn	Checked	Approved
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Project Code	Originator Code	QMS Code
D+WP56	ARP	280275-00

Project Title: **DART+ COASTAL SOUTH**

Drawing Title: EMERGING PREFERRED OPTION
SEAPOINT ROAD
PLAN & CROSS SECTION

Drawing File Name	Sheet Number	Status	Rev
D+WP56-ARP-P2-SL-DR-CB-020101	01 of 01	S3	P01

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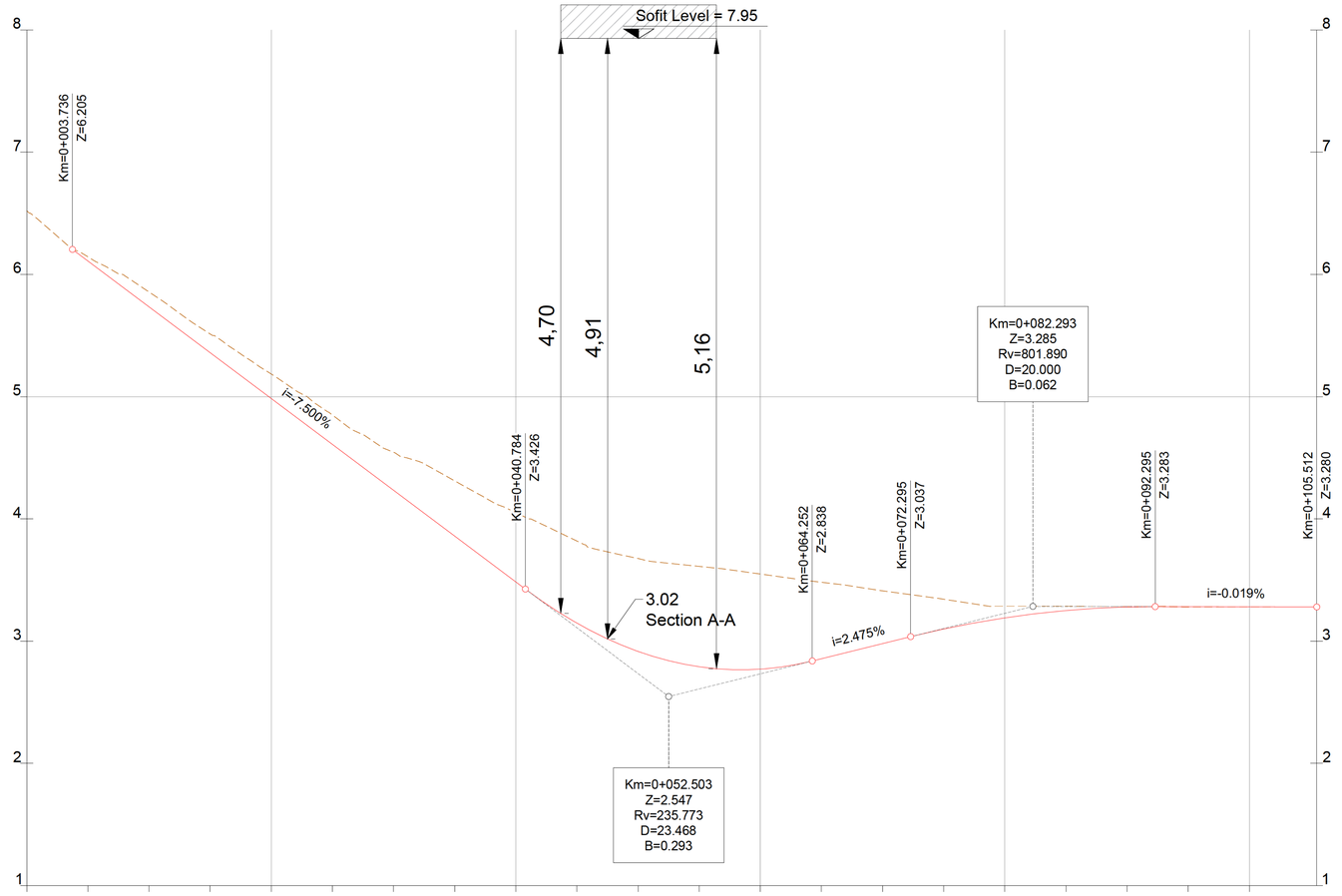
LEGEND :

EXISTING LEVEL

PROPOSED LEVEL



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EXISTING LEVEL		6.110	5.735	5.360	4.985	4.610	4.235	3.860	3.485	3.148	2.916	2.790	2.771	2.856	2.980	3.099	3.191	3.251	3.280	3.282	3.281	3.280
PROPOSED LEVEL	6.520	6.144	5.856	5.512	5.185	4.850	4.545	4.311	4.052	3.819	3.676	3.612	3.549	3.482	3.412	3.343	3.285	3.285	3.285	3.280	3.280	3.280
LIFT / LOWER		0.034	0.121	0.153	0.200	0.240	0.310	0.452	0.567	0.671	0.760	0.821	0.778	0.626	0.432	0.244	0.094	0.034	0.005	-0.002	-0.001	0.000
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DART+ Coastal South

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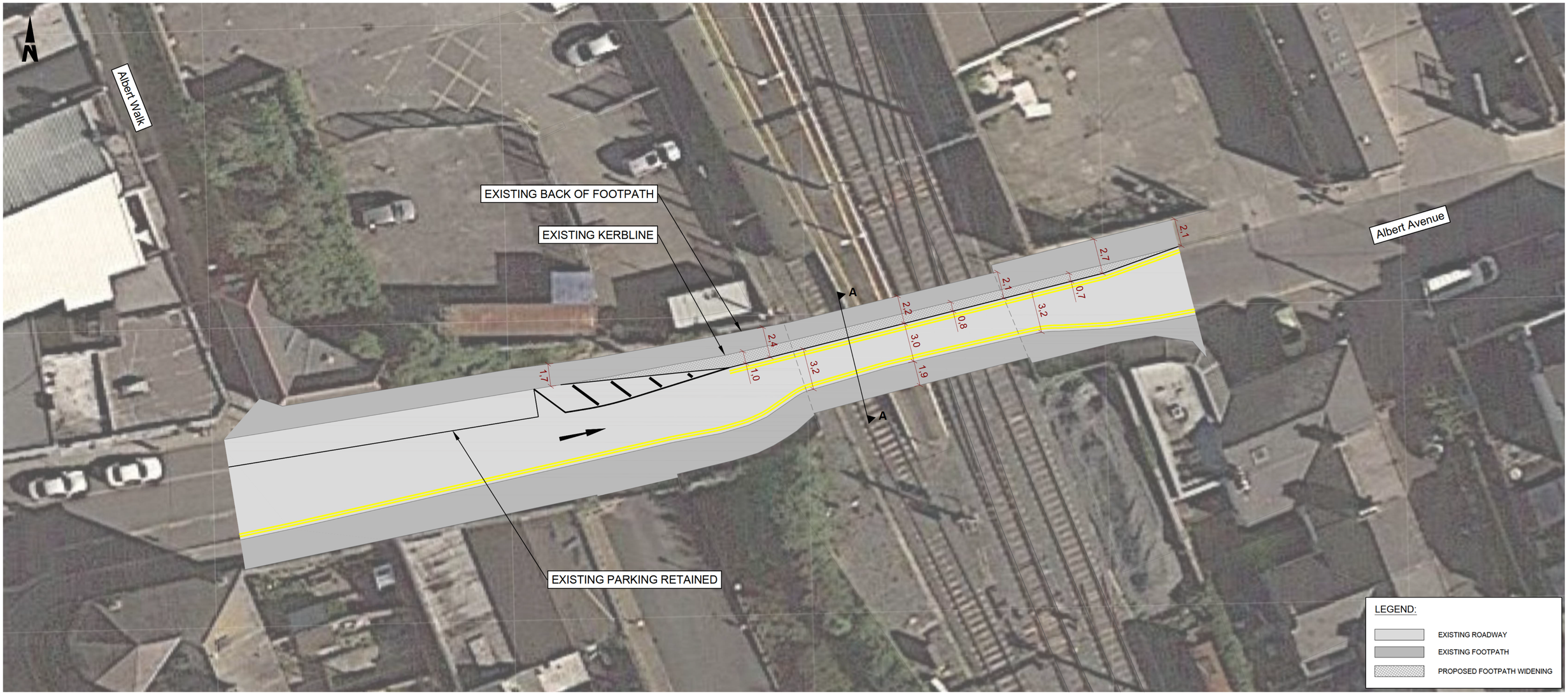

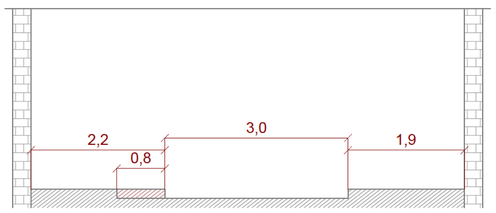

CROSS SECTION
A-A

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DART+ Coastal South

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Drawing Title: Bray Level Crossing Technical Optioneering Report Improvements at Albert Avenue Plan & Cross Section

Drawing File Name	Sheet Number	Status	Rev
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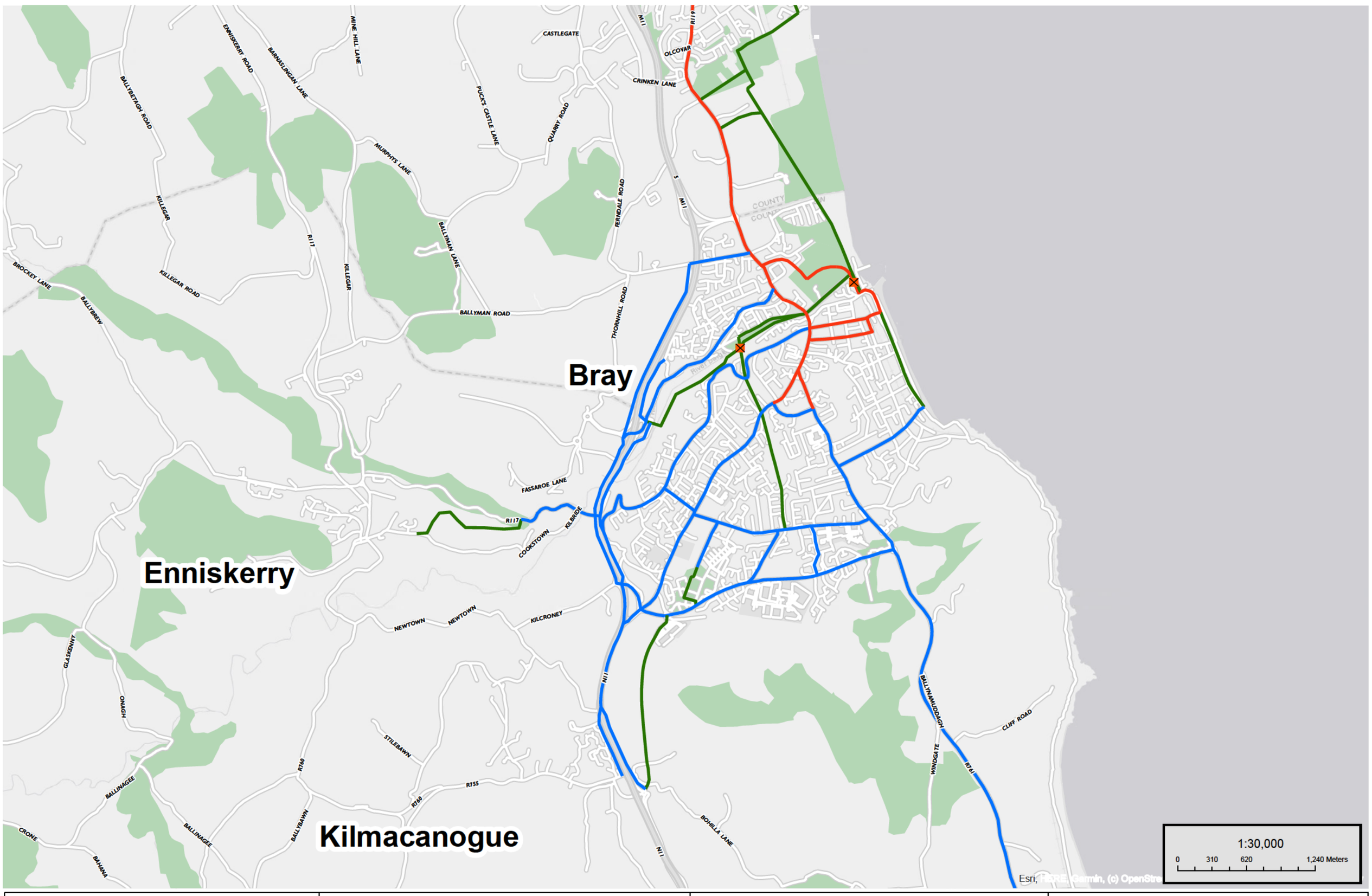
Appendix C

Greater Dublin Cycle Network Plan for the Bray Area.



Project:	Title:	Legend:	
CYCLE NETWORK PLAN FOR THE GREATER DUBLIN AREA	DRAFT GREATER DUBLIN AREA CYCLE NETWORK - BRAY & ENNISKERRY	Proposed Crossing Points Primary Radial Primary Orbital Secondary Greenway - Utility Further Study *Strategic Network Only - Lower Classifications not included*	NTA Údarás Náisiúnta Iompair National Transport Authority AECOM

Document Verification

Project title	DART+ Coastal South
Document title	Annex 3.5 Ennis Lane Level Crossing
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CONTENTS

1. INTRODUCTION 9

1.1 Packages of work 9

1.2 References 10

1.3 Option Assessment Approach 10

2. EXISTING SITUATION 11

2.1 Overview 11

2.2 Level Crossing Operation 13

2.3 Structures 15

2.4 Permanent Way and Tracks 16

2.5 Ground Conditions 17

2.5.1 Ground Investigation 19

2.6 Environmental 20

2.6.1 Traffic and transportation 20

2.6.2 Landscape and Visual Quality 26

2.6.3 Archaeology and cultural heritage 26

2.6.4 Architectural heritage 27

2.6.5 Noise and Vibration 27

2.6.6 Air quality and climate 27

2.6.7 Agricultural and non-agricultural 28

2.6.8 Geology and soils 28

2.6.9 Water resources 29

2.6.10 Biodiversity 30

2.7 Utilities 31

3. REQUIREMENTS 33

3.1 Specific requirements 33

3.2 Design standards 33

4. CONSTRAINTS 35

4.1 Technical 35

4.1.1 Level Crossing Operations 35

4.1.2 Permanent Way and Track 35

4.1.3 Geotechnical 35

4.1.4 Structures 36

4.1.5 Utilities 36

4.2 Environmental 36
4.2.1 Traffic and transportation 36
4.2.2 Landscape and visual quality 37
4.2.3 Archaeology and cultural heritage 37
4.2.4 Architectural heritage 37
4.2.5 Noise and vibration 37
4.2.6 Air quality and climate 37
4.2.7 Agricultural and non-agricultural 37
4.2.8 Geology and soils 37
4.2.9 Water resources 38
4.2.10 Biodiversity 38
4.3 Planning 39
5. OPTIONS 41
5.1 Longlist of Options for Vehicles 41
5.1.1 Option V0 – Do Nothing 42
5.1.2 Option V1 – Do Minimum: Restrict Access 42
5.1.3 Option V2.1 – Overbridge to the North 42
5.1.4 Option V2.2 – Access Road from the North 44
5.1.5 Option V2.3 – Access Road form the South 45
5.1.6 Option V3 – Remove Access Rights / Land Purchase 46
5.2 Sifting of Longlist of Vehicle Options 46
5.3 Summary of Longlist Sifting of Vehicle Options 49
5.4 Longlist of Options for Pedestrians and Cyclist Access 50
5.4.1 Option P0 – Do Nothing 50
5.4.2 Option P1.1 – Do Minimum: Close Crossing 50
5.4.3 Option P1.2 – Do Minimum: CCTV Upgrade 50
5.4.4 Option P2.1(a) – Overbridge with North-Side Ramp Access (West) 51
5.4.5 Option P2.1(b) – Overbridge with South-Side Ramp Access (West) 52
5.4.6 Option P2.2 – Pedestrian/Cyclist Underpass 53
5.5 Sifting of Longlist of Pedestrian and Cyclist Options 54
5.6 Summary of Longlist Sifting of Pedestrian and Cyclist Options 56
5.7 Shortlisted options 56
5.7.1 Option 1 59
5.7.2 Option 2a 59
5.7.3 Option 2b 59
5.7.4 Option 2c 60
5.7.5 Option 2d 60

5.7.6 Option 3a....60
5.7.7 Option 3b....61
5.7.8 Option 4a....61
5.7.9 Option 4b....61
5.7.10 Option 5a....62
5.7.11 Option 5b....62
5.8 Multi-Criteria Analysis....62
5.8.1 Methodology....62
5.8.2 MCA summary table....62
5.8.3 Economy....65
5.8.4 Safety....68
5.8.5 Environment....70
5.8.6 Integration....77
5.8.7 Physical Activity....79
5.9 Construction Consideration....80
5.9.1 Minimal or No Construction Works....80
5.9.2 Moderate Construction Complexity....80
5.9.3 High Construction Complexity....81
6. SUMMARY AND CONCLUSION....82
6.1.1 Non-preferred options....82
6.1.2 Emerging preferred option....84
6.1.3 Key risks/next steps....85
APPENDIX A....87
MCA Matrix....87
APPENDIX B....88
Emerging Preferred Option Sketch....88

Tables

Table 1-1 List of key documents associated with this report....10
Table 3-1 Design Standards....33
Table 5-1 Vehicle longlist options considered....42
Table 5-2 Sifting of Longlist of Vehicle Options (Options 0 to V2.2)....47
Table 5-3 Longlist sifting summary for vehicle options....49
Table 5-4 Pedestrian and cyclist longlist options considered....50
Table 5-5 Sifting of longlist of pedestrian and cyclist options (Options P0 to P2.2)....55
Table 5-6 Longlist sifting summary for pedestrian and cyclist options....56
Table 5-7 Matrix of compatibility between vehicle and pedestrian/cyclist options....57
Table 5-8 Shortlist of combined options taken forward to MCA....58

Table 5-9 MCA Summary table 63
Table 5-10 Overall criteria MCA summary table 64
Table 5-11 Legend for MCA Summary Table 64

Figures

Figure 2-1 Aerial view of Ennis Lane level crossing 11
Figure 2-2 Level crossing from the western side of the railway corridor (source: Arup)....12
Figure 2-3 Image of level crossing taken on the railway, looking north (source: Arup) 12
Figure 2-4 Level crossing from the eastern side of the railway corridor (source: Arup) 12
Figure 2-5 Schematic of Ennis Lane Level Crossing control system....14
Figure 2-6 Bray Head Tunnel No.4 (source: Arup) 15
Figure 2-7 Structures in the vicinity of Ennis Lane Level Crossing source:OSi Aerial Imagery16
Figure 2.8 Greystones Soil Deposits (source: Táilte Éireann Aerial Imagery)....17
Figure 2.9 Greystones Bedrock Geology (source: Táilte Éireann Aerial Imagery) 18
Figure 2.10 Greystones Hydrology (source: Táilte Éireann Aerial Imagery)....19
Figure 2-11 Pedestrian / cycle routes to/from the cliff walk via the level crossing 22
Figure 2-12 Alternative pedestrian/cycle routes to/from the cliff walk not using level crossing..23
Figure 2-13 Pedestrian/cycle routes to/from the town centre via level crossing 24
Figure 2-14 Alternative pedestrian/cycle routes to/from the town centre not using level 25
Figure 2.15 Landslide Susceptibility mapping of the Greystones area (source: Táilte Éireann imagery)....28
Figure 2.16 GSI recorded Landslide Events in the Greystones area....29
Figure 2-17 Location of Ennis Lane Level Crossing (red X) in relation to nearby European sites (blue hatching), and national sites (Orange dots)....31
Figure 2-18 Utilities in proximity of Ennis Lane Level Crossing 32
Figure 5-1 Optioneering Process for Ennis Lane Level Crossing....41
Figure 5-2 Indicative location of opti....43
Figure 5-3 Indicative location plan of the proposed overbridge 44
Figure 5-4 Location plan of Option V2.2 45
Figure 5-5 Plan location of Option V2.3....46
Figure 5-6 Indicative location plan for Option P2.1(a) 51
Figure 5-7 Indicative location plan for Option P2.1(b) 52
Figure 5-8 Indicative location plan for Option P2.2....53
Figure 5-9 Proposed cross section of underpass 54
Figure 5-10 Infrastructure solution – new access road to the south 59
Figure 5-11 Infrastructure solution – new overbridge for pedestrians and cyclists 60
Figure 5-12 Infrastructure solution - new underpass for pedestrians and cyclists 61

Abbreviations

Abbreviation	Definition
ABP	An Bord Pleanála
AONB	Area of Outstanding Natural Beauty
APIS	Authorisation for Placing in Service
APM	Aggregate Potential Mapping
CAF	Common Appraisal Framework
CAPEX	Capital Expenditure
CCE	Chief Civil Engineer's Department
CCTV	Closed Circuit Television
CGS	County Geological Site
CRR	Commission of Railway Regulation
CSO	Central Statistics Office
CTC	Central Traffic Control
DART	Dublin Area Rapid Transit
EMODnet	European Marine Observation and Data Network
EPA	Environmental Protection Authority
ESB	Electricity Supply Board
GHG	Greenhouse Gases
GSI	Geological Survey Ireland
ICPSS	Irish Coastal Protection Strategy Study
IÉ	Iarnród Éireann/Irish Rail
IEL	Industrial Emissions License
INF	Infrastructure
IPC	Integrated Pollution Control
IPPC	Integrated Pollution Prevention and Control
LX	Level Crossing
MAI	Functional Susbsystem Maintenance

Abbreviation	Definition
MCA	Multi-criteria analysis
NHA	Natural Heritage Area
NIAH	National Inventory of Architectural Heritage
NPWS	National Parks and Wildlife Service
NTA	National Transport Authority
OHLE	Overhead Line Equipment
OPE	Functional Subsystem Operation and traffic management
OPEX	Operational expenditure
OPW	Office of Public Works
OSi	Ordnance Survey Ireland
PAHs	Polycyclic Aromatic Hydrocarbons
pNHA	Proposed Natural Heritage Area
QI	Qualifying Interest
RPS	Record of Protected Structures
SAAO	Special Amenity Area Orders
SAC	Special Area of Conservation
SPA	Special Protected Area
TII	Transport Infrastructure Ireland
tph	Trains per hour
TPHs	Total Petroleum Hydrocarbons
TSS	Train Service Specification
WFD	Water Framework Directive
ZAP	Zone of Archaeological Potential

1. INTRODUCTION

The purpose of the report is to assess and identify how an appropriate level of accessibility can be provided when the frequency of the DART+ Coastal South service increases. The findings of this report will input to the Preliminary Option Selection Report. This report provides the technical assessment at Ennis Lane Level Crossing from option selection through to the Emerging Preferred Option, including the options considered and how an Emerging Preferred Option was chosen.

The report includes:

- An introduction and description of the study;
- A summary of the option assessment approach undertaken;
- A description of the existing situation;
- The relevant requirements;
- The relevant constraints;
- The option assessment containing:
  - Longlist of options;
  - Sifting of longlist of options;
  - Summary and details of the shortlisted options;
  - Multi-criteria analysis (MCA);
  - The Emerging Preferred Option.

1.1 Packages of work

This report refers to the optioneering assessment for works at Ennis Lane Level Crossing. The scope is to consider the level of accessibility at the level crossing at Ennis Lane, north of Greystones and to ensure the TSS can be reliably achieved. This report considers all feasible longlist options with a view to reducing them through sifting to produce a shortlist of options. The shortlist then goes forward to the MCA process to select the Emerging Preferred Option.

1.2 References

This report should be read in conjunction with the following related optioneering reports:

Table 1-1 List of key documents associated with this report

Annex	Title	Description
N/A	DART+ Coastal South Preliminary Option Selection Report: Main Report	This is the main report which summarises the optioneering process and the different packages of proposed works on the DART+ Coastal South project.
1	Emerging Preferred Option Maps	Includes drawings for each Emerging Preferred Option, to support the Preliminary Option Selection Report.
2.1	Policy Context	This presents a detailed review of the European, National, Regional and Local policy context for the DART+ Programme and the DART+ Coastal South Project
2.2	Useful Links	Useful links to documents/websites relating to the DART+ Coastal South project.
3.1	Constraints Report	This report reviews the DART+ Coastal South constraints
3.3	Technical Optioneering Report: Bray to Greystones Capacity Enhancement	The Technical Optioneering Report for the works between Bray and Greystones. The report addresses track and station modifications to allow for the increased number of DART services.
3.5	Technical Optioneering Report: Ennis Lane Level Crossing *(this document)*	The Technical Optioneering Report for the Ennis Lane level crossing. The report addresses the level of accessibility at the level crossing when an increased number of DART services is provided.

1.3 Option Assessment Approach

The proposed options at Ennis Lane have been assessed using the Department of Transport's Common Appraisal Framework for Transport Projects and Programmes (CAF) as the options have the potential to be geographically different from each other and have a material difference on external parties or the environment. Further details can be found in the option selection process section of the Preliminary Option Selection Report.

2. EXISTING SITUATION

2.1 Overview

Ennis Lane Level Crossing (IÉ ref XR012) is situated to the north of Greystones Station. The crossing provides a means of pedestrian/cyclist access to the Bray to Greystones Cliff Walk and vehicular access to the farmland located between the railway corridor and the sea.

An aerial view of the area immediately surrounding the level crossing is shown in Figure 2-1.

Figure 2-1 Aerial view of Ennis Lane level crossing

Figure 2-2 Level crossing from the western side of the railway corridor (source: Arup)

Figure 2-3 Image of level crossing taken on the railway, looking north (source: Arup)

Figure 2-4 Level crossing from the eastern side of the railway corridor (source: Arup)

2.2 Level Crossing Operation

A level crossing is at an interface between a railway line and the public where a physical barrier is formed to prevent access to the railway line.

Ennis Lane Level Crossing is defined as a user worked crossing and presents instructions on the gates along with a warning light system to assist users in deciding when it is safe to cross. The user worked crossing relies on the public to cross safely i.e. there is no automatic barrier which closes/locks when a train is approaching.

A schematic diagram of the crossing is provided below. The main components are as follows:

- Strike-in point: This is the point where the passage of a train is detected and initiates the warning light system (until train crosses strike-out point).
- Warning lights: Upon a user pushing the button, these are lit red if a train is approaching (i.e., has passed the strike-in point) or otherwise amber to advise caution. The warning light system is advisory and the decision is with the user as to whether it is safe to cross.

In addition to the components shown, the crossing also contains pedestrian and vehicle gates (uncontrolled) and warning signage.

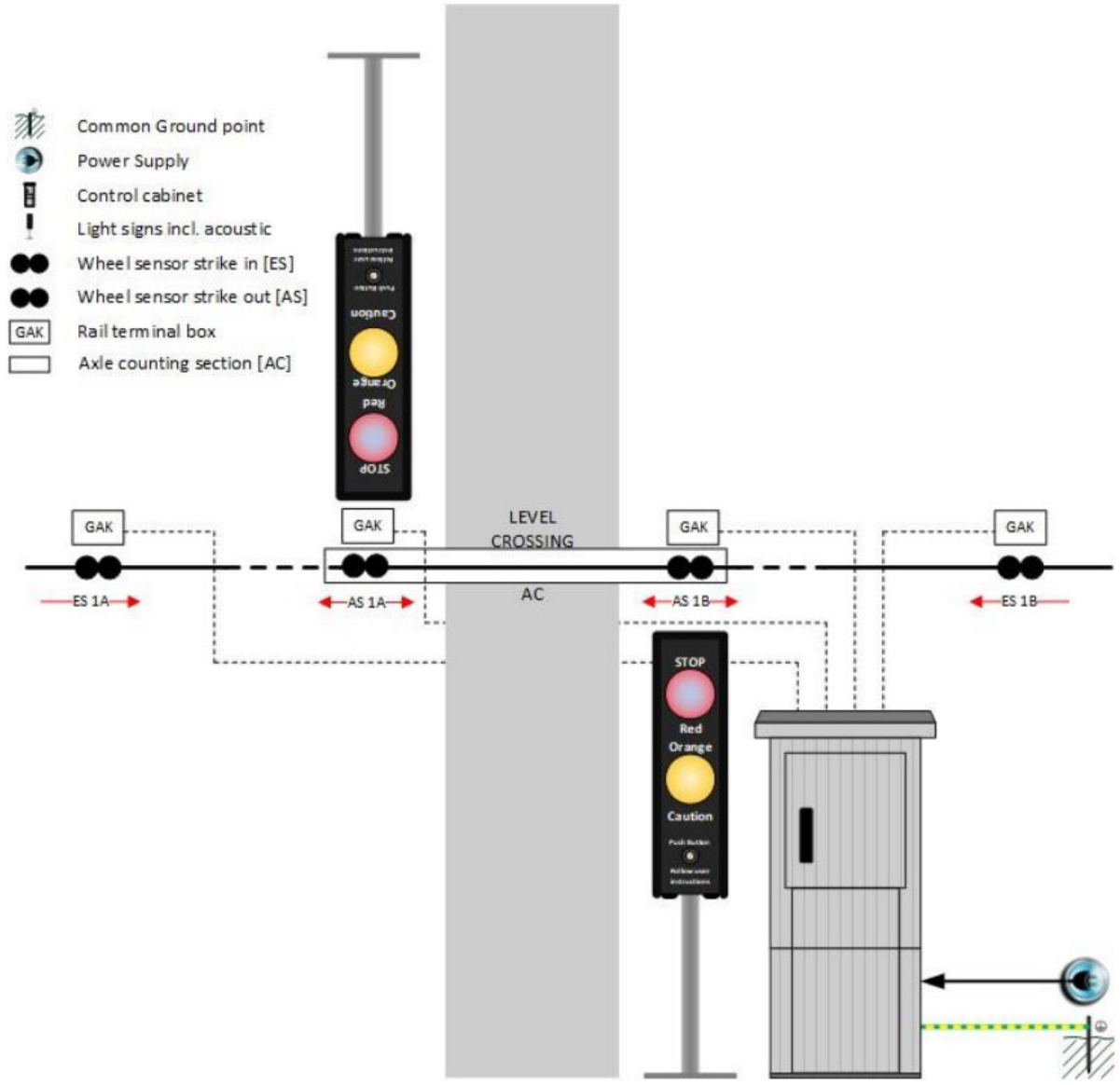


Figure 2-5 Schematic of Ennis Lane Level Crossing control system

2.3 Structures

There are 2 existing structures within the vicinity of the level crossing.

A concrete arch culvert (IÉ reference number UBR149), located approximately 160m south of the level crossing, carries a stream beneath the railway line. The culvert is approximately 1.37m wide and supports approximately 2.5m of fill embankment above the culvert.

The second structure is the railway tunnel (IÉ reference number Bray Head Tunnel No. 4), located approximately 750m north of the level crossing.

Note there is an underbridge with a clearance of 4.89m at Victoria Road (2 lanes, Underbridge UBR150 Victoria Road). Refer to the figures in Section 2.6.1 for details on how this road forms part of the pedestrian routes around the Greystones area.

Figure 2-6 Bray Head Tunnel No.4 (source: Arup)

Figure 2-7 Structures in the vicinity of Ennis Lane Level Crossing (source: OSi Aerial Imagery)

2.4 Permanent Way and Tracks

The existing railway at the level crossing consists of a single track. The operational line speed is 60mph and is electrified.

Signalling is controlled from North East CTC at Connolly Station.

2.5 Ground Conditions

A review of historic mapping indicates the land was originally agricultural fields (OSi 6" First Edition) with minimal developments within the vicinity of the site. Other features noted include Rathdown Castle (in ruins), a church (in ruins) and a stream, believed to be the Templecarrig stream running north-east to the sea on the south of the side. Later mapping from the 19th century/early 20th century (OSi 6" Last Edition and 25") shows the presence of a railway line and underpass immediately adjacent to the coastline on the east side of the castle. Aerial photography (1995) indicates that the railway line was shifted further away from the coast and the level crossing was built.

On the north-west of the site, recent aerial imagery shows residential developments and a substation related to the railway line.

The Geological Survey Ireland (GSI) Quaternary sediment and Environmental Protection Authority (EPA) National Soil mapping show the presence of Renzinas / Lithosios (BminSW) and Surface water gleys / Ground water Gleys Acidic (AminPD) soils in the north and reworked and artificial ground associated with the Greystones urban centre to the south, shown in Figure 2.8.

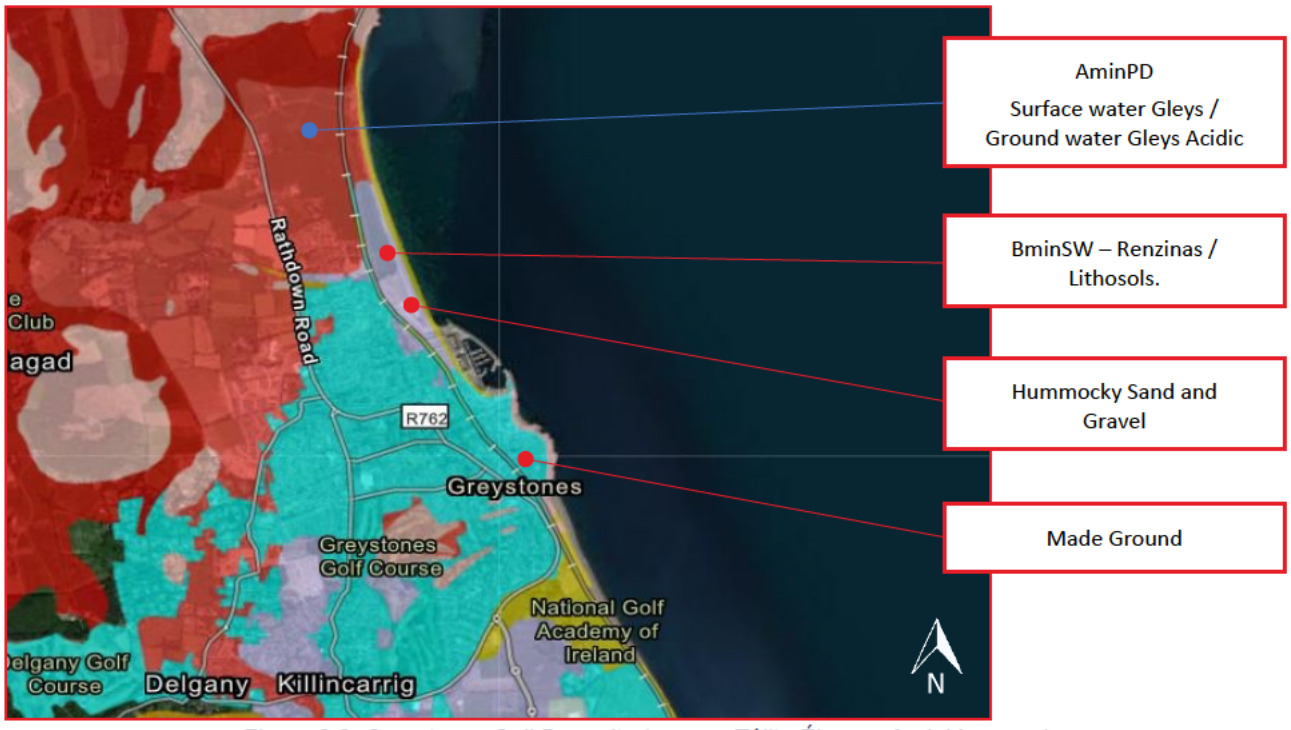


Figure 2.8: Greystones Soil Deposits (source: Táilte Éireann Aerial Imagery)

To the south of Bray Head, the GSI Quaternary sediment mapping indicates the presence of till (derived from Cambrian sandstones and shales), Irish Sea Till (derived from Cambrian sandstones and shales), gravels derived from limestones, as well as made ground to the southwest of the Templecarrig stream. Further west, alluvium materials and a glacial meltwater channel are noted in the vicinity of the stream.

The GSI bedrock mapping indicates that the soil deposits overlay the solid geology of the Bray Head Formation (Greywacke & Quartzite), as shown in Figure 2.9. Greywacke and shale of the Devils Glen Formation are noted in the northern extent of the site. The presence of an anticlinal axis (running North-East to South-West direction) is indicated approx. 160m to the south of the site. Depth to bedrock mapping is not available for this area.

The Bray Head and Devil's Glen Formations are classified as a Poor (Pl) Aquifer which is Generally Unproductive except in Local Zones, as shown in Figure 2.10. According to the GSI groundwater vulnerability mapping, the groundwater vulnerability is variable across the site, ranging from low to high. There are no significant karst features identified near the site.

EPA radon mapping indicates the railway line between Bray Head and Greystones station is in an area where the radon risk level varies from *about 1 in 20 homes in this area is likely to have high radon levels* and a*bout 1 in 10 homes in this area is likely to have high radon levels*; a small area of *about 1 in 5 homes in this area is likely to have high radon levels* is noted directly to the east of Greystones station.

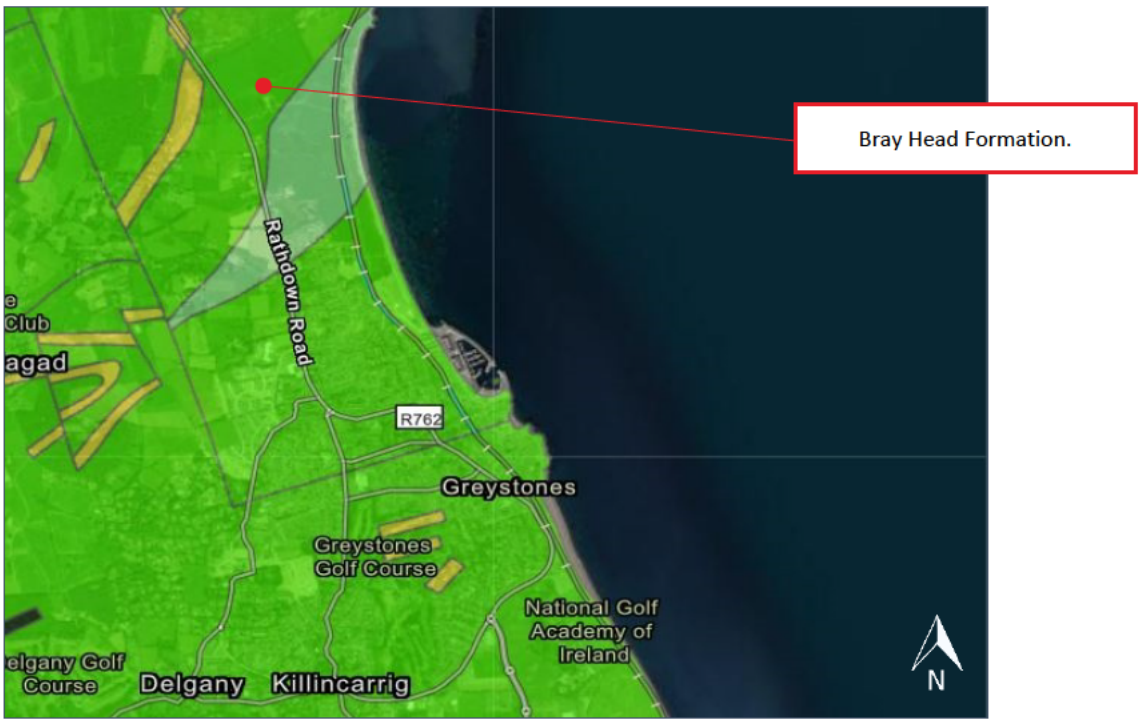


Figure 2.9: Greystones Bedrock Geology (source: Táilte Éireann Aerial Imagery)

The study area lies within the Wicklow groundwater body (IE_EA_G_076). The Wicklow groundwater body is currently at Good WFD Status for the 2016-2021 monitoring cycle but is deemed at risk of failing to meet its WFD objectives by 2027. There are no high yielding water supply springs and wells i.e., public water supplies or group water scheme supplies within the site. No Source Protection Zones associated with public, or group groundwater supply schemes are located with the site.

The EPA waterbodies mapping (2021) indicates the presence of the Paddock 10 stream (potentially the Kilruddery Stream) crossing the site at the southern portal of Tunnel 4 and the Kilruderry Deerpark stream (potentially the Templecarrig stream) approximately 200m to the south of the site in Greystones.

No historic pits, quarries or IPCC, IPC and IEL facilities were identified within 250m from both sides of the railway line at the site. Furthermore, there is no EPA licenced waste facilities and discharge points under WFD Article 5 within the site extent.

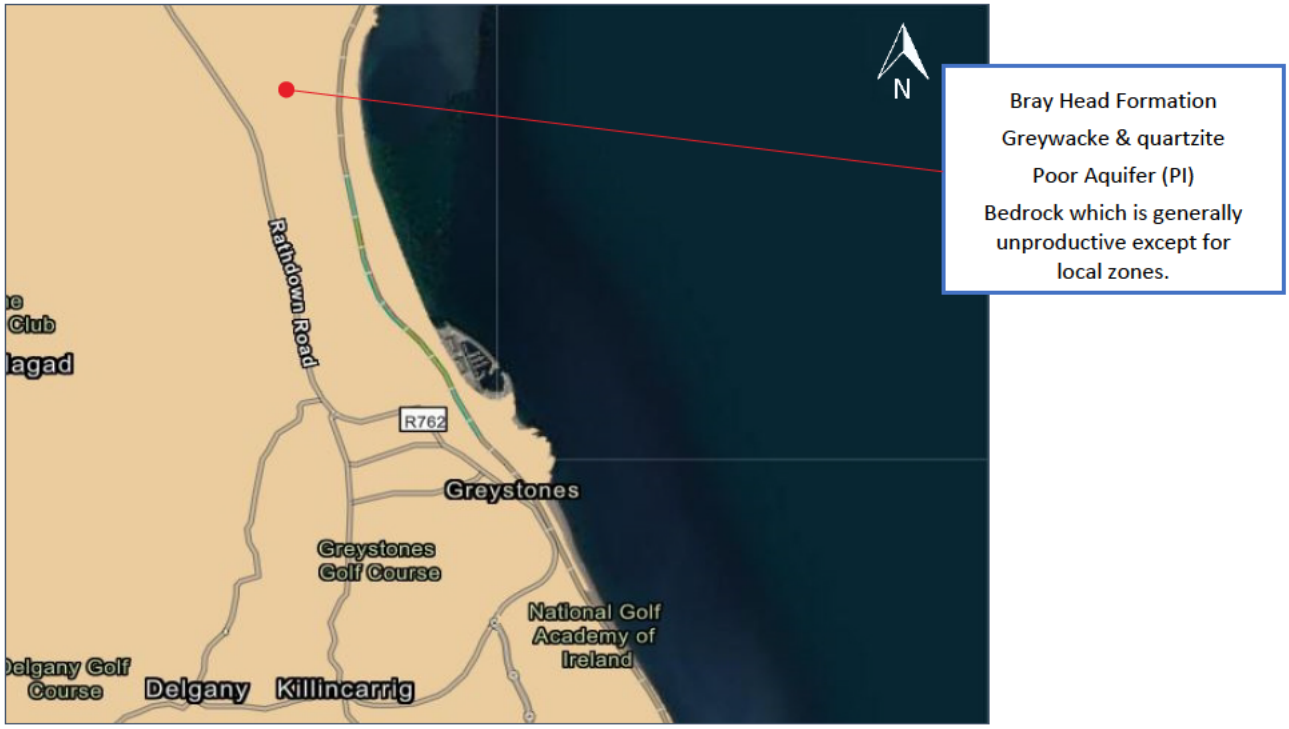


Figure 2.10: Greystones Hydrology (source: Táilte Éireann Aerial Imagery)

2.5.1 Ground Investigation

Limited ground investigation information is available on the site. That which is available is summarised below.

East Coast Railway Protection Projects (ECRIPP) (CGL, 2024):

Causeway Geotech Limited (CGL) carried out a ground investigation along, and adjacent to, the railway line south of Bray and north of Greystones Station in 2024 for proposed protection measures against coastal erosion. The GI comprised five boreholes to a maximum depth of 40 m BGL (percussion and rotary), nine window samples to a maximum depth of 5.0 m BGL with adjacent dynamic probes, one standalone dynamic probe, one foundation inspection pit, four groundwater installations, geophysical surveying (MASW, ERT), and laboratory testing (geotechnical and geo-environmental).

Off-track exploratory locations at the top of the cliff face approximately 0.25 to 1.25km north of the Ennis Lane crossing indicate topsoil generally underlain by cohesive deposits comprising firm to very stiff Clays and Silts with minor granular deposits comprising medium dense to very dense Sands and Gravels. Greywacke bedrock was encountered in two boreholes at 11.5 and 29.5 m BGL, generally dipping towards the south, however two boreholes did not encounter bedrock before terminating at 40 m BGL. Groundwater monitoring completed between January and June 2024 in four boreholes indicates variable groundwater levels ranging from 1.3 m BGL (56.4 m OD) to 38.3 m BGL (11.56 m OD), however some locations may have a tidal influence. Data loggers were installed in all boreholes, however, the result have not currently been provided. In addition, seven window samples were undertaken along Greystones beach which encountered granular deposits of medium dense to very dense Sands and Gravels to a maximum depth of 3.45m.

On-track window samples (100m south of Fiddler's Bridge and at northern portal of Tunnel 2) identified made ground comprising ballast to a maximum depth of 2.0 m BGL underlain by reworked firm Clay made ground to a maximum depth of 2.1 m BGL underlain by cohesive deposits comprised of firm Clay. Dynamic probes were completed adjacent to window samples and some low values were noted. Geophysics was undertaken along the railway line; however, the geophysical report notes issues regarding the interpretation of the data due to existing OHLE structures.

Fairfield Park Greystones Ground Investigation Report 10177B-11-20 (GII, December 2020):

Adjacent to the east side of the railway line, a ground investigation was carried out in 2020 by Ground Investigations Ireland for a proposed residential development (Fairfield Park). The works included four trial pits (1.85-3.5m BGL), six dynamic probes (5.4-6.9m BGL), three cable percussion boreholes (7.2-8.8mBGL) and geoenvironmental laboratory testing. No geotechnical laboratory testing was undertaken.

Topsoil and made ground were encountered to 0.1-0.6mBGL and 1m BGL, respectively. Loose, medium-dense and dense sand and gravel strata were encountered to of 4.2 to 7.2m BGL. A firm clay was noted in one trial pit at 2.8m BGL and a soft clay layer in one borehole from 5-6m BGL. Very stiff clay was noted from 4.2 to 7.4m BGL.

Groundwater strikes were noted at 3m, 4m, and 8.2m depths in two of the boreholes; groundwater strikes were not encountered in any of the trial pits. One groundwater monitoring installation was installed in a borehole however no groundwater monitoring data is available.

2.6 Environmental

The existing level crossing links agricultural land on the eastern side of the railway to the western side and is located approximately 1.9km to the north of Greystones Station. The crossing provides a means of vehicular and pedestrian/cyclist access to the Bray to Greystones Cliff Walk and the farmland located between the railway corridor and the sea.

The area is within the administrative area of Wicklow County Council. There are a number of residential properties on the west of the crossing. Refer to Annex 3.1 Constraints Report for details of relevant existing planning applications.

A brief overview of the baseline environment, under key environmental criteria, is provided in the following sections.

2.6.1 Traffic and transportation

The level crossing at Ennis Lane provides vehicle access for the landowner to the east of the rail line. It also provides access for pedestrians and cyclists to the Bray to Greystones Cliff Walk from Rathdown Road and in future could provide access to the proposed East Coast Greenway (see section 4.3). However, the the level crossing, in its current state, is not an ideal facility to access the proposed East Coast Greenway (given the aspiration to promote active travel and increase levels of patronage along the greenway).

The level crossing means these high-quality amenities are between 500m and 1.2km walking / cycling distance from residents west of the rail line. It is also possible for some residents to walk / cycle for 2km to/from the Greystones Town Centre, using the level crossing.

Not using the level crossing, the alternative walking / cycling distance to / from the Bray-Greystones Cliff Walk and future proposed East Coast Greenway is between 2.2km and 3.5km for residents west of the rail line. The walking distance to/from the Greystones Town Centre is 2.1km.

In terms of vehicle access, the nearest alternative is Victoria Road - a 2-lane underpass with a vehicle clearance of 4.89m that currently allows vehicle access to the seafront, including the Greystones Town Centre. The Victoria Road access however does not allow vehicle access to the fields and land immediately east of the railway land.

Figures 2-7 to 2-10 below demonstrate how pedestrians and cyclists can access the town centre or cliff walk using the level crossing when open or closed.

Figure 2-11 Pedestrian / cycle routes to/from the cliff walk via the level crossing

Figure 2-12 Alternative pedestrian/cycle routes to/from the cliff walk not using level crossing

Figure 2-13 Pedestrian/cycle routes to/from the town centre via level crossing

Figure 2-14 Alternative pedestrian/cycle routes to/from the town centre not using level crossing

2.6.2 Landscape and Visual Quality

The site is located north of Greystones, in proximity to residential houses, coastal cliffs and shingle beach, amenity grasslands, and agricultural fields. Residential areas off The Grove, Rathdown Road, Ennis Lane, and at North Shore, St. Crispin's and Redford Park lie west of the railway and the level crossing. The site of St. Crispin's Cell (Church) and associated former graveyard is located west of the railway and southwest of the level crossing. Areas east of the railway and the level crossing comprise a narrow coastal plain which includes the Bray to Greystones Cliff Walk and the site of the ruin of Rathdown Castle.

The site and surrounding residential areas are located within the lower sensitivity Greystones / Delaney 'Urban Area' on the Wicklow Landscape Category mapping. The coastal area to the north is part of the higher sensitivity Coastal Areas', 'Area of Outstanding Natural Beauty' (AONB).

Protected 'Prospects of Special Amenity Value or Special Interest' are identified along the Bray to Greystones Cliff Walk, which passes immediately adjacent to the railway / level crossing. There are no protected 'Views of Special Amenity Value or Special Interest' pertaining to the site or immediate surrounds. There are no protected trees or groups of trees in the vicinity of the site.

The Bray Head Special Amenity Area extends south along the coastal edge / beach to where Ennis Lane meets the coast.

2.6.3 Archaeology and cultural heritage

The lands proposed for improvement works are located to the north and east of St Crispin's Cell (Church and graveyard) (WI008-012001 /002) and traverse the site of Rathdown Castle (WI008-011) and moated site (WI008-011001). These sites have been the subject of a historical and archaeological study, which has resulted in the identification of many other associated and ancillary archaeological sites in the fields west of St. Crispin's Cell. And the identification of a deserted medieval settlement to the north of the castle site (WI008-011002).

Rathdown is first referred to in the Annals of the Four Masters in the year 3501 Anno Mundi. This refers to a Rath Oinn, in the territory of Cualann, being erected by Heremon. The Ordnance Survey letters of Eugene Curry, from 1838, state that the rath was still visible to the south and east of the castle (Smal 1993).

At the time of the Norman invasion, this area was the stronghold of Donnall MacGillamohomloc, who was married to Dervorgil, a daughter of Diarmait MacMurchadha. MacGillamohomloc fought alongside the Normans against the Dublin Norse in 1171.

Henry II retained MacGillamohomloc's territories as a royal demesne, with MacGillamohomloc as tenant. In 1207, Donnall MacGillamohomloc's son Dermot received a grant of his father's lands from King John in fee by the service of one knight. When Dermot died, his son John was a minor, and his lands were taken in charge by the king until he came of age. John married Claricia, daughter of Gilbert Fitzgriffin, who was a nephew of Raymond Le Gros. His descendants held Rathdown until 1308, when it was sold to Nigel Le Brun.

The lands at Rathdown were burned by the O'Tooles and O'Byrnes in 1301 and 1310. In 1482, Gerald Fitzmorce, Eighth Earl of Kildare, put members of his family in possession of Rathdown (Price 1957).

The castle and lands were granted to Peter Talbot, a noted defender of the Pale, in 1536, by Henry VIII. In 1622, Bernard Talbot succeeded to these lands, and the Down Survey of 1657 referred to the fact that ten cottages remained in the village, but that the castle was in ruins.

The next owner was a Col. Tarrant, who had the village, parish church and graveyard all razed, and the remains from the graveyard interred in a large pit, which had been dug for the purpose (O'Flanagan 1928). The lands were redistributed after the Cromwellian Wars. A grant, dated 16 August 1666, gave the lands to a Welshman, Col. Richard Edwards. His descendants sold it to the La Touche family.

The castle was levelled during the construction of the railway in 1854–56. The site of the castle is now partially occupied by a decommissioned sewage treatment plant built by Wicklow Co. Co. in 1975 and a post-medieval limekiln. The moated site (WI008-011001) enclosed the castle and appears as a square shaped enclosure defined by a ditch with a causeway to the north.

The church is known locally as St Crispin's Cell, and the remains consist of a small single cell church with square-shaped porch at the west end. The walls are well preserved and built with rubble and granite with quartzitic quoins. A geophysical survey undertaken in 2016 identified several responses including rectilinear ditched features, perhaps indicative of a small field system. Curvilinear trends in the gradiometer data and fragmented high resistance responses in the resistance survey are evident to the north of the church. These may represent an outer enclosure of the church, although this is speculative' (Leigh 2016).

2.6.4 Architectural heritage

In terms of architectural heritage, the land sits north and east of St Crispin's Cell (Church and graveyard) (WI008-012001 /002 and RPS 08-67). There is some old walling in the vicinity of Ennis Lane. This is an old wall evident on historic mapping including the first OS map. Other constraints include the remains of old railway line and Rathdown Castle (RMP WI008-011).

2.6.5 Noise and Vibration

The level crossing at Ennis Lane has detached residences to the north-west, and open land to the north-east, and south. The detached houses to the north-west may have to be considered during any works to ensure the acoustic amenity of the houses is preserved.

2.6.6 Air quality and climate

As defined in the air quality standards regulations (SI 180 of 2011), Greystones is located in Zone D. Based on monitoring completed by the Environmental Protection Agency (EPA) in 2020, pollutant concentrations are in compliance with air quality standards in Zone D.

The main local sources of air pollution in Greystones are traffic and home heating.

In 2021, the EPA reported that Greenhouse gas (GHG) emissions in Ireland decreased 3.6% in 2020. The decrease in emissions is reflected in most sectors with the exception of increases in residential, agriculture and public services. Despite the decrease, Ireland is still not on the pathway required to meet future targets and a climate neutral economy. These targets are set out in the Climate Action and Low Carbon Development Act 2015, as amended, which legally binds Ireland to net-Zero emissions no later than 2050, and to a 51% reduction in emissions by 2030.

2.6.7 Agricultural and non-agricultural

Land between Bray Head and Greystones crosses agricultural land (one tillage farm) for approximately 1.5km before entering the urban area of Greystones. The tillage farm in this location is of medium sensitivity. Access to the farmland on the eastern side of the railway is via the Ennis Lane Level Crossing. This is the only means of vehicular access currently.

2.6.8 Geology and soils

The expected ground conditions are detailed in Section 2.5.1.

The geological mapping for the area indicates that the soils and geology of the area comprise of gravels derived from limestones and Irish sea till derived from Cambrian sandstones and shales; made ground is likely present from the construction of the rail line and has been also been identified within 250m (to the south). The underlying bedrock is greywacke and quartzite of the Bray Head formation.

The Corine Land Cover 2018 categorises the land use in the area as artificial surfaces with discontinuous urban fabric. Furthermore, part of the region within 250m from the site is classified as agricultural areas with non-irrigated arable land.

GSI Landslide Susceptibility mapping indicates that there is a low to high landslide susceptibility in the Greystone area, as shown in Figure 2.15. The areas with highest susceptibility to landslides are immediately south of Bray Head. The GSI Landslide Events mapping records three previous landslides adjacent to the railway line immediately south of Bray Head, as shown in Figure 2.16.

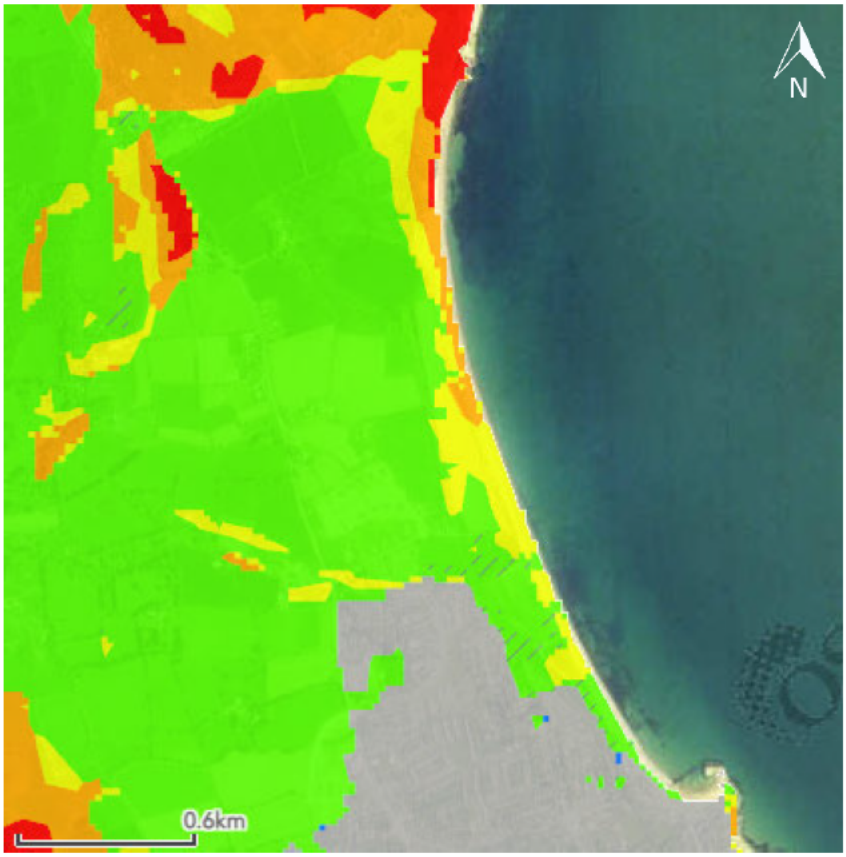


Figure 2.15: Landslide Susceptibility mapping of the Greystones area (source: Táilte Éireann aerial imagery)

Figure 2.16GSI recorded Landslide Events in the Greystones area

The APM Granular Aggregate Potential map indicates that the site is classed as high potential.

Greystones Beach CGS (Site Code WW036) is approximately 200m from the site. The site has been recommended as a Geological Natural Heritage Area (NHA).

The EMODnet geology map indicates that Greystones Beach, located approximately 200m to the east of the study area, is classed as a region with coastal behaviour associated to erosion (coastal retrogradation) based on the coastal migration rate. Additionally, the ICPSS National Coastal Erosion map indicates that the 2050 Coastal Erosion Line is located approximately 150m to the east of the site.

Three geological heritage areas are located adjacent to the site. They are:

- Greystones Beach (WW036) located along the coast between the Bray Head and Ennis Lane;
- Greystones (Appinite) (WW035) located to the north-east of Greystones station; and
- Wicklow-Greystones Coast (WW060), located adjacent to Greystones station.

2.6.9 Water resources

Surface water bodies

The study area lies in the Kilruddery_Deerpark_010 river sub-basin which is in the Newcastle [Wicklow]_SC_010 river sub-catchment. The Templecarrig Stream, which is one of the channels of the Kilruddery_Deerpark_010 river sub-basin, flows from west to east approximately 150m to the south of Ennis Lane Level Crossing.

The Kilruddery_Deerpark_010 watercourse discharges to the Southwestern Irish Sea – Killiney Bay (HA10) coastal waterbody. The coastal waterbody is part of the Bray Head SAC and pNHA located approximately 150m to the east of Ennis Lane Level Crossing and close to the outflow of the Templecarrig Stream. One of the conservation objectives of the Bray Head SAC relates to the physical structure: functionality and hydrological regime. The objective targets include no alteration to natural functioning of geomorphological and hydrological processes, including groundwater quality, due to artificial structures.

The Water Framework Directive (WFD, 2000/60/EC) "Ecological Status" of the Kilruddery_Deerpark_010 is unassigned and under review. The Southwestern Irish Sea – Killiney Bay (HA10) coastal waterbody is classified as High status and Not at Risk of failing to achieve its objectives. The WFD the minimum objectives for a water body are to achieve at least Good status (or Good potential for artificial/ highly modified water bodies) and no deterioration of existing status.

Groundwater

The site is underlain by the Bray Head and Devil's Glen Formations and are classified as a Poor (Pl) Aquifer which is Generally Unproductive except in Local Zones. According to the GSI groundwater vulnerability mapping, the groundwater vulnerability is variable across the site, ranging from low to high. There are no significant karst features identified near the site.

The study area lies within the Wicklow groundwater body (IE_EA_G_076). The Wicklow groundwater body is currently at Good WFD Status for the 2013-2018 monitoring cycle and currently Under Review with regard to achieving its WFD objectives.

There are no high yielding water supply springs and wells i.e. public water supplies or group water scheme supplies within the site. No Source Protection Zones associated with public or group groundwater supply schemes are located with the site.

Flooding

Historical flooding has been assessed by examining reports and maps from the OPW's National Flood Hazard mapping. The area along the Templecarrig Stream located approximately 150m to the south of the Ennis Lane Level Crossing is an area of high probability of fluvial flooding. Ennis Lane Level Crossing is shown to be at low risk of fluvial flooding when allowing for climate change (High End Future Scenario). Along the coastline, approximately 150m to the east of the site, there is a high probability of coastal flooding.

There are no historical flood events recorded in the area.

2.6.10 Biodiversity

The works locations are focused on the existing level crossing at Ennis Lane, Greystones, Co. Wicklow, with some options including works nearby in 'Darcy's Park', adjacent to the Ennis Lane level crossing. All the locations are located north of Greystones, in proximity of residential houses, coastal cliffs and shingle beach, amenity grasslands, and agricultural fields.

The nearest designated sites to the proposed works area are the Bray Head Special Area of Conservation (SAC), and Bray Head proposed Natural Heritage Area (pNHA), both located c. 180m east of the level crossing at Ennis Lane.

Figure 2-17 Location of Ennis Lane Level Crossing (red X) in relation to nearby European sites (blue hatching), and national sites (Orange dots)

2.7 Utilities

Utility records have been gathered from the utility providers in the area. At the time of writing, lineside cable information was not available and as such shall be excluded from these records. The following utility companies have infrastructure within the area of interest:

- ESB;
- BT Ireland;
- Irish Water;

All utility records should be considered indicative only and must be verified prior to any intrusive works occurring. There are no utility crossings in the area around the level crossing.

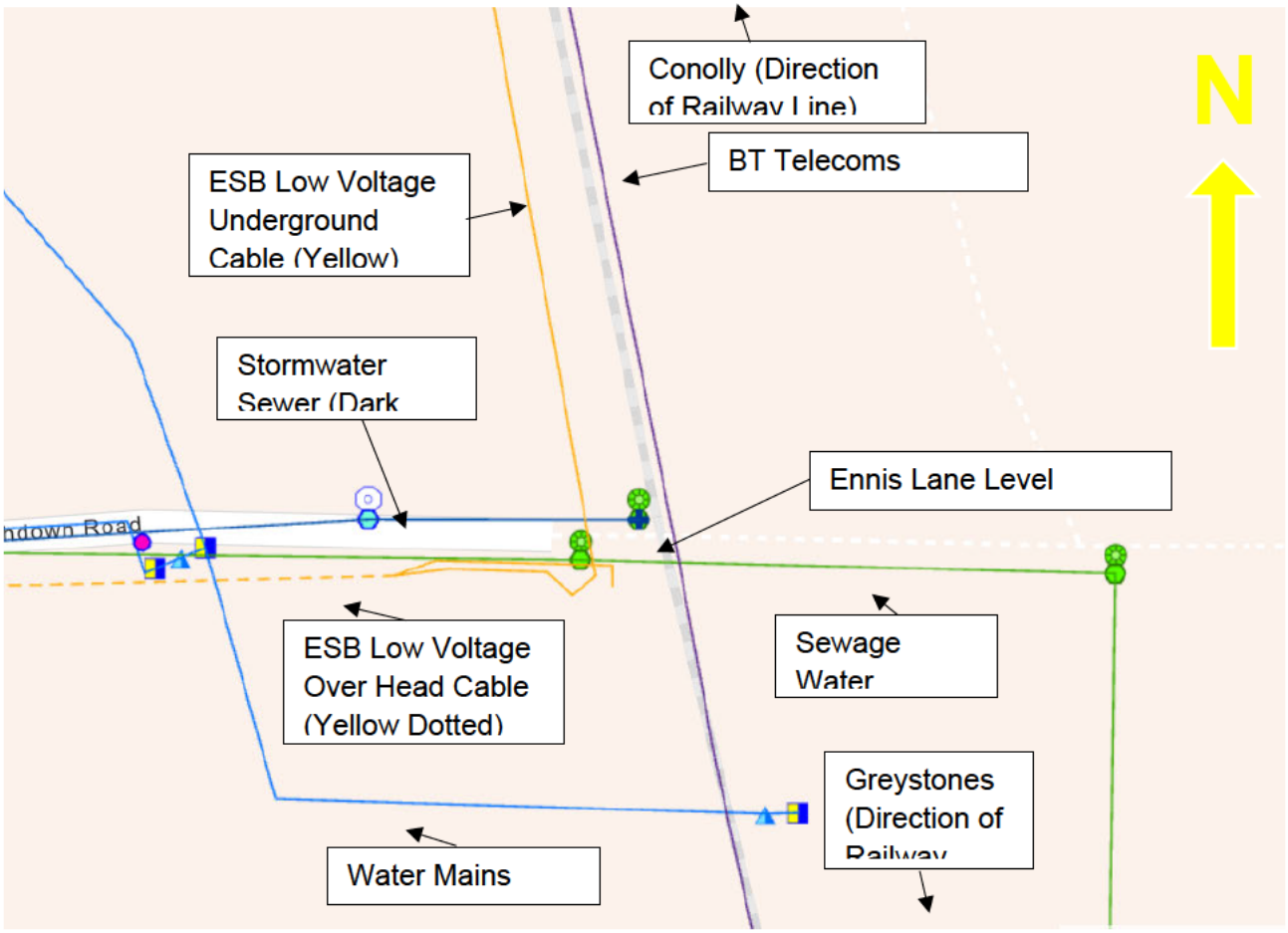


Figure 2-18 Utilities in proximity of Ennis Lane Level Crossing

3. REQUIREMENTS

The project objective to increase rail capacity in the area whilst meeting the requirement to provide an appropriate level of accessibility across the rail corridor provides the fundamental challenge of this study.

With the project objective to increase rail capacity in the area, mitigation solutions will need to be implemented to reduce the risk to users due to increased rail traffic. Rail traffic is to increase from 2 trains per hour per direction (tphpd) to 3 tphpd. This involves introducing a short section of new double track between the tunnel north of the level crossing and Greystones. Please refer to Annex 3.3: Technical Optioneering Report: Bray to Greystones Capacity Enhancement.

3.1 Specific requirements

There are no specific requirements relating to crossing opening times other than to provide an appropriate level of accessibility.

3.2 Design standards

Table 3-1 contains some of the applicable standards that will be used to develop the design. This list of standards is not exhaustive and other standards may be used.

Prior to completing the detailed design, Arup will undertake a fully detailed risk assessment in accordance with The Commission of Railway Regulation (CRR) mandatory requirements as set out within the documents listed below:

- CRR-G-009-G: Guideline for the Process of Authorisation for Placing in Service of Railway Sub Systems;
- CRR-G-009-G Sections 2.2.3 – 2.2.4: Guideline providing List of Parameters and Requirements for Authorisation for Placing in Service (APIS) of Heavy Rail INF & related OPE/MAI Parameters.

Table 3-1 Design Standards

Source	Description	Comments
Government of Ireland	Transport Act 1950	Section 15 - general duties of CIÉ
Government of Ireland	Railway Safety Act 2005 (the 2005 Act)	Section 36 – general duties of a railway organisation
Dept. of Public Expenditure and Reform	National Development Plan (2018-2027)	
TII	DN-GEO-03036	Cross Sections and Headroom

Source	Description	Comments
TII	DN-GEO-03040	Subways for Pedestrians and Pedal Cyclists Layout and Dimensions
Irish Rail	I-PWY-1101	Requirements for Track and Structures Clearances
Irish Rail	CCE-TMS-300	Track Construction Requirements and Tolerances
Irish Rail	CCE-TMS-340	Horizontal Curvature Design
Irish Rail	CCE-TMS-341	Vertical Curvature Design
Irish Rail	CCE-TMS-344	Requirements for Undertrack Crossings and Pressure Pipelines
Irish Rail	CCE-TMS-380	Technical Standard for the Management of User Worked Unattended Level Crossings
Irish Rail	CCE-TMS-382	Decision Support System at User Worked Crossings
Irish Rail	CCE-TMS-410	Civil Engineering Structures Design Standard
Irish Rail	CCE-TRK-SPN-007	Specification for Track Ballast
Irish Rail	CCE-TRK-SPN-021	Specification for Permanent Way Signs
Irish Rail	MAY-MDC-ELE-DART-SP-E-0002	Electricity Functional Specifications System-Wide
Irish Rail	MAY-MDC-TEL-DART-SP-Y-0001	Telecommunications Generic Functional Requirement Specification DART Wide
Irish Rail	MAY-MDC-SIG-DART-SP-E-0001	Signalling Functional Requirements Specifications System-Wide
Irish Rail	MAY-MDC-LVP-DART-SP-E-0001	SET Electricity Functional Specifications System-Wide for LV Power

4. CONSTRAINTS

This section describes the constraints that are relevant to this package of work.

4.1 Technical

The technical constraints are described in the following sub-sections.

4.1.1 Level Crossing Operations

The presence of the Ennis Lane level crossing is a key constraint to meeting capacity and frequency increase. Currently trains have to approach the user worked level crossing at caution, which restricts the train from running at the linespeed. With the proposed frequency of service increasing from 2 tphpd to 3 tphpd, the time that the level crossing is clear for users to cross will reduce. Subject to the design development for the EPO for the Bray to Greystones (refer to Annex 3.3 for further details), the possible introduction of a second track may be required at this location, therby significantly increasing the risk profile for users of the crossing by introducing a greater crossing distance, the possibility of trains approaching in multiple directions and affecting sighting.

4.1.2 Permanent Way and Track

The possibility of introducing of a second track at this location (further details in Annex 3.3) would necessitate reconstruction and widening of the crossing.

The knock-on impacts of introducing a second track are as follows:

- The traffic light system (Decision Support System) at the level crossing is not authorised for use on a double line level crossing.
- Longer crossing time is needed across the level crossing requiring longer viewing distances which are not available. This increases the risk for users of the level crossing.
- Currently the user can assume that there will not be another train immediately after the passage of a train on a single line. This will not be the case when there is a double line, where there can be another train approaching from the other direction which may be concealed by a train which has just passed, as this level crossing is on a curve.

4.1.3 Geotechnical

Based on the desk study information, there is the risk of made ground and contamination due to the historic and industrial use of the site as a railway. Subsequently, material excavated during the works may not be suitable for reuse on site and, subject to testing, may require disposal or recovery to a suitably licensed facility.

There is no ground investigation information at the location. Based on the preferred option chosen, a site-specific ground investigation will be required to investigate the current ground and groundwater conditions. The GI's scope and timing will be considered based on the preferred option and the level of works required for it.

4.1.4 Structures

This area currently accommodates a one-track railway. Any reconfiguration of the horizontal track alignment or increase in the number of tracks may require alteration to the River outflow Culvert UBR149.

4.1.5 Utilities

Existing utilities are a constraining factor to the project when considering the various design options. It is often cheaper, easier, and quicker for a project to change the design than to divert a utility. Existing utilities should be taken into consideration from an early stage in the project, and where possible worked around and only diverted where necessary.

Utility locations should be taken into consideration when constructing or designing bridges, underpasses, or automatic barrier crossings, as this may require utilities in the area to be diverted. Any construction work taking place in the vicinity of the level crossing must take the existing lineside and telecommunication cables into consideration. Appropriate arrangements must be made with Irish Rail, ESB, BT Ireland, Irish Water, and the local county council.

Currently the only known utilities in the vicinity are comprised of telecommunication, ESB low voltage power cables, Irish Water pipes, storm water and foul water infrastructure. Approximately 120m north-west of the level crossing and in the farmland to the east of the railway corridor are high voltage ESB cables. At time of writing lineside cable records were not available.

4.2 Environmental

For an overview of the existing environmental constraints for DART+ Coastal South, refer to Annex 3.1 Constraints Report.

Section 2.6 above describes the baseline environment for the various options being considered under this package of work. Building on this information, the key constraints associated with the options being considered are summarised below under the various environmental criteria.

4.2.1 Traffic and transportation

Ennis Lane Level Crossing presents some mobility and accessibility constraints to the movement of vehicles, pedestrians, and cyclists. These include pedestrian and cyclist access to the Bray to Greystones Cliff Walk / Proposed East Coast Greenway and the Greystones Marina; as well as vehicular access to the farmland to the east of the rail line.

An alternative crossing exists at Victoria Road, about 1km to the south. However, maintaining provision of pedestrian and cycling accessibility across the rail line and to maintain vehicular accessibility to the farmland at this location may be required. Accessibility to emergency services in terms of minimum response time should also be considered.

The current user worked crossing arrangements present some constraint to existing users, especially the less able bodied who may find the existing arrangements a barrier to accessing the coastal path.

4.2.2 Landscape and visual quality

The following features are of landscape and visual quality and sensitivity:

- The open nature of the coastal plain (area of outstanding natural beauty) to the east of the railway;
- The north south Bray to Greystones Cliff Walk with associated protected prospects;
- The Bray Head Special Amenity Area;
- Residential areas / properties west of the railway; and
- Cultural landscape around St. Crispin's Cell and surrounds west of the railway.

4.2.3 Archaeology and cultural heritage

Given the archaeological remains and the rich history the townland of Rathdown Upper, the lands, even though they have experienced some level of disturbance, are considered to be of great cultural heritage significance.

4.2.4 Architectural heritage

In terms of architectural heritage, there is some old walling that could be impacted by some options. This is an old wall evident on historic mapping including the first OS. Other constraints include the remains of old railway line and Rathdown Castle (RMP WI008-011) and St Crispin's Cell (Church and graveyard) (WI008-012001 /002 and RPS 08-67).

4.2.5 Noise and vibration

As noted earlier the level crossing at Ennis Lane has detached residences to the north-west, and open land to the north-east, and south. The detached houses to the north-west will have to be considered during any works to ensure the acoustic amenity of the houses is preserved.

4.2.6 Air quality and climate

Residential properties in the vicinity of Ennis Lane Level Crossing should be considered. There is potential for air quality impacts during construction.

4.2.7 Agricultural and non-agricultural

Access to the farmland on the eastern side of the railway will have to be considered.

4.2.8 Geology and soils

Based on the historic and industrial use of the site as a railway, there are likely to be some sources of contamination within the made ground throughout the study area.

There is one geological heritage area on the site and three adjacent to the site. Depending on the preferred option, consultation with the Geological Survey Ireland as part of the planning phase will be required.

As described in Section 2.6.8, landslide susceptibility is variable across the study area with previous landslide events recorded in the Bray Head area and north of Greystones.

As stated in Section 2.6.8, the site is adjacent to Greystones Beach which is classed as a region with coastal behaviour susceptible to erosion based on the coastal migration rate.

Further constraints at the location include Architectural (denoted as Recorded Monuments & Zones of Notifications - Section 12), Special Area of Conservation (SAC), Proposed Natural Heritage Area (pNHA) and Geological Heritage sites within a 250m from the site.

4.2.9 Water resources

The constraints to the development in terms of water resources include the Templecarrig Stream, Southwestern Irish Sea - Killiney Bay (HA10) coastal waterbody and the protected Bray Head SAC and pNHA. The crossing could be within the fluvial flood extents from Templecarrig Stream in the future due to climate change. The underlying Poor aquifer is also considered to be a constraint, however as it is considered to be of low importance any impact on the aquifer is considered to be imperceptible and therefore it will not be considered within the MCA. The constraints identified may be impacted by changes to the hydrogeological and hydrological regime or as a result of changes in water quality.

4.2.10 Biodiversity

The key ecological constraint in this area is the Bray Head SAC, which is designated for terrestrial and coastal habitats, and the overlapping pNHA designation. These designated areas are of international and national biodiversity importance.

The qualifying interests (reasons for designation) of the Bray Head SAC, are listed below:

- 1230 Vegetated sea cliffs of the Atlantic and Baltic coasts
- 4030 European dry heaths
- Other potential ecological constraints include:
- [redacted]
- Interactions with the underlying groundwater body which has the potential for impacts on species and habitats that rely on groundwater fed ecosystems
- Changes to the hydrological regime as a result of run-off from proposed activities into the receiving environment

4.3 Planning

Ennis Lane Level Crossing is located within the Greystones-Delgany and Kilcoole Local Area Plan (LAP) 2013-2019, which was originally scoped for a six-year period and subsequently extended beyond its stated duration. Although the LAP has now expired, it remains the most relevant statutory land use framework for the area pending the adoption of an updated plan or framework.

To provide interim guidance following the expiry of several LAPs, Wicklow County Council is preparing a series of Local Planning Frameworks (LPFs). These LPFs are intended to replace previous LAPs and ensure consistency with the Wicklow County Development Plan 2022–2028. They will be adopted as formal variations under Section 13 of the Planning and Development Act 2000 (as amended) and will guide the future sustainable development of individual settlements.

A Draft LPF for Greystones–Delgany and Kilcoole was published as Variation No. 4 to the County Development Plan and issued for public consultation from May to June 2025. In parallel, a new Greystones–Delgany and Kilcoole LAP (2025) is being prepared. Until the new LAP is adopted, the original 2013–2019 LAP remains the most relevant reference framework for planning purposes.

The aim of the Greystones–Delgany and Kilcoole LAP is to enhance and facilitate the balancing of economic, social and environmental infrastructure in order to maintain and develop a high quality of life without compromising the protection of the environment and the needs of future generations. The Plan recognises that Greystones is served by the DART and a substantial park and ride facility.

At the time of adoption, the plan noted:

“While the DART service averages one train per half hour, limitations of track capacity are constraining an increase in the frequency of services.”

A key vision of the Plan’s vision for Greystones is:

“Greystones is to develop in a sustainable manner at a relatively large-scale in accordance with its role as a county significant ‘growth’ town. The town shall provide a high order economic and social function and shall capitalize on its accessible location with good road, bus and DART/rail links to the Dublin metropolitan area….”

Policy TS11: is particularly relevant:

To provide for the development of sustainable modes of transportation within the plan area including public transport, walking and cycling, in particular to provide high quality pedestrian and bicycle links between residential areas and retail, recreation and education facilities. The Council will facilitate the following:

- works required to upgrade the frequency and capacity of existing DART services.

The DART+ Coastal South project is consistent with the policies and zoning objectives of the LAP. It supports the overall strategy to improve DART services, enhance modal shift to public transport, and maintain access to high-quality rail infrastructure for communities in Greystones and Kilcoole.

There are no policies, objectives or designated areas within the LAP that would be adversely impacted by the proposed works at Ennis Lane Level Crossing.

The proposed East Coast Greenway would pass in the vicinity of the site. At approximately 20km in length, the route would extend from the southern end of the Bray to Greystones Cliff Walk at Greystones Harbour, down to Wicklow town.

5. OPTIONS

The options for the Ennis Lane Level Crossing have been divided into two categories:

1. Vehicle access
2. Pedestrian and cyclist access

Separate options were developed for each category and evaluated through a longlist sifting process to produce shortlists for both. A compatibility assessment was then carried out to identify feasible combinations of vehicle and pedestrian/cyclist options. These combined options are taken forward to the Multi-Criteria Analysis (MCA).

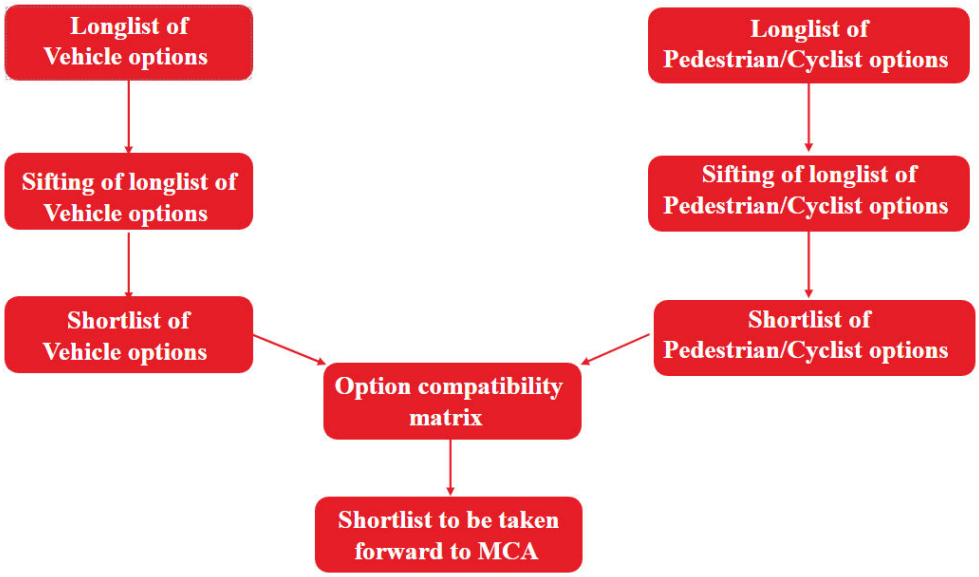


Figure 5-1 Optioneering Process for Ennis Lane Level Crossing

5.1 Longlist of Options for Vehicles

This section outlines the vehicle access options considered for Ennis Lane Level Crossing. A detailed description is provided for those that proceed to the shortlist. The options are summarised in Table 5-1 below.

Table 5-1 Vehicle longlist options considered

Option	Description
V0	Do nothing: Leave the level crossing open as is.
V1	Do Minimum: Keep the crossing open only for IÉ, the landowner (east of the railway), and emergency vehicles.
V2.1	New Infrastructure: Build an overbridge north of Ennis Lane.
V2.2	New Infrastructure: Construct a new access road from the north.
V2.3	New Infrastructure: Construct a new access road from the south.
V3	Remove vehicle access rights to the farmland, or IÉ to purchase the land.

5.1.1 Option V0 – Do Nothing

The crossing remains unchanged, providing ongoing access for vehicles, pedestrians, and cyclists. No infrastructure works are proposed.

5.1.2 Option V1 – Do Minimum: Restrict Access

The crossing remains open but is limited to IÉ, the landowner, and emergency vehicles. No major infrastructure is required, though minor improvements to vehicle controls at the crossing are included.

5.1.3 Option V2.1 – Overbridge to the North

This option closes the existing crossing and provides a new vehicle overbridge approximately 140m north (See Figures 5-2 and 5-3).

- The bridge would serve adjacent farmland and the cliff walk, with public access restricted by a locked gate.
- The western approach ramp must avoid overhead power lines and could be accessed from North Shore Road or via Ennis Lane to the northwest.
- The southern ramp would run parallel to the railway.
- The bridge would be a single-span concrete structure with prestressed girders and a reinforced deck on reinforced earth abutments.

Figure 5-2 Indicative location of option V2.1

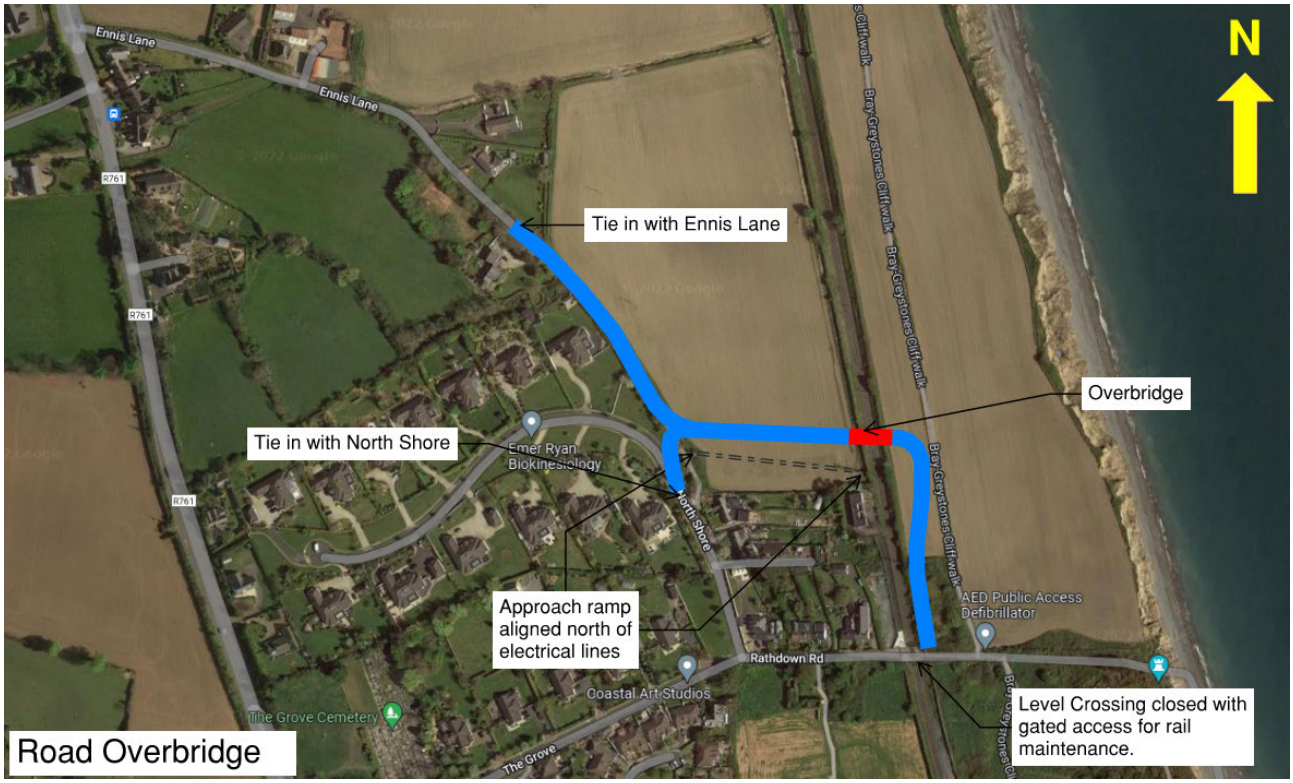


Figure 5-3 Indicative location plan of the proposed overbridge

5.1.4 Option V2.2 – Access Road from the North

This option closes the level crossing and provides vehicle access via a new 1.5km road from the north (See Figure 5-4):

- The route would start from the R761, following or adjacent to a private lane, then cross through farmland and follow the existing farm tracks.
- It would run parallel to the Bray to Greystones Cliff Walk, reconnecting near the current crossing.
- A locked gate would restrict public access.
- The route includes a bridge over a gully east of Bray Head Tunnel No. 4 and must account for ongoing coastal erosion.
- The road would be 3m wide with a bituminous surface.

Figure 5-4 Location plan of Option V2.2

5.1.5 Option V2.3 – Access Road form the South

This option closes the crossing and provides a short (approx. 200m) access road from the south (See Figure 5-5):

- The road would extend from 'The Shore' through parkland to the existing crossing.
- A crossing over a culvert near the junction of the road and the cliff walk would be required.
- The road would be about 3m wide with a tarmacadam surface.
- A locked gate would control access.

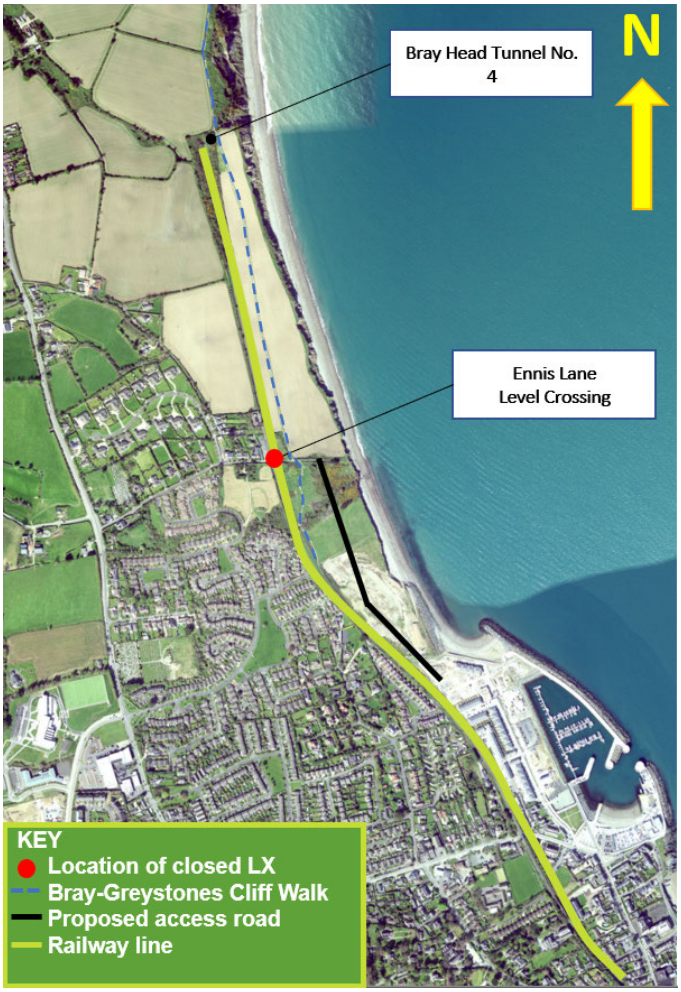


Figure 5-5 Plan location of Option V2.3

5.1.6 Option V3 – Remove Access Rights / Land Purchase

This option removes vehicle access rights to the farmland. Alternatively, IÉ could purchase the land (approx. 8 hectares).

- Minimal or no new infrastructure is needed.
- A locked gate would be installed at the crossing for IÉ maintenance and emergency access only.

5.2 Sifting of Longlist of Vehicle Options

Each vehicle option has been assessed against the project's objectives and requirements. The results of this evaluation are shown in Table 5-2.

Table 5-2 Sifting of Longlist of Vehicle Options (Options 0 to V2.2)

Project Objectives & Requirements	Description	Option 0 Do-nothing: Keep crossing open		Option V1 – Improvements to vehicle controls at crossing		Option V2.1 – New Infrastructure: Access Road from the north		Option V2.2 – New Infrastructure: Overbridge at Ennis Lane		Option V2.3 – New Infrastructure: Access Road from the south		Option V3 – Remove access rights to farmland	
		Pass/ fail	Rationale	Pass/ fail	Rationale	Pass/ fail	Rationale	Pass/ fail	Rationale	Pass/ fail	Rationale	Pass/ fail	Rationale
Project Objective	To deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	**Pass**	Delivers the TSS	**Pass**	Delivers the TSS	**Pass**	Delivers the TSS	**Pass**	Delivers the TSS	**Pass**	Delivers the TSS	**Pass**	Delivers the TSS
Project Objective	To deliver solutions which improve the passenger experience where passenger infrastructure interventions are required to meet the planned increase in DART service frequency.	**Pass**	No change from existing	**Pass**	No significant improvement to passenger experience	**Pass**	No significant improvement to passenger experience	**Pass**	No significant improvement to passenger experience	**Pass**	No significant improvement to passenger experience	**Pass**	No significant improvement to passenger experience
Project Objective	To deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works	**Pass**	Minimal impacts	**Pass**	Minimal impacts	**Pass**	Impact to farmland owners – high % of land take	**Pass**	New construction	**Pass**	Impact to farmland owners	**Pass**	No works during construction, no change to operations
Project Objective	To identify cost-effective solutions from a capital, operations, and maintenance perspective.	**Pass**	No capital cost expenditure	**Pass**	Minimal capital cost expenditure	**Pass**	Cost of new access road, and associated construction	**Pass**	Cost of new structure and associated construction, including new access road	**Pass**	Cost of new access road, and associated construction	**Pass**	Minimal capital cost expenditure
Project Objective	To minimise adverse impacts on the natural and built environment associated with the construction, operation and maintenance of the project.	**Pass**	No works during construction, no change to operations	**Pass**	Minimal works during construction (new fence), no change to operations	**Fail**	Access going through deep gully along a vulnerable coastline Risk of coastal erosion due to proposed access road located very close to cliff edge Risk of impact to the tunnel structure	**Fail**	Significant impact to the natural environment where road is constructed - large land take required. Impact on residents.	**Pass**	Impact to the natural environment where road is constructed	**Pass**	Minimal works during construction (new fence), no change to operations
Project Objective	To minimise adverse impacts on existing rail services, road users and landowners associated with the construction, operation and maintenance of the project	**Pass**	No works during construction, no change to operations	**Pass**	No works during construction, no change to operations	**Pass**	New construction	**Pass**	Impact to farmland owners	**Pass**	New construction	**Pass**	Minimal impacts
Project Objective	To provide efficient and cost-effective integration of systems with the other DART+ Programme projects.	**Pass**	No new systems required	**Pass**	No integration issues identified at this stage	**Pass**	No integration issues identified at this stage	**Pass**	No integration issues identified at this stage	**Pass**	No integration issues identified at this stage	**Pass**	No integration issues identified at this stage

Project Requirement	To provide an appropriate level of accessibility	**Pass**	The crossing will be less usable with increased number of trains per hour Access to the farmland / cliff walk is maintained	**Pass**	The crossing will be less usable with increased number of trains per hour Access to the farmland / cliff walk is maintained for IÉ, landowners and emergency vehicles only	**Pass**	Access to the farmland / cliff walk is maintained	**Pass**	Access to the farmland / cliff walk is maintained	**Pass**	Access to the farmland / cliff walk is maintained	**Pass**	Access to the farmland / cliff walk is maintained

5.3 Summary of Longlist Sifting of Vehicle Options

The outcome of the longlist sifting is summarised in Table 5-3.

Table 5-3 Longlist sifting summary for vehicle options

Option	Description	Pass/Fail	Rationale for fail
V0	Do nothing: Leave the level crossing open as is.	**PASS**	Meets project objectives and requirements
V1	Do Minimum: Keep the crossing open only for IÉ, the landowner (east of the railway), and emergency vehicles.	**PASS**	Meets project objectives and requirements
V2.1	New Infrastructure: Build an overbridge north of Ennis Lane.	**FAIL**	Impact to the natural environment where road is constructed – high land take .
V2.2	New Infrastructure: Construct a new access road from the north.	**FAIL**	Access going through deep gully along a vulnerable coastline Risk of coastal erosion due to proposed access road located very close to cliff edge Risk of impact to the tunnel structure
V2.3	New Infrastructure: Construct a new access road from the south.	**PASS**	Meets project objectives and requirements
V3	Remove vehicle access rights to the farmland, or IÉ to purchase the land.	**PASS**	Meets project objectives and requirements

5.4 Longlist of Options for Pedestrians and Cyclist Access

This section outlines the full range of options considered for pedestrian and cyclist access at the Ennis Lane level crossing. A more detailed technical description is provided for shortlisted options. The options are summarised in Table 5-4 below.

Table 5-4 Pedestrian and cyclist longlist options considered

Option	Description
P0	Do Nothing: Leave the level crossing open with no changes.
P1.1	Do Minimum: Close the level crossing to all users.
P1.2	Do Minimum: Upgrade the crossing to a CCTV-controlled system.
P2.1 (a)	New Infrastructure: Build an overbridge with west ramp access on the north side.
P2.1 (b)	New Infrastructure: Build an overbridge with west ramp access on the south side.
P2.2	New Infrastructure: Build an underpass with ramp access on both the west and east sides.

5.4.1 Option P0 – Do Nothing

No infrastructure changes. The crossing remains open as-is, allowing continued access for pedestrians, cyclists, IÉ, the landowner (east of the railway), and emergency vehicles.

5.4.2 Option P1.1 – Do Minimum: Close Crossing

The crossing is fully closed to pedestrians and cyclists. No additional infrastructure is provided.

5.4.3 Option P1.2 – Do Minimum: CCTV Upgrade

The crossing stays open to current users: pedestrians, cyclists, IÉ, the landowner (east of the railway), and emergency vehicles. The existing crossing is upgraded to a CCTV-controlled system, with no major new infrastructure.

5.4.4 Option P2.1(a) – Overbridge with North-Side Ramp Access (West)

This option closes the level crossing to pedestrians and cyclists and replaces it with a new pedestrian/cyclist overbridge located next to the current crossing.

- On the western side, the access ramps extend north before turning and running south, parallel to the railway, to connect with the Bray to Greystones Cliff Walk.
- The bridge crosses the railway in a single span.
- The approach ramps on both sides are approximately 120 metres long, with a 5% gradient and regular landings for accessibility.

Due to limited space on the western side:

- The ramps would be elevated structures, doubling back on themselves to maintain access from Rathdown Road.
- This layout also avoids impacting the substation to the north.

On the eastern side:

- There is more space available, so the ramp could initially be built as an embankment, transitioning into an elevated structure as needed.

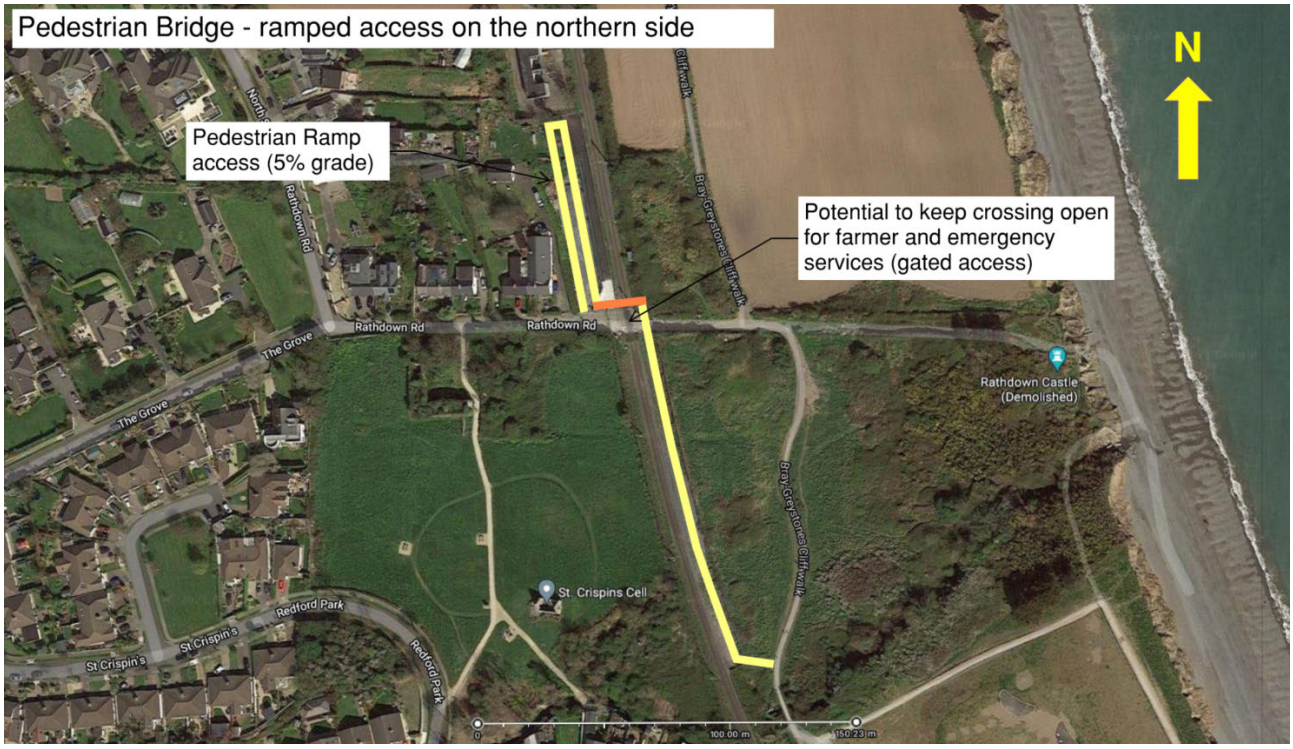


Figure 5-6 Indicative location plan for Option P2.1(a)

5.4.5 Option P2.1(b) – Overbridge with South-Side Ramp Access (West)

This option closes the level crossing to pedestrians and cyclists and replaces it with a pedestrian/cyclist overbridge located next to the existing crossing.

- On the western side, the access ramps extend south before turning and continuing south, parallel to the railway, to connect with the Bray to Greystones Cliff Walk.
- The bridge would be a single-span structure crossing the railway, with 120-metre approach ramps on each side.
- Ramps would have a 5% gradient and include landings at regular intervals for accessibility.

Due to limited space on the western side:

- The ramps would be elevated structures, looping back to maintain access from Rathdown Road.

On the eastern side:

- There is sufficient space to begin the ramp as an embankment, transitioning to an elevated structure as it approaches the bridge.

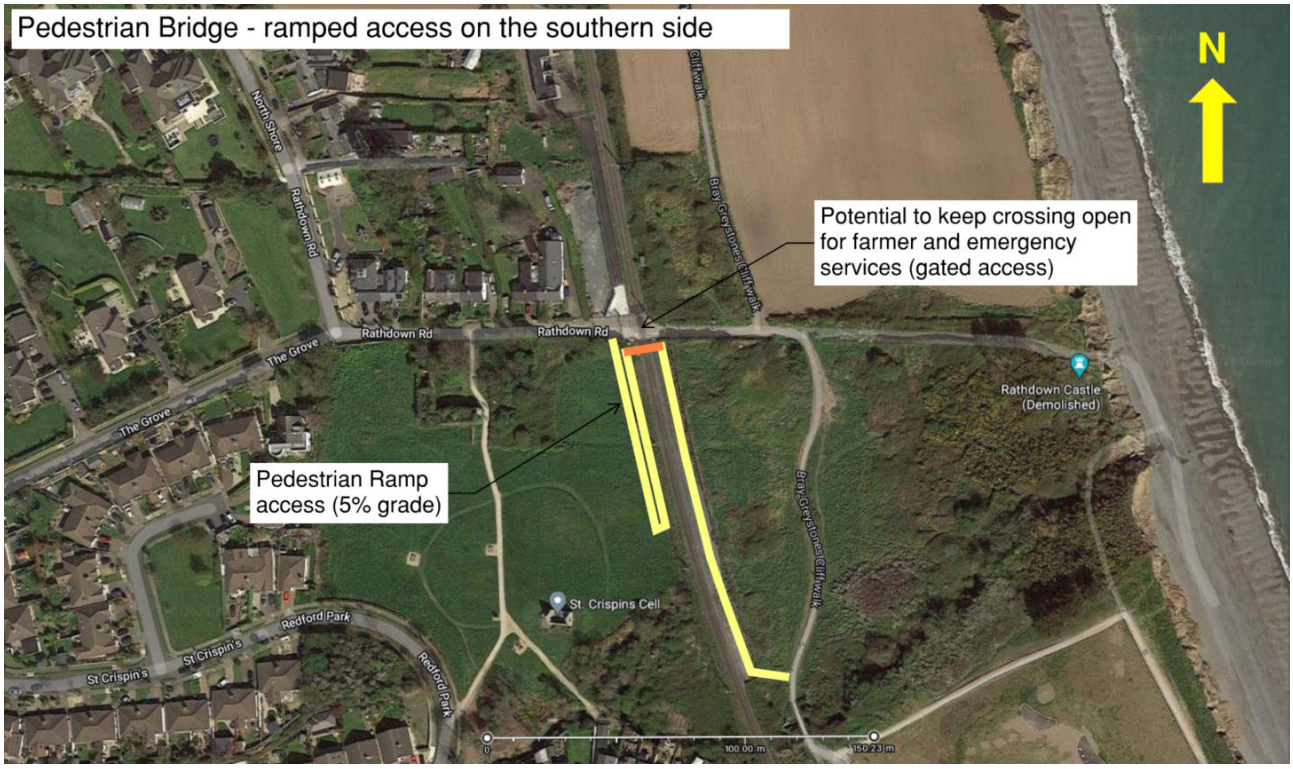


Figure 5-7 Indicative location plan for Option P2.1(b)

5.4.6 Option P2.2 – Pedestrian/Cyclist Underpass

This option closes the level crossing to pedestrians and cyclists and replaces it with an underpass located directly next to the existing crossing.

- The underpass would use a buried precast concrete box structure, approximately 15 metres long, with reinforced concrete wingwalls on both sides.
- It would provide a segregated path for pedestrians and cyclists, measuring 5.0 metres wide with a 2.4 metre vertical clearance.
- The structure would be installed to maintain at least 300mm of ballast under the railway sleepers.

Ramp Access:

- Ramps on both sides would have a 7% gradient to minimise disruption to St. Crispin's Cell and reduce the removal of mature trees.
- The western ramp would be shifted south of Rathdown Road to preserve access to nearby properties. This would require adjusting boundary walls and relocating overhead power lines.
- Both ramps would be approximately 50 metres long.

Additional Works:

- On the western side, retaining walls will be needed, especially near Rathdown Road.
- On the eastern side, shorter retaining walls can be used, with the rest handled by cut slopes.
- The ramp surfaces will be finished with bituminous material, suitable for both pedestrians and cyclists.

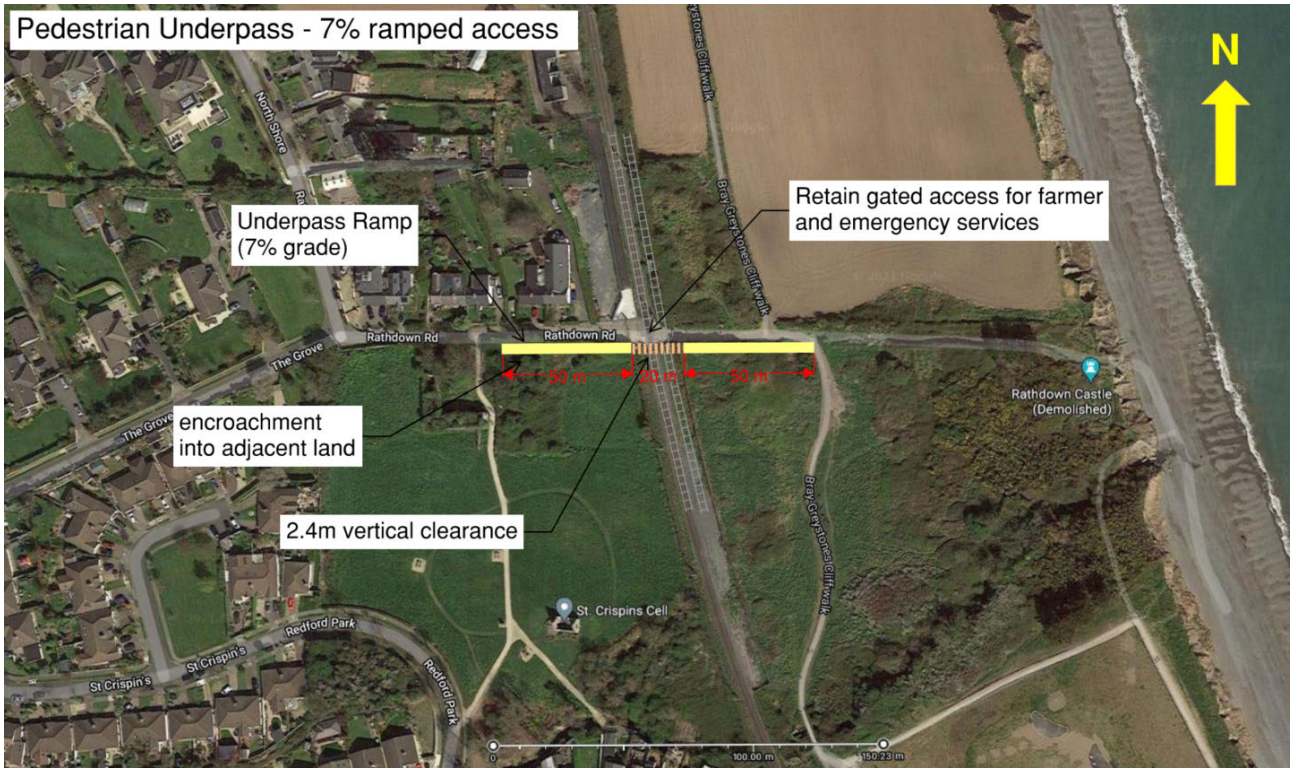


Figure 5-8 Indicative location plan for Option P2.2

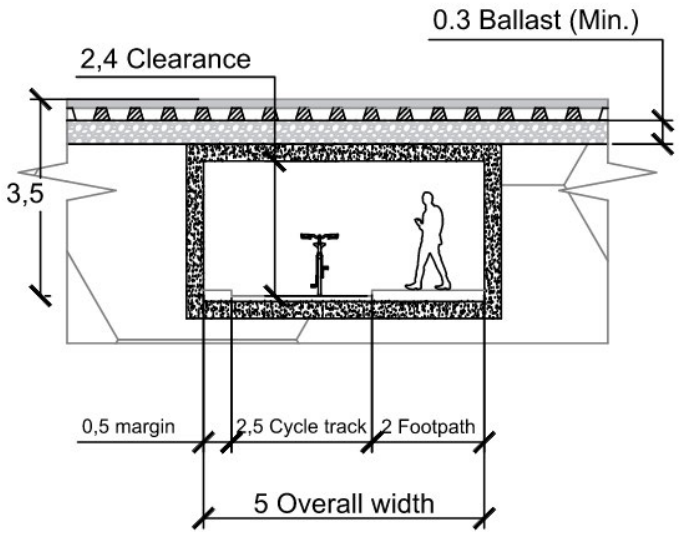


Figure 5-9 Proposed cross section of underpass

5.5 Sifting of Longlist of Pedestrian and Cyclist Options

Each option has been evaluated against the project's objectives and requirements to assess how well it meets them.

The results of this sifting process are presented in Table 5-5.

Table 5-5 Sifting of longlist of pedestrian and cyclist options (Options P0 to P2.2)

Project Objectives & Requirements	Description	Option P0 – Do Nothing		Option P1.1 – Do Minimum: Close Crossing		Option P1.2 - Do Minimum: CCTV Upgrade		Option P2.1(a) – Overbridge with North-Side Ramp Access (West)		Option P2.1(b) – Overbridge with South-Side Ramp Access (West)		Option P2.2 – Pedestrian/Cyclist Underpass	
		Pass / Fail	Rationale	Pass / Fail	Rationale	Pass / Fail	Rationale	Pass / Fail	Rationale	Pass / Fail	Rationale	Pass / Fail	Rationale
Project Objective	To deliver a higher frequency, higher capacity, reliable route to enable the planned increase in DART service frequency between Greystones and Dublin City Centre.	**Pass**	Delivers the TSS	**Pass**	Delivers the TSS	**Pass**	Delivers the TSS	**Pass**	Delivers the TSS	**Pass**	Delivers the TSS	**Pass**	Delivers the TSS
Project Objective	To deliver solutions which improve the passenger experience where passenger infrastructure interventions are required to meet the planned increase in DART service frequency.	**Pass**	No change from existing	**Pass**	No significant improvement to passenger experience	**Pass**	No significant improvement to passenger experience	**Pass**	No significant improvement to passenger experience	**Pass**	No significant improvement to passenger experience	**Pass**	No significant improvement to passenger experience
Project Objective	To deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works.	**Pass**	Minimal impacts	**Pass**	Minimal impacts	**Pass**	Minimal impacts	**Pass**	New construction	**Pass**	New construction	**Pass**	New construction
Project Objective	To identify cost-effective solutions from a capital, operations, and maintenance perspective.	**Pass**	No capital cost expenditure	**Pass**	Minimal capital cost expenditure	**Pass**	Cost of new equipment required	**Pass**	Cost of new bridge and associated infrastructure required	**Pass**	Cost of new bridge and associated infrastructure required	**Pass**	Cost of new underpass and cost of associated infrastructure required
Project Objective	To minimise adverse impacts on the natural and built environment associated with construction, operation and maintenance of the project	**Pass**	No construction works, no impact	**Pass**	Minimal works during construction, minimal impact	**Pass**	Minimal works during construction, minimal impact	**Pass**	Impact to the natural environment where bridge is constructed	**Pass**	Impact to the natural environment where bridge is constructed	**Pass**	Impact to the natural environment where underpass is constructed
Project Objective	To minimise adverse impacts on existing rail services, road users and landowners associated with construction, operation and maintenance of the project	**Pass**	No construction works, no change to operations	**Pass**	Minimal works during construction, no change to operations	**Pass**	Minimal works during construction, enhanced safety changes to operations	**Fail**	Impact to farmland owners Impact on local residences - construction adjacent to homes Views into properties from new structure.	**Pass**	Impact to farmland owners	**Pass**	Minimal impact
Project Objective	To provide efficient and cost-effective integration of systems with the other DART+ Programme projects	**Pass**	No new systems required	**Pass**	No integration issues identified at this stage	**Pass**	No integration issues identified at this stage	**Pass**	No integration issues identified at this stage	**Pass**	No integration issues identified at this stage	**Pass**	No integration issues identified at this stage
Project Requirement	To provide an appropriate level of accessibility	**Pass**	The crossing will be less usable with increased number of trains per hour Access to the farmland / cliff walk is maintained	**Fail**	No access to the seafront is maintained from level crossing. Distance to walk to next access point is approximately 3.5km	**Pass**	Access to the farmland / cliff walk is maintained	**Fail**	Impact to farmland owners. Impact on local residences - construction adjacent to homes	**Pass**	Access to the farmland / cliff walk is maintained	**Pass**	Access to the farmland / cliff walk is maintained

5.6 Summary of Longlist Sifting of Pedestrian and Cyclist Options

The results of the longlist sifting for pedestrian and cyclist options are summarised in Table 5-6.

Table 5-6 Longlist sifting summary for pedestrian and cyclist options

Option	Description	Screening Result	Summary
P0	Do Nothing: Leave the level crossing open with no changes.	**PASS**	Meets project objectives and requirements
P1.1	Do Minimum: Close the level crossing to all users.	**FAIL**	No access to the seafront is maintained from level crossing. Distance to walk to next access point is approximately 3.5km
P1.2	Do Minimum: Upgrade the crossing to a CCTV-controlled system.	**PASS**	Meets project objectives and requirements
P2.1 (a)	New Infrastructure: Build an overbridge with west ramp access on the north side.	**FAIL**	Impact to farmland owners Impact on local residences - construction adjacent to homes
P2.1 (b)	New Infrastructure: Build an overbridge with west ramp access on the south side.	**PASS**	Meets project objectives and requirements
P2.2	New Infrastructure: Build an underpass with ramp access on both the west and east sides.	**PASS**	Meets project objectives and requirements

5.7 Shortlisted options

Options that passed the sifting process—listed in Table 5-3 (vehicles) and Table 5-6 (pedestrian/cyclist)—have been reviewed for compatibility. Since not all shortlisted vehicle options align with all pedestrian and cyclist options, a compatibility assessment was carried out to identify feasible combined solutions.

A summary of these compatible combinations, which will be taken forward to the Multi-Criteria Analysis (MCA), is provided in Table 5-7.

Table 5-7 Matrix of compatibility between vehicle and pedestrian/cyclist options

Y = Compatible options X = Not compatible

Options (Pedestrian and cyclist options as columns, vehicle options as rows)	P0 - Do Nothing: Leave the level crossing open with no changes.	P1.2 - Do Minimum: Upgrade the crossing to a CCTV-controlled system.	P2.1(b) - New Infrastructure: Build an overbridge with west ramp access on the south side.	P2.2 - New Infrastructure: Build an underpass with ramp access on both the west and east sides.
V0 - Do nothing: Leave the level crossing open as is.	Y Option 1	X	X	X
V1 - Do Minimum: Keep the crossing open only for IÉ, the landowner (east of the railway), and emergency vehicles.	X	Y Option 2c	Y Option 3a	Y Option 3b
V2.3 - New Infrastructure: Construct a new access road from the south.	Y Option 2a	X	Y Option 4a	Y Option 5a
V3 - Remove vehicle access rights to the farmland, or IÉ to purchase the land.	Y Option 2b	Y Option 2D	Y Option 4b	Y Option 5b

As Following the compatibility assessment outlined in Table 5-7, eleven combined options have been shortlisted for the Multi-Criteria Analysis (MCA).

To avoid confusion, these options have been renumbered for clarity. From this point forward, they will be referred to using the numbers shown in Table 5-7 below.

Table 5-8 Shortlist of combined options taken forward to MCA

Option	Description
1	Level crossing remains open to both vehicles and pedestrians (Do Nothing).
2a	Level crossing remains open for pedestrians only. Vehicles rerouted via a new access road from the south.
2b	Level crossing remains open for pedestrians only. Vehicle access rights to the farmland are removed, or IÉ purchases the land.
2c	Level crossing is upgraded to a CCTV-controlled system. Crossing remains open to both pedestrians and farm access vehicles with improved controls.
2d	Level crossing is upgraded to a CCTV-controlled system. Vehicle access rights to the farmland are removed, or IÉ purchases the land.
3a	Level crossing closed for pedestrians. Pedestrian access provided via a new overbridge at the Ennis Lane location. Crossing remains open for vehicles with improved controls.
3b	Level crossing closed for pedestrians. Pedestrian access provided via a new underpass at the Ennis Lane location. Crossing remains open for vehicles with improved controls.
4a	Level crossing closed to both pedestrians and vehicles. Pedestrian access via a new overbridge at the Ennis Lane location. Vehicles rerouted via a new access road from the south.
4b	Level crossing closed to both pedestrians and vehicles. Pedestrian access via a new overbridge at the Ennis Lane location. Vehicle access rights to the farmland are removed, or IÉ purchases the land.
5a	Level crossing closed to both pedestrians and vehicles. Pedestrian access via a new underpass at the Ennis Lane location. Vehicles rerouted via a new access road from the south.
5b	Level crossing closed to both pedestrians and vehicles. Pedestrian access via a new underpass at the Ennis Lane location. Vehicle access rights to the farmland are removed, or IÉ purchases the land.

5.7.1 Option 1

This This combines Vehicle Option V0 and Pedestrian/Cyclist Option P0 (see Sections 5.1.1 and 5.4.1). The level crossing remains fully open to all users—vehicles, pedestrians, and cyclists—with no changes or interventions required.

5.7.2 Option 2a

This combines Vehicle Option V2.3 and Pedestrian/Cyclist Option P0 (see Sections 5.1.5 and 5.4.1). The level crossing remains open for pedestrians and cyclists but is closed to vehicles. A new access road from the south is provided (Figure 5-10) to maintain vehicle access to the eastern side of the railway.

Figure 5-10 Infrastructure solution – new access road to the south

5.7.3 Option 2b

This combines Vehicle Option V3 and Pedestrian/Cyclist Option P0 (see Sections 5.1.6 and 5.4.1). The level crossing remains open pedestrians and cyclists but closed for vehicles. Access to the farmland on the eastern side removed.

5.7.4 Option 2c

This option combines vehicle option V1 and pedestrian/cyclist option P1.2. General overviews for the respective options are contained within section 5.1.2 and 5.4.3. This results in the upgraded CCTV level crossing remains fully open to pedestrians and cyclists, with vehicle access restricted to farm access by means of lockable bollards.

5.7.5 Option 2d

This option combines vehicle option V3 and pedestrian/cyclist option P1.2. General overviews for the respective options are contained within section 5.1.6 and 5.4.3. This results in the upgraded CCTV level crossing remaining open for pedestrians and cyclists but closing for vehicles and access to the farmland on the eastern side removed.

5.7.6 Option 3a

This combines Vehicle Option V1 and Pedestrian/Cyclist Option P2.1(b) (see Sections 5.1.2 and 5.4.5). The level crossing remains open for vehicles but is closed to pedestrians and cyclists. A new overbridge is provided to maintain pedestrian and cyclist access across the railway (See).

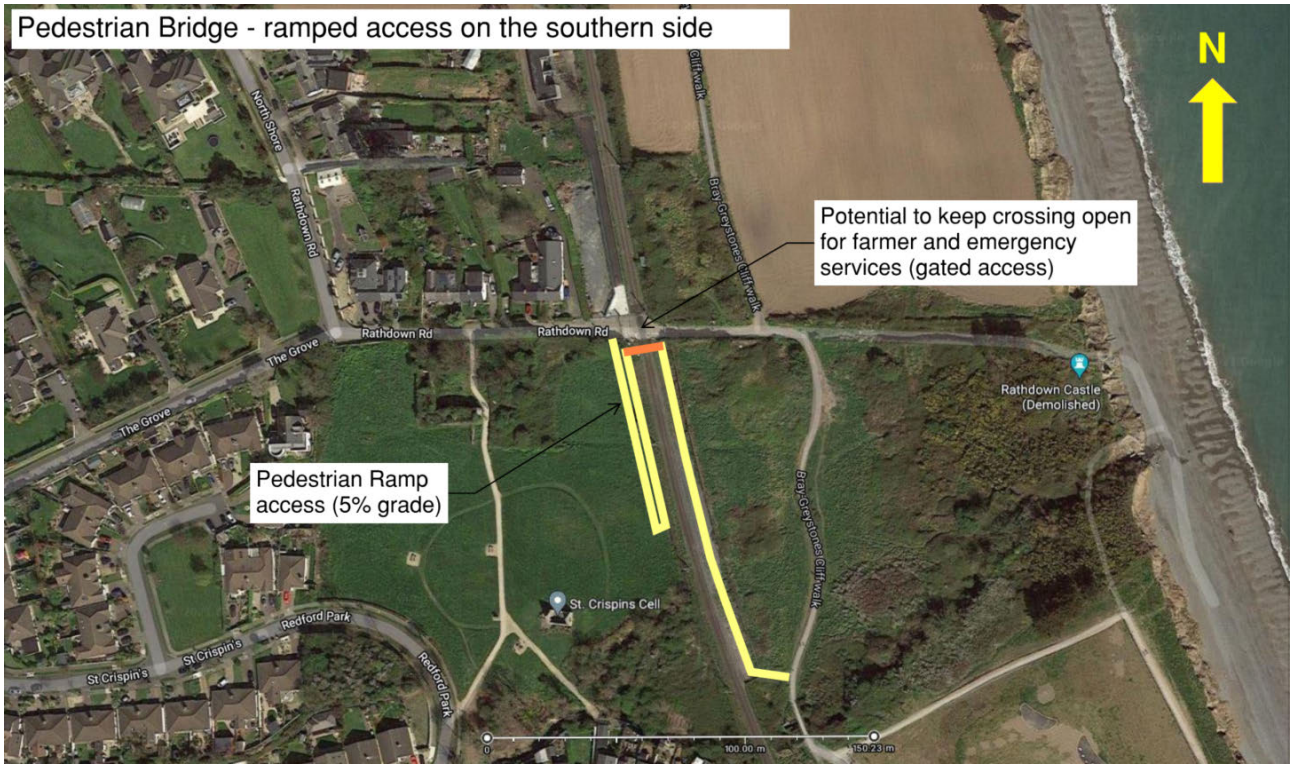


Figure 5-11 Infrastructure solution – new overbridge for pedestrians and cyclists

5.7.7 Option 3b

This combines Vehicle Option V1 and Pedestrian/Cyclist Option P2.2 (see Sections 5.1.2 and 5.4.6). The level crossing stays open for vehicles but is closed to pedestrians and cyclists. A new underpass is provided for pedestrian and cyclist access (See Figure 5-12).

Figure 5-12 Infrastructure solution - new underpass for pedestrians and cyclists

5.7.8 Option 4a

This combines Vehicle Option V2.3 and Pedestrian/Cyclist Option P2.1(b) (see Sections 5.1.5 and 5.4.5). The level crossing is closed to all users.

- Vehicle access is maintained via a new access road from the south (See Figure 5-10).
- Pedestrian and cyclist access is maintained via a new overbridge (See 11).

5.7.9 Option 4b

This combines Vehicle Option V3 and Pedestrian/Cyclist Option P2.1(b) (see Sections 5.1.6 and 5.4.5). The level crossing is closed.

- Pedestrian and cyclist access is maintained via a new overbridge (See).
- No vehicle access is provided. Vehicle access rights to the farmland are removed, or the land is purchased by IÉ.

5.7.10 Option 5a

This This combines Vehicle Option V2.3 and Pedestrian/Cyclist Option P2.2 (see Sections 5.1.5 and 5.4.6). The level crossing is closed.

- Vehicle access is maintained via a new access road from the south (See Figure 5-10).
- Pedestrian and cyclist access is maintained via a new underpass (See Figure 12).

5.7.11 Option 5b

This This combines Vehicle Option V3 and Pedestrian/Cyclist Option P2.2 (see Sections 5.1.6 and 5.4.6). The level crossing is closed.

- Pedestrian and cyclist access is maintained via a new underpass (See Figure 5-12).
- No vehicle access is provided. Vehicle access rights to the farmland are removed, or the land is purchased by IÉ.

5.8 Multi-Criteria Analysis

5.8.1 Methodology

Each shortlisted option has been assessed using the Multi-Criteria Analysis (MCA) framework. The options were compared against one another using a five-point, colour-coded ranking scale, as shown in Table 5-11.

5.8.2 MCA summary table

A Multi-Criteria Assessment table is presented in this section. This has been developed to reflect the relative rankings for all sub-criteria assessed for each of the options and is presented as a summary of the key issues considered.

A more detailed table is provided in a separate appendix with the full detailed rationale behind the scoring of each criterion and option.

Table 5-9 MCA Summary table

Criteria	Sub-Criteria	1	2a	2b	2c	2d	3a	3b	4a	4b	5a	5b
		Level crossing is open for both vehicles and pedestrians	Level crossing open for pedestrians but closed for vehicles. Access for vehicles from the south on new access road	Level crossing open for pedestrians but closed for vehicles. Access rights to farmland removed at location/IÉ purchase land opposite	Upgraded CCTV level crossing remains fully open to pedestrians and cyclists. Vehicle access restricted to farm access only.	Upgraded CCTV level crossing remaining open for pedestrians and cyclists but closing for vehicles and access to the farmland on the eastern side removed.	Closed for pedestrians, new overbridge at Ennis Lane Level Crossing location. Improvements to vehicles controls at crossing	Closed for pedestrians, new underpass at Ennis Lane Level Crossing location. Improvements to vehicles controls at crossing	Closed for pedestrians and vehicles. New overbridge at Ennis Lane Level Crossing location for pedestrians Access for vehicles from the south on new access road	Closed for pedestrians and vehicles. New overbridge at Ennis Lane Level Crossing location for pedestrians. Vehicle access rights to farmland removed at location/IÉ purchase land opposite	Closed for pedestrians and vehicles. New underpass at Ennis Lane Level Crossing location for pedestrians. Access for vehicles from the south on new access road	Closed for pedestrians and vehicles. New underpass at Ennis Lane Level Crossing location for pedestrians. Vehicle access rights to farmland removed at location/IÉ purchase land opposite
	CAPEX											
	OPEX											
	Train operations functionality/economic benefit											
	Traffic functionality & associated economic activities and opportunities											
Safety	Employer's Safety											
	Public safety											
Environment	Landscape and Visual Quality											
	Biodiversity											
	Noise and Vibration											
	Water resources											
	Archaeology, Architectural and Cultural Heritage											
	Geology and Soils											
	Agricultural and non-agricultural											
	Air Quality & Climate Change											
Accessibility & Social Inclusion	Accessibility											
	Social Inclusion											
Integration	Adaptability in the future											
	With other transport systems											
	Land Use Integration											
	Government policy integration											
	Geographical integration											
Physical Activity	Walking/cycling opportunities											

Table 5-10 Overall criteria MCA summary table

Criteria Summary	1	2a	2b	2c	2d	3a	3b	4a	4b	5a	5b
Economy											
Safety											
Environment											
Accessibility & Social Inclusion											
Integration											
Physical Activity											

Table 5-11 Legend for MCA Summary Table

Significant comparative advantage over other options
Some comparative advantage over other options
Comparable to other options / neutral
Some comparative disadvantage over other options
Significant comparative disadvantage over other options

5.8.3 Economy

Economy has been divided into four sub-criteria which are considered below.

5.8.3.1 CAPEX

Options with a significant comparative advantage over other options represent the most cost-effective proposals with minimal capital demands. Option 1 is the clear leader in this category. It requires no infrastructure, no land acquisition, and incurs zero capital outlay. With no construction or physical intervention needed, it offers the lowest possible cost and sets the benchmark for economic efficiency.

Options with some comparative advantage over other options involve low to moderate capital expenditure while offering practical, targeted solutions. Option 2a requires moderate investment for the development of a new access road, supporting a single-use intervention with focused land use and no need for major structures. Option 2b avoids major infrastructure entirely, resulting in low upfront costs; however, its permanent restriction on vehicle access limits its long-term utility. Option 2c involves a low-cost CCTV upgrade, with minimal land impact and disruption, offering excellent cost-efficiency. Option 2d, while slightly more expensive than 2c due to vehicle closure impacts, still avoids significant infrastructure works and maintains a low-cost profile overall.

Options considered comparable to other options present a middle-ground in terms of capital expenditure, neither standing out for cost-efficiency nor incurring excessive financial demands. Option 3a requires moderate investment for an overbridge, with some temporary land use and a compact permanent footprint, resulting in a balanced cost-benefit profile. Option 4b also sits in this category, involving a moderately priced overbridge with no vehicle provision. While it requires a reasonable amount of land and carries some complexity, it does not present any major capital disadvantages. Option 2b, while listed here again for its balance of low cost and limited future value, also reflects this neutral positioning.

Options with some comparative disadvantage over other options are associated with higher capital costs and increased construction impacts. Option 3b falls into this category due to the relatively expensive nature of underpass construction, which requires additional drainage and safety systems, and generates notable temporary disruption. Option 4a is similarly disadvantaged, as it involves dual infrastructure in the form of both a road and a bridge, leading to elevated capital costs, land acquisition requirements, and project complexity.

Finally, options with a significant comparative disadvantage over other options reflect the most costly and complex capital interventions. Option 5a is the most expensive option overall, combining road and underpass infrastructure with extensive construction requirements and significant land and timing considerations. Option 5b, although slightly less costly, retains the burden of underpass construction without providing vehicle access, reducing the value return and making it a poor investment relative to its cost.

5.8.3.2 OPEX

Options with a significant comparative advantage over other options show the strongest performance in terms of operational costs, technology use, and long-term viability. Option 2d stands out in this category. It includes modern technology upgrades and eliminates vehicle traffic, streamlining operations and enhancing safety. This option offers the best overall balance between cost-efficiency, operational simplicity, and future adaptability.

Options with some comparative advantage over other options provide solid operational performance with clear long-term benefits. Option 2a benefits from vehicle rerouting, which reduces operational risks, and the associated access road is straightforward and cost-effective to maintain. Option 2c includes modern technology upgrades and restricts vehicle traffic, streamlining operations and enhancing safety, with only moderate costs and impacts. Option 3a features a durable overbridge design that keeps operational expenditure low while improving safety by separating pedestrians and cyclists, which also helps reduce maintenance requirements.

Options assessed as comparable to other options present a balanced profile, offering neither major advantages nor significant drawbacks. Option 2b uses simplified infrastructure, which keeps maintenance needs low, but lacks technology enhancements and reduces future flexibility. Option 4b provides an effective overbridge solution; while the restriction of vehicle access is a limitation, its operational costs remain within a manageable range. Option 5b involves higher maintenance due to the underpass, but the absence of vehicle access offsets some of the burden, keeping its overall OPEX impact neutral.

Options with some comparative disadvantage over other options carry increased operational demands or complexity. Option 3b involves an underpass that requires ongoing maintenance of drainage, lighting, and safety systems, with a higher likelihood of disruption during inspections or repairs. Option 4a, although structurally robust and resilient in the long term, involves a high upfront cost and complex infrastructure, which contributes to elevated ongoing operational requirements.

Finally, options with a significant comparative disadvantage over other options face the most substantial operational challenges. Option 1 retains an outdated, legacy setup with no technological improvements, resulting in high ongoing staffing and safety costs and poor alignment with modern standards. Option 5a combines a road with an underpass, creating dual maintenance obligations, more frequent inspection requirements, and operational complexity, making it the most burdensome in terms of ongoing cost and effort.

5.8.3.3 Train operations functionality/economic benefits

Options with a significant comparative advantage over other options deliver the most substantial benefits to train operations and economic outcomes. Option 4a is the strongest performer, fully closing the level crossing and eliminating all conflict points between trains and road users. This significantly enhances operational safety, reliability, and efficiency—especially valuable for future high-frequency DART services. It supports long-term rail growth and delivers the clearest operational advantage.

Options with some comparative advantage over other options provide meaningful improvements, though with some caveats. Option 5a mirrors the rail benefits of Option 4a by removing the crossing entirely, supporting long-term connectivity and economic outcomes. However, the complexity of constructing the underpass introduces a risk of disruption during the build phase. Option 5b similarly removes the crossing conflict and offers good long-term rail and safety outcomes. Yet, compared to 4b, it carries slightly more operational risk due to the additional structural complexity of the underpass.

Options considered comparable to other options strike a middle ground, improving aspects of train operations or safety without fully resolving existing constraints. Option 2d removes vehicles from the crossing, which is a step forward, but still permits pedestrian and cyclist movement across the rail line, maintaining some risk. Option 3a keeps the vehicle crossing, leaving residual operational conflict, but introduces an overbridge for pedestrians and cyclists, which helps reduce some safety concerns. Option 3b replaces the pedestrian and cyclist crossing with an underpass, improving safety on that front; however, it retains vehicle access, which may continue to affect train reliability. Option 4b fully removes the level crossing, supporting train performance, but excludes vehicle access—potentially affecting local economic benefit and access.

Options with some comparative disadvantage over other options fall short of fully resolving safety and operational issues. Option 2a removes vehicles from the level crossing, but pedestrians and cyclists continue to cross the rail line at grade, leaving unresolved conflict and safety risks. Option 2b takes a similar approach—removing vehicles but failing to improve safety for non-motorised users. Without any technological or structural mitigation, pedestrian and cyclist risk remains unmanaged. Option 2c does include CCTV, improving visibility and oversight, but it retains full access across the crossing. All user groups still interact directly with the rail line, leaving the core safety issues unresolved.

Option 1 carries a significant comparative disadvantage. It makes no improvement to the existing situation and retains the fully exposed level crossing. This option leaves the highest level of operational risk, limits future service expansion, and is the least aligned with strategic goals for rail safety and capacity. It offers no benefit to train performance and is the weakest option from an operational and economic perspective.

5.8.3.4 Traffic functionality and associated economic activities and opportunities

All proposed options are assessed as having comparable impacts to other options in terms of traffic functionality and related economic activity. This neutral rating reflects the consistently low traffic volumes at the location, particularly during peak hours, and the careful planning to mitigate disruption during both the operational and construction stages.

Option 1 maintains the current level crossing arrangement. Given the low peak-hour traffic at this location, any increase in boom gate closures is not expected to significantly affect vehicular flow. As no construction is required, there will be no impact during the delivery phase.

Option 2a also results in minimal traffic disruption. Emergency vehicle access is preserved, and access for landowners is maintained by diverting traffic through Greystones Marina. With very low diverted volumes, no notable operational impact is anticipated. Construction traffic for the access

road through parkland will enter via the existing level crossing, meaning disruption during the build phase is limited.

Option 2b ensures continued emergency access and requires no construction activity, resulting in no expected disruption either operationally or during delivery. This mirrors the impact level of Option 2c, which also introduces no construction works and faces no significant operational effects due to the area's low traffic volume.

Option 2d likewise ensures emergency access and is not expected to affect local traffic during operation or construction, as no works are needed.

Option 3a involves the construction of a pedestrian and cyclist overbridge. However, construction traffic will enter via the current level crossing and volumes are expected to be low, keeping disruption minor. During operation, traffic functionality remains unaffected due to low traffic demand.

Option 3b, which proposes a pedestrian underpass, follows the same pattern: low traffic volumes mean negligible operational impact, and construction access via the existing level crossing keeps disruption to a minimum.

Option 4a maintains emergency access and diverts landowner traffic through the marina, a route with expected low volumes. Construction of both the overbridge and parkland access road will also use the current level crossing for site access, limiting wider traffic impacts.

Option 4b supports emergency access and involves minimal construction disruption, as works will be accessed through the existing level crossing and affect only a small area.

Option 5a mirrors Option 4a, with similar arrangements for access and traffic diversion. Construction traffic for the underpass and access road is managed via the level crossing, minimising broader disruption. Option 5b, which requires no construction, preserves emergency access and causes no interference with local traffic during any phase.

5.8.4 Safety

Safety has been divided into two sub-criteria which are considered below. It should be noted that all options are safe, but some will have the potential for greater residual risks to remain. This criterion considers relative advantages of each option on the criteria of safety.

5.8.4.1 Employer's Safety

Options with a significant comparative advantage over other options offer the highest level of safety improvement for IÉ and railway staff. Option 4a is the strongest performer, fully closing the level crossing and eliminating direct exposure of staff to rail-user conflict points. All infrastructure is segregated, with minimal contact required during maintenance, reducing both routine and operational risks to the lowest possible level.

Options with some comparative advantage over other options also deliver meaningful safety gains. Option 4b closes the level crossing and eliminates vehicle traffic, with maintenance limited to the overbridge. While pedestrian access remains, the overall risk to staff is significantly reduced. Option 5a mirrors many of the benefits of 4a, with the crossing closed and infrastructure separated.

However, the use of an underpass introduces confined space hazards during maintenance. Option 5b, though slightly more complex due to the underpass structure, also benefits from crossing closure and reduced staff exposure, offering a safer scenario compared to open crossing options.

Options considered comparable to other options maintain a moderate level of safety improvement but still expose staff to certain operational risks. Option 2a removes vehicles from the crossing, which reduces incident likelihood, but leaves pedestrians and cyclists interacting with the live railway. No separation infrastructure is provided, limiting staff protection. Option 2c includes CCTV upgrades, which support remote oversight and slightly enhance safety, but as the level crossing remains in use, staff are still required to perform inspections and maintenance on-site. Option 2d offers similar benefits—reduced vehicle interaction and improved visibility—but still demands occasional staff presence near the tracks. Option 3a introduces a pedestrian overbridge, which reduces non-vehicle rail interaction, but the vehicle crossing remains active, meaning maintenance staff are still exposed during operational tasks. Option 5b, while it involves an underpass, still provides a closed crossing and safer long-term profile, though maintenance procedures are more involved.

Options with some comparative disadvantage over other options show less favourable safety outcomes for staff. Option 2b removes vehicle traffic but introduces no technology or structural segregation, leaving pedestrians and cyclists within the live rail environment and IÉ staff with ongoing exposure during operations. Option 3b presents risks both during construction—due to underpass works—and in long-term maintenance, with continued vehicle access maintaining the need for on-site staff intervention.

Option 1 faces a significant comparative disadvantage. It includes no safety upgrades of any kind and allows all user types—vehicles, pedestrians, and cyclists—to mix at the level crossing. This configuration maintains the highest ongoing risk to railway staff during inspections, maintenance, and regular operations, making it the least safe option from an employer safety standpoint.

5.8.4.2 Public Safety

Options with a significant comparative advantage over other options deliver the highest level of safety for the public. Option 4a is the most robust, completely closing the level crossing and providing full grade separation for all users—vehicles, pedestrians, and cyclists. This eliminates all direct public interaction with the rail line, offering the maximum possible reduction in risk. It represents the strongest outcome in terms of safety design and mitigation.

Options with some comparative advantage over other options also achieve strong public safety improvements, though with some residual considerations. Option 4b removes all crossing risks by eliminating access to the rail line and providing an overbridge for pedestrians and cyclists. The absence of vehicle access further enhances safety for vulnerable users. Option 5a, like 4a, removes all level crossing conflict, but the use of an underpass introduces potential risks such as poor lighting, drainage issues, or security concerns if not well designed. Nonetheless, it still offers a significant improvement by removing all public interfaces with the tracks.

Options assessed as comparable to other options represent moderate safety improvements or trade-offs. Option 2c retains full access at the level crossing but adds CCTV, providing enhanced oversight without resolving the physical crossing risk. Option 2d removes vehicles and includes CCTV, which slightly improves the safety profile, but pedestrians and cyclists still interact with the live railway.

Option 3a introduces an overbridge, effectively eliminating pedestrian and cyclist risk at the tracks, though vehicles still cross, leaving some incident potential. Option 3b replaces pedestrian/cyclist crossings with an underpass, which improves safety for those users, but retains the vehicle crossing and includes some construction and design-related risks. Option 5b also features an underpass that eliminates level crossing risk but may introduce safety concerns such as poor visibility, flooding, or antisocial behaviour, depending on design quality.

Options with some comparative disadvantage over other options fall short in managing public risk. Option 2a removes vehicles from the crossing but leaves pedestrians and cyclists crossing at grade with no protective infrastructure. The lack of CCTV or segregation leaves this as a partial and insufficient safety measure. Option 2b is similar but removes vehicle access entirely, resulting in an unusual configuration where only pedestrian and cyclist risk remains, without any mitigation.

Option 1 presents a significant comparative disadvantage. It maintains the current level crossing with no interventions. All user types—vehicles, pedestrians, and cyclists—continue to access the rail line at grade, resulting in the highest level of unmanaged public risk and the weakest safety outcome of all options..

5.8.5 Environment

Section 2.6 sets out a description of the existing environment, under key environmental criteria, along with key constraints associated with this study area. Below is a summary of the key findings of the MCA under the various environmental criteria, with an emphasis on differentiating aspects for the options considered.

5.8.5.1 Landscape and Visual Quality

Options with a significant comparative advantage over other options result in no change to the existing landscape or visual environment. Option 1 and Option 2b require no intervention, meaning they cause no construction disturbance or permanent visual intrusion. These options preserve the existing scenic character entirely, offering the most sensitive and landscape-friendly outcomes.

Options with some comparative advantage over other options involve only minimal intervention, leading to negligible visual or landscape impacts. Options 2c and 2d fall into this category. Their minor scale ensures that any changes to the landscape are limited and unlikely to cause disruption or noticeable alterations to the visual environment.

Options considered comparable to other options have measurable construction-stage impacts but result in low-significance changes once built. Option 3b and Option 5b involve underpass construction at Ennis Lane. While the works are substantial during the build phase, the post-construction visual impacts are localised and not significant, especially as the interventions can be effectively integrated into the surrounding environment.

Options with some comparative disadvantage over other options cause more noticeable temporary and lasting visual change. Option 2a involves constructing a new access road from The Shore to the south. This introduces significant short-term disruption during works and leads to moderate, though localised, visual impacts in a currently undeveloped area. Similarly, Option 5a combines the

underpass with a new access road, producing greater visual disturbance during construction and moderate residual effects on the landscape.

Options with a significant comparative disadvantage over other options produce the most pronounced landscape and visual effects. Options 3a, 4a, and 4b all involve the construction of pedestrian/cyclist overbridges at Ennis Lane, in areas highly sensitive due to their proximity to residential properties, cultural landmarks, and the protected Greystones to Bray Cliff Walk. These structures result in both substantial construction-stage disruption and significant long-term visual intrusion within an area of outstanding natural beauty.

5.8.5.2 Biodiversity

Options with a significant comparative advantage over other options have the least environmental impact and offer the greatest potential for ecological benefit. Options 1 and 2b involve no physical intervention and therefore cause no harm to biodiversity. In particular, Option 2b also offers opportunities for biodiversity net gain through the use of IE-owned farmland to offset habitat loss elsewhere along the railway line. Options 2c and 2d also perform very strongly. Both involve minimal works—mainly CCTV upgrades—with no meaningful impact on wildlife or habitats. Option 2d, like 2b, includes potential for net biodiversity gain through land enhancement, further reinforcing its positive ecological profile.

Options with some comparative advantage over other options involve measurable impacts but include mitigation potential. Option 4b and Option 5b each require vegetation clearance for construction works and may result in temporary or indirect impacts on designated sites such as the Bray Head SAC and pNHA. However, both allow for biodiversity net gain through strategic use of IE's farmland, offering a balance between short-term disturbance and long-term ecological benefit.

Options with a significant comparative disadvantage over other options pose the highest risks to biodiversity. Option 2a involves the construction of an access road through parkland, resulting in potential direct and indirect impacts to sensitive ecological areas and species, particularly due to vegetation loss and hydrological changes. Options 4a and 5a are similarly problematic, combining extensive works—such as overbridge or underpass construction and access roads—with risks to surface water quality, habitat integrity, and increased erosion or landslide risk along the coast. These interventions could lead to significant disturbance and mortality for local fauna and degradation of designated conservation areas.

5.8.5.3 Noise and Vibration

Options with a significant comparative advantage over other options result in no change from the current noise or vibration environment. Option 1 and Option 2b both involve no construction activity or operational alterations, meaning there is no additional noise, vibration, or disturbance. These options preserve the existing acoustic environment and are the least intrusive for nearby residents.

Options with some comparative advantage over other options introduce only minor or localised changes. Option 2a involves some construction noise and vibration associated with roadworks, but traffic volumes on the new road are expected to be low, limiting long-term noise increases. Any localised traffic noise gain is balanced by reductions along roads closed to vehicles. Options 2c and 2d involve minimal works, with only minor intermittent noise during the operation of barriers at crossings—changes that are negligible compared to existing background noise and represent only a slight shift in environmental sound levels.

Options considered to have some comparative disadvantage over other options experience more noticeable temporary impacts due to construction, though operational noise remains low. Options 3a, 3b, 4b, and 5b all involve substantial works—either overbridge or underpass construction—which will generate noise and vibration during the build phase. However, as the affected roads are not anticipated to carry heavy traffic, operational noise levels post-construction remain relatively unchanged. The primary concern in these cases is short-term construction disturbance rather than long-term noise impact.

Options with a significant comparative disadvantage over other options are those with the most complex or disruptive construction processes. Options 4a and 5a involve both major infrastructure works (overbridge or underpass) and the creation of new access roads. These projects are expected to generate significant construction noise and vibration, particularly near sensitive residential areas. Although operational noise increases will be minimal, there may be some rise in traffic noise for residents near the new road, partially offset by decreases in quieter areas. Nonetheless, the combined scale of construction activity places these options at the highest end of potential noise and vibration disruption.

5.8.5.4 Water Resources

Options with a significant comparative advantage over other options pose the least risk to water resources, due to minimal or no construction activity. Options 1, 2b, 2c, and 2d involve little to no physical works and therefore present negligible potential for impacts on local drainage, flood risk, or water quality. These options safeguard existing hydrological conditions and are the most favourable in terms of water resource protection.

Options considered comparable to other options carry some risk due to necessary construction but are not expected to result in major adverse impacts with appropriate mitigation. Options 3a, 3b, 4b, and 5b all involve construction of significant infrastructure—either overbridges or underpasses—which could affect local drainage systems and downstream waterbodies, including the Templecarrig Stream, Southwestern Irish Sea – Killiney Bay, and the designated Bray Head SAC and pNHA. While these impacts are potentially manageable, they do require careful design and mitigation during construction to avoid degradation of water quality or ecological value.

Options with a significant comparative disadvantage over other options pose the greatest threat to water resources due to a combination of complex infrastructure and sensitive hydrological context. Options 2a, 4a, and 5a all include the construction of a new access road from the south, which is associated with several risks: disruption to local drainage, mobilisation of sediment, alteration of stream hydraulics, and the potential to reduce floodplain capacity—thus increasing upstream flood risk. These works occur in or near high flood-risk zones and could affect protected downstream waterbodies, making them the least favourable options in terms of water resource impact.

5.8.5.5 Archaeology, Architectural and Cultural Heritage

Options with a significant comparative advantage over other options present the lowest risk to archaeological or architectural heritage. Option 1 involves no construction activity in a zone of high archaeological potential, thereby avoiding any physical impacts on buried remains or heritage assets. This non-intervention approach ensures full preservation of the cultural landscape.

Options with some comparative advantage over other options offer similarly low risk, albeit with minor or passive elements. Options 2b, 2c, and 2d do not require infrastructure interventions and therefore avoid disturbance to known archaeological zones. These options are especially beneficial given the location's sensitivity and the presence of features such as Rathdown Castle and associated medieval sites. Option 2a involves some works for a new access road, introducing moderate archaeological risk. However, this area has already been disturbed to some extent by prior development, and the risk of significant loss is somewhat limited, keeping the option within the lower-impact range.

Options considered comparable to other options present a moderate and manageable level of risk. Option 3a and Option 4b both involve overbridge works in zones of known archaeological potential. Earthmoving here could uncover buried remains related to nearby medieval sites (church, graveyard, moated site, castle). Additionally, old walling noted on historic maps could be disturbed. These features are significant but well documented, and the impacts can be managed through standard archaeological mitigation practices.

Options with some comparative disadvantage over other options introduce a higher level of risk, especially from excavation works. Option 3b, Option 4a, and Option 5b all require significant ground disturbance within areas rich in archaeological remains. In addition to potential effects on known medieval features and old railway remnants, architectural heritage such as historic walls and early farm structures may be altered or lost. These options require extensive archaeological oversight and risk management to reduce potential harm.

Option 5a represents a significant comparative disadvantage. It combines deep excavation for an underpass with the construction of a new access road in highly sensitive archaeological areas. The potential impact spans several heritage features including Rathdown Castle, historic infrastructure, and mapped early structures. The broad scope of works, both in scale and location, makes this the most intrusive and potentially damaging option from a heritage perspective.

5.8.5.6 Geology and Soils

Options with a significant comparative advantage over other options present no risk to geological or soil resources. Option 1 involves no construction works, and therefore no disturbance to soils,

topography, or geological stability. It preserves existing green space, avoids excavation, and does not interfere with drainage or erosion-sensitive areas—making it the most geologically benign option.

Options with some comparative advantage over other options result in minimal impacts due to limited or low-intensity interventions. Options 2b, 2c, and 2d involve only minor or localised construction activities and do not require substantial excavation or civil engineering. As such, they avoid significant soil disturbance or landform alteration, and any impact on green spaces or topsoil is negligible.

Options considered comparable to other options carry moderate geological impacts primarily associated with overbridge construction. Options 3a and 4b will require excavation for ramps, with some loss of green space and generation of earthworks material for disposal. The proximity to nearby river networks introduces the possibility of encountering soft ground, but these issues are relatively standard in infrastructure projects and manageable with appropriate geotechnical design and mitigation.

Options with some comparative disadvantage over other options pose higher levels of disturbance. Option 2a involves constructing a new access road through parkland, leading to the loss of topsoil, vegetation, and green space. The proximity to the sea and soft ground conditions creates a risk of erosion and geotechnical instability. Similarly, Options 3b and 5b involve underpass works requiring extensive excavation, retaining walls, and temporary works. These result in substantial earth movement, soil loss, and potential disruption to ground stability, particularly in soft or erosion-prone areas.

Option 5a has a significant comparative disadvantage due to its combination of intensive underpass construction and the development of a new access road. This option presents the greatest risk, including the loss of large areas of green space, considerable excavation volumes, and possible interference with unstable coastal terrain prone to erosion and landslides. It involves heavy civil engineering in sensitive areas, with broad and compounded impacts on both soil resources and local geomorphology.

5.8.5.7 Agricultural and non-agricultural

Options with a significant comparative advantage over other options maintain uninterrupted access to agricultural land and involve little or no construction works, thus avoiding disruption to farm operations. Options 1, 2c, 3a, and 3b all preserve existing access routes for agricultural vehicles and personnel. While Options 3a and 3b involve overbridge and underpass construction respectively, both ensure continued access post-construction, with only minor, manageable impact on landholding layouts.

Options considered comparable to other options / neutral maintain access to farmland but introduce changes that may moderately affect farm operations. Options 2a, 4a, and 5a each propose a new access road to the south, which results in the permanent diversion of agricultural vehicle routes. While access remains feasible, these diversions could impact logistical efficiency, routine farm operations, or field connectivity, especially for larger landholdings.

Options with a significant comparative disadvantage over other options result in the complete loss of access to agricultural land, which undermines the viability of farming in the affected areas. Options 2b, 2d, 4b, and 5b all eliminate vehicular access routes essential to farming activity, creating a critical barrier to land use continuity and representing the highest level of adverse impact from an agricultural perspective.

5.8.5.8 Air Quality and Climate

Significant comparative advantage over other options - Options 1 and 2b present no air quality or climate impacts due to the absence of construction activity or operational changes, making them the most environmentally benign options.

Some comparative advantage over other options - Options 2c and 2d involve minimal construction, and any associated impacts on air quality or climate are considered negligible during both the construction and operational phases. These options avoid new vehicular infrastructure and align with sustainability goals.

Comparable to other options / neutral - Options 3a, 3b, and 5b may result in temporary air quality impacts during the construction of overpasses or underpasses, but these are short-term and not expected to have lasting environmental effects. They do not involve significant increases in traffic volumes or emissions post-completion.

Some comparative disadvantage over other options - Options 2a and 4b generate moderate environmental impacts due to construction works. Option 2a includes a new access road, contributing to vehicle-related emissions during the build phase. Option 4b involves overbridge construction, introducing temporary disruption and increased emissions.

Significant comparative disadvantage over other options - Options 4a and 5a involve both the construction of new access roads and major infrastructure (overbridge or underpass), leading to the greatest potential impact on air quality and greenhouse gas emissions during the construction phase. These represent the least favourable outcomes from a climate and air quality perspective.

5.8.5.9 Accessibility and Social Inclusion

5.8.5.10 Accessibility

Options with a significant comparative advantage over other options offer the highest levels of accessibility for all user groups. Option 2c is the strongest in this category, maintaining full access for vehicles, pedestrians, and cyclists, while incorporating CCTV to enhance safety and comfort. With no physical restrictions or detours, and minimal disruption, it delivers the most inclusive and user-friendly experience, particularly for vulnerable or mobility-limited individuals.

Options with some comparative advantage over other options support strong accessibility with manageable trade-offs. Option 2a reroutes vehicles via a new road but preserves access for all users. While the diversion introduces a minor inconvenience, access to key facilities is retained, making this a practical and inclusive solution. Option 3a maintains vehicle access and introduces a pedestrian/cyclist overbridge, which enhances safety and accessibility for non-motorised users. Option 3b achieves similar outcomes, though the underpass may feel less comfortable or safe for some users due to its enclosed nature, which can affect perceived accessibility.

Options considered comparable to other options provide a balanced but not exceptional level of accessibility. Option 2d excludes vehicles but retains access for pedestrians and cyclists, supported by CCTV, which enhances user experience and safety. It is suitable for local movement on foot or by bike but doesn't cater for broader transport needs. Option 4a is similar to Option 5a, both allowing user access through overbridge or underpass arrangements, but requiring longer routes or detours that may be less convenient or accessible for some. The comfort and usability of the infrastructure vary depending on user preferences and physical ability.

Options with some comparative disadvantage over other options reduce accessibility for certain groups. Option 2b offers basic access only, with minimal infrastructure and no vehicle provision. The lack of upgrades limits usability for vulnerable users, making the route exclusionary in effect. Option 4b retains pedestrian access but eliminates vehicle and farm access, reducing overall inclusivity, particularly for users reliant on direct transport or agricultural connectivity. Option 5b maintains pedestrian movement via an underpass but removes vehicle access, combining structural limitations with access restrictions—creating barriers for multiple user groups.

Option 1 faces a significant comparative disadvantage. Although physical access remains, there are no safety or comfort upgrades. This limits use by cautious, older, or mobility-impaired individuals and does not accommodate future accessibility standards. It fails to support inclusive travel and represents the least accessible option overall.

5.8.5.11 Social Inclusion

Options with a significant comparative advantage over other options provide the strongest support for inclusive access and equitable transport. Option 2c stands out by offering fully inclusive access for all users—vehicles, pedestrians, and cyclists—alongside improved safety features such as CCTV. There are no physical or perceived barriers, making this option supportive of diverse user needs, including those of vulnerable groups, older adults, and individuals with disabilities. It directly aligns with transport equity and social inclusion goals.

Options with some comparative advantage over other options also contribute positively to social inclusion, though with some limitations. Option 2a maintains connectivity for all users, including those reliant on vehicles. While the rerouting adds some distance, pedestrian and cyclist access is retained at-grade, allowing continued use by a broad range of individuals. Option 3a provides safe, separated access via an overbridge for non-vehicular users while preserving vehicle access, making it a practical and inclusive solution. Option 3b retains vehicle access and includes a pedestrian underpass, but the enclosed environment may feel unsafe or unwelcoming to some vulnerable users unless it is well lit and carefully designed to mitigate antisocial behaviour.

Options considered comparable to other options offer moderate levels of inclusion. Option 2d provides pedestrian and cyclist access with improved safety through CCTV, supporting local non-car users, but excludes vehicles, potentially limiting access to wider services for some groups. Option 4a includes an overbridge which improves physical safety, but the gradient or exposure of the structure could challenge some users with limited mobility. Rerouting of vehicles may also disproportionately affect individuals who depend on direct road access. Option 5a combines a pedestrian underpass with rerouted vehicle access, preserving connectivity but introducing environments that may deter certain users due to perceived safety concerns.

Options with some comparative disadvantage over other options present noticeable barriers to inclusion. Option 2b allows access for pedestrians and cyclists but fails to provide enhancements for safety, comfort, or user confidence. It also excludes vehicle users entirely, limiting reach to essential services for some. Option 4b provides no vehicle access and only an overbridge, which could pose challenges for users with mobility impairments or those uncomfortable with bridge use. Option 5b is more exclusionary—removing vehicle access entirely and offering only an underpass for pedestrians and cyclists, which may feel unsafe or impractical for some vulnerable users.

Option 1 faces a significant comparative disadvantage. While it technically preserves access, it fails to improve safety or comfort and remains unfriendly to vulnerable users. With no upgrades and continued safety risks, it does not support social inclusion and falls short of meeting modern accessibility and equity expectations.

5.8.6 Integration

Integration has been assessed using the five sub-criteria described below.

5.8.6.1 Adaptability in the Future

Options with a significant comparative advantage over other options offer the strongest future adaptability. Option 4a leads in this category, providing full grade separation of all users. This design supports unrestricted train frequency, improved safety, and seamless integration with future high-capacity services such as DART+, intercity, or express lines. It also offers a robust land footprint that allows for long-term operational and modal flexibility, making it the most futureproof option.

Options with some comparative advantage over other options also perform well in terms of adaptability. Option 5a is similar in outcome to 4a, using an underpass instead of an overbridge. While it achieves full separation and prepares rail operations for future upgrades, it introduces maintenance requirements that must be considered in long-term resilience planning. Nonetheless, it maintains strong alignment with evolving service demands and system scalability.

Options rated as comparable to other options show moderate or mixed adaptability. Option 2a introduces a new access road, which works well for vehicles and offers operational simplicity, but it lacks grade separation or tech infrastructure for pedestrian and cyclist movement, limiting full future compatibility. Option 4b includes an overbridge for non-vehicular users, offering safe and scalable infrastructure for pedestrians and cyclists, but the lack of vehicle access restricts broader multimodal flexibility. Option 5b supports increased rail capacity and separation of pedestrians, but the permanent exclusion of vehicles may limit its utility in a diverse transport network.

Options with some comparative disadvantage over other options face more notable constraints on future flexibility. Option 2b removes vehicle access and lacks any technological or scalable infrastructure, limiting options for future upgrades or system modifications. Option 2c offers smart monitoring through CCTV and retains full user access, showing some future-readiness at a low cost, but still lacks structural or modal separation. Option 2d supports pedestrian and cyclist access only, limiting modal diversity and long-term transport adaptability. Option 3a uses an overbridge to separate pedestrians and cyclists, improving safety and supporting some scalability, but the retention of at-grade vehicle access constrains future rail expansion. Option 3b includes an underpass that

improves safety for non-vehicular users, but like 3a, it maintains vehicle crossings, which can limit frequency and introduces long-term maintenance complexity.

Option 1 represents a significant comparative disadvantage. With no changes introduced, it remains entirely incompatible with future rail service enhancements, such as DART+ or increased train frequencies. It also retains all current operational, modal, and safety limitations, making it the least adaptable of all options.

5.8.6.2 Transport Integration

Options with a significant comparative advantage over other options offer the strongest integration with existing and proposed active travel routes. Option 3b provides an unrestricted connection for pedestrians to the Cliff Walk, the proposed East Coast Greenway, and the Town Centre, with no delays caused by boom gate closures. Cyclists also retain access to key routes, and while they may experience minor delays during peak hours, the overall impact is negligible due to low traffic volumes. This option delivers seamless multi-modal connectivity and minimal interference with pedestrian or cyclist movement.

Options with some comparative advantage over other options maintain strong integration with minimal disruption. Option 1 allows continued pedestrian and cyclist access to the Cliff Walk and the proposed East Coast Greenway, with only slight potential delays due to boom gate closures. However, the low traffic volume makes these delays practically insignificant. Option 2c and Option 2d similarly ensure that all users retain access to local active travel routes, with no major changes to journey lengths or route continuity. Minor wait times remain the only drawback, but these are minimal in impact.

Options considered comparable to other options provide adequate transport integration but involve trade-offs in distance or routing. Option 3a, Option 4a, and Option 4b introduce longer walking and cycling distances due to the layout of the overbridge, especially for residents in the North Shore area. While the routes remain functional and well-connected, the additional distance slightly reduces convenience. Option 2a maintains access to key routes but increases travel distances for cyclists by up to 3km depending on their origin, which may impact route preference and active travel uptake. Option 5b allows unrestricted pedestrian movement and supports access to the Greenway and Town Centre, but cyclists no longer have direct access to the Cliff Walk, limiting full integration.

Options with some comparative disadvantage over other options restrict certain user groups or increase travel distance in ways that limit full transport integration. Option 5a, though providing strong pedestrian access and avoiding boom gate delays, increases cycling distances significantly—up to 3km for North Shore residents—making active travel less appealing. Option 2b performs the worst in this category, removing vehicle access and entirely cutting off cyclist access to the Cliff Walk. Though pedestrian movement remains, the overall loss in connectivity for cyclists marks it as the least integrated with wider transport networks.

5.8.6.3 Land Use Integration

All options under consideration are assessed as comparable to other options, reflecting a neutral impact on land use integration. Across all proposals for the Ennis Lane Level Crossings, access to both the north and south sides of the railway line will be preserved, ensuring continuity in connectivity and movement patterns.

None of the options are expected to interfere with existing land use zoning or restrict future development potential. The proposals have been designed to align with the surrounding spatial context, with no severance or barriers introduced that would compromise land access, planning objectives, or development rights.

5.8.6.4 Geographical Integration

All options are assessed as comparable to other options, reflecting a neutral position in terms of geographical integration. Each proposal aligns with national and international policy objectives aimed at improving public transport services—particularly the expansion of DART services—and supports broader goals such as encouraging modal shift from private vehicles to sustainable transport.

The options are consistent with planning strategies that promote increased development density in areas well-served by public transport, reinforcing spatial integration principles. No option demonstrates a clear advantage or disadvantage over another in this regard, as all are equally supportive of policy compliance and network connectivity.

5.8.6.5 Government Policy Integration

All proposed options are assessed as comparable to other options, reflecting a neutral impact in terms of alignment with government policy. Each option complies with relevant regional and local policy frameworks that aim to enhance public transport services, including the expansion of DART, promote modal shift towards sustainable travel, and support higher-density development in appropriate areas.

None of the options conflict with existing policy objectives, nor do they affect current land uses. They are all designed within the scope of established planning and transport strategies, ensuring consistency with government aims without introducing either additional benefits or challenges.

5.8.7 Physical Activity

Options with a significant comparative advantage over other options provide the most effective support for active travel. Option 3b performs best in this category by offering an unrestricted connection for pedestrians to the Cliff Walk, East Coast Greenway, and Town Centre, without delays from boom gates. Cyclists retain access to all key routes, with only minor and insignificant delays during peak hours due to low traffic volume. This option fully supports walking and cycling as practical, uninterrupted transport modes.

Options with some comparative advantage over other options also support strong walking and cycling access with minimal compromise. Option 1 maintains direct pedestrian and cyclist integration with key routes, with only slight potential delays during peak hours. Due to low traffic volumes, these

wait times are not considered significant. Option 2c and Option 2d offer similar benefits—full integration with the Greenway and Cliff Walk, and negligible disruption to active travel due to boom gate operation.

Options considered comparable to other options maintain viable walking and cycling routes but introduce minor detours or added distance. Option 3a, Option 4a, and Option 4b involve a long overbridge, increasing the walking and cycling distance from the North Shore area to the Cliff Walk from roughly 500m to 850m. Although access is preserved, this added distance reduces overall convenience. These changes also alter the shortest routes to the Town Centre, making travel slightly less direct.

Options with some comparative disadvantage over other options introduce more noticeable limitations. Option 2a preserves active travel access, but the detour via Victoria Road increases the cycling distance to the Cliff Walk by up to 3km for North Shore residents and 1km for those west of the rail line, impacting the attractiveness of cycling as a mode. Option 5a, while offering an unrestricted pedestrian route and full access to the Greenway, imposes similar extended distances for cyclists, reducing direct route efficiency. Option 5b maintains pedestrian access without delay but removes cyclist access to the Cliff Walk entirely, limiting connectivity and reducing the overall value for active travel users.

Option 2b faces a significant comparative disadvantage. Although pedestrian access remains (with only minor boom gate delays), cyclists can no longer access the Cliff Walk. This severely restricts cycling opportunities and diminishes the integration and convenience of the overall active travel network.

5.9 Construction Consideration

The construction requirements and associated risks vary significantly across the MCA options, with implications for delivery complexity, public disruption, environmental impact, and programme duration. A high-level summary of construction-related considerations for each option is provided below.

5.9.1 Minimal or No Construction Works

Option 1 (Do Nothing) and Option 2b require no physical infrastructure works. These options present no engineering complexity, no environmental risk, and no construction disruption. However, they offer no improvement to safety or accessibility and may require legal or land acquisition processes in the case of farmland access restrictions.

Options 2c / 2d involves a CCTV-controlled upgrade at the existing level crossing. This is a low-impact, low-complexity intervention, involving installation of cameras, power supply, and minor civil works. It is not expected to cause any meaningful disruption or present significant technical risk.

5.9.2 Moderate Construction Complexity

Option 2a, 4a, and 5a include the construction of a new access road from the south to maintain vehicle connectivity. This introduces moderate construction complexity including roadworks through existing parkland, groundworks in proximity to the coastline, and potential for soft ground conditions.

These works may cause notable disruption to the public, particularly to residents near Greystones Marina, during the construction phase. Careful traffic and community management will be necessary.

Options 3a, 4a, and 4b propose the construction of a pedestrian/cyclist overbridge with associated ramps at Ennis Lane. This requires significant elevated structure works, including piling and cranage in a constrained and environmentally sensitive location near residential areas and protected landscape views. Although technically feasible, these works will require careful staging and could have temporary visual, noise, and access impacts.

5.9.3 High Construction Complexity

Options 3b, 5a, and 5b involve the construction of a road underpass approximately 3.5 metres below existing ground level at Ennis Lane. This is a significant civil engineering undertaking, involving extensive excavation, retaining structures, piling, and complex temporary works. Given its proximity to the operational railway, it will likely require extended possessions or track protection measures during key phases. Although the rural location mitigates public disruption, this type of structure carries increased programme and cost risk, particularly with respect to groundwater management, drainage, and earthworks disposal.

6. SUMMARY AND CONCLUSION

6.1.1 Non-preferred options

Below is a concise summary of justification for non-preferred options based on the analysis across all the MCA criteria.

- **Option 1 – Do Nothing:**
  - Significant comparative disadvantages in safety, accessibility, and social inclusion.
  - Retains the existing level crossing without improvement, failing to address known safety risks.
  - Offers no support for future accessibility needs, does not meet transport integration or inclusivity objectives.
  - Although there are no environmental impacts, the option fails to deliver policy alignment or user benefits..
- **Options 2a – Pedestrian Crossing with New Access Road:**
  - Introduces moderate construction complexity and public disruption, especially around Greystones Marina.
  - While pedestrian access is retained, vehicle detours impact agricultural and community connectivity.
  - Comparative disadvantages in noise, biodiversity, water, and land use due to road construction through parkland.
  - Benefits are limited relative to the more balanced and lower-impact Option 2c.
- **Option 2b – Pedestrian Crossing Only, No Vehicle Access:**
  - Significant comparative disadvantages due to removal of vehicle access to farmland without mitigation.
  - Excludes key user groups, reducing accessibility and social inclusion.
  - Despite low environmental impact, it undermines functional access and is not supportive of economic land use.
- **Option 2d – CCTV Control, No Vehicle Access:**
  - Shares environmental advantages with 2c but loses critical utility due to removal of vehicle access.
  - Reduced accessibility for agricultural and emergency vehicle needs.
  - Limits flexibility and does not optimise multi-user connectivity like 2c does.

- **Option 3a – Overbridge for Pedestrians, Level Crossing for Vehicles:**
  - Moderate user benefits but presents significant landscape and visual impacts due to the prominent overbridge structure.
  - Construction near protected views and residential areas introduces sensitivity and opposition risk.
  - Higher construction complexity and cost with no major improvement over Option 2c in terms of transport integration or accessibility.
- **Option 3b – Underpass for Pedestrians, Level Crossing for Vehicles:**
  - Offers good accessibility, but comes with high construction risk, extended possession requirements, and significant civil works.
  - Ground and water risks, and higher cost and programme uncertainties compared to Option 2c.
  - Visual and environmental impacts are more contained, but benefits do not outweigh complexity.
- **Options 4a – Overbridge for Pedestrians, Access Road for Vehicles:**
  - Combines high visual and landscape impacts with substantial biodiversity and water resource risks.
  - Disruption to both residents and the environment during construction of bridge and new access road.
  - Less cost-effective than Option 2c and offers no unique performance benefits to justify additional impacts.
- **Option 4b – Overbridge Only, No Vehicle Access:**
  - Suffers from significant landscape, heritage and accessibility drawbacks.
  - Vehicle access to agricultural land removed, reducing inclusivity and economic utility.
  - Construction complexity and ecological impacts do not align with the relative benefits delivered.
- **Option 5a – Underpass for Pedestrians, Access Road for Vehicles:**
  - Combines two high-impact elements—underpass and new road—leading to maximum environmental and construction disruption.
  - High comparative disadvantages in geology, biodiversity, and noise.
  - Does not improve user experience significantly more than Option 2c but at much greater cost and risk.
- **Option 5b – Underpass Only, No Vehicle Access:**
  - Maintains high construction and environmental impact while also removing vehicle access, undermining agricultural utility and connectivity.
  - Despite potential for biodiversity net gain, this does not offset the functional limitations and delivery risks.

6.1.2 Emerging preferred option

Option 2c – Level crossing upgraded to a CCTV-controlled system; remains open to pedestrians and cyclists with improved controls. Vehicle access restricted to farm access only. This has emerged

as the preferred option due to its balanced performance across all assessment criteria, offering maximum benefit with minimal impact.

Please refer to Appendix B for a drawing of the Emerging Preferred Option.

Key Advantages:

- Public Safety: Improves safety through CCTV monitoring, reducing conflict risk at the crossing without the need for full grade separation.
- Accessibility & Social Inclusion: Maintains full access for pedestrians, cyclists, and farm access vehicles. This ensures inclusive mobility, especially for local residents and agricultural users.
- Adaptability: Supports future upgrades and operational flexibility. Retains all user modes and integrates well with potential future smart technologies.
- Environmental Impact: Minimal construction required. Negligible impact on biodiversity, water resources, geology, noise, air quality, or landscape.
- Cost & Delivery: Offers low capital expenditure relative to grade-separated options and avoids complex engineering works, minimising construction risks, disruption, and duration.
- Land Use & Policy Compliance: Fully aligns with national and local transport and planning policy objectives. No loss of land use or development potential.
- Public Acceptance & Disruption: Likely to be better received by the community due to limited construction disruption, especially when compared to more invasive overbridge/underpass options.

Neutral or Comparable Areas:

- Geographical and Government Policy Integration: Performs equally well as other options, with compliance to modal shift, DART+ support, and density policies.
- Visual & Cultural Heritage Impact: No significant visual intrusion or risk to archaeological or architectural assets.

6.1.3 Key risks/next steps

6.1.3.1 Key Risks

1. Technical Integration Risk
   - Potential challenges in integrating the CCTV-controlled crossing system with existing IÉ rail infrastructure and signalling.
   - Ensuring system resilience under varied weather conditions and peak usage times.

2. Safety and Regulatory Risk
   - Although improved, at-grade crossings remain inherently less safe than grade-separated options.
   - Full compliance with IÉ operational safety standards and regulatory approvals must be demonstrated.
3. Public and Stakeholder Perception
   - Some stakeholders may view the retention of an at-grade crossing as a compromise on long-term safety or network resilience.
   - Perceptions that the option does not future-proof the location for increased pedestrian or vehicular traffic.
4. Planning and Consent Risk
   - Minor civil works and upgrades may still trigger planning or environmental screening requirements.
   - Delays in approvals could impact programme milestones.
5. Procurement and Installation
   - Risks associated with sourcing and commissioning CCTV and barrier equipment within required timelines.
   - Need for coordination with other works in the area to avoid conflict or access constraints.

6.1.3.2 Next Steps

1. Undertake Preliminary Design
   - Develop a detailed preliminary design for the CCTV-controlled level crossing.
   - Include geometry, visibility, signalling interfaces, equipment locations, and barrier configurations.
2. Conduct Site Investigations
   - Complete topographical surveys for minor civil works.
   - Confirm ground investigation requirements for the preferred option and strategy for when such investigations would take place.
   - Identify utility conflicts or local access issues.
3. Safety and Risk Assessments
   - Initiate a Preliminary Safety Case in line with IÉ protocols.
   - Complete a formal risk assessment including human factors and residual risks to users.
4. Stakeholder Consultation
   - Engage with local authorities, accessibility groups, landowners and residents.
   - Confirm acceptability of the solution and gather input to refine the preliminary design.
5. Planning and Environmental Screening
   - Confirm whether the proposed upgrade requires planning permission or EIA screening.

- Prepare any required documents to support the application, if applicable.

6. Cost and Programme Review
   - Update cost estimates based on preliminary design detail.
   - Review programme for design, procurement, installation and commissioning stages.
7. Prepare for Procurement
   - Develop scope for equipment supply and installation contracts.
   - Initiate procurement strategy discussions to align with IÉ and national guidelines.

Appendix A

MCA Matrix

Comparison Criteria Legend
Significant comparative advantage over other options
Some comparative advantage over other options
Comparable to other options / neutral
Some comparative disadvantage over other options
Significant comparative disadvantage over other options

				Economy							
				Capital Expenditure (CAPEX): Construction, land acquisition, temporary works		OPEX:operational costs (IE or other entities), Technology advancements and future proofing / obsolescence		Train Operations Functionality/Economic Benefit		Traffic functionality and associated economic activities and opportunities	
Works Description	Summary of requirements	Option Number	Description of Option	Qualitative appraisal of potential infrastructure costs of proposed options	Rationale	Qualitative appraisal of potential ongoing infrastructure maintenance costs of proposed options	Rationale	Qualitative appraisal of potential ongoing operational costs of proposed options	Rationale	Qualitative appraisal of potential wider benefits of proposed options	Rationale
				Estimate high level cost of construction of option Extent and type of 3rd party lands required permanently Extent and type of 3rd party land required temporarily for temporary works during construction		Cost to maintain the infrastructure over the whole life. Effects of infrastructure maintenance to services. Provision of ways of undertaking routine inspections and maintenance activities while minimising the effect on service to customers.		Potential improvement or deterioration of the operation conditions of the line (reduction or increase of the risk of interruption of service) Increased DART service improving connectivity and economy (leading to increased competition in economy, increased output of firms, increased tax revenue).		Potential benefit to vehicular traffic flows in the vicinity of the works during construction and associated economic activities and opportunities in the vicinity Consideration of duration of traffic disruption and length of diversions To minimise the impacts on traffic and transportation during the construction and operational stages	
Southern Line Ennis Lane Level Crossing	To provide an appropriate level of accessibility	1	Level crossing remains open to both vehicles and pedestrians (Do Nothing).		No infrastructure built, zero capital outlay, no land required. Lowest-cost.		Legacy setup with no tech improvements, high ongoing staff & safety costs, low adaptability. Least aligned with modern standards.		No improvement — retains highest operational risk and constraint to rail service expansion. Fully exposed level crossing remains.		Due to the low traffic volume during peak hours at this location, the potential impact of longer or more frequent boom gate closures on vehicular traffic flows in the peak hour during operational stage is considered insignificant. No construction activity will be required for this option and therefore no impact is envisaged on traffic flows during construction stage.
		2a	Level crossing remains open for pedestrians only. Vehicles rerouted via a new access road from the south.		Moderate CAPEX for new access road; single-use intervention with focused land use. No major structures needed.		Vehicle rerouting reduces operational risk; access road is simple and cost-effective long-term.		Only removes vehicles from crossing — pedestrians and cyclists still interact with the rail line. Residual conflict persists.		Emergency vehicle access to the rail track to serve rail line and the tunnel to the north will be maintained. Land owner access will be maintained by diverting access traffic through the Greystones marina. The diverted traffic volume is expected to be very low and therefore no significant disruption is expected during the operational stage. Construction traffic related to the construction of the access road through park land and the pedestrian and cyclists overbridge will access the construction site via the current level crossing and will therefore have minimal impact in terms of traffic disruption and diversion during construction stage.
		2b	Level crossing remains open for pedestrians only. Vehicle access rights to the farmland are removed, or if purchases the land.		No major infrastructure built, but permanent loss of vehicle access limits long-term value. Low upfront cost.		Simpler infrastructure, but lacks tech upgrades and reduces future adaptability. Balanced by low maintenance need.		Vehicles removed, but no tech or safety enhancement for others. Pedestrian/cyclist risk remains unmanaged.		Emergency vehicle access to the rail track to serve rail line and the tunnel to the north will be maintained. No significant disruption is expected during the operational stage. No construction activity will be required for this option and therefore no impact is envisaged on traffic flows during construction stage.
		2c	Level crossing is upgraded to a CCTV-controlled system. Crossing remains open to both vehicles and pedestrians with improved controls.		Low-cost CCTV upgrade, minimal land impact, limited disruption. Excellent cost-efficiency.		Uses smart tech (CCTV), low OPEX, scalable, low service disruption. Best balance of cost, operability, and future adaptability.		Keeps full access but adds CCTV — improves oversight but retains all risk interactions with trains.		Due to the low traffic volume during peak hours at this location, the potential impact of longer or more frequent boom gate closures on vehicular traffic flows in the peak hour during operational stage is considered insignificant. No construction activity will be required for this option and therefore no impact is envisaged on traffic flows during construction stage.
		2d	Level crossing is upgraded to a CCTV-controlled system. Vehicle access rights to the farmland are removed, or if purchases the land.		Slightly higher cost than 2c due to vehicle closure impacts, but minimal infrastructure work keeps costs in check.		Includes tech upgrades and removes vehicles, simplifying operations. Moderate cost and impact.		Still allows pedestrian/cyclist crossing, removing vehicles. Slight risk remains. Better than status quo, but not transformative.		Emergency vehicle access to the rail track to serve rail line and the tunnel to the north will be maintained. No significant disruption is expected during the operational stage. No construction activity will be required for this option and therefore no impact is envisaged on traffic flows during construction stage.
		3a	Level crossing closed for pedestrians. Pedestrian access provided via a new overbridge at the Ennis Lane location. Crossing remains open for vehicles with improved controls.		Overbridge moderate CAPEX, some temp land required, but compact permanent footprint.		Overbridge is durable and low OPEX; pedestrian/cyclist separation reduces crossing incidents and maintenance needs.		Maintains vehicle crossing residual operational conflict. Overbridge for peds/cyclists reduces some risk.		Due to the low traffic volume during peak hours at this location, the potential impact of longer or more frequent boom gate closures on vehicular traffic flows in the peak hour during operational stage is considered insignificant. Construction traffic related to the construction of the pedestrian and cyclist overbridge will access the construction site via the current level crossing and will therefore have minimal impact in terms of traffic disruption and diversion during construction stage.
		3b	Level crossing closed for pedestrians. Pedestrian access provided via a new underpass at the Ennis Lane location. Crossing remains open for vehicles with improved controls.		Underpass is costly to build, especially with drainage & safety systems. High temporary impact.		Underpass higher OPEX due to drainage, lighting, inspection needs. Disruption during maintenance is more likely.		Underpass replaces ped/cycle at crossing, helping safety. But vehicle crossing still introduces potential for delays.		Due to the low traffic volume during peak hours at this location, the potential impact of longer or more frequent boom gate closures on vehicular traffic flows in the peak hour during operational stage is considered insignificant. Construction traffic related to the construction of the pedestrian and cyclist underpass will access the construction site via the current level crossing and will therefore have minimal impact in terms of traffic disruption and diversion during construction stage.
		4a	Level crossing closed to both pedestrians and vehicles. Pedestrian access via a new overbridge at the Ennis Lane location. Vehicles rerouted via a new access road from the south.		Dual infrastructure (road + bridge) drives up cost, land acquisition, and complexity.		High upfront cost but operationally stable; durable structures and separated modes improve future resilience.		Full level crossing closure removes all conflict points with trains. Enables safest, most efficient rail operation. Best for future high-frequency DART.		Emergency vehicle access to the rail track to serve rail line and the tunnel to the north will be maintained. Land owner access will be maintained by diverting access traffic through the Greystones marina. The diverted traffic volume is expected to be very low and therefore no significant disruption is expected during the operational stage. Construction traffic related to the construction of the access road through park land and the pedestrian and cyclists overbridge will access the construction site via the current level crossing and will therefore have minimal impact in terms of traffic disruption and diversion during construction stage.
		4b	Level crossing closed to both pedestrians and vehicles. Pedestrian access via a new overbridge at the Ennis Lane location. Vehicle access rights to the farmland are removed, or if purchases the land.		Moderate cost overbridge, no vehicle provision, but reasonable land footprint and complexity.		Overbridge is effective; vehicle access restriction is a disadvantage but OPEX manageable.		Level crossing closed; supports train reliability. But no vehicle access may affect local economic benefit.		Emergency vehicle access to the rail track to serve rail line and the tunnel to the north will be maintained. No significant disruption is expected during the operational stage. Construction traffic related to the construction of the pedestrian and cyclist overbridge will access the construction site via the current level crossing and will therefore have minimal impact in terms of traffic disruption and diversion during construction stage.
		5a	Level crossing closed to both pedestrians and vehicles. Pedestrian access via a new underpass at the Ennis Lane location. Vehicles rerouted via a new access road from the south.		Most expensive option — road + underpass. High construction burden, complex land/timing needs.		Road + underpass dual maintenance burdens, more complexity and inspection requirements.		Same rail benefit as 4a, but underpass construction adds risk of disruption during build. Strong long-term economic and connectivity upside.		Emergency vehicle access to the rail track to serve rail line and the tunnel to the north will be maintained. Land owner access will be maintained by diverting access traffic through the Greystones marina. The diverted traffic volume is expected to be very low and therefore no significant disruption is expected during the operational stage. Construction traffic related to the construction of the access road through park land and the pedestrian underpass will access the construction site via the current level crossing and will therefore have minimal impact in terms of traffic disruption and diversion during construction stage.
		5b	Level crossing closed to both pedestrians and vehicles. Pedestrian access via a new underpass at the Ennis Lane location. Vehicle access rights to the farmland are removed, or if purchases the land.		Same underpass burden without vehicle access. Less value return from investment.		Underpass increases maintenance, but with no vehicle access, some OPEX pressures are reduced.		Removes crossing conflict. Similar to 4b, but slightly more operational risk due to underpass complexity.		Emergency vehicle access to the rail track to serve rail line and the tunnel to the north will be maintained. No significant disruption is expected during the operational stage. No construction activity will be required for this option and therefore no impact is envisaged on traffic flows during construction stage.

Comparison Criteria Legend
Significant comparative advantage over other options
Some comparative advantage over other options
Comparable to other options / neutral
Some comparative disadvantage over other options
Significant comparative disadvantage over other options

				Safety			
				Employer's Safety		Public safety	
Works Description	Summary of requirements	Option Number	Description of Option	Qualitative appraisal on the safety impacts on IE or railway staff	Rationale	Qualitative appraisal on the safety impacts on the public (road/rail/cycle/pedestrian)	Rationale
				To reduce safety risks associated with construction maintenance and operations. To reduce the potential for incidents or near-misses for IE/construction staff.		To reduce safety risks associated with passengers at platforms, public adjacent to the railway and road, pedestrian and cycle users at level crossings. To reduce the potential for accidents for members of the public/passengers on railway infrastructure. To reduce the potential for conflict between rail and road users.	
Southern Line Ennis Lane Level Crossing	To provide an appropriate level of accessibility	1	Level crossing remains open to both vehicles and pedestrians (Do Nothing).		No safety upgrades, all user types mix at the crossing. Highest ongoing risk to IE staff during maintenance, inspection, and operations.		No interventions. Level crossing remains fully open for all users. Highest level of public risk with no mitigation.
		2a	Level crossing remains open for pedestrians only. Vehicles rerouted via a new access road from the south.		Removes vehicles from the crossing, reducing incidents, but pedestrians/cyclists still present, and no infrastructure to separate modes or enhance safety for staff.		Vehicles removed, but pedestrians and cyclists still cross the tracks at grade. No safety enhancements (e.g., CCTV or grade separation).
		2b	Level crossing remains open for pedestrians only. Vehicle access rights to the farmland are removed, or IE purchases the land.		Vehicle crossing removed, but no new tech or segregation — pedestrians/cyclists still present in a live rail environment.		Same as 2a, but also no vehicle access at all. Pedestrian/cyclist interaction at crossing remains a risk point.
		2c	Level crossing is upgraded to a CCTV-controlled system. Crossing remains open to both vehicles and pedestrians with improved controls.		CCTV is a safety improvement, but keeping the level crossing fully open means IE staff are still required to manage or inspect it, increasing exposure.		Full access remains, CCTV helps, but crossing conflicts still exist for all user types. No physical separation.
		2d	Level crossing is upgraded to a CCTV-controlled system. Vehicle access rights to the farmland are removed, or IE purchases the land.		Reduced vehicle interaction is good, and CCTV improves visibility. Still, some maintenance still requires staff presence near tracks.		Removes vehicles from crossing, includes CCTV, but still allows pedestrian/cyclist access at track level. Medium safety profile.
		3a	Level crossing closed for pedestrians. Pedestrian access provided via a new overbridge at the Ennis Lane location. Crossing remains open for vehicles with improved controls.		Overbridge helps reduce pedestrian interaction, but vehicle crossing remains — staff still exposed during maintenance.		Overbridge removes pedestrian/cyclist crossing risk. However, vehicles still cross tracks, keeping some risk of incidents.
		3b	Level crossing closed for pedestrians. Pedestrian access provided via a new underpass at the Ennis Lane location. Crossing remains open for vehicles with improved controls.		Underpass adds worker safety risks during construction and maintenance. Vehicle crossing remains open, so staff exposure continues.		Removes pedestrian/cyclist conflict, but vehicle level crossing remains a risk. Underpass safety depends on design.
		4a	Level crossing closed to both pedestrians and vehicles. Pedestrian access via a new overbridge at the Ennis Lane location. Vehicles rerouted via a new access road from the south.		Fully closes the level crossing. Removes all exposure of IE staff to crossing-related incidents. Infrastructure is segregated, low contact with rail line during maintenance.		Level crossing fully closed. Full grade separation of all users (road & foot). Maximum reduction in risk for all public interfaces with rail.
		4b	Level crossing closed to both pedestrians and vehicles. Pedestrian access via a new overbridge at the Ennis Lane location. Vehicle access rights to the farmland are removed, or IE purchases the land.		No vehicles, crossing closed, and maintenance limited to overbridge. Reduced risk, though pedestrian movement still present.		Removes all crossing risks for the public. Overbridge keeps vulnerable road users off the tracks. No vehicle access is a safety gain.
		5a	Level crossing closed to both pedestrians and vehicles. Pedestrian access via a new underpass at the Ennis Lane location. Vehicles rerouted via a new access road from the south.		Similar to 4a in benefits, though underpass adds confined space risks during maintenance. Still significantly safer than keeping crossing open.		Same as 4a in closure, but underpass adds potential safety risks if not well-lit/drained. Still eliminates all level crossing conflict.
		5b	Level crossing closed to both pedestrians and vehicles. Pedestrian access via a new underpass at the Ennis Lane location. Vehicle access rights to the farmland are removed, or IE purchases the land.		Same crossing closure benefit, but underpass involves more complex safety procedures for maintenance. Still relatively safe overall.		Underpass removes crossing risk but brings some safety risks (visibility, flooding, antisocial use) if not well designed.

Comparison Criteria Legend

- Significant comparative advantage over other options
- Some comparative advantage over other options
- Comparable to other options / neutral
- Some comparative disadvantage over other options
- Significant comparative disadvantage over other options

				Environment																	
				Landscape and Visual Qualitative		Biodiversity		Noise and Vibration		Water resources		Archaeology, Architectural and Cultural Heritage		Geology & Soils		Agricultural and non-agricultural		Air Quality & Climate Change	
Works Description	Summary of requirements	Option Number	Description of Option	Appraisal of landscape and visual impacts of options based on the sensitive viewpoints	Rationale	Qualitative appraisal on the impact on biodiversity	Rationale	Qualitative appraisal of the potential noise and vibration impact	Rationale	Qualitative appraisal on the potential impacts to surface ground or coastal waters	Rationale	Qualitative appraisal of the potential impacts of proposed options on potential sub surface archaeology and impact on foundations and above ground elements of architectural heritage	Rationale	Qualitative appraisal of the potential of the proposed options on waste and material resources including the reuse of site won materials.	Rationale	Qualitative appraisal of impacts on valued resources either from a human or natural origin with value arising for economic or cultural reasons. These assets can be existing utilities or non-renewable resources	Rationale	Qualitative appraisal of air quality and climate impacts both on the operational and construction phases	Rationale
				• To avoid / minimise impact on designated amenities, landscapes, protected trees or views. • To avoid / minimise visual impact on properties & amenities. • To avoid / minimise removal of trees / hedgerows. • To avoid / minimise impact from light pollution. • To provide opportunities to enhance the local amenity and green infrastructure.		To consider effects on biodiversity of the area and/, such as impacts on specific flora or fauna, or on defined habitats. To provide opportunities to enhance biodiversity. To ensure that impacts on nature conservation resources are prevented and mitigated. These can occur through direct loss or damage to habitat or specific species, creation of barriers to population movement or indirect effects resulting from, for example, changes in water quality of levels, air quality or noise and light levels.		•To provide a solution which ensures minimum levels of noise and vibration		•To minimise the impact or provide opportunities to enhance the quality of surface waters and associated floodplains, ground waters and coastal waters.		The construction, presence and operation of transport infrastructure can impact directly on such cultural heritage resources through physical impacts resulting from direct loss or damage, or indirectly through changes in setting, noise and vibration levels, air quality, and water levels. To minimise the impact on cultural heritage such as on below ground archaeological remains, historic buildings (individual and areas), and historic landscapes and parks.		To consider the impacts on designated areas of geological interest, unstable natural ground and ground contamination. To consider the impacts on agricultural soil and sensitive or vulnerable soils and material resources, including the reuse of site won materials.		Qualitative appraisal of impacts on valued resources either from a human or natural origin with value arising for economic or cultural reasons. These assets can be existing utilities or non-renewable resources		Impacts of Construction Traffic. Improvements in air quality through use of EMUs over DMUs. Improvements in greenhouse gas emission through modal shift from road to rail. Improvements in greenhouse gas emission through use of EMUs over DMUs. Reduction in greenhouse gas emissions. Preservation or enhancement the local air quality.	
Southern Line Ennis Lane Level Crossing	To provide an appropriate level of accessibility	1	Level crossing remains open to both vehicles and pedestrians (Do Nothing).		No intervention required, and therefore no impacts on the landscape or visual environment.		No intervention required, and therefore no impacts on biodiversity.		No change from current situation		This option has no/minimal impacts since minimal construction works have been proposed.		The level crossing is located in an area of significant archaeological potential but as no infrastructure intervention is proposed, this option has significant comparative advantages over other options. No impact on architectural heritage assets in the receiving environment.		This option has no impacts from a geology and soils perspective since no construction works have been proposed.		Access to agricultural land maintained. This option has no/minimal impacts since minimal construction works have been proposed.		No air quality or climate impacts	
		2a	Level crossing remains open for pedestrians only. Vehicles rerouted via a new access road from the south.		Significant construction stage impacts in provision of new access road from The Shore to south. Post construction impacts are localised and moderate.		Provision of new access road from the south will have indirect impacts on designated sites i.e. Bray Head SAC and Bray Head pNHA, as a result of surface water quality impacts due changes to the hydrological regime, and the increase in likelihood of erosion/landslides of the coastline. This option will require vegetation removal within the parkland for the provision of access road, with potential direct and indirect impacts on birds, bats, small mammals and invertebrates. From habitat loss/displacement, disturbance, and mortality impacts.		Some construction noise and vibration expected during roadworks. Some increase in traffic noise for residents adjacent to new road and some decrease in traffic for residents along road closed to traffic. MCA assessment based largely on construction noise as operational noise is not expected to be very high (as the road is not expected to be highly trafficked)		Provision for the new access road from the south is associated with the following points - Potential to impact the drainage within the area, impact the hydraulic conveyance within the stream and mobilise sediment with the potential to impact on the surface water flow quality within the stream - The construction of the bridge within an area of high flood risk has the potential to reduce the flood plain capacity and increasing the potential for flooding upstream		New vehicular access is located within the zone of archaeological potential associated with a number of monuments, namely Rathdown Castle, moated site, midden and a deserted medieval settlement. Potential impact on remains of old railway line and Rathdown Castle (RMP WI008-011) although the area has been disturbed by previous development including sewerage infrastructure and coastal erosion.		Provision of the new access road from the south is associated with the following points - Loss of significant green space, amenities and topsoil/vegetation/growing soil since new road will go through parkland. - Due to proximity with the sea, there is the possibility of encountering soft ground, gravel, silt and sand which is inadequate for pavement design. - The proposed road will be constructed in an area prone to erosion and landslide. Therefore, it may adversely impact the surrounding environment by disrupting the current drainage regime and favour further coastal erosion/landslide issues. - Generation of earthworks materials for disposal.		Access to agricultural land maintained. Provision of new access road to the south will have an impact on the farm due to permanent diversion of vehicles in order to access agricultural land. May impact operations of farm.		Option requires the construction of new access road for vehicles. Generation of negative impacts on air quality and climate during construction.	
		2b	Level crossing remains open for pedestrians only. Vehicle access rights to the farmland are removed, or if purchases the land.		No intervention required, and therefore no impacts on the landscape or visual environment.		No intervention required, and therefore no impacts on biodiversity. Enhancement measures are possible with this option due to the purchase of farmlands by IE. Potential for use as biodiversity net gain to compensate for habitats loss elsewhere along the railway line.		No change from current situation		This option has no/minimal impacts since minimal construction works have been proposed.		The level crossing is located in an area of significant archaeological potential but as no infrastructure intervention is proposed, this option has significant comparative advantages over other options. No impact on architectural heritage assets in the receiving environment.		This option has minimal impacts from a geology and soils perspective since minimal construction works have been proposed.		No access to agricultural land. Significant comparative disadvantage over other options.		No air quality or climate impacts	
		2c	Level crossing is upgraded to a CCTV-controlled system. Crossing remains open to both vehicles and pedestrians with improved controls.		Minimal intervention required, and therefore no significant impacts on the landscape or visual environment.		The change to CCTV controls will have no effect on biodiversity/wildlife, and the increase in noise from barrier opening/closing will be negligible when compared to the existing buzzer on the pedestrian gate.		Comparative advantage over other options; no/minimal construction works. Minor change from current situation due to operation of crossing which will result in intermittent noise for barrier opening/closing.		This option has no/minimal impacts since minimal construction works have been proposed.		The level crossing is located in an area of significant archaeological potential but as no infrastructure intervention is proposed, this option has significant comparative advantages over other options. No impact on architectural heritage assets in the receiving environment.		This option has minimal impacts from a geology and soils perspective since minimal construction works have been proposed.		Access to agricultural land maintained. This option has no/minimal impacts since minimal construction works have been proposed.		Air quality or climate impacts deemed insignificant during construction/operation phase.	
		2d	Level crossing is upgraded to a CCTV-controlled system. Vehicle access rights to the farmland are removed, or if purchases the land.		Minimal intervention required, and therefore no significant impacts on the landscape or visual environment.		The change to CCTV controls will have no effect on biodiversity/wildlife, and the increase in noise from barrier opening/closing will be negligible when compared to the existing buzzer on the pedestrian gate. Enhancement measures are possible with this option due to the purchase of farmlands by IE. Potential for use as biodiversity net gain to compensate for habitats loss elsewhere along the railway line.		Comparative advantage over other options; no/minimal construction works. Minor change from current situation due to operation of crossing which will result in intermittent noise for barrier opening/closing.		This option has no/minimal impacts since minimal construction works have been proposed.		The level crossing is located in an area of significant archaeological potential but as no infrastructure intervention is proposed, this option has significant comparative advantages over other options. No impact on architectural heritage assets in the receiving environment.		This option has minimal impacts from a geology and soils perspective since minimal construction works have been proposed.		No access to agricultural land. Significant comparative disadvantage over other options.		Air quality or climate impacts deemed insignificant during construction/operation phase.	
		3a	Level crossing closed for pedestrians. Pedestrian access provided via a new overbridge at the Ennis Lane location. Crossing remains open for vehicles with improved controls.		Significant construction stage impacts in provision of new pedestrian / cycle overbridge at Ennis Lane - in vicinity of residential and cultural properties, Greystones to Bray Cliff Walk (Protected Prospects), and adjoining area of outstanding natural beauty. Post construction impacts are localised and significant.		Potential for indirect impacts on designated sites nearby due to construction works for the ramp that is in close proximity to Kilruddery, Deerpark watercourse, and Bray Head SAC and Bray Head pNHA as a result of run-off during construction. Requirement for vegetation removal for ramp access, likely low value scrub and hedgerow, however potential direct impacts on birds, bats, small mammals, and invertebrates		Construction noise and vibration expected during bridge works. No change in operational noise or vibration MCA assessment based largely on construction noise as operational noise is not expected to be very high (as the road is not expected to be highly trafficked)		Provision of the new overbridge is associated with the construction of physical structures which have the potential to impact on the drainage in the area and therefore on the downgradient waterbodies including the Templecarraig Stream, Southwestern Irish Sea - Kilkiny Bay (HA10) coastal waterbody and the protected Bray Head SAC and pNHA		The proposed pedestrian ramp is located within a zone of significant archaeological potential and any earthmoving works have the potential to reveal buried archaeological remains associated with the church and graveyard (WI008-012001/002) which is located to the west or medieval activity associated with the castle and moated site (WI008-011/001) located to the east. In terms of architectural heritage, there is some old walling that could be impacted by the proposed overbridge. This is an old wall evident on historic mapping including the first OS.		This option has some comparative disadvantages as listed below - The construction of a new overbridge and associated ramps will require excavation works, thereby generating earthworks materials for disposal. - Additionally, part of the proposed ramps seem to fall within a green space. Hence, this will contribute in loss of growing soil and green space. - Soft ground may be encountered		Access to agricultural land maintained. Construction of overbridge may impact landholding, however access to be maintained during operation.		Potential air quality impacts during construction phase.	
		3b	Level crossing closed for pedestrians. Pedestrian access provided via a new underpass at the Ennis Lane location. Crossing remains open for vehicles with improved controls.		Significant construction stage impacts in provision of new underpass at Ennis Lane. Post construction impacts are localised and not significant.		The construction of an underpass at Ennis Lane will have indirect impacts on nearby designated sites i.e. Bray Head SAC and Bray Head pNHA, as a result of surface water and groundwater quality impacts due changes to the hydrological/hydrogeological regime, and the increase in likelihood of erosion/landslides of the coastline. Will likely require removal of vegetation along Ennis Lane, with potential impacts on birds, bats, small mammals, and invertebrates as a result of habitat loss, disturbance/displacement, and		Construction noise and vibration expected during underpass works. No change in operational noise or vibration MCA assessment based largely on construction noise as operational noise is not expected to be very high (as the road is not expected to be highly trafficked)		Provision of the new underpass is associated with the construction of physical structures and retaining walls which have the potential to impact on the drainage in the area and therefore on the downgradient waterbodies including the Templecarraig Stream, Southwestern Irish Sea - Kilkiny Bay (HA10) coastal waterbody and the protected Bray Head SAC and pNHA		The proposed underpass will involve considerable excavation within an area of significant archaeological potential (known from the recorded presence and from excavations that have taken place in advance of residential development to the west). In terms of architectural heritage, there is some old walling and farm buildings that could be impacted by the proposed underpass. This is an old wall evident on historic mapping including the first OS.		This option has some comparative disadvantages as listed below - The construction of a new underpass and associated ramps will require heavy civil engineering works, considerable amount of temporary works, provision for retaining walls. Therefore, significant excavation works will be involved , thereby generating large volumes of earthworks materials for disposal.		Access to agricultural land maintained. Construction of underpass may impact landholding, however access to be maintained during operation.		Potential air quality impacts during construction phase.	
		4a	Level crossing closed for both pedestrians and vehicles. Pedestrian access via a new overbridge at the Ennis Lane location. Vehicles rerouted via a new access road from the south.		Significant construction stage impacts in provision of new pedestrian / cycle overbridge at Ennis Lane - in vicinity of residential and cultural properties, Greystones to Bray Cliff Walk (Protected Prospects), and adjoining area of outstanding natural beauty. Post construction impacts are localised and significant.		The provision of new access road from the south, and overbridge will have indirect impacts on nearby designated sites i.e. Bray Head SAC and Bray Head pNHA, as a result of surface water quality impacts due changes to the hydrological regime, and the increase in likelihood of erosion/landslides of the coastline. This option will require vegetation removal within the parkland for the provision of access road, and due to the construction of overbridge, with potential direct and indirect impacts on birds, bats, small mammals and invertebrates, from habitat loss/displacement, disturbance, and mortality impacts.		Construction noise and vibration expected during bridge works. Some increase in traffic noise for residents adjacent to new road and some decrease in traffic for residents along road closed to traffic. MCA assessment based largely on construction noise as operational noise is not expected to be very high (as the road is not expected to be highly trafficked)		Provision for the new access road from the south is associated with the following points - Potential to impact the drainage within the area, impact the hydraulic conveyance within the stream and mobilise sediment with the potential to impact on the surface water flow quality within the stream - The construction of the pedestrian overbridge within an area of high flood risk has the potential to reduce the flood plain capacity and increasing the potential for flooding upstream Provision of the new overbridge is associated with the construction of physical structures which have the potential to impact on the drainage in the area and therefore on the downgradient waterbodies including the Templecarraig Stream, Southwestern Irish Sea - Kilkiny Bay (HA10) coastal waterbody and the protected Bray Head SAC and pNHA		The proposed pedestrian ramp is located within a zone of significant archaeological potential and any earthmoving works have the potential to reveal buried archaeological remains associated with the church and graveyard (WI008-012001/002) which is located to the west or medieval activity associated with the castle and moated site (WI008-011/001) located to the east. New vehicular access is located within the zone of archaeological potential associated with a number of monuments, namely Rathdown Castle, moated site, midden and a deserted medieval settlement. In terms of architectural heritage, there is some old walling that could be impacted by the proposed overbridge. Potential impact on remains of old railway line and Rathdown Castle (RMP WI008-011) although the area has been disturbed by previous development including sewerage infrastructure and coastal erosion.		Provision of the new access road from the south is associated with the following points 1. The construction of a new overbridge and associated ramps will require excavation works, thereby generating earthworks materials for disposal. 2. Provision of the new access road from the south is associated with the following points - Loss of significant green space, amenities and topsoil/vegetation/growing soil since new road will go through parkland. - Due to proximity with the sea, there is the possibility of encountering soft ground, gravel, silt and sand which is inadequate for pavement design. - The proposed road will be constructed in an area prone to erosion and landslide. Therefore, it may adversely impact the surrounding environment by disrupting the current drainage regime and favour further coastal erosion/landslide issues. - Generation of earthworks materials for disposal.		Access to agricultural land maintained. Provision of new access road to the south may have an impact on the farm due to permanent diversion of vehicles in order to access agricultural land. May impact operations of farm.		Option requires the construction of new access road for vehicles. Generating negative impacts on air quality and climate during construction. Construction works for overbridge.	
		4b	Level crossing closed for both pedestrians and vehicles. Pedestrian access via a new overbridge at the Ennis Lane location. Vehicle access rights to the farmland are removed, or if purchases the land.		Significant construction stage impacts in provision of new pedestrian / cycle overbridge at Ennis Lane - in vicinity of residential and cultural properties, Greystones to Bray Cliff Walk (Protected Prospects), and adjoining area of outstanding natural beauty. Post construction impacts are localised and significant.		Construction of overbridge will have indirect impacts on nearby designated sites i.e. Bray Head SAC and Bray Head pNHA, as a result of surface water quality impacts due changes to the hydrological regime, and the increase in likelihood of erosion/landslides of the coastline. Will likely require removal of vegetation along Ennis Lane and within parkland, with potential impacts on birds, bats, small mammals, and invertebrates as a result of habitat loss, disturbance/displacement, and mortality.		Construction noise and vibration expected during underpass works. No change in operational noise levels. MCA assessment based largely on construction noise as operational noise is not expected to be very high (as the road is not expected to be highly trafficked)		Provision of the new overbridge is associated with the construction of physical structures which have the potential to impact on the drainage in the area and therefore on the downgradient waterbodies including the Templecarraig Stream, Southwestern Irish Sea - Kilkiny Bay (HA10) coastal waterbody and the protected Bray Head SAC and pNHA		The proposed pedestrian ramp is located within a zone of significant archaeological potential and any earthmoving works have the potential to reveal buried archaeological remains associated with the church and graveyard (WI008-012001/002) which is located to the west or medieval activity associated with the castle and moated site (WI008-011/001) located to the east. In terms of architectural heritage, there is some old walling that could be impacted by the proposed overbridge. This is an old wall evident on historic mapping including the first OS.		This option has some comparative disadvantages as listed below - The construction of a new overbridge and associated ramps will require excavation works, thereby generating earthworks materials for disposal. - Additionally, part of the proposed ramps seem to fall within a green space. Hence, this will contribute in loss of growing soil and green space. - Soft ground may be encountered		No access to agricultural land. Significant comparative disadvantage over other options.		Construction works for overbridge.	
		5a	Level crossing closed for both pedestrians and vehicles. Pedestrian access via a new underpass at the Ennis Lane location. Vehicles rerouted via a new access road from the south.		Significant construction stage impacts in provision of new underpass at Ennis Lane and new access road from The Shore to south. Post construction impacts are localised and moderate.		The construction of an underpass at Ennis Lane and access road from The Shore will have indirect impacts on nearby designated sites i.e. Bray Head SAC and Bray Head pNHA, as a result of surface water and groundwater quality impacts due changes to the hydrological/hydrogeological regime, and the increase in likelihood of erosion/landslides of the coastline. Will require removal of vegetation along Ennis Lane and within parkland, with potential impacts on birds, bats, small mammals, and invertebrates as a result of habitat loss, disturbance/displacement, and mortality.		Construction noise and vibration expected during underpass works. No change in operational noise or vibration Some increase in traffic noise for residents adjacent to new road and some decrease in traffic for residents along road closed to traffic. MCA assessment based largely on construction noise as operational noise is not expected to be very high (as the road is not expected to be highly trafficked)		Provision of the new underpass is associated with the construction of physical structures and retaining walls which have the potential to impact on the drainage in the area and therefore on the downgradient waterbodies including the Templecarraig Stream, Southwestern Irish Sea - Kilkiny Bay (HA10) coastal waterbody and the protected Bray Head SAC and pNHA Provision of the new overbridge is associated with the construction of physical structures and retaining walls which have the potential to impact on the drainage in the area and therefore on the downgradient waterbodies including the Templecarraig Stream, Southwestern Irish Sea - Kilkiny Bay (HA10) coastal waterbody and the protected Bray Head SAC and pNHA - The construction of the bridge within an area of high flood risk has the potential to reduce the flood plain capacity and increasing the potential for flooding upstream Provision of the new underpass is associated with the construction of physical structures and retaining walls which have the potential to impact on the drainage in the area and therefore on the downgradient waterbodies including the Templecarraig Stream, Southwestern Irish Sea - Kilkiny Bay (HA10) coastal waterbody and the protected Bray Head SAC and pNHA		The proposed underpass will involve considerable excavation within an area of significant archaeological potential (known from the recorded presence and from excavations that have taken place in advance of residential development to the west). New vehicular access is located within the zone of archaeological potential associated with a number of monuments, namely Rathdown Castle, moated site, midden and a deserted medieval settlement. In terms of architectural heritage, there is some old walling and farm buildings that could be impacted by the proposed overbridge. This is an old wall evident on historic mapping including the first OS. Potential impact on remains of old railway line and Rathdown Castle (RMP WI008-011) although the area has been disturbed by previous development including sewerage infrastructure and coastal erosion.		This option has some comparative disadvantages as listed below 1. Construction of underpass and associated encroachments to adjacent lands - Heavy civil engineering works, considerable amount of temporary works and provision for retaining walls will be required. Therefore, significant excavation works will be involved , thereby generating large volumes of earthworks materials for disposal. - Additionally, the proposed encroachments to the adjacent land seem to fall within a green space. Hence, this will contribute in loss of growing soil and green space. Also, it may generate additional earthworks materials for disposal - Soft ground may be encountered due to proximity with a river network within 200m.		Access to agricultural land maintained. Provision of new access road to the south may have an impact on the farm due to permanent diversion of vehicles in order to access agricultural land. May impact operations of farm.		Option requires the construction of new access road for vehicles. Generating negative impacts on air quality and climate during construction. Construction works for overbridge.	
		5b	Level crossing closed to both pedestrians and vehicles. Pedestrian access via a new underpass at the Ennis Lane location. Vehicle access rights to the farmland are removed, or if purchases the land.		Significant construction stage impacts in provision of new underpass at Ennis Lane. Post construction impacts are localised and not significant.		The construction of an underpass at Ennis Lane will have indirect impacts on nearby designated sites i.e. Bray Head SAC and Bray Head pNHA, as a result of surface water and groundwater quality impacts due changes to the hydrological/hydrogeological regime, and the increase in likelihood of erosion/landslides of the coastline. Will likely require removal of vegetation along Ennis Lane, with potential impacts on birds, bats, small mammals, and invertebrates as a result of habitat loss, disturbance/displacement, and		Construction noise and vibration expected during underpass works. No change in operational noise levels. MCA assessment based largely on construction noise as operational noise is not expected to be very high (as the road is not expected to be highly trafficked)		Provision of the new underpass is associated with the construction of physical structures and retaining walls which have the potential to impact on the drainage in the area and therefore on the downgradient waterbodies including the Templecarraig Stream, Southwestern Irish Sea - Kilkiny Bay (HA10) coastal waterbody and the protected Bray Head SAC and pNHA		The proposed underpass will involve considerable excavation within an area of significant archaeological potential (known from the recorded presence and from excavations that have taken place in advance of residential development to the west). New vehicular access is located within the zone of archaeological potential associated with a number of monuments, namely Rathdown Castle, moated site, midden and a deserted medieval settlement. In terms of architectural heritage, there is some old walling and farm buildings that could be impacted by the proposed land take. This is an		This option has some comparative disadvantages as listed below - The construction of a new underpass and associated encroachment to adjacent lands will require heavy civil engineering works, considerable amount of temporary works, provision for retaining walls. Therefore, significant excavation works will be involved , thereby generating large volumes of earthworks materials for disposal.		No access to agricultural land. Significant comparative disadvantage over other options.		Construction works for underpass.	

Comparison Criteria Legend
Significant comparative advantage over other options
Some comparative advantage over other options
Comparable to other options / neutral
Some comparative disadvantage over other options
Significant comparative disadvantage over other options

				Accessibility & Social Inclusion			
				Accessibility		Social Inclusion	
Works Description	Summary of requirements	Option Number	Description of Option	Qualitative appraisal of capacity of options to facilitate the movement of people (either within, on to or across the rail system)	Rationale	Qualitative appraisal of capacity of options to provide ease of access for the mobility and visually impaired	Rationale
				Capacity of options to facilitate the movement of people (either within, on to or across the rail system) Impact on the wellbeing of the passenger and public. Positive impact on passenger and public experience. Improve accessibility to key facilities, such as employment, education, transport and healthcare to satisfy transport demand for all trip types.		Positive impact towards vulnerable groups Improvement of accessibility to public transport facilities, in particular from deprived geographic areas.	
Southern Line Ennis Lane Level Crossing	To provide an appropriate level of accessibility	1	Level crossing remains open to both vehicles and pedestrians (Do Nothing).		Retains access physically, but lacks upgrades. Safety and comfort issues limit use by vulnerable or cautious users. Not supportive of future accessibility needs.		Technically allows access, but with no improvements, it's unsafe and unfriendly to vulnerable users. No support for inclusion goals.
		2a	Level crossing remains open for pedestrians only. Vehicles rerouted via a new access road from the south.		Vehicles rerouted via new road; all users can still cross. Minor inconvenience offset by maintained access to facilities.		Vehicle rerouting may add distance but maintains connectivity. Ped/cycle access at grade, accessible but not enhanced.
		2b	Level crossing remains open for pedestrians only. Vehicle access rights to the farmland are removed, or if purchases the land.		Minimal infrastructure, vehicle access removed, no upgrades for pedestrians/cyclist experience. Basic and exclusionary.		Pedestrian/cyclist access only, but no enhancements to make it safe or inclusive. No vehicle access limits reach to services.
		2c	Level crossing is upgraded to a CCTV-controlled system. Crossing remains open to both vehicles and pedestrians with improved controls.		Fully open to all users (vehicles, pedestrians, cyclists). Includes CCTV for safety and comfort. No loss of access, minimal disruption best accessibility and user experience.		Fully inclusive access for all users, improved safety (CCTV), no restrictions or barriers. Supports equity in transport for all demographics.
		2d	Level crossing is upgraded to a CCTV-controlled system. Vehicle access rights to the farmland are removed, or if purchases the land.		No vehicle access, but pedestrians and cyclists retained. Good for local non-motorised movement. CCTV improves experience.		Pedestrian/cyclist access retained with CCTV, good for non-car users. Excludes vehicles but still improves safety.
		3a	Level crossing closed for pedestrians. Pedestrian access provided via a new overbridge at the Ennis Lane location. Crossing remains open for vehicles with improved controls.		Vehicles still have direct access. Pedestrians/cyclists use overbridge, which improves safety and accessibility. Very functional and inclusive.		Overbridge gives safe, separated access for vulnerable groups, and vehicles can still pass. Inclusive and reliable.
		3b	Level crossing closed for pedestrians. Pedestrian access provided via a new underpass at the Ennis Lane location. Crossing remains open for vehicles with improved controls.		Similar to 3a, but underpass may feel less inviting/safe for some users. Still maintains access for all.		Vehicle access good, but underpass is less inviting for vulnerable users. Risk of antisocial behaviour unless well designed.
		4a	Level crossing closed to both pedestrians and vehicles. Pedestrian access via a new overbridge at the Ennis Lane location. Vehicles rerouted via a new access road from the south.		Similar to 3a, but with overbridge, which improves usability for some. Traffic rerouting may be inconvenient for some trips.		Overbridge improves access for walkers/cyclists, but some may find gradients/exposure difficult. Vehicle route detour may impact some low-mobility users.
		4b	Level crossing closed to both pedestrians and vehicles. Pedestrian access via a new overbridge at the Ennis Lane location. Vehicle access rights to the farmland are removed, or if purchases the land.		Pedestrian access is retained, but vehicle and farm access is removed. Some users excluded reduced inclusivity.		No vehicle access and overbridge only. Vulnerable road users and those without strong mobility may find access difficult.
		5a	Level crossing closed to both pedestrians and vehicles. Pedestrian access via a new underpass at the Ennis Lane location. Vehicles rerouted via a new access road from the south.		All users can cross, but potential barriers include longer detours, perceived safety of underpass, and access road disruption.		Pedestrian/cyclist underpass accessible but may deter some users (dark, enclosed). Vehicle rerouting preserved, so no full exclusion.
		5b	Level crossing closed to both pedestrians and vehicles. Pedestrian access via a new underpass at the Ennis Lane location. Vehicle access rights to the farmland are removed, or if purchases the land.		Underpass + no vehicle access reduced accessibility for many user types, particularly those needing direct road access.		Underpass + no vehicle access more exclusion, especially for those reliant on vehicle transport or with accessibility needs.

Comparison Criteria Legend
Significant comparative advantage over other options
Some comparative advantage over other options
Comparable to other options / neutral
Some comparative disadvantage over other options
Significant comparative disadvantage over other options

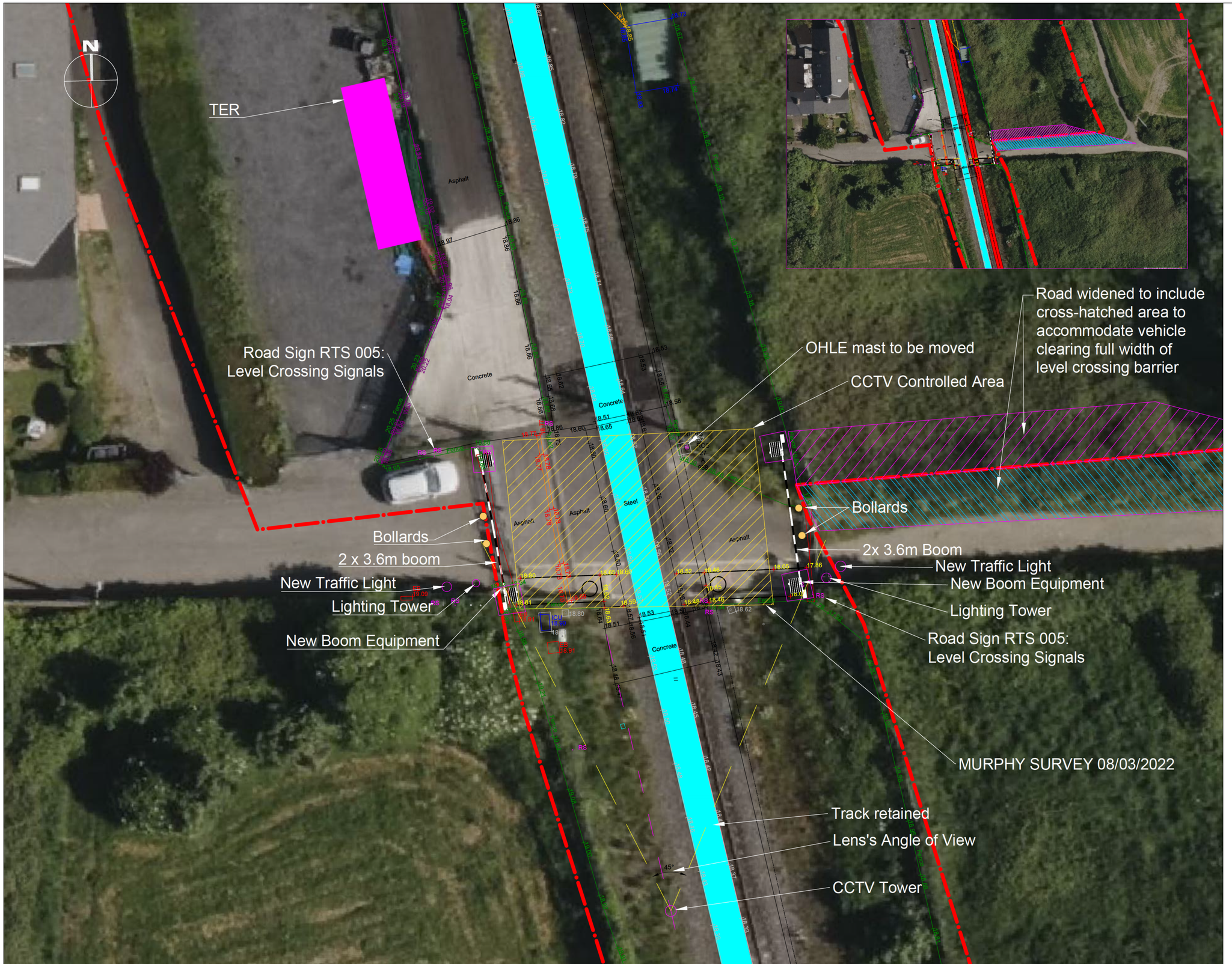
				Integration											
				Adaptability in the future		Transport Integration		Land use integration		Geographical Integration		Government policy Integration			
Works Description	Summary of requirements	Option Number	Description of Option	Qualitative appraisal of capacity of options to cater for future projects or aspirations	Rationale	Qualitative appraisal of the options and their impact on integration with other transport modes	Rationale	Qualitative appraisal of the options and their impact on integration with land use policies	Rationale	Qualitative appraisal of the options and their impact on integration with geographical polices	Rationale	Qualitative appraisal of the options and their impact on integration with geographical and government polices	Rationale		
				Allowance for future internal transport links within Ireland.		Similarity of systems with other DART+ Programmes. The solution proposed should integrate with other transport systems such as DART+ West, Metrolink and light rail lines, local and national traffic road systems, walkways, and cycleways.		Integration with land use policies and objectives; and Integration with regional and local land use plans Adhesion to regional and local plans and policies		Integration with land use policies and objectives Integration with regional and local land use plans		Integration with national and international plans and policies			
Southern Line Ennis Lane Level Crossing	To provide an appropriate level of accessibility	1	Level crossing remains open to both vehicles and pedestrians (Do Nothing).		No change no adaptability. Incompatible with future rail upgrades, DART+, or enhanced service levels. Keeps safety and operational limitations.		Pedestrian and cyclist integration with the existing Bray / Greystones cliff walk and the proposed East Coast Greenway will continue to be possible. Wait times during peak hours may be slightly impacted due to longer or more frequent boom gate closures. However, due to the low traffic volume, the impact of increased wait times in the peak hour is considered to be insignificant.		The various proposals for options for the Ennis Lane Level Crossings will have a neutral impact on land use integration. Access to both south and south of the railway line will be maintained and there will be no impact on either land use zoning or development potential.		The options comply with national and international policies to improve public transport services including DART services, encouraging modal shift and allowing for increased density of development in certain areas.		The options comply with regional and local policies to improve public transport services including DART services, encouraging modal shift and allowing for increased density of development in certain areas. There is no impact on existing land uses.
		2a	Level crossing remains open for pedestrians only. Vehicles rerouted via a new access road from the south.		New access road adapts well for vehicles, but no long-term tech/grade separation for pedestrians/cyclists.		Pedestrian and cyclist integration with the existing Bray / Greystones cliff walk and the proposed East Coast Greenway will continue to be possible. Pedestrian wait times during peak hours may be slightly impacted due to longer or more frequent boom gate closures. However, due to the low traffic volume, the impact of increased pedestrian wait times in the peak hour is considered to be insignificant. Cyclist will utilise Victoria Avenue to access the Cliff Walk or the Town Centre. **This will have an impact on cyclists from the residential area around North Shore, by increasing the distance to the Cliff Walk by around 3km. It will also have an impact on cyclists from the Greystones residential area west of the rail line, by increasing the distance to the Cliff Walk by around 1km.**		The various proposals for options for the Ennis Lane Level Crossings will have a neutral impact on land use integration. Access to both south and south of the railway line will be maintained and there will be no impact on either land use zoning or development potential.		The options comply with national and international policies to improve public transport services including DART services, encouraging modal shift and allowing for increased density of development in certain areas.		The options comply with regional and local policies to improve public transport services including DART services, encouraging modal shift and allowing for increased density of development in certain areas. There is no impact on existing land uses.
		2b	Level crossing remains open for pedestrians only. Vehicle access rights to the farmland are removed, or if purchases the land.		Lacks infrastructure for tech or scalable expansion. Vehicle access permanently removed, no system flexibility.		Pedestrian wait times during peak hours may be slightly impacted due to longer or more frequent boom gate closures. However, due to the low traffic volume, the impact of increased pedestrian wait times in the peak hour is considered to be insignificant. Cyclist will utilise Victoria Avenue to access the Town Centre. **Cyclist access to the Cliff Walk will no longer be possible.**		The various proposals for options for the Ennis Lane Level Crossings will have a neutral impact on land use integration. Access to both south and south of the railway line will be maintained and there will be no impact on either land use zoning or development potential.		The options comply with national and international policies to improve public transport services including DART services, encouraging modal shift and allowing for increased density of development in certain areas.		The options comply with regional and local policies to improve public transport services including DART services, encouraging modal shift and allowing for increased density of development in certain areas. There is no impact on existing land uses.
		2c	Level crossing is upgraded to a CCTV-controlled system. Crossing remains open to both vehicles and pedestrians with improved controls.		Retains all user access, includes smart monitoring (CCTV), and uses flexible existing alignment. Good low-impact future-readiness.		Pedestrian and cyclist integration with the existing Bray / Greystones cliff walk and the proposed East Coast Greenway will continue to be possible. Wait times during peak hours may be slightly impacted due to longer or more frequent boom gate closures. However, due to the low traffic volume, the impact of increased wait times in the peak hour is considered to be insignificant.		The various proposals for options for the Ennis Lane Level Crossings will have a neutral impact on land use integration. Access to both south and south of the railway line will be maintained and there will be no impact on either land use zoning or development potential.		The options comply with national and international policies to improve public transport services including DART services, encouraging modal shift and allowing for increased density of development in certain areas.		The options comply with regional and local policies to improve public transport services including DART services, encouraging modal shift and allowing for increased density of development in certain areas. There is no impact on existing land uses.
		2d	Level crossing is upgraded to a CCTV-controlled system. Vehicular flexibility. Limits modal choices long-term.		Ped/cycle access only; no vehicle or structural flexibility. Limits modal choices long-term.		Pedestrian and cyclist integration with the existing Bray / Greystones cliff walk and the proposed East Coast Greenway will continue to be possible. Wait times during peak hours may be slightly impacted due to longer or more frequent boom gate closures. However, due to the low traffic volume, the impact of increased wait times in the peak hour is considered to be insignificant.		The various proposals for options for the Ennis Lane Level Crossings will have a neutral impact on land use integration. Access to both south and south of the railway line will be maintained and there will be no impact on either land use zoning or development potential.		The options comply with national and international policies to improve public transport services including DART services, encouraging modal shift and allowing for increased density of development in certain areas.		The options comply with regional and local policies to improve public transport services including DART services, encouraging modal shift and allowing for increased density of development in certain areas. There is no impact on existing land uses.
		3a	Level crossing closed for pedestrians. Pedestrian access provided via a new overbridge at the Ennis Lane location. Crossing remains open for vehicles with improved controls.		Overbridge separates modes, keeping line adaptable. Vehicle access at-grade is a limitation, but solution is expandable.		The long overbridge's distance will be added for pedestrians and cyclists to access the Cliff Walk or the Town Centre. **This will have an impact on pedestrians and cyclists from the residential area around North Shore, by increasing the distance to the Cliff Walk from around 500m to around 810m.** The shortest distance to the Town Centre from the North Shore area will change to be through the residential area west of the rail line (around 2.1km) as opposed to through the area east of the rail line (2.35km).		The various proposals for options for the Ennis Lane Level Crossings will have a neutral impact on land use integration. Access to both south and south of the railway line will be maintained and there will be no impact on either land use zoning or development potential.		The options comply with national and international policies to improve public transport services including DART services, encouraging modal shift and allowing for increased density of development in certain areas.		The options comply with regional and local policies to improve public transport services including DART services, encouraging modal shift and allowing for increased density of development in certain areas. There is no impact on existing land uses.
		3b	Level crossing closed for pedestrians. Pedestrian access provided via a new underpass at the Ennis Lane location. Crossing remains open for vehicles with improved controls.		Underpass helps separate modes but vehicle crossing remains limits future rail frequency. Underpass adds maintenance constraint.		**An unrestricted connection will be provided for pedestrians to access the Cliff Walk, proposed East Coast Greenway and the Town Centre** and they will incur no waiting time during the closure of the boom gates. Cyclist integration with the existing Bray / Greystones cliff walk and the proposed East Coast Greenway will continue to be possible. Cyclist wait times during peak hours may be slightly impacted due to longer or more frequent boom gate closures. However, due to the low traffic volume, the impact of increased wait times in the peak hour is considered to be insignificant. Cyclist will utilise Victoria Avenue to access the Cliff Walk or the Town Centre. **Cyclist access to the Cliff Walk will no longer be possible.**		The various proposals for options for the Ennis Lane Level Crossings will have a neutral impact on land use integration. Access to both south and south of the railway line will be maintained and there will be no impact on either land use zoning or development potential.		The options comply with national and international policies to improve public transport services including DART services, encouraging modal shift and allowing for increased density of development in certain areas.		The options comply with regional and local policies to improve public transport services including DART services, encouraging modal shift and allowing for increased density of development in certain areas. There is no impact on existing land uses.
		4a	Level crossing closed to both pedestrians and vehicles. Pedestrian access via a new overbridge at the Ennis Lane location. Vehicles rerouted via a new access road from the south.		Full separation of all users enables unlimited train frequency, safety, and potential future integration with high-capacity services like DART+, intercity, and more. Strong land footprint for flexibility.		The long overbridge's distance will be added for pedestrians and cyclists to access the Cliff Walk or the Town Centre. **This will have an impact on pedestrians and cyclists from the residential area around North Shore, by increasing the distance to the Cliff Walk from around 500m to around 810m.** The shortest distance to the Town Centre from the North Shore area will change to be through the residential area west of the rail line (around 2.1km) as opposed to through the area east of the rail line (2.35km).		The various proposals for options for the Ennis Lane Level Crossings will have a neutral impact on land use integration. Access to both south and south of the railway line will be maintained and there will be no impact on either land use zoning or development potential.		The options comply with national and international policies to improve public transport services including DART services, encouraging modal shift and allowing for increased density of development in certain areas.		The options comply with regional and local policies to improve public transport services including DART services, encouraging modal shift and allowing for increased density of development in certain areas. There is no impact on existing land uses.
		4b	Level crossing closed to both pedestrians and vehicles. Pedestrian access via a new overbridge at the Ennis Lane location. Vehicle access rights to the farmland are removed, or if purchases the land.		Overbridge good for peds/cyclists, but lack of vehicle access limits overall transport system flexibility.		The long overbridge's distance will be added for pedestrians and cyclists to access the Cliff Walk or the Town Centre. **This will have an impact on pedestrians and cyclists from the residential area around North Shore, by increasing the distance to the Cliff Walk from around 500m to around 810m.** The shortest distance to the Town Centre from the North Shore area will change to be through the residential area west of the rail line (around 2.1km) as opposed to through the area east of the rail line (2.35km).		The various proposals for options for the Ennis Lane Level Crossings will have a neutral impact on land use integration. Access to both south and south of the railway line will be maintained and there will be no impact on either land use zoning or development potential.		The options comply with national and international policies to improve public transport services including DART services, encouraging modal shift and allowing for increased density of development in certain areas.		The options comply with regional and local policies to improve public transport services including DART services, encouraging modal shift and allowing for increased density of development in certain areas. There is no impact on existing land uses.
		5a	Level crossing closed to both pedestrians and vehicles. Pedestrian access via a new underpass at the Ennis Lane location. Vehicles rerouted via a new access road from the south.		Similar to 4a, with underpass vs overbridge. Futureproofs rail ops but requires maintenance planning for long-term resilience.		**An unrestricted connection will be provided for pedestrians to access the Cliff Walk, proposed East Coast Greenway and the Town Centre** and they will incur no waiting time during the closure of the boom gates. Cyclist integration with the existing Bray / Greystones cliff walk and the proposed East Coast Greenway will continue to be possible. Cyclist will utilise Victoria Avenue to access the Cliff Walk or the Town Centre. This will have an impact on cyclists from the residential area around North Shore, by increasing the distance to the Cliff Walk by around 3km. It will also have an impact on cyclists from the Greystones residential area west of the rail line, by increasing the distance to the Cliff Walk by around 1km.		The various proposals for options for the Ennis Lane Level Crossings will have a neutral impact on land use integration. Access to both south and south of the railway line will be maintained and there will be no impact on either land use zoning or development potential.		The options comply with national and international policies to improve public transport services including DART services, encouraging modal shift and allowing for increased density of development in certain areas.		The options comply with regional and local policies to improve public transport services including DART services, encouraging modal shift and allowing for increased density of development in certain areas. There is no impact on existing land uses.
		5b	Level crossing closed to both pedestrians and vehicles. Pedestrian access via a new underpass at the Ennis Lane location. Vehicle access rights to the farmland are removed, or if purchases the land.		Supports future rail capacity but excludes vehicles permanently — may reduce multi-modal future utility.		**An unrestricted connection will be provided for pedestrians to access the Cliff Walk, proposed East Coast Greenway and the Town Centre** and they will incur no waiting time during the closure of the boom gates. Cyclist will utilise Victoria Avenue to access the Town Centre. **Cyclist access to the Cliff Walk will no longer be possible.**		The various proposals for options for the Ennis Lane Level Crossings will have a neutral impact on land use integration. Access to both south and south of the railway line will be maintained and there will be no impact on either land use zoning or development potential.		The options comply with national and international policies to improve public transport services including DART services, encouraging modal shift and allowing for increased density of development in certain areas.		The options comply with regional and local policies to improve public transport services including DART services, encouraging modal shift and allowing for increased density of development in certain areas. There is no impact on existing land uses.

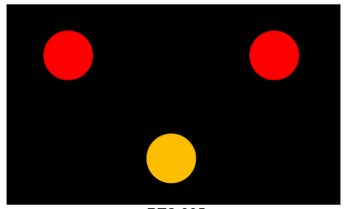
Comparison Criteria Legend
Significant comparative advantage over other options
Some comparative advantage over other options
Comparable to other options / neutral
Some comparative disadvantage over other options
Significant comparative disadvantage over other options

				Physical Activity	
				Walking / cycling opportunities	
Works Description	Summary of requirements	Option Number	Description of Option	Qualitative appraisal of the options and their impact to enable walking and cycling opportunities in a safer environment for the communities along the route	Rationale
				To enable walking and cycling opportunities in a safer environment in the communities along the route. To create a healthy environment conducive to active travel	
Southern Line Ennis Lane Level Crossing	To provide an appropriate level of accessibility	1	Level crossing remains open to both vehicles and pedestrians (Do Nothing).		Pedestrian and cyclist integration with the existing Bray / Greystones cliff walk and the proposed East Coast Greenway will continue to be possible. Wait times during peak hours may be slightly impacted due to longer or more frequent boom gate closures. However, due to the low traffic volume, the impact of increased wait times in the peak hour is considered to be insignificant.
		2a	Level crossing remains open for pedestrians only. Vehicles rerouted via a new access road from the south.		Pedestrian and cyclist integration with the existing Bray / Greystones cliff walk and the proposed East Coast Greenway will continue to be possible. Pedestrian wait times during peak hours may be slightly impacted due to longer or more frequent boom gate closures. However, due to the low traffic volume, the impact of increased pedestrian wait times in the peak hour is considered to be insignificant. Cyclist will utilise Victoria Avenue to access the Cliff Walk or the Town Centre. **This will have an impact on cyclists from the residential area around North Shore, by increasing the distance to the Cliff Walk by around 3km. It will also have an impact on cyclists from the Greystones residential area west of the rail line, by increasing the distance to the Cliff Walk by around 1km.**
		2b	Level crossing remains open for pedestrians only. Vehicle access rights to the farmland are removed, or if purchases the land.		Pedestrian wait times during peak hours may be slightly impacted due to longer or more frequent boom gate closures. However, due to the low traffic volume, the impact of increased pedestrian wait times in the peak hour is considered to be insignificant. Cyclist will utilise Victoria Avenue to access the Town Centre. **Cyclist access to the Cliff Walk will no longer be possible.**
		2c	Level crossing is upgraded to a CCTV-controlled system. Crossing remains open to both vehicles and pedestrians with improved controls.		Pedestrian and cyclist integration with the existing Bray / Greystones cliff walk and the proposed East Coast Greenway will continue to be possible. Wait times during peak hours may be slightly impacted due to longer or more frequent boom gate closures. However, due to the low traffic volume, the impact of increased wait times in the peak hour is considered to be insignificant.
		2d	Level crossing is upgraded to a CCTV-controlled system. Vehicle access rights to the farmland are removed, or if purchases the land.		Pedestrian and cyclist integration with the existing Bray / Greystones cliff walk and the proposed East Coast Greenway will continue to be possible. Wait times during peak hours may be slightly impacted due to longer or more frequent boom gate closures. However, due to the low traffic volume, the impact of increased wait times in the peak hour is considered to be insignificant.
		3a	Level crossing closed for pedestrians. Pedestrian access provided via a new overbridge at the Ennis Lane location. Crossing remains open for vehicles with improved controls.		The long overbridge's distance will be added for pedestrians and cyclists to access the Cliff Walk or the Town Centre. **This will have an impact on pedestrians and cyclists from the residential area around North Shore, by increasing the distance to the Cliff Walk from around 500m to around 820m.** The shortest distance to the Town Centre from the North Shore area will change to be through the residential area west of the rail line (around 2.1km) as opposed to through the area east of the rail line (2.350m).
		3b	Level crossing closed for pedestrians. Pedestrian access provided via a new underpass at the Ennis Lane location. Crossing remains open for vehicles with improved controls.		**An unrestricted connection will be provided for pedestrians to access the Cliff Walk, proposed East Coast Greenway and the Town Centre** and they will incur no waiting time during the closure of the boom gates. Cyclist integration with the existing Bray / Greystones cliff walk and the proposed East Coast Greenway will continue to be possible. Cyclist wait times during peak hours may be slightly impacted due to longer or more frequent boom gate closures. However, due to the low traffic volume, the impact of increased cyclist wait times in the peak hour is
		4a	Level crossing closed to both pedestrians and vehicles. Pedestrian access via a new overbridge at the Ennis Lane location. Vehicles rerouted via a new access road from the south.		The long overbridge's distance will be added for pedestrians and cyclists to access the Cliff Walk or the Town Centre. **This will have an impact on pedestrians and cyclists from the residential area around North Shore, by increasing the distance to the Cliff Walk from around 500m to around 820m.** The shortest distance to the Town Centre from the North Shore area will change to be through the residential area west of the rail line (around 2.1km) as opposed to through the area east of the rail line (2.350m).
		4b	Level crossing closed to both pedestrians and vehicles. Pedestrian access via a new overbridge at the Ennis Lane location. Vehicle access rights to the farmland are removed, or if purchases the land.		The long overbridge's distance will be added for pedestrians and cyclists to access the Cliff Walk or the Town Centre. **This will have an impact on pedestrians and cyclists from the residential area around North Shore, by increasing the distance to the Cliff Walk from around 500m to around 820m.** The shortest distance to the Town Centre from the North Shore area will change to be through the residential area west of the rail line (around 2.1km) as opposed to through the area east of the rail line (2.350m).
		5a	Level crossing closed to both pedestrians and vehicles. Pedestrian access via a new underpass at the Ennis Lane location. Vehicles rerouted via a new access road from the south.		**An unrestricted connection will be provided for pedestrians to access the Cliff Walk, proposed East Coast Greenway and the Town Centre** and they will incur no waiting time during the closure of the boom gates. Cyclist integration with the existing Bray / Greystones cliff walk and the proposed East Coast Greenway will continue to be possible. Cyclist will utilise Victoria Avenue to access the Cliff Walk or the Town Centre. This will have an impact on cyclists from the residential area around North Shore, by increasing the distance to the Cliff Walk by around 3km. It will also have an impact on cyclists from the Greystones residential area west of the rail line, by increasing the distance to the Cliff Walk by around 1km.
		5b	Level crossing closed to both pedestrians and vehicles. Pedestrian access via a new underpass at the Ennis Lane location. Vehicle access rights to the farmland are removed, or if purchases the land.		**An unrestricted connection will be provided for pedestrians to access the Cliff Walk, proposed East Coast Greenway and the Town Centre** and they will incur no waiting time during the closure of the boom gates. Cyclist will utilise Victoria Avenue to access the Town Centre. **Cyclist access to the Cliff Walk will no longer be possible.**

Appendix B

Emerging Preferred Option Sketch





RTS 005:
LEVEL CROSSING
SIGNALS

CIE PROPERTY

WCC PROPERTY

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DART+ Coastal North

NTA Údarás Náisiúnta Iompair National Transport Authority

Tionscadal Éireann Project Ireland 2040

Rev	Date	Drn	Chk'd	App'd	Description
P01	29/04/2025	MG	CC	EOD	First Revision
P02	/05/2025		CC	EOD	Second Revision
	1	EAM			

Client: Iarnród Éireann Irish Rail

Engineering Designer: ARUP

Date	Scale	Drawn	Checked	Approved
29/04/2025	1:100 @ A1 1:200 @ A3	MG	CC	EOD

Project Code	Originator Code	QMS Code
D+WP56	ARP	306152-00

Project Title: DART+ COASTAL SOUTH

Drawing Title: Ennis Lane Level Crossing - Option 1a CCTV Controlled Crossing

Drawing File Name	Sheet Number	Status	Rev
D+WP56-ARP-ZZ-SL-DR-PW-SK00015	01 of 01	S3	P0

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