Appendix 1.1
EIA Scoping Report

DART+ South West

ENVIRONMENTAL IMPACT ASSESSMENT

SCOPING REPORT

NTA
Údarás Náisiúnta Iompair
National Transport Authority

Rialtas na hÉireann
Government of Ireland

Tionscadal Éireann
Project Ireland
2040

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Iarnród Éireann
Irish Rail

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Glossary of Terms

AA	Appropriate Assessment
AADT	Annual Average Daily Traffic
ACA	Architectural Conservation Areas
ABP	An Bord Pleanála
AEP	Annual Exceedance Probability
AERMOD	American Meteorological Society
Alternating Current (AC)	Electrical current that changes direction 50 times per second.
AHPG	Architectural Heritage Protection Guidelines
Attenuation Tank	Stormwater attenuation tanks provide a storage system for rainwater and surface water. The stored water inside the attenuation tank is released via a flow-control chamber and is either pumped via a pumping chamber or run-off through a gravity stormwater pipe system.
BRT	Bus Rapid Transit
CA	Conservation Areas
CAF	Common Appraisal Framework
CAFE	Clean Air for Europe
CGS	County Geological Site
CIA	Cumulative Impact Assessment
CIÉ	Córas Iompair Éireann
CIRIA	Construction Industry Research and Information Association
COMAH	Control of Major Accident Hazards
Cork Mainline	The DART+ South West Project includes part of the existing Cork Mainline between Hazelhatch & Celbridge Station and Heuston Station. This part of the Cork Mainline is also referred to in policy documents and publications as the 'Kildare Line'.
Cross overs	A set of railway parts at the crossing of several tracks which helps trains change tracks to other directions.
CSO	Central Statistics Office
Cutting	A railway in cutting means the rail level is below the surrounding ground level.
DART	Dublin Area Rapid Transit (IÉ's Electrified Network)
DCC	Dublin City Council
DCDP	Dublin City Development Plan 2016 - 2022
DEHLG	Department of Environment, Heritage and Local Government
Direct Current (DC)	Electrical current that flows in one direction, like that from a battery.
DHPLG	Department of Housing, Planning and Local Government
DMRB	Design Manual for Roads and Bridges
DMU	Diesel Multiple Unit
DSRS	Dublin Suburban Rail Strategic
DTO	Dublin Transportation Office
DTTAS	Department of Transport, Tourism and Sport
EC	European Commission
ED	Electoral Division
ELC	European Landscape Convention
ELF	Extremely-Low Frequency
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
END	Environmental Noise Directive
EMC	Electromagnetic Compatibility
EMRA	Eastern and Midland Regional Assembly
EIA	Environmental Impact Assessment (EIA) is the process of examining the anticipated environmental effects of the proposed project - from consideration of environmental aspects at design stage through consultation and the preparation of an Environmental Impact Assessment Report (EIAR).
EIAR	Environmental Impact Assessment Report
ELC	European Landscape Convention
EPA	Environmental Protection Agency
EMF	Electric and Magnetic Fields
EMI	Electromagnetic Interference
ERM	National Transport Authority's Eastern Regional Model
ESB	Electricity Supply Board
ESD	Effort Sharing Decision
ESRI	Economic and Social Research Institute
EU	European Union
E&B	Earthing and Bonding
FRA	Flood Risk Assessment
Four-tracking	Four-tracking is a railway line consisting of four parallel tracks with two tracks used in each direction. Four track railways can handle large amounts of traffic and are often used on busy routes.
GDA	Greater Dublin Area
GWDTE	Groundwater Dependent Terrestrial Ecosystems
GHG	Greenhouse Gases
GI	Ground Investigation
GLVIA	Guidelines for Landscape and Visual Impact Assessment
GSM-R	Global System for Mobile Communications – Railway
GSWR	Great Southern & Western Railway (i.e., the Phoenix Park Tunnel Branch Line)
GSI	Geological Survey of Ireland
GWB	Groundwater Bodies
Horizontal Clearance	The horizontal distance between a bridge support and the nearest railway track is referred to as horizontal clearance. Bridge supports include abutments (at the ends of the bridge) and piers (at intermediate locations).
HSA	Health and Safety Authority
IAQM	Institute of Air Quality Management
ICOMOS	International Council on Monuments and Sites
IEF	Important Ecological Features
IÉ / IR	Iarnród Éireann / Irish Rail
IFI	Inland Fisheries Ireland
INEA	Innovation and Networks Executive Agency
IPH	Institute of Public Health
ISO	International Organization for Standardization
KCC	Kildare County Council
KCDP	Kildare County Development Plan 2017-2023
KDA	Key Development Area. Identified in the Celbridge Local Area Plan

Kildare Line	The DART+ South West Project includes the part of the existing Cork Mainline between Hazelhatch & Celbridge Station and Heuston Station. This part of the Cork Mainline is also referred to in policy documents and publications as the 'Kildare Line'.
Lateral Clearance	Clearances between trains and structures.
LI	Locally Important
LV	Low Voltage
LVIA	Landscape and Visual Impact Assessment
LAP	Local Area Plan
MASP	Metropolitan Area Strategic Plan
MCA	Multicriteria Analysis
MRI	Magnetic Resonance Imaging
NAF	National Adaptation Framework
NCCAF	National Climate Change Adaptation Framework
NDP	National Development Plan 2021–2030
NECP	National Energy and Climate Plan
NHA	Natural Heritage Area
NIAH	National Inventory of Architectural Heritage
NIS	Natura Impact Statement
NLS	National Landscape Strategy
NO2	Nitrogen Dioxide
NOx	Nitrogen Oxides
NPF	National Planning Framework
NRA	National Roads Authority
NSO	National Strategic Outcomes
NTA	National Transport Authority
OPW	Office of Public Works
OS	Ordnance Survey
OSi	Ordnance Survey Ireland
OSR	Option Selection Report
Overbridge (OB)	A bridge that allows traffic to pass over a road, river, railway etc.
Over Headline Equipment (OHLE)	This is a key requirement for the DART+ South West Project. OHLE generally refers to the mechanical and electrical items used to carry and deliver electrical power to the train units. OHLE is required to provide electrical power to the network's new electrified train fleet.
Pantograph	The device on top of the train that collects electric current from the contact wire to power the train.
Permanent Way	A term used to describe the track or railway corridor and includes all ancillary installations such as rails, sleepers, ballast as well as lineside retaining walls, fencing and signage.
PLUTO	Planning Land Use and Transport Outlook 2040
$PM_{2.5}$	Particulate Matter (up to 2.5 micrometers in size)
PM_{10}	Particulate Matter (up to 10 micrometers in size)
PO	Preservation Orders
PPT	Phoenix Park Tunnel
PPT Branch Line	The Phoenix Park Tunnel Branch Line links Heuston Station to Glasnevin through the Phoenix Park Tunnel. It is part of the Great Southern and Western Railway constructed in the 19th Century which linked Kingsbridge Station (now Heuston Station) to the Dublin Docklands. Historically it was used for freight but it was opened to passenger traffic in 2016.
PRAI	Property Registration Authority of Ireland
PW	The Permanent Way

REB	Relocatable Equipment Buildings are accommodation for signalling equipment and associated power supplies
RC	Reinforced Concrete
Re-signalling	Re-signalling of train lines will regulate the sage movement of trains and increase the capacity of train services along the route.
RF	Radiofrequency
RMP	Record of Monuments and Places
RMR	Reken- en Meetvoorschrift Railverkeerslawaai '96. A Dutch methodology for the assessment of railway noise.
RO	Railway Order. Broadly similar to the planning application process, the project is categorised as Strategic Infrastructure Development (SID) and Iarnród Éireann applies directly to An Bord Pleanála for permission.
RPS	Record of Protected Structures
RS	Rolling Stock
RSES	Regional Spatial and Economic Strategy
RU	Railway Undertaking (IÉ)
SA	Small Area
SAC	Special Areas of Conservation
SDZ	Strategic Development Zone
SEM	Scanning Electron Microscopy
SDCC	South Dublin County Council
SDCDP	South Dublin County Development Plan 2016-2022
SER	Signalling Equipment Rooms
SET	Signalling, Electrical and Telecommunications
Slab Track	Modern form of track construction which offers proven higher performance in service and a longer life than traditional ballasted track.
SMR	Sites and Monuments Record
Sidings	A siding is a short stretch of railway track used to store rolling stock or enable trains on the same line to pass
SER	Signalling Equipment Rooms are accommodation for signalling equipment and associated power supplies
SIFLT	Strategic Investment Framework for Land Transport
SPAs	Special Protection Areas
SUDS	Sustainable Drainage Systems
SW	South West
TEN-T EA	Trans-European Transport Network Executive Agency
T-ENT	Trans-European Transport Network
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 and the curves it follows.
TPHPD	Trains Per Hour Per Direction
Turnback	A turnback is a rail crossover that connects two tracks together allowing trains to reverse direction (turn back) to provide continuing service in the opposite direction.
TII	Transport Infrastructure Ireland
TTAJV	TYPSA, TUC RAIL and ATKINS Design Joint Venture (also referred to as TTA)
Underbridge (UB)	A bridge that allows traffic to pass under a road, river, railway etc. The underneath of a bridge.
URDF	Urban Regeneration and Development Fund
VDC	Direct Current Voltage

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.
WAM	With Additional Measures
WEM	With Existing Measures
WFD	Water Framework Directive
ZoI	Zone of Influence
ZAP	Zone of Archaeological Potential

Executive Summary

The DART+ Programme will provide a high-capacity, sustainable and efficient rail transit system for the Greater Dublin Area that delivers a substantial increase to peak-hour capacity, frequency, and reliability. The second of the infrastructural projects of the DART+ Programme to be delivered will be the DART+ South West Project.

The DART+ South West Project will deliver an electrified network, with increased passenger capacity and enhanced train service between Hazelhatch & Celbridge Station to Heuston Station (circa 16km) on the Cork Mainline, and to Glasnevin Junction on the Phoenix Park Tunnel Branch Line (circa 4km). The scale of the DART+ South West Project will necessitate some interventions outside the existing railway corridor e.g. for the provision of substations. The only method for Iarnród Éireann to compulsorily acquire these lands is through a Railway Order Application process.

An Environmental Impact Assessment (EIA) Screening exercise was undertaken to establish whether the proposed Project would require an EIA under the Planning and Development (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018), the Transport (Railway Infrastructure) Act 2001 (as amended) or any other planning legislation. The proposed Project is being progressed through an application for a Railway Order, under the Transport (Railway Infrastructure) Act 2001 as amended.

Section 37(2)(e) of the Transport Act 2001, as amended, requires a Railway Order Application to be accompanied by:

> *'(e) a statement of the likely effects on the environment (referred to subsequently in this Part as an 'environmental impact statement') of the proposed railway works.'*

This requirement effectively negates the need to apply further EIA screening criteria as it is mandatory to submit a 'statement of the likely effects on the environment' to accompany the application for a Railway Order.

The term environmental impact statement was reframed under the 2014 EIA Directive [2014/52/EU] as an environmental impact assessment report or EIAR, and the meaning referred to in Article 5 and Annex IV of the Directive. For the purpose of the proposed Project, the mandatory requirement to submit a 'statement of the likely effects on the environment' is understood to mean an environmental impact assessment report in the context of the 2014 EIA Directive. To ensure compliance with both European and national legislation, Iarnród Éireann is proceeding to take account of both the 2014 EIA Directive requirements and the requirements of the Transport (Railway Infrastructure) Act 2001.

Where EIA is required the process moves to EIA Scoping and this is followed by preparation of an Environmental Impact Assessment Report (EIAR) which identifies, evaluates and mitigates the effects (positive and negative) on the receiving environment as a result of a proposed project. The content of this report relates to Scoping only. EIA scoping seeks to establish the content and extent of the matters which should be covered in the environmental information to be submitted in the EIAR. This includes definition of temporal and spatial scope and also potential for significant effects throughout the lifecycle of the project.

This Scoping Report will be circulated to stakeholders to consult about the extent of the information required to be contained within the EIAR. The stakeholders are invited to contribute to the EIA process by providing feedback on aspects such as additional baseline data sources, survey techniques and assessment approaches and potential impacts that should be addressed in the EIAR.

It is envisaged that the EIAR will be presented in five volumes as follows:

Volume 1 – Non Technical Summary

Volume 2 – Environmental Impact Assessment Report

Volume 3A – Technical Figures

Volume 3B – Photomontages

Volume 4 – Technical Appendices

Volume 5 – Supporting Environmental Documents

Iarnród Éireann is now seeking feedback from stakeholders on the following:

- The key issues to be addressed in the EIAR;
- The proposed content of the EIAR and the potential impacts that have been scoped in/out;
- The proposed assessment methodologies to assess the potential impacts; and
- Any other data that the environmental assessments should consider and address in the EIAR.

This consultation process for EIA Scoping will commence on 10th November 2021 and continue for a 5-week period, concluding on 17th December 2021.

All feedback can be submitted up to the 17th of December 2021 to DARTSouthWest@irishrail.ie and should be marked “DART+ South West EIA Scoping”.

All feedback received during the scoping process will be considered by the IÉ and the project team and the EIAR scope updated as required. The EIAR will record all issues raised during Scoping and how they have been addressed in the EIAR.

The DART+ Programme is a key transportation improvement to form a high-quality and integrated public transport system. It will have benefits for the residents of the Greater Dublin Area and also those living in the other regions. It will assist in providing a sustainable transport system and a societal benefit for current and future generations.

The DART+ South West Project will deliver an electrified network, with increased passenger capacity and enhanced train service between Hazelhatch & Celbridge Station to Heuston Station on the Cork Mainline, and to Glasnevin Junction on the Phoenix Park Tunnel Branch Line. Upon completion of the electrification of the DART+ South West route, new DART trains will be used on this railway corridor, similar to those currently operating on the Malahide / Howth to Bray / Greystones Line.

1. Introduction

1.1. Introduction

An Environmental Impact Assessment (EIA) Screening exercise was undertaken to establish whether the DART+ South West Project (hereafter referred to as the proposed Project) would require an EIA under the Planning and Development (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018), the Transport (Railway Infrastructure) Act 2001 (as amended by the Planning and Development Strategic Infrastructure Act 2006) or any other planning legislation.

The scale of the DART+ South West Project will necessitate some interventions outside the existing railway corridor owned by Iarnród Éireann (IÉ) e.g. for the provision of substations. The only method for Iarnród Éireann to compulsorily acquire these lands is through a Railway Order Application process. The proposed Project is being progressed through an application for a Railway Order, under the Transport (Railway Infrastructure) Act 2001 as amended.

Section 37(2)(e) of the Transport (Railway Infrastructure) Act 2001, as amended, requires a Railway Order Application to be accompanied by:

'(e) a statement of the likely effects on the environment (referred to subsequently in this Part as an 'environmental impact statement') of the proposed railway works.'

This requirement effectively negates the need to apply further EIA screening criteria as it is mandatory to submit a 'statement of the likely effects on the environment' to accompany the application for a Railway Order. As such, the screening exercise determined that the proposed Project is a project that requires a mandatory 'statement of the likely effects on the environment'.

The term environmental impact statement was reframed under the 2014 EIA Directive [2014/52/EU] as an environmental impact assessment report or EIAR, and the meaning referred to in Article 5 and Annex IV of the Directive. The 2001 Transport (Railway Infrastructure) Act has yet to be directly amended (by way of legislation or regulation) to take account of the 2014 EIA Directive. For the purpose of the proposed Project, the mandatory 'statement of the likely effects on the environment' is understood to mean an environmental impact assessment report [in the context of the 2014 EIA Directive] under Section 37 of the Transport (Railway Infrastructure) Act, 2001 (the Act), (as amended). To ensure compliance with both European and national legislation, an EIAR will now be prepared to accompany the application for a Railway Order to ABP in accordance with the 2014 EIA Directive requirements and the requirements of the Transport (Railway Infrastructure) Act 2001

The next stage in the EIA process is to establish the proposed content and extent of issues to be described and assessed in the EIAR through the process of EIA Scoping. In line with good practice, this Informal Environmental Impact Assessment Scoping Report has been prepared to facilitate consultation on the scope of the EIAR.

This Scoping Report for the DART+ South West Project will be circulated to stakeholders to consult about the extent of the information required to be contained within the EIAR. The stakeholders are invited to contribute to the EIA process by providing feedback on aspects such as additional baseline data sources, survey techniques and assessment approaches and potential impacts that should be addressed in the EIAR.

1.2. Report Structure

In line with good practice, a Scoping Report in relation to the DART+ South West Project has been prepared to facilitate consultation on the scope of the EIAR. This is the subject of this report and this Environmental Impact Assessment Scoping Report is structured as follows:

Chapter 1: Introduction

Chapter 2: Background to the Project

Chapter 3: Project Description

Chapter 4: Railway Order and EIA Process

Chapters 5 – 23: Specialist Environmental Scopes

Chapter 24: Interactions and cumulative impacts

Chapter 25: Conclusion/ Next Steps

1.3. Current Status

The project is currently at "Preferred Option" stage. The 'Preferred Option' is the preferred combination of design options that have been identified for each of the elements of the project. Following the completion of Public Consultation No. 1 on the Emerging Preferred Option which was the subject of public consultation for a 6 week period from the 12th of May 2021 until its formal closure on the 23rd of June 2021, the project team has analysed the submissions and considered all relevant information in re-evaluation and further development of design options leading to the selection of the 'Preferred Option'. A summary of key issues or concerns raised during PC1 are described in the Public Consultation No. 1 Findings Report, Volume 4, which is available on www.dartplus.ie.

The "Preferred Option" for the DART+ South West Project is the subject of a second stage of non-statutory public consultation. Once the public consultation process is complete all feedback and submissions received will be reviewed and assessed as part of the finalisation of the design. Following a full appraisal of the feedback, a Public Consultation No. 2 Findings Report will be prepared and published.

All information gathered by the project team will be used to inform the design development of the project which will be the subject of the Environmental Impact Assessment (EIA) and Appropriate Assessment (AA) as part of the Railway Order application that will be submitted to An Bord Pleanála. This process will culminate with the publication of an Environmental Impact Assessment Report (EIAR) and an Appropriate Assessment Screening Report (and Natura Impact Statement if required) that will be submitted as part of documentation required for the Railway Order approvals process.

1.4. Project Team

Iarnród Éireann have appointed TTAJV (TYPSA, TUC RAIL and ATKINS Design Joint Venture) to prepare a design for the proposed DART+ South West Project.

Article 5(3)(a) of the 2014 EIA amended Directive requires that "the developer shall ensure that the environmental impact assessment report is prepared by competent experts" to ensure the completeness and quality of the EIAR. In this regard, the EIAR and Railway Order are being prepared

by RPS with inputs from a team of competent, technical experts who have the knowledge and understanding to assess the potential impacts associated with the proposed Project and develop mitigation measures and propose monitoring where required.

1.5. DART+ South West Overview

The DART+ Programme is a key transportation improvement to form a high-quality and integrated public transport system. It will have benefits for the residents of the Greater Dublin Area and also those living in the other regions. It will assist in providing a sustainable transport system and a societal benefit for current and future generations.

The current electrified DART network is circa 50km long, extending from Malahide / Howth to Bray/ Greystones, and the DART+ Programme seeks to increase the high capacity and electrified network to 150km. The DART+ Programme is required to facilitate increased train capacity to meet current and future demands, which will be achieved through a modernisation of existing railway corridors. This modernisation includes the electrification, re-signalling and certain interventions to remove constraints across the four main rail corridors within the Greater Dublin Area, as per below:

- DART+ South West **(this Project)** – circa 16km between Hazelhatch & Celbridge Station to Heuston Station and also circa 4km between Heuston Station to Glasnevin Junction, via the Phoenix Park Tunnel Branch Line.
- DART+ West – circa 40km from Maynooth & M3 Parkway Stations to the City Centre.
- DART+ Coastal North – circa 50km from Drogheda to the City Centre.
- DART+ Coastal South – circa 30km from Greystones to the City Centre.
- DART+ Fleet – purchase of new electrified fleet to serve new and existing routes.

The second of the infrastructural projects of the DART+ Programme to be delivered will be the DART+ South West Project. The DART+ South West Project will deliver an electrified network, with increased passenger capacity and enhanced train service between Hazelhatch & Celbridge Station to Heuston Station (circa 16km) on the Cork Mainline, and to Glasnevin Junction via Phoenix Park Tunnel Branch Line (circa 4km).

DART+ South West Project will complete four tracking between Park West & Cherry Orchard Station and Heuston Station, in addition to re-signalling and electrification of the entire route. The completion of the four tracking will remove a significant existing constraint on the line, which is currently limiting the number of train services that can operate on this route. DART+ South West will also deliver track improvements along the Phoenix Park Tunnel Branch Line, which will allow a greater number of trains to access the city centre.

Upon completion of the electrification of the DART+ South West route, new DART trains will be used on this railway corridor, similar to those currently operating on the Malahide / Howth to Bray / Greystones Line. DART+ South West will improve performance and increase train and passenger capacity on the route between Hazelhatch & Celbridge Station and Heuston Station and through the Phoenix Park Tunnel Branch Line to the City Centre, covering a distance of circa 20km. The key benefits of the DART+ South West Project are summarised below:

Increase peak passenger capacity from 5,000 to 20,000 per hour per direction and increase train frequency between Dublin City and Hazelhatch & Celbridge Station – facilitating frequent and reliable transport to the surrounding communities.

Enhance public transport opportunities for work, education or leisure purposes.

Facilitate the development and future growth of existing and new communities that will greatly benefit from the connectivity that the DART+ South West will deliver.

Alleviate road congestion.

Build a sustainable and connected city region, supporting the transition to a low carbon and climate resilient society.

Facilitate people to make sustainable travel choices by encouraging a move away from private cars to a reliable, efficient and safer public transport network.

Improve multimodal transport connectivity through interchange with the Luas at Heuston Station, Bus Connects and the proposed MetroLink.

Improve journey time reliability.

1.6. Capacity Increases Associated with DART+ South West

The operating capacity of services in the Heuston area is currently constrained by railway infrastructure limitations and the ability of Heuston Station to accommodate terminating trains. Iarnród Éireann currently operates at a maximum capacity of 12 inbound trains in the AM peak hour and 12 outbound trains in the PM peak hour along the Cork Mainline. This provides a peak capacity of approximately 5,000 passengers per hour per direction during the AM and PM peak hours; operating inbound and outbound, respectively. DART+ South West aims to improve train service and increase train and passenger capacity on the route between Hazelhatch & Celbridge Station to Heuston Station and through the Phoenix Park Tunnel Branch Line to the City Centre, covering a distance of circa 20km.

DART+ South West will significantly increase train capacity from the current 12 trains per hour per direction to 23 trains per hour per direction (i.e., maintain the existing 12 services, with an additional 11 train services provided by DART+ South West). This will increase passenger capacity from the current peak capacity of approximately 5,000 passengers per hour per direction to approximately 20,000 passengers per hour per direction.

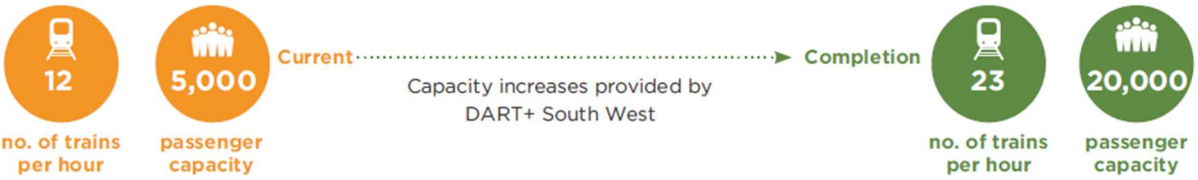


Figure 1-1 DART+ South West Capacity Increase

1.7. Key Infrastructural Elements of DART+ South West

The key elements of DART+ South West include:

- Continuation of four-tracking from Park West & Cherry Orchard Station to Heuston Station, extending the works completed on the route in 2009.
- Electrification of the line from Hazelhatch & Celbridge Station to Heuston Station and also from Heuston Station to Glasnevin Junction, via the Phoenix Park Tunnel Branch Line.
- Undertaking improvements/reconstructions of bridges to achieve vertical and horizontal clearances.
- Remove rail constraints along the Phoenix Park Tunnel Branch Line.
- Delivery of a new Heuston West Station[1].

Interventions outside of Iarnród Éireann lands will be required at a number of locations for some of the scheme elements such as:

- Four-tracking from Park West & Cherry Orchard Station to Heuston Station
- Bridge replacement works
- New substations (to facilitate the provision of power to the line)

The "Preferred Option" will be compatible with the future stations at Kylemore and Cabra, although the construction of these stations is not part of the DART+ South West Project.

[1] For PC1 the scope of the project involved feasibility of a new Heuston West Station. As a result of stakeholder feedback, the new station will now be brought forward to Railway Order.

Figure 1-2 DART+ South West Route Map

1.8. DART+ South West Timeline

A high-level timeline for statutory approval process for the DART+ South West is set out in Figure 1-3. Looking beyond that construction is expected to commence in 2023.

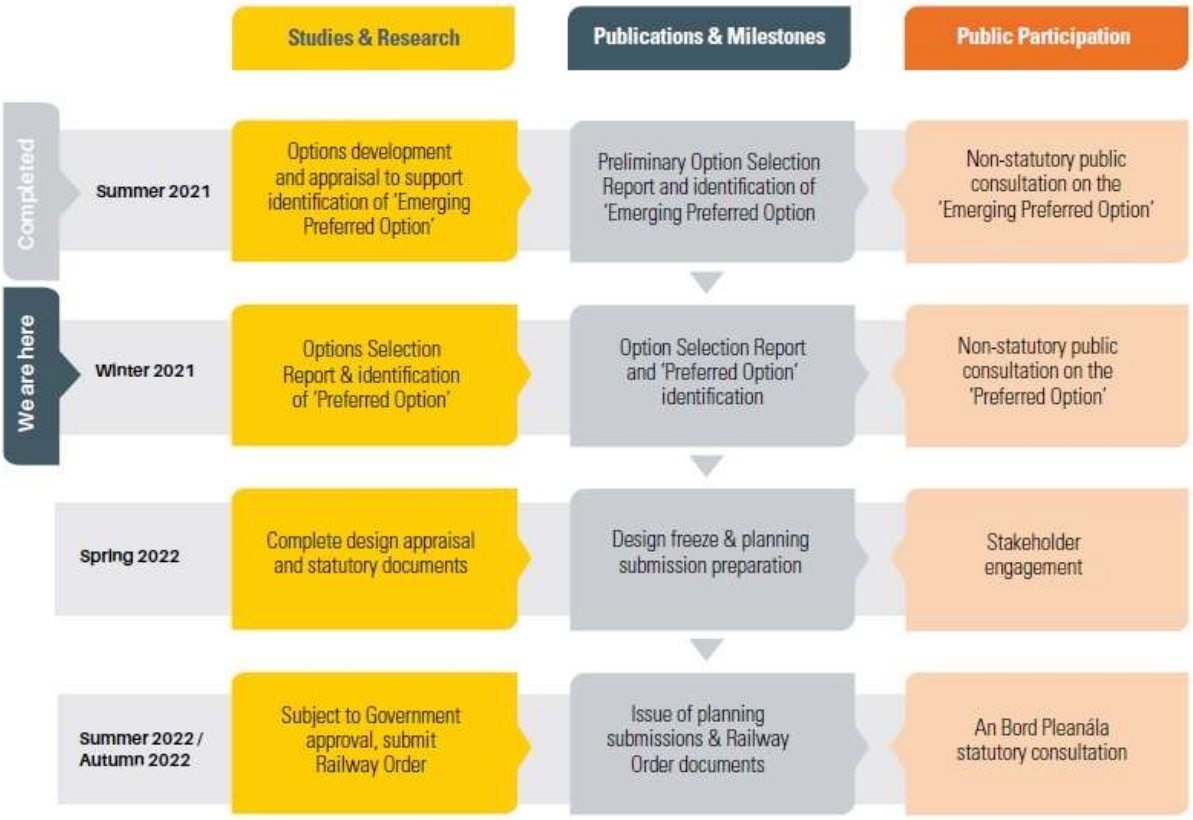


Figure 1-3 DART+ South West Timeline up to Statutory Approval Process

2. Background to the Project

2.1. Project History

The need for improvements and modernisation of the rail network has long been identified. The DART+ Programme, and more specifically the DART+ South West Project, is a continuation of improvements that commenced from 2000 onwards. The underlying rationale was that integration of land-use and transportation can help reduce the need to travel and facilitate sustainable urban development. These objectives have consistently featured in strategic investment and land use plans published over the last 20 years; as have the specific improvements required to deliver these objectives, including the improvements needed on the Cork Mainline[2].

In the *National Development Plan 2000 – 2006* and *Strategic Planning Guidelines for the Greater Dublin Area* (1999) investment in the rail network was identified as a key requirement to provide a better service for the working and resident population of the Greater Dublin Area (GDA); both plans also promoted the concept of maximising existing transportation corridors along which future development of the GDA would occur.

In 2000, Iarnród Éireann and CIE published the *Dublin Suburban Rail Strategic (DSRS) Review*, which provided the genesis for the DART Expansion Programme (subsequently renamed the DART+ Programme). Of relevance to DART+ South West, there has been a long-standing rail industry recognition that operating a mixed railway (where commuter services, inter-city long distance services, and urban transit and freight services operate on the same tracks) severely compromises performance and capacity. Given the number of inter-city and commuter services using this section of the Cork Mainline the proposal to build two extra sets of railway tracks in order to separate Intercity / regional and suburban railway services and eliminate the existing capacity constraint, has been identified as a pre-requisite to improve capacity along the line.

This DSRS Review noted that, in order to maximize the use of the existing network, capacity improvements on the Cork Mainline were required (again focusing on the need for additional tracks to separate Intercity and suburban railway services). The Report recommended amongst other things:

- *"four tracking of the Kildare line should start with the Cherry Orchard- Hazelhatch section to permit up to 6tph Heuston-Hazelhatch or 4tph to Sallins and 2tph Kildare, if suitable terminal facilities are provided"*
- *"electrification of the suburban lines from Maynooth and Sallins/Kildare"*

The DSRS Review also recommended the electrification of lines. The Review further identified that the development of an underground interconnector linking Spencer Dock and the City Centre would provide for cross-city rail services and would widen the city centre rail catchment. The development of such a tunnel would also provide capacity for more intensive development along the Cork Mainline. It was from this document that the DART Underground Programme was devised (i.e., underground rail interconnector and electrification of the radial lines).

[2] The DART+ South West Project includes part of the existing Cork Mainline between Hazelhatch & Celbridge Station and Heuston Station. This part of the Cork Mainline is often referred to in policy documents and publications as the 'Kildare Line'.

In 2001, *A Platform for Change - An Integrated Transportation Strategy for the Greater Dublin Area 2000 to 2016* (published by the Dublin Transportation Office) reiterated the key objectives of investing in rail and maximising the use of existing rail lines and reiterated the underlying requirements for the DART+ Programme. Those of relevance to DART+ South West, were:

- Four tracking from Cherry Orchard to Sallins;
- An east-west city centre tunnel; and
- Electrification of the Cork Mainline to the city centre.

In 2003, the Department of Transport commissioned a report to evaluate the long-term rail requirements from a national perspective in light of the emerging spatial planning and regional development trends and policies. This was presented in the *Strategic Rail Review* (2003). This report was cognisant of the recommendations of the DTO's *A Platform for Change* but considered more detailed analysis to take account of the localised development potential that would result in increased passenger demand (i.e. greater than assumed in *A Platform for Change*). The *Strategic Rail Review* (2003) acknowledged that the more detailed analysis could affect the timing of elements of the investment strategy.

The recommendation of the Strategic Rail Review was to develop the Dublin Suburban Routes in four phases, including as Phase 3: "*Widening of the rail corridors between Dublin Connolly and Howth Junction and between Dublin Heuston and Hazelhatch on the Kildare route from two to four track, enabling separation of stopping DART services from fast intercity and commuter train services.*" The investment strategy recommended included:

- Progressing construction of the new turnback facility at Newbridge.
- The lengthening of platforms at Sallins and Hazelhatch.
- Secure a Railway Order and proceed to construction of the four tracking on the Kildare Line to separate Intercity and commuter traffic.

Since 2001, these objectives and requirements have remained constant including establishing Hazelhatch & Celbridge as the termination point for four tracking and Sallins the termination point for electrification; however, having regard to interdependencies between some elements, they have had to be brought forward as different projects or phases at different times.

An early project (one of the investment strategy recommendations of the *Strategic Review 2003*), involved delivering platform lengthening at Hazelhatch & Celbridge Station and Sallins & Naas Station to accommodate longer trains in 2003.

However, addressing the existing constraints of the Cork Mainline was the priority; and the four-tracking of the line, between Park West & Cherry Orchard Station and Hazelhatch & Celbridge Station, was brought forward as the Kildare Route Project in 2006. At the time, it was not possible to include the four-tracking further into the city as part of the project because the design alignment of DART Underground and its interface with the Cork Mainline around Heuston and Inchicore had not been finalised.

The delivery of the Kildare Route Project in 2009 laid down significant groundwork for the DART+ South West Project, providing four-tracking for 11km and reconstructing several bridges to provide the necessary lateral clearance and vertical clearance for future electrification.

In 2009, with the DART Underground alignment finalised, the second phase of the Kildare Route Project was progressed. This looked at continuing four-tracking from the end of Kildare Route Project at Park West & Cherry Orchard through to the end of proposed DART Underground within the IÉ Inchicore Works. With the onset of the economic recession, the Government decided to defer the DART Expansion Programme in the *Capital Expenditure Programme 2012-2016*, with a view to progressing it again when funding permitted. The progression of the Railway Order application for Kildare Route Project Phase 2 Project was put on hold.

In 2015, the Government deferred authorisation for construction of DART Underground. In this regard, the onset of the financial crisis in 2010 and a series of capital spending reviews has affected the timing, but not the objectives or underlying requirements for the DART Expansion Programme (now the DART+ Programme).

In 2018, the *DART-Expansion-Programme-Options-Assessment* (Oct 2018) by Jacobs and Systra sought to identify a lower cost alternative to the proposed DART underground tunnel component of the DART Expansion Programme. It considered a range of 'scheme bundles' and recommended that the DART Expansion programme be delivered by enhancing the existing rail network in the short to medium term (Scheme Bundle 6). Of relevance to DART+ South West, Scheme Bundle 6 - DART Expansion with Existing Network Enhancement (No DART Underground) initially included:

- Upgrading of the Phoenix Park Tunnel Branch Line (as an alternative to the DART Underground tunnel).[3]
- New stations at Heuston West (Platform 10) and Cabra.
- Four tracking on the Cork Line from Park West to Heuston station.

Following optimisation an above-ground station at Kylemore on the Cork Mainline was recommended as an alteration to Scheme Bundle 6. This in turn meant that the Heuston West (Platform 10) station was no longer required and was removed from Scheme Bundle 6.

As part of future transport policy and strategy further improvements of the Cork Mainline may be promoted, which may include full InterCity and/or Commuter electrification extensions. There is nothing being designed by DART+ South West that will preclude these future plans. These future projects will be subject to their own designs, technical assessment, and statutory approval.

In conclusion, the DART+ South West Project continues the railway modernisation works already significantly progressed by previous projects delivered since the early 2000s. DART+ South West is fully compliant with recent government transport and climate policy, most particularly the *National Development Plan 2021-2030* for completion of four-tracking from Park West to Heuston and electrification of the commuter lines from Hazelhatch to Heuston and along the Phoenix Park Tunnel

[3] It is noted that DART Underground remains a proposal and the tunnel alignment is protected for potential future development.

Branch Line. In this context, the DART+ South West Project is an up to date upgrading the suburban railway service along this section of the Cork Mainline.

2.2. Policy Context

The DART+ Programme and DART+ South West Project are central to the delivery of planning and transportation policy objectives at EU, national, regional and local level. An overview of the strategic fit of the DART+ Programme and DART+ South West Project in relation to European, national, regional, and local policy is described in the Options Selection Report (OSR)– Policy Context, Volume 4.2, which is available on www.dartplus.ie.

3. Project Description

The second of the infrastructural projects of the DART+ Programme to be delivered will be the DART+ South West Project, the subject of this informal scoping report. An outline of the DART+ South West Project is provided in Section 1.5 and the key infrastructural elements are outlined in Section 1.7.

The end-to-end preferred route is illustrated in the general schematic layouts in the drawings that accompany Volume 1 (Annex 1.0 – Preferred Option General Arrangement Drawings[4]), which are available to view and download on www.dartplus.ie.

The Project will require modernisation and modifications to the existing railway line. There is a range of general linear works required along the full length of the Project to enable the electrification of the line and the upgrade of the existing network. This chapter of the report presents a high level overview of the main elements of the project.

More information on the project is presented in the Volume 3: Options Selection Reports by Area, which is available on www.dartplus.ie. The reports by Area contain additional technical information focusing of sections of the railway infrastructure moving consecutively from west to east.

3.1. Introduction to General Linear Works (End to End)

Given that much of the general linear works manifest along the full extent of the scheme, these elements are described first in this section to avoid the need for repetition. In addition, elements of the scheme which, although arising at discrete locations throughout the scheme, are proposed to be provided with common treatment are also described in this section (for example, additional signalling).

The elements of the Preferred Option that are relevant to the entire length of the railway corridor are:

- Overhead electrification equipment which will be required along the full extent of the railway line from Hazelhatch & Celbridge Station to Heuston Station and through the Phoenix Park Tunnel Branch Line up to Glasnevin Junction, where it will link with the proposed DART+ West Project. The equipment will be similar to the overhead electrification equipment currently used on the existing DART network;
- Signalling upgrades and additional signalling infrastructure;
- Telecommunications infrastructure including buildings;
- Ancillary equipment cabins;
- Works to the Permanent Way (or track or railway corridor) including all ancillary installations such as rails, sleepers, ballast interfaces with existing utilities, boundary treatments, drainage works, vegetation management and other ancillary works.

There are a number of discrete Project elements, which are required along the full length of the Project, that are addressed in more detail in following sections, and which include the following:

[4] https://www.dartplus.ie/en-ie/projects/dart-south-west/public-consultation-round-2/dart-south-west-useful-material-and-downloads

- Six electrical substations will be required at intervals along the rail line to provide power to the network;
- Where existing bridges do not provide the necessary clearance for overhead electrification of the lines or lateral clearance for four-tracking, options have been considered on a case-by-case basis, these include:
  - Provision of specialist electrical solutions for the OHLE with reduced clearance;
  - Lowering the rail track under the bridge;
  - Modification of the existing structure;
  - Removal of the existing structure and provision of a replacement structure; or
  - A combination of the above.
- Retaining walls supporting widening of the rail corridor and replacement bridges;
- Overhead electrified line protection works at bridges;
- Construction compounds.

3.2. Signalling, Electrical and Telecommunications (SET)

3.2.1. Signalling System

The signalling system is used to safely control and monitor train movement on the Irish Rail network. The system comprises a network of sensors, controls, signs and lights; it also includes localised control cabinets and cabins.

In order to achieve the necessary capacity enhancements and performance required for the DART+ Programme, it will be necessary to upgrade the existing signalling system as well as replacing some of the legacy signalling system. This will include the provision of Signalling Equipment Rooms (SER), Low Voltage Rooms (LVRs) and Relocatable Equipment Buildings (REB) where required along the route in order to accommodate signalling equipment and associated power supplies and backup.

A Signalling scheme plan has been developed for the route. The scheme identifies the proposed number and type of signals that will be allocated on the route. The following section details the typical physical signalling infrastructure that will be installed along the route.

The signalling system is a technical, operational and safety requirement of the project; and will be located entirely within the existing and widened railway corridor.

3.2.1.1. Signals

Signals may be mounted on posts, masts or large structures, such as gantries and cantilevers. Gantries and cantilevers will generally be placed only in stations or areas with more than two tracks. Figure 3-1 shows a typical signalling cantilever and trackside signal post.

Figure 3-1 Typical Signalling Infrastructure

3.2.1.2. Object Controller Cabinet (OBJ)

In the railway system, the movement of the train is controlled by an interlocking system. Such an interlocking system consists of different parts. From a logical perspective, there is a central device (computer) that controls and senses the condition of important equipment such as switches, signals, track circuits, etc. This equipment is collectively referred to as an object or rail side object. The equipment that handles the interface between the central device and the object is referred to as an object controller. A typical Object Controller Cabinet is shown in Figure 3-2.

Figure 3-2 Examples of typical Object Controller Cabinet (OBJ) and Location Case

3.2.1.3. Location Case

Location Cases (LOCs) accommodate railway signalling equipment to detect the location of trains, control the trackside signals and switch the points. They link the physical asset to the control equipment within. Additionally, they are used to accommodate the required power distribution to the signalling equipment. A typical Location Case is shown in Figure 3-2 above.

3.2.2. Electrical

It is a project requirement to provide an electrification system that is compatible with the existing DART system and other electrification projects associated with the DART+ Programme.

Equally to the existing DART network, the new DART+ Programme will operate at 1,500V DC (Direct Current), with trains being powered via the Overhead Line Equipment OHLE.

The power supply is required along the full length of the Project, from Celbridge and Hazelhatch Station to Heuston Station and through the Phoenix Park Tunnel up to the Glasnevin Junction where the line connects with the proposed DART+ West scheme.

The OHLE system will be supplied with electrical power from the ESB distribution network at regular intervals, at locations known as substations. These substations will receive power from the local power distribution network and transform this into the required 1500V DC for distribution along the OHLE system. The specific voltage to be adopted will be determined at a later date in discussions with the ESB.

A 'DART System-Wide Power Study' identified that six substations will be required at various locations along the length of the DART+ South West Project to provide power to the network. The location for each of the substations was identified by following a two-step optioneering process, Preliminary Assessment and a Multi-Criteria Analysis (feasible options), where appropriate. This led to the identification of the Preferred Options in respect of each of the required substation locations.

The proposed substation locations along the line, are:

- Heuston / Islandbridge;
- Kylemore;
- Park West;
- Kishoge;
- Adamstown;
- Hazelhatch.

The substations will comprise a secured, fenced compound surrounding a building which will house all the necessary electrical switching and feeding equipment. Welfare facilities are also required for Iarnród Éireann's maintenance teams. The characteristics of the substation compound and buildings for the DART+ South West Project are as follows:

- The footprint of a typical substation compound will generally be 50m (length) x 20m (wide) (i.e. approximately 1,000sq m). The substation dimensions will generally be 35 m (length) x 10 m (width) and 6 m (height).
- Consistent with the existing Irish Rail substations:
    - The substation compound will be secured by a 2.4 m high security fence, or similar. See below for a typical OHLE substation including security fencing.

- The architectural finish will be grey brick / blocks. However, there may be site specific areas where a high architectural finish is required. See Figure 3-3 for a typical substation appearance.
- The substation must be located at ground level in order to facilitate the installation or replacement of heavy electrical equipment, the immediate area around the substation should be level.
- Substations must be located so that the access doors open outwards onto a clearly marked low-risk fire area.
- The exterior and the access of the electrical substation must be illuminated with sufficieCIÉnt lighting to assure the mobility and the security of any operation during the hours of darkness.
- The design of the substations will be subject to further design development at the next design stage and the inclusion of ESB requirements. The sizing of the proposed substations has been taken from information obtained from ESB.

Figure 3-3 Typical Substation

3.2.3. Telecommunications

The purpose of the Telecom Equipment Building (TER) is to house servers, storage devices, switches, routers, cabling patch panels and any additional passive electronics to provide IT services (access control, CCTV, intrusion detection, patch panels, public address system, voice announcement system, distributed antenna systems) in the station and its area of influence. This is where the physical connection between the field equipment (signals, train detectors, etc.) and the electronic equipment takes place.

TERs will typically be located within stations on Iarnród Éireann owed land, for existing stations, a new TER room will be considered when the existing TERs lack sufficient capacity for new equipment.

The following requirements apply to TER rooms / buildings:

- The Station TER shall be as per current IE specifications – e.g.: min 4m x 3m, false floor, air conditioned, dedicated power board, 24hr access, access monitoring, fire detection.

- Telecommunication Equipment Rooms (TERs) shall be built as close as possible to the existing TER to facilitate the migration of the existing infrastructure into the new facility.
- Secured external light switch shall activate the internal equipment room lights.

According to the current design, it is expected to implement two TER rooms that will house the new equipment needed for the existing stations.

3.3. Overhead Electrification Equipment (OHLE)

Overhead Line Equipment (OHLE) generally refers to the mechanical and electrical equipment items used to carry and deliver electrical power to the trains.

Electrical energy is supplied to the train through contact between the equipment mounted on the top of the train (pantograph) and an electrically live overhead cable. This cable is suspended from a system of steel masts. The live overhead cable is fed electrically from individual substations which are located along the route.

The existing Project route corridor is not currently electrified and no OHLE infrastructure has been installed. OHLE will therefore be required. The preferred option for the OHLE for DART+ Programme will comprise a pre-sagged simple (2-wire) auto-tensioned system, supported on galvanised steel support structures. While functionally similar to the OHLE on the existing DART network, modern design is being considered to maximise reliability and safety on the route.

While a standardised approach to electrification will be adopted, specific arrangements will also need to be considered at particular locations.

OHLE is formed by auto-tensioned section lengths by means of a fixed-point anchor at one end and balance weights or spring solutions at the opposite end ensuring constant tension regardless of the variation of temperature.

The mechanical tension can be achieved by two main solutions, springs or counterweights/balance weights. The type of OHLE mechanical compensation equipment shall be determined at a later stage of the design process when further information is available.

OHLE masts will carry support frameworks for the OHLE system over each of the electrified tracks. Vertical hangers will support and separate the upper and lower wires; additional feeder cables, insulators and earth wire.

OHLE foundations will be a critical and key element for the electrification works to be undertaken under the DART+ Programme. Three foundation options are under consideration (steel pile driven, concrete bored pile and concrete PAD). The type of foundation shall be determined at a later stage of the design process when further information is available.

3.3.1. OHLE Alternative Arrangements

The OHLE arrangement will vary at different sections along the route depending on the track configuration, clearance to structures and local site conditions. Figure 3-4 shows a typical arrangement in a 2-track section.

Two Track Cantilevers (TTCs) are generally only placed on one side of the line, to support OHLE on the two tracks. TTCs may also be used on two track sections where obstructions prohibit the use of single cantilevers. TTCs will be the OHLE arrangement from Hazelhatch & Celbridge Station to Park West & Cherry Orchard Station.

Single Track Cantilevers (STCs) support the OHLE over one track and are generally used on sections where there is sufficient space and no obstructions adjacent to tracks.

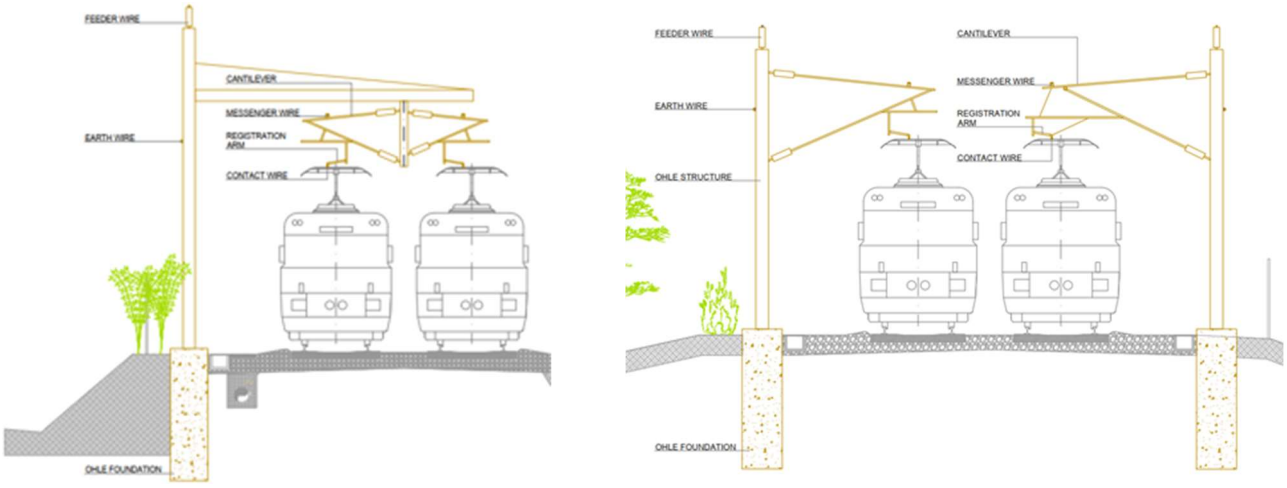


Figure 3-4 Alternative OHLE Arrangements in 2-Track Section

Figure 3-5 shows the typical configuration on the four track sections, Two Track Cantilevers (TTCs) will generally only be placed on the north side of the line, to support OHLE on the northern two tracks.

This will be the OHLE arranagement between Hazelhatch & Celbridge Station and Heuston Station.

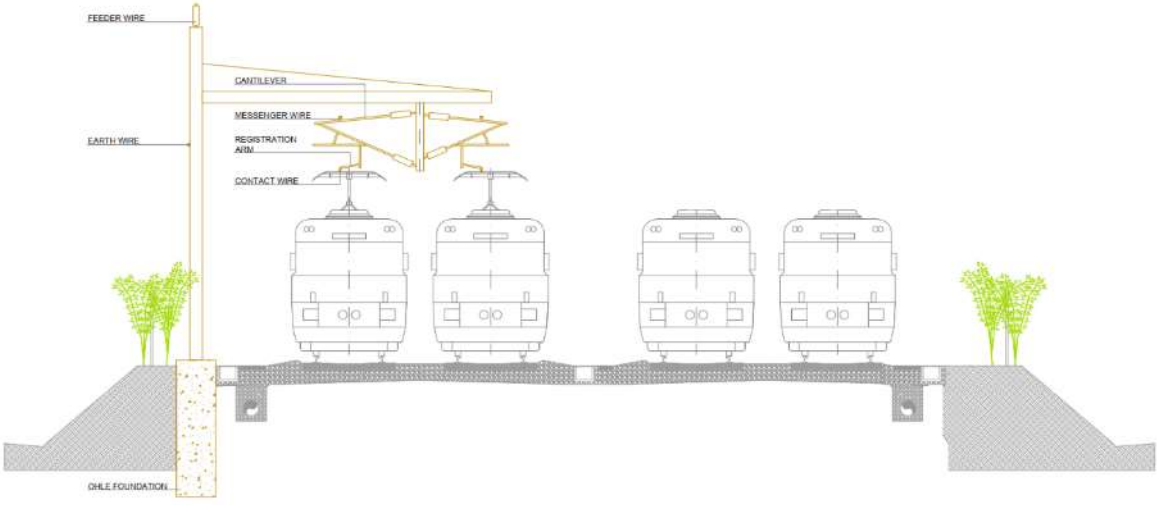


Figure 3-5 Typical OHLE Arrangement in 4-track Section (Northern Tracks Electrified)

In multi-track areas particularly around stations, more complex structures spanning multiple tracks will be needed. In such areas, it is generally not possible to use single mast structures as there is insufficient space between the tracks. In these areas TTCs or Portals (Figure 3-6) are proposed.

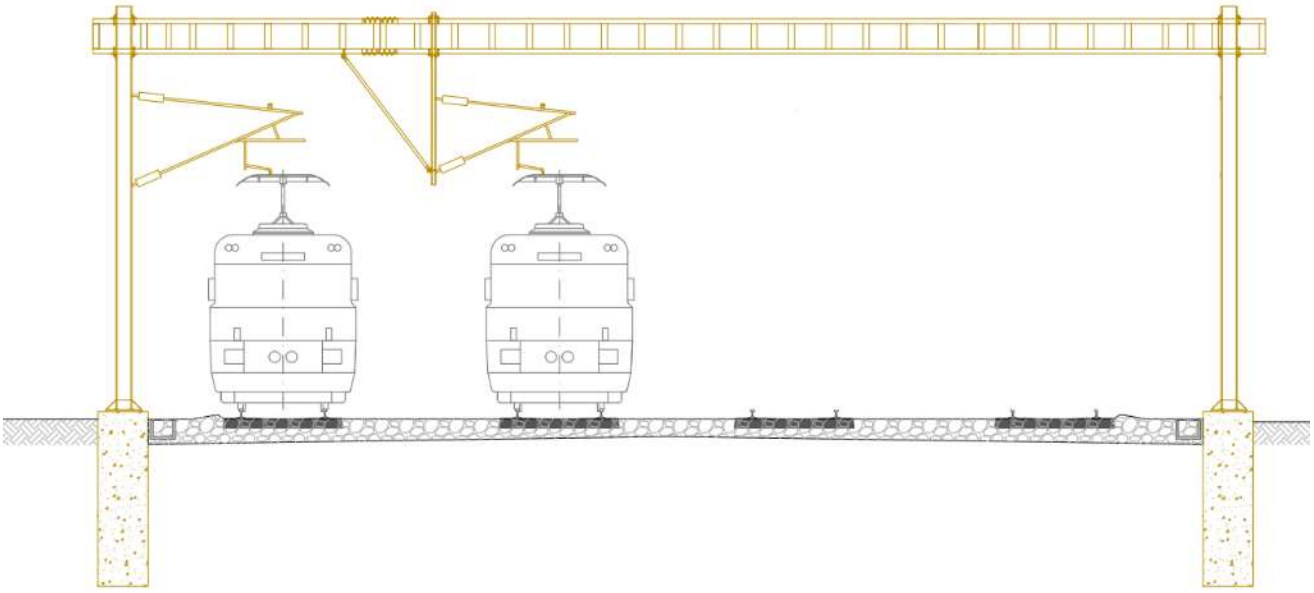


Figure 3-6 Typical OHLE portal arrangement in four track open route (Northern Tracks Electrified)

3.3.2. OHLE Clearances

Wherever a bridge crosses over the railway, it is necessary to ensure that the OHLE passes safely below the bridge. Where existing bridges do not, or may not, provide the necessary clearance for OHLE, a range of options have been considered on a case-by-case basis.

The options include modifications to the track layout and structural solutions to gain the necessary vertical and horizontal clearance. A detailed assessment has been carried out of each structure along the route to establish the clearance and level of intervention required to accommodate the OHLE system. The options associated with each structure include the following (either standalone or in combination):

- Provision of specialist electrical solutions for the OHLE with reduced clearance.
- Lowering the rail track under the bridge.
- Modification of the existing structure.
- Removal of the existing structure and provision of a replacement structure.

Along the Project route corridor, there are several bridges that have insufficient vertical headroom for OHLE or lateral clearances for four-tracking (where required) therefore, reconstruction is unavoidable to meet the Project requirements. Six structures on the section between Cherry Orchard and Heuston Station and one structure on the Phoenix Park Tunnel branch line require reconstruction.

For other bridges, including those along the Phoenix Park Tunnel Branch Line, where the required electrical clearance beneath the bridges is sub-standard, clearances will be increased by means of track lowering, fitted OHLE and / or derogation from Standard.

3.3.3. OHLE Protection Measures

The existing bridges along the route must comply with necessary safety requirements by providing suitable protection for the general public to prevent accidental contact with the OHLE. The existing bridges which are to be retained, have been assessed to determine if existing parapet heights comply with the safety requirements.

Reasonable steps to prevent people from accidentally or otherwise falling onto or touching the OHLE are required to:

- Prevent access.
- Prevent falling.
- Prevent contact / sparking.

Two main options to achieve the necessary level of protection are currently under consideration and involve increasing the heights of existing bridge parapets (by either wall or panels) or installing safety screens over the OHLE.

There are currently a number of options being evaluated for parapets and approach road containment walls for the new bridges.

The bridge parapets are required to provide an overall height of 1.8m above deck level. The options under consideration include full height precast reinforced concrete parapets, full height steel parapets, and 1.2m high Reinforced Concrete parapets with perforated or glazed sections to the remaining 0.6m to achieve the min height requirement. Two bridges on the Cork main line and one bridge on the Phoenix Park Tunnel Branch Line have been identified as potentially requiring bridge parapet modification works.

As the aesthetic is an important factor a number of finishes are being considered for the precast concrete options. These include introducing patterned concrete formers to replicate the existing masonry parapets currently in place. There a many different finishes available to use and the panels can be coloured.

Other options under consideration are to fully clad the precast panels with masonry cladding to match the exiting parapets or to retain and repurpose the existing masonry in the parapets to be used as cladding for the new precast parapets. Other options being considered take into account landscape and visual considerations.

3.4. Permanent Way Requirements

The Permanent Way (PW) is a term used to describe the track or railway corridor and includes all ancillary installations such as rails, sleepers, ballast as well as lineside retaining walls, fencing and signage. The DART+ South West Project includes:

- Widening of the railway corridor and completion of four-tracking between Park West & Cherry Orchard Station and Heuston Station.
- Track lowering arising from electrical clearance requirements.

- Improvements, including realignment works, to the Phoenix Park Tunnel Branch Line to support the increased capacity.

A key aspect of the permanent way is where intervention is required, e.g. at bridge locations, as it has knock on issues extending beyond the area of intervention of the bridge location itself, with implications for track alignment, road levels on adjoining roads, other bridges, etc. and hence the need for a solution to be considered more holistically.

3.5. Ancillary Works

3.5.1. Attenuation

Elements of the DART+ South West Project which can modify the performance of the current drainage system include track lowering, an increase in the rail corridor width (resulting in a larger catchment area for rainfall), and the introduction of slab track along parts of the corridor.

A preliminary assessment of existing drainage system along the Project route corridor and the attenuation requirements for the DART+ South West Project has been undertaken. Relevant considerations include:

- Existing and potential levels of run-off including the existing outfall to the River Liffey.
- The source and quantity of seepage into the Phoenix Park Tunnel.
- The possibilities for the existing attenuation system (including pumping stations, pressure pipes, attenuation tanks and soakaways) to cope with the potential changes.

Stormwater attenuation tanks are currently recommended for the following locations: Le Fanu Road, Inchicore, and Islandbridge. Where possible these will be accommodated along the railway corridor or on adjoining land owned by CIÉ.

3.5.2. Utility Diversions

The utilities that cross the existing rail corridor along the Project route corridor are generally concentrated in road bridges and train stations. There are also several utilities that cross underneath the tracks or run parallel to the tracks, such as Irish Water pipes (including both water supply and wastewater) and ESB ducts.

Utilities will be constraints during both the design and construction phases. As such, their treatment in the temporary and permanent situations has been carefully considered during the development of options.

Discussions are ongoing with service providers regarding the location and nature of existing utility services and structures, to determine whether diversion is required.

3.6. Retaining Walls

Several different retaining wall types are proposed for the Project depending on the height of the retained soil, the soil conditions and the proximity of buildings to the railway corridor. These potential solutions are:

- Secant piled walls and contiguous bored piled walls;

- Cantilever Retaining Walls; and
- Soil Nailing.

3.7. Construction Compounds

Works on this linear scheme will require construction compounds at specific locations. The sites will need to accommodate offices for the contractor and client teams, storage facilities, recycling facilities, parking for cars and plant and potentially fabrication areas. It is a prerequisite that the construction compounds are located close to and ideally with direct access to the respective work site. The sites must be fully serviced with electricity, water, sewerage and telecoms and must have good access to the public road network.

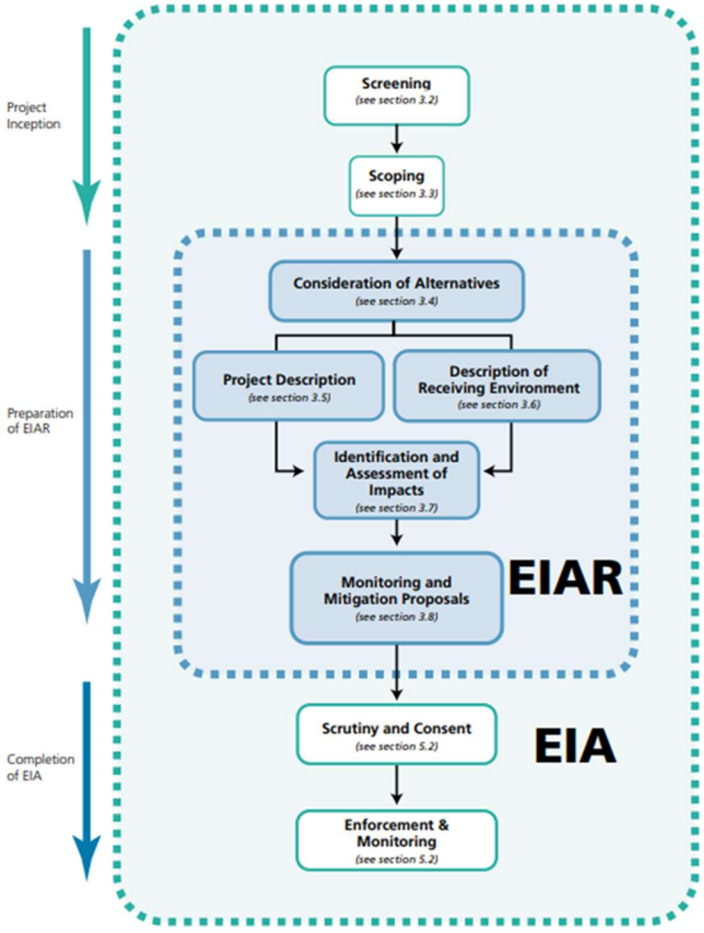
The compounds are required at specific construction sub-sites; they are distributed along the scheme by location specific features. For example, compounds will be required at each of the bridge reconstruction locations, they will also be required for material processing and storage of construction components. The compounds will be used to support earthworks, enabling works, site clearance, utility diversions work, civil works, the demolition of bridges, OHLE, track installation, signalling and telecoms equipment and all ancillary works.

4. Railway Order & EIA Process

4.1. Introduction

This chapter presents an overview of the EIA process which will be applied to the DART+ South West Project. The EIA process encompasses a number of key decision points and outputs used by the relevant Competent Authority [in this case An Bord Pleanála] to complete the EIA process. It commences with consideration of whether an EIA needs to be undertaken or not – EIA Screening. Where EIA is required the process moves to EIA Scoping and this is followed by preparation of an Environmental Impact Assessment Report (EIAR) which identifies, evaluates and mitigates the effects (positive and negative) on the receiving environment as a result of a proposed project. This output is used by the relevant Competent Authority, along with any other supplementary information they deem appropriate, to complete the EIA process and either allow (with or without modifications) or refuse the proposed application. The overall process and where the various stages occur is outlined in Figure 4-1.

The content of this report relates to Scoping only.



Source: Draft Guidelines on the Information to be Contained in an EIAR (EPA, 2017)

Figure 4-1 The Position of Scoping an EIAR within the EIA Process

4.2. EIA Legislation

The scale of the DART+ South West Project will necessitate some interventions outside the existing railway corridor e.g. for the provision of substations. The only method for Iarnród Éireann to compulsorily acquire these lands is through a Railway Order Application process. The proposed Project is being progressed through an application for a Railway Order, under the Transport (Railway Infrastructure) Act 2001 as amended.

A Railway Order Application is made directly to ABP under Section 37 of the Transport (Railway Infrastructure) Act, 2001 (the Act), (as amended by the Planning and Development Strategic Infrastructure Act 2006).

Section 37(2)(e) of the Transport Act 2001, as amended, requires a Railway Order Application to be accompanied by:

> *'(e) a statement of the likely effects on the environment (referred to subsequently in this Part as an 'environmental impact statement') of the proposed railway works.'*

The term environmental impact statement was reframed under the 2014 EIA Directive [2014/52/EU] as an environmental impact assessment report or EIAR, and the meaning referred to in Article 5 and Annex IV of the Directive. The 2001 Transport (Railway Infrastructure) Act has yet to be directly amended (by way of legislation or regulation) to take account of the 2014 EIA Directive. For the purpose of the proposed Project, the mandatory 'statement of the likely effects on the environment' is understood to mean an environmental impact assessment report [in the context of the 2014 EIA Directive] under Section 37 of the Transport (Railway Infrastructure) Act, 2001 (the Act), (as amended). To ensure compliance with both European and national legislation, an EIAR will now be prepared to accompany the application for a Railway Order to ABP in accordance with the 2014 EIA Directive requirements and the requirements of the Transport (Railway Infrastructure) Act 2001. The EIAR will detail the nature and extent of the proposed project and identify and describe the impacts on the environment. It will also detail measures that will be taken to avoid, reduce and/or monitor these impacts.

4.3. EIA Scoping

EIA scoping seeks to establish the content and extent of the matters which should be covered in the environmental information to be submitted in the EIAR[5]. This includes definition of temporal and spatial scope and also potential for significant effects throughout the lifecycle of the project.

The process involves an assessment of a project's possible issues before deciding which should be brought forward for further consideration in the EIAR. An initial scoping of potential impacts may identify those issues thought to be potentially significant in EIA terms, those where significance is unclear, and those thought to be not significant. The issues in the potentially significant category are brought forward, together with those in the uncertain category. Those considered to be not significant are not considered further in the EIAR.

[5] EC Guidance on EIA Scoping (2017)

The preparation of this Scoping Report has had regard to the Key Legislation and Guidance outlined in Section 4.6. In addition, topic-specific guidance has been reviewed for specialist topic areas. This is outlined in the specialist chapters.

Having regard to the most recent guidance scoping must be focused on issues and impacts which are:

- Environmentally based;
- Likely to occur; and
- Significant and adverse.

Although scoping commences early in the process and informs the content and level of detail in the EIAR, it is noted that scoping is a dynamic process and only provides a starting point from which to launch an environmental assessment of the proposed Project. It is regarded as an ongoing phase throughout the evolution of the EIAR, responsive to issues that may arise as a result of field survey, changes to design and stakeholder feedback.

4.4. Consideration of Alternatives

Consideration of alternatives is an essential part of the EIA process. The EIA Directive 2014/52/EU amending Directive 2011/92/EU on the Assessment of the Effects of Certain Public and Private Projects on the Environment sets out the requirements in terms of alternatives in the Directive principally at Article 5.1 (d), noting that the developer must provide:

(d) a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment.

Furthermore in Annex IV paragraph 2 and Annex IV.3 further context is added pointing to consideration of issues such as project design, technology, location, size and scale and also a requirement to provide an *outline of the likely evolution of the current state of the environment without implementation of the project (baseline scenario), as a means of improving the quality of the environmental impact assessment process and of allowing environmental considerations to be integrated at an early stage in the project's design*.

In the context of DART+ South West, reasonable alternatives will be focused on the optioneering process. The description of reasonable alternatives to be considered and presented in the EIAR for DART+ South West will be informed and supported by the Option Selection Process for the end to end Preferred Option. A clearly defined appraisal methodology has been used in the selection of the end-to-end Preferred Option for the Project. Consistent with other NTA projects, it is based on 'Guidelines on a Common Appraisal Framework for Transport Projects and Programmes' (CAF) published by the Department of Transport, Tourism, and Sport (DTTAS), March 2016 (updated 2020), TII's Project Management Guidelines (TII PMG 2019) and Iarnród Éireann's Project Approval Guidelines.

The Multi-Criteria Analysis technique provides a coherent mechanism for choosing between options on a comparative basis. Each option is characterised under six principal categories as defined within the *Common Appraisal Framework Guidelines* and compared on a qualitative basis. The defined criteria are as follows:

- Economy
- Safety
- Environment
- Accessibility & Social Inclusion
- Integration
- Physical Activity

The principles of the process apply to all options assessment for the Project. The mechanism allows for an objective approach to be taken in relation to the selection of the most suitable option for the project.

In the context of DART+ South West, reasonable alternatives are focussed on the existing operational rail corridor and are more limited than a "greenfield" development. The location, broad lateral and vertical extents are limited. For example, alternatives have focussed on the four-tracking section of the proposed scheme from Park West to Hazelhatch, the identification of the Preferred Options in respect of each of the required substation locations and the selection of suitable sites for use as construction and maintenance compounds to facilitate the construction of the works.

4.5. Railway Order Application

The Railway Order application process is set out in the Transport (Railway Infrastructure) Act 2001 (as amended) and the application will be submitted to An Bord Pleanála for statutory approval, accompanied by an Environmental Impact Assessment Report (EIAR).

There are a number of public and privately owned properties that will likely be impacted by the DART+ South West, where the acquisition of land and/or property and other interests (including new rights), whether in whole or in part, will be necessary (detailed design and technical and construction related solutions will continue to seek to minimise this) and therefore a Compulsory Purchase Order will be required. A Compulsory Purchase Order is a legal function that allows certain statutory bodies, like Iarnród Eireann, to acquire land and property for large projects such as road and railway schemes. Land, property, and other interests (including new rights) can only be acquired once the Railway Order has been confirmed by ABP.

4.6. Key Legislation and Guidance

A number of key EU and national policy, plans, guidance and legislation will be referenced in the preparation of the EIAR and in relation to topic specific assessments. Where topic specific policy, plans, guidance and legislation exists, this is discussed in the topic scopes presented in Chapters 5 to 23 of this document.

Key Legislation

- Transport (Railway Infrastructure) Act 2001, as amended;
- Directive 2014/52/EC amending Directive 2011/92/EU on the Assessment of the Effects of Certain Public and Private Projects on the Environment;

- Planning and Development Regulations 2001 (S.I. No. 600 of 2001), as amended

Key Guidance

- Guidelines for Planning Authorities and an Bord Pleanála on carrying out Environmental Impact Assessment (DHPLG, August 2018);
- Circular Letter: PL 05/2018 Transposition into Planning Law of Directive 2014/52/EU;
- Guidance on EIA Scoping (European Commission, 2017);
- Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impacts Assessment Report (European Commission 2017);
- Guidelines on the information to be contained in Environmental Impact Assessment Reports, (draft) (EPA, August 2017)
- Advice notes for preparing Environmental Impact Statements (draft) (EPA Sept. 2015)
- Environmental Impact Assessment of National Road Schemes – A Practical Guide (NRA, 2008);
- Advice Notes on Current Practice in the Preparation of Environmental Impact Statements (EPA,2003);
- Guidelines on the Information to be contained in Environmental Impact Statements (EPA, 2002).

4.7. EIAR Structure

It is envisaged that the EIAR will be presented in five volumes as follows:

Volume 1 – Non Technical Summary

Volume 2 – Environmental Impact Assessment Report

Volume 3A – Technical Figures

Volume 3B – Photomontages

Volume 4 – Technical Appendices

Volume 5 – Supporting Environmental Documents

4.8. EIAR Chapter Content

The methodology applied to specific environmental assessments will follow relevant guidance for the topic where available in order to present a systematic analysis of the impacts of the proposed Project in relation to the existing environment. Impacts will include both positive and negative, short, medium and long-term, direct and indirect as well as cumulative.

All assessments will be based on a detailed and thorough project description which will present information on key stages of the Project including site enabling works, construction (including compounds, any demolitions etc.), operation and maintenance. The EIAR will be prepared and presented in a manner which is clear, concise and accessible to the reader.

For each of the specialist chapters, the reporting structure will be as follows:

- Introduction;
- Discipline Specific Legislation, Policy, Guidance;
- Methodology (including Study Area, Survey Methodology, Assessment Methodology, Consultation, Difficulties encountered / Limitations);
- Receiving Environment;
- Description of Potential Impacts (including site enabling works, Construction, Operation, Maintenance);
- Mitigation Measures;
- Monitoring;
- Residual Impacts; and
- Cumulative effects.

Cumulative impacts will be addressed under each of the environmental topics and in addition a separate chapter will be provided in the EIAR presenting the project cumulative impact assessment. Similarly impact interactions will be completed by each specialist in the first instance within their chapter and also in a coordinated chapter.

4.9. Other Related Environmental Processes

4.9.1. Appropriate Assessment

The Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora ('the Habitats Directive') provides legal protection for habitats and species of European importance. Articles 3 to 9 provide the legislative means to protect habitats and species of Community interest through the establishment and conservation of an EU-wide network of sites known as Natura 2000. Natura 2000 is a European ecological network of Special Areas of Conservation (SAC), composed of sites hosting the natural habitat types listed in Annex I and habitats of the species listed in Annex II, to enable the natural habitat types and the species' habitats concerned to be maintained or, where appropriate, restored at a favourable conservation status in their natural range.

In Ireland, these Natura 2000 sites are designated as European Sites and include Special Protection Areas (SPAs), established under the EU Birds Directive (79/409/EEC, as codified by 2009/147/EC) for birds; and SACs, established under the Habitats Directive 92/43/EEC for habitats and species. Article 6(3) of the Habitats Directive requires that an Appropriate Assessment (AA) is carried out for any plan or project likely to have a significant effect on a European site, alone or in combination with other plans and projects.

The Habitats Directive has been transposed into Irish law by Part XAB of the Planning and Development Act 2000 as amended and the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011) as amended ('the Habitats Regulations').

An Appropriate Assessment is a separate but inter-related process to EIA, with its own distinct tests for compliance. The process will be undertaken concurrently with preparation of the EIAR, but both processes will be clearly distinguished. In the first instance, it must be determined if full AA is required. This stage of the process, known as AA Screening. An Appropriate Assessment Screening Report will be prepared by the project team to assess in view of the best scientific knowledge, if the proposed project, either individually or in combination with other plans or projects, is likely to have a significant effect(s) on any European Site. If the effects are deemed to be significant, potentially significant, or uncertain then the process will proceed to Stage 2 AA with the preparation of a Natura Impact Statement (NIS). This documentation is submitted as part of the RO and the AA determination is carried out by the 'competent authority', in this case An Bord Pleanála.

The Department of Environment, Heritage and Local Government (DEHLG) has published Appropriate Assessment Guidelines for Planning Authorities (DEHLG, 2010). In addition to this, the European Commission has published a number of documents which provide a significant body of guidance on the requirements of AA, including 'Assessment of Plans and Projects Significantly Affecting Natura 2000 sites – Methodological Guidance on the Provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC (EC,2001) and 'Managing Natura 2000 sites: The Provisions of Article 6 of the 'Habitats' Directive 92/43/EEC' (EC, 2019). These guidance documents set out the approach to considering plans and projects with respect to the legislation. Other pertinent guidance documents will be identified and employed to inform the development of an NIS if required.

4.9.2. Flood Risk Assessment

A Flood Risk Assessment (FRA) will be undertaken to inform the design process and will inform the hydrology chapter in the EIAR. The assessment will be carried out in accordance the requirements of "The Planning System and Flood Risk Management, Guidelines for Planning Authorities" and its Technical Appendices (Office of Public Works, November 2009).

The FRA will be a separate document to support the application for a Railway Order and will be included in Volume 5 – Supporting Environmental Documents.

4.9.3. Water Framework Directive Assessment

The Water Framework Directive (WFD) (2000/60/EC) came into force in December 2000 and establishes a framework for the protection of inland surface waters, transitional waters, coastal waters and groundwater. Ireland is required to comply with four main obligations under the environmental objectives of the WFD, namely to:

- Prevent deterioration of the status of all bodies of surface water and groundwater;
- Protect, enhance and restore all bodies of surface water and groundwater with the aim of achieving good status by the end of 2027;
- Protect and enhance all artificial and heavily modified bodies of water, with the aim of achieving good ecological potential and good surface water chemical status; and
- Achieve compliance with the requirements for designated protected areas.

Guidelines for planning authorities on the relationship between physical planning and river basin management planning are currently in preparation by DHLGH. These guidelines are likely to be published within the timeframe of the proposed Project. In anticipation of the guidelines a specific WFD Assessment will be included in the EIAR documentation for the proposed Project.

4.10. Consultation

The consultation activity on the proposed Project from project inception including a summary of the public consultation events held and also the statutory and non-statutory stakeholder communications/engagement throughout will be included in the EIAR. Key themes raised during consultations will be identified and how / where they have been dealt with in the EIAR and the design will be identified.

TECHNICAL SCOPES

5. Traffic and Transportation

5.1. Introduction

This chapter describes the proposed scope and methodology for undertaking the traffic and transportation assessment of the proposed Project. The proposed DART+ South West expansion is a significant public transport project which is expected to improve the overall transport network by improving existing rail capacity while reducing private vehicle traffic along the south-western corridor. Due to nature and scale of the project, the construction activities are expected to have a significant short term impact on the surrounding road network while the long term impact is expected to be insignificant as a result of there being no permanent change to the road network.

The objective of this chapter of the EIAR is to establish the overall approach of the traffic assessment which includes data collection, baseline determination, measuring of potential impacts, determining mitigation measures and identification of residual effects (if any).

5.2. Legislation, Policy and Guidance

Specific to the Traffic and Transportation EIAR chapter, the following will be considered to inform the scope of the assessment:

Legislation

There is no specific legislation of relevance to this chapter other than the key legislation referenced in the preparation of the EIAR as outlined in Section 4.6 .

Policy

- Project Ireland 2040 National Planning Framework (Government of Ireland, February 2018);
- Dublin City Development Plan 2016-2022 (and draft plan 2022-2028 as available);
- South Dublin County Development Plan 2016-2022 (and draft plan 2022-2028 as available);
- Kildare County Development Plan 2017-2023 (and draft plan 2023-2029 as available);

Guidance

- National Transport Authority (NTA, 2016) - Transport Strategy for the Greater Dublin Area 2016-2036 (and draft plan 2022-2042 as available);
- National Transport Authority (NTA, 2015) - Permeability Best Practice Guide;
- Transport Infrastructure Ireland (TII, 2014) – Traffic and Transport Assessment Guidelines;
- National Transport Authority (NTA, 2013) - Greater Dublin Area Cycle Network Plan
- Department of Transport Tourism and Sport (DTTS, 2013) – Design Manual for Urban Roads and Streets (DMURS); and
- National Transport Authority (NTA, 2011) - National Cycle Manual.

5.3. Methodology

The methodology will cover the entire assessment process in order to determine the potential impacts during both the construction and operational phases of the proposed development including determining mitigation measures and identification of residual effects (if any).

5.3.1. Study Area

The proposed project includes the electrification of the Cork Mainline from Heuston Station (Dublin) to the Hazelhatch & Celbridge Station. It also makes provision for the electrification of the line through the Phoenix Park Tunnel Branch Line to Glasnevin.

The proposed upgrade (Heuston Station to Hazelhatch & Celbridge Station) lies between the M4/N4 to the north and the N7/Naas Rd to the south. These two routes are the most significant high order roads that run in parallel with the Cork Mainline. Hazelhatch and Celbridge Station, where the DART+ South West Project commences is located approximately 2km south of Celbridge town on the regional road R405. The R405 and the R134 are also secondary roads which also run in parallel with the proposed line upgrade to the north and south respectively. The proposed study area with the existing road network is illustrated in Figure 5-1.

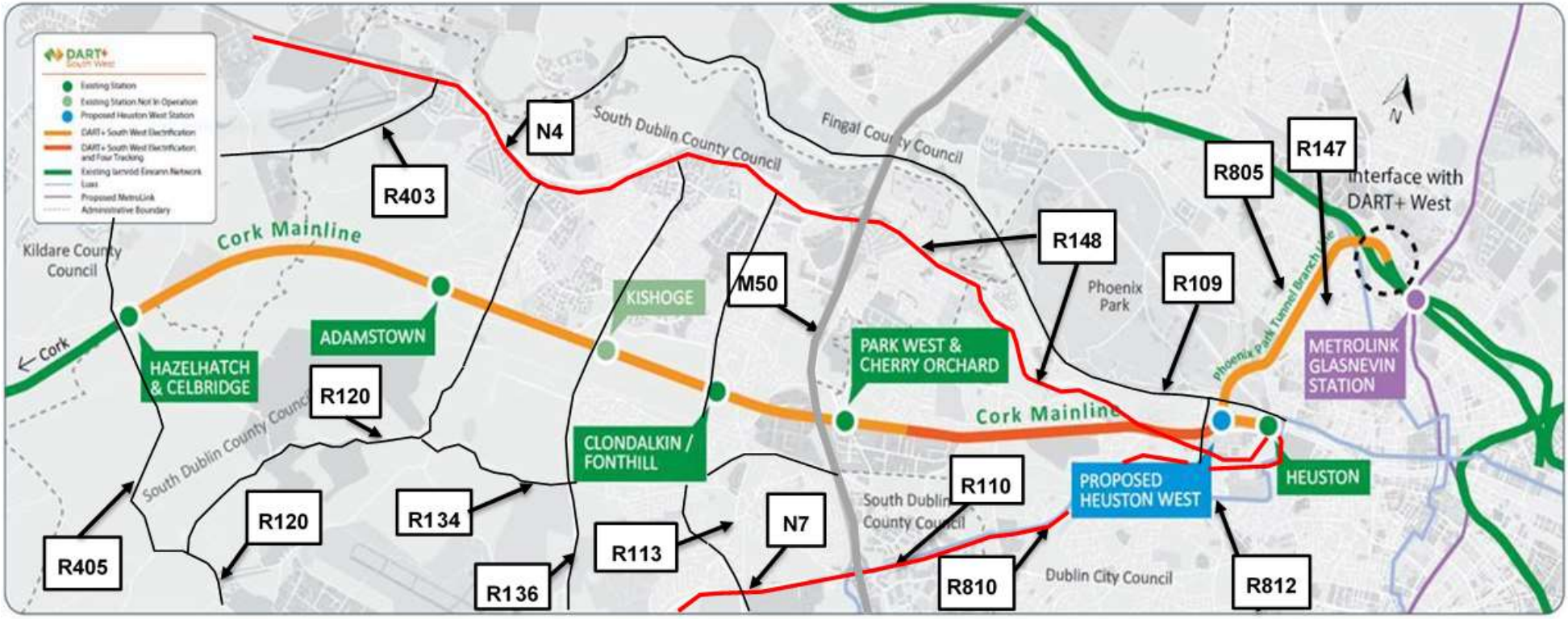


Figure 5-1 Proposed Study Area

5.3.2. Transport Modelling

The Eastern Regional Model (ERM) is one of five transport demand models in the NTA's Regional Modelling System. The ERM covers the whole of Ireland with a focus on the counties within Leinster and the Greater Dublin Area (GDA). These areas are represented by 1844 detailed zones with travel between these areas and the rest of Ireland represented by 7 external zones. The base year of the model is 2016 and it represents an average weekday with five separate peak periods modelled;

- AM peak (07:00-10:00);
- Morning Inter peak (10:00-13:00);
- Afternoon Inter peak (13:00-16:00);
- PM peak (16:00-19:00); and
- Off peak (19:00-07:00).

The model covers all surface access modes for personal travel and goods vehicles, including private vehicles (taxis and cars), public transport (bus, rail, Luas, BRT, Metro), active modes (walking and cycling) and goods vehicles (light goods vehicles and heavy goods vehicles). The NTA have developed a number of ERM reference case forecasts (2028, 2043 and 2058). These were used on DART+ Programme and are in line with the projections contained in the Project Ireland 2040: National Planning Framework (NPF).

The model has been used to carry out the demand modelling associated with the DART+ Programme. The output from the study has been used to update the transportation modelling for the DART+ Programme and will also inform the traffic assessment as part of the EIAR to accompany the DART+ South West Project Railway Order application.

5.3.2.1. DART+ South West Transport Modelling

Since no permanent road network changes are proposed for the operational phase of the project, the net result is expected to have a positive effect by creating a modal shift from private vehicles to rail. In order to assess the long term impact, traffic flow data is to be extracted from the NTA's Eastern Regional Model for comparison for the following scenarios:

- Opening Year (2028) with no DART+ Programme
- Opening Year (2028) with DART+ West Only
- Opening Year (2028) with DART+ West & DART+ South West
- Opening Year (2028) with Full DART+ Programme
- Opening Year (2043) with no DART+ Programme
- Opening Year (2043) with DART+ West Only
- Opening Year (2043) with DART+ West & DART+ South West
- Opening Year (2043) with Full DART+ Programme + Full NTA Programme (Metrolink, BusConnects etc)

Since the project is only expected to decrease road network traffic, the assessment is expected to reflect this reduction in road traffic. The traffic information derived for these scenarios are expected to be used as input data for the other environmental disciples such as air quality emissions and noise.

Since no permanent road network changes are proposed for the operational phase of the project, the transport modelling strategy will primarily be focused on several temporary bridge closures during the construction phase of the development. The bridge closures are expected for the section of line which is proposed to be widened to accommodate additional tracks. This section is between Heuston Station and the Park West & Cherry Orchard Station and would require either full or partial temporary closure at the following locations/crossings:

- Le Fanu Road;
- Kylemore Road;
- Sarsfield Road;
- Memorial Road; and
- South Circular Road / Con Colbert Road.

There is a requirement for a new bridge desk at Glasnevin Cemetery Road Bridge which would result in the temporary closure of the existing crossing.

Each of the closures are to be assessed individually, along with the associated traffic diversions. The assessment will be undertaken using traffic count data at the intersections immediately surrounding each closure.

Due to the sensitivity of the South Circular Rd / Con Colbert Rd junction (an extremely busy junction and having regard to its importance for local and strategic accessibility), full closure will not be considered. Various options for the partial closure are to be considered and assessed utilising a localised VISSIM (Verkehr In Städten – SIMulationsmodell) model. The anticipated model is to be calibrated using recent 2019 count data from the BusConnects scheme as well as signal timing data provided by Dublin County Council (DCC). The model area is shown in **Figure 5-2** below.

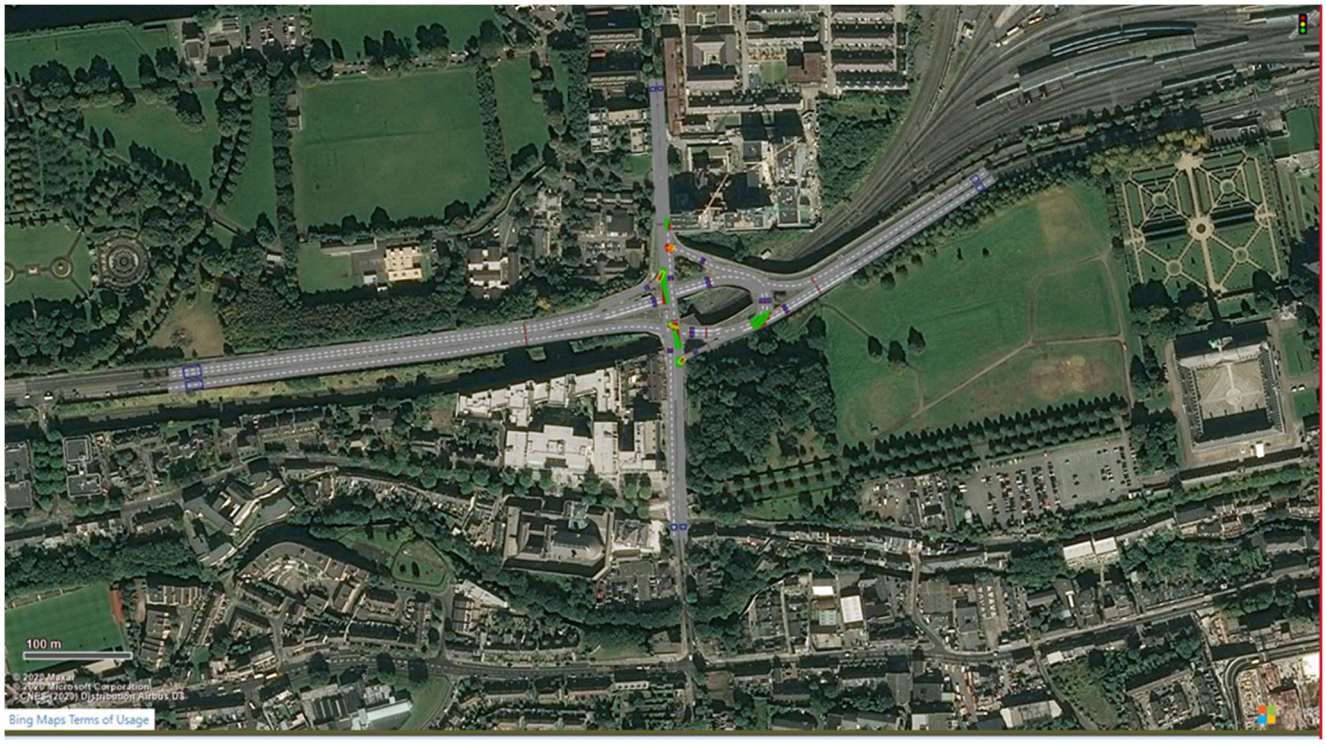


Figure 5-2 Proposed Vissim Model Area

5.3.3. Methods of Assessment

The transport impact assessment will be undertaken having regard to the Transport Infrastructure Ireland's Traffic and Transport Assessment Guidelines (TII, 2014). The assessment criteria to be used in the assessment is outlined in Table 5.1.

Table 5.1: Assessment Criteria

Category	Project Phase	Theme	Assessment Criteria
Road Traffic	Construction	Diverted traffic from temporary bridge closures	Traffic flow assessment at isolated junctions. Isolated junction modelling using Linsig / Junction 9 where required.
	Operational	Reduction in traffic flows due to implementation of DART+ South West	Junction flow outputs from the ERM (specifically from Saturn) to be used for comparison for the DART+ project phases.
Public Transport	Construction	Affected Public Transport service disruptions due to bridge closures	Provide revised routes for affected services where possible.
	Operational	Change in rail ridership due to increased line capacity	ERM traffic flow outputs for scenarios including DART+ West, South West and Full Programme.

Category	Project Phase	Theme	Assessment Criteria
Cyclists	Construction	Affected cycle routes due to bridge closures	Use junction count data (pedal cycles) to determine existing cycle volumes and proposed strategy (ie. Temporary pedestrian bridge - route diversions)
Pedestrians	Construction	Affected pedestrians due to bridge closures	Use pedestrians count data to determine existing pedestrian volumes and proposed strategy (ie. Temporary pedestrian bridge - route diversions)

5.3.4. Surveys

The cordon from which data to be extracted from the ERM for the operational phase assessment is shown in **Figure 5-3**. All available traffic flow information within this cordon from the SATURN model will be provided by AECOM who have interrogated the model on behalf of Iarnród Éireann for the DART+ Programme.

Traffic and pedestrian counts are to be conducted at several junctions surrounding the proposed temporary bridge closure sites. This data will be used to determine the effect of temporary traffic diversions. The new count data is to be used in conjunction with historical count data associated with the proposed BusConnects Scheme. The count information is shown in **Figure 5-4** and **Figure 5-5.**

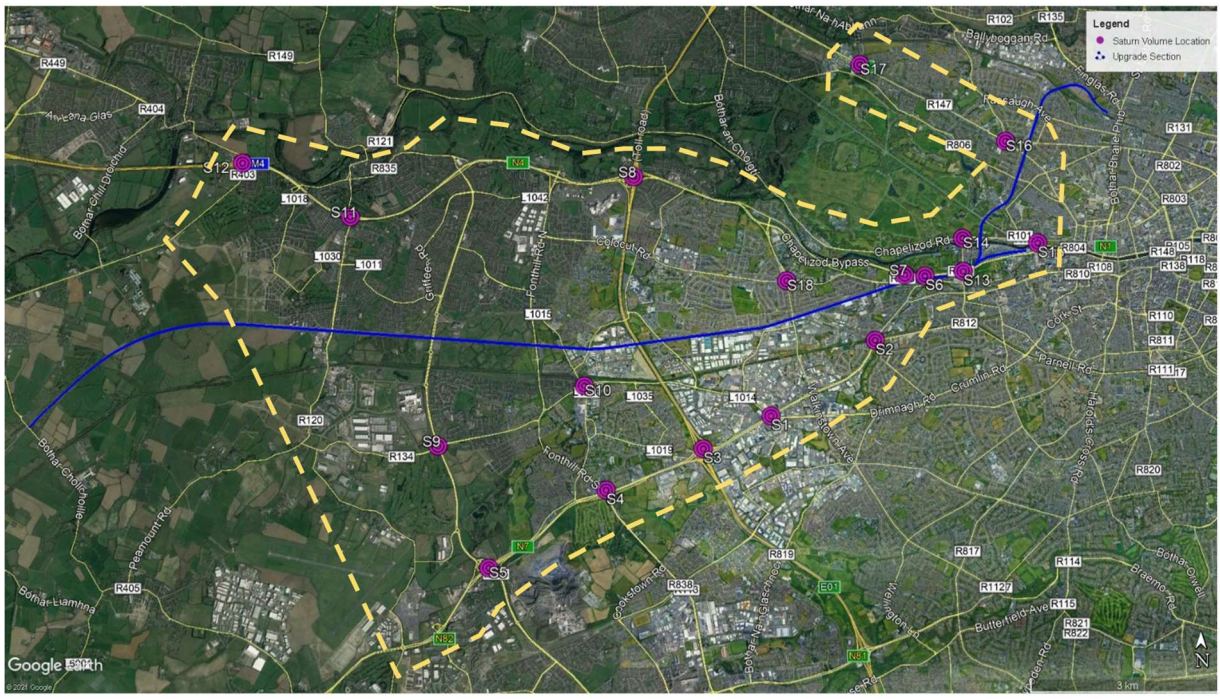


Figure 5-3 ERM Traffic Volumes Cordon

5.3.5. Technical Consultations

Public consultations will be carried out at various intervals throughout the EIA process with a particular focus on the temporary bridge closures which are expected to have an impact on the surrounding community. Specific consultation with the following stakeholders will be undertaken;

- National Transport Authority;
- Transport Infrastructure Ireland;
- Project Design teams for BusConnects and MetroLink;
- Relevant County Councils impacted by the proposed Project (Dublin City, South Dublin and Kildare) will be consulted.

5.4. Receiving Environment

5.4.1. Traffic Counts

The historical traffic survey data to be included in the assessment is based on counts that were conducted for the proposed BusConnects scheme. The BusConnects routes associated with the with the count data as well as dates in which the counts were conducted are as follows:

- Route 6: Lucan to City Centre (Tuesday 11th February 2020);
- Route 7: Liffey Valley to City Centre (Thursday 28th November 2019); and
- Route 8: Clondalkin to Drimnagh (Thursday 28th November 2019).

New traffic counts in May 2021 have been conducted at localised junctions in the immediate vicinity of each of the proposed bridge closures. These junctions will be assessed in order to determine whether the diverted traffic can be sufficiently catered for using isolated junction modelling where required. The isolated junctions will be assessed using Linsig 3.0 for signalised junctions and Junctions 9 for the priority junctions where necessary. The complete list of traffic count data to be used in the assessment is shown **Table 5.2** while the locations of each count in relation to the bridge closure locations are shown in **Figure 5-4** and **Figure 5-5**.

Table 5.2: Traffic Counts

Count ID	Location	Count	Count Date
HC 1	Le Fanu & Ballyfermot Rd	Historical Junction Turning Count	28/11/2019
HC 2	Kylemore Avenue & Ballyfermot Rd	Historical Junction Turning Count	28/11/2019
HC 3	Sarsfield Rd & Con Colbert Rd	Historical Junction Turning Count	28/11/2019
HC 4	Memorial Rd & Con Colbert Rd	Historical Junction Turning Count	11/02/2020
HC 5	South Circular Rd & Con Colbert Rd	Historical Junction Turning Count	11/02/2020
HC 6	Ballyfermot Rd & Con Colbert Rd	Historical Junction Turning Count	11/02/2020

Count ID	Location	Count	Count Date
HC 7	Killeen Rd & New Nangor Rd	Historical Junction Turning Count	28/11/2019
JTC 1	Kylemore Ave, Le Fanu Rd & Raheen Park Rd	New Junction Turning Count for 2021	06/05/2021
JTC 2	Kylemore Ave & Kylemore Road	New Junction Turning Count for 2021	06/05/2021
JTC 3	Landon Rd & Kylemore Rd	New Junction Turning Count for 2021	06/05/2021
JTC 4	Kylemore Park N & Le Fanu Rd	New Junction Turning Count for 2021	06/05/2021
JTC 5	Kylemore Park N & Kylemore Rd	New Junction Turning Count for 2021	06/05/2021
JTC 6	Sarsfield Rd & Inchicore Rd (R839)	New Junction Turning Count for 2021	06/05/2021
JTC 7	Memorial Rd & Inchicore Rd (R839)	New Junction Turning Count for 2021	06/05/2021
JTC 8	South Circular Road & Inchicore Rd (R839)	New Junction Turning Count for 2021	06/05/2021
JTC 9	Conyngham Rd & South Circular Road	New Junction Turning Count for 2021	06/05/2021
JTC 10	South Circular Rd, Old Kilmainham & Emmet Rd	New Junction Turning Count for 2021	06/05/2021
JTC 11	Tyrconnell Rd & Emmet Rd	New Junction Turning Count for 2021	06/05/2021
PC 1	Con Colbert Rd & Memorial Rd	New Pedestrian Count for 2021	06/05/2021
PC 2	South Circular Rd &Con Colbert Rd (Outbound)	New Pedestrian Count for 2021	06/05/2021
PC 3	South Circular Rd &Con Colbert Rd (Inbound)	New Pedestrian Count for 2021	06/05/2021

Figure 5-4 Traffic Count Data (1)

Figure 5-5 Traffic Count Data (2)

5.4.2. Bus Routes

The bus routes that are expected to be affected by the temporary bridge closures are illustrated in **Table 5.3** below. It should be noted that no public transport disruptions are expected to be experienced at the Le Fanu Road Bridge (OBC7) & Memorial Rd Bridge (OBC3) closures. As neither will have had Bus Connects implemented over these respective bridge route in the forecast implementation timeframe. Further to this, public transport disruptions at South Circular Road junction are expected to be minimal since only partial closure of the junction is to be considered. Public Transport services are to be prioritised during the construction phase.

Each bus service is to be assessed individually with differing outcomes. Services are expected to be either diverted or suspended depending on the characteristics of each service.

Table 5.3: Affected Bus Routes

Route ID	Le Fanu	Kylemore Ave	Sarsfield Rd	Memorial Rd	South Circular Rd	Conyngham Rd
18 Sandymount - Palmerstown	-	Yes	-	-	-	-
79A Ashton Quay – Spiddal Park – Park West	-	Yes	-	-	Yes	-
79 Ashton Quay – Spiddal Park – Park West	-	Yes	Yes	-	Yes	-
40 Charlestown Shopping Centre – Liffey Valley Shopping Centre	-	-	Yes	-	-	-
25N Westmoreland St. - Adamstown	-	-	Yes	-	-	-
66 Merrion Sq. To Maynooth	-	-	-	-	-	Yes
66A Merrion Sq. Towards Leixlip (Captain's Hill)	-	-	-	-	-	Yes
66B Merrion Sq. Towards Leixlip (Castletown)						Yes
66N Westmoreland St. Towards Leixlip via Glen Easton						Yes
67 Merrion Sq. To Maynooth	-	-	-	-	-	Yes
68 Hawkins St. Towards Newcastle / Greenogue Business Park	-	-	-	-	Yes	Yes
69 Hawkins St. - Rathcoole	-	-	-	-	Yes	-

Route ID	Le Fanu	Kylemore Ave	Sarsfield Rd	Memorial Rd	South Circular Rd	Conyngham Rd
51D Aston Quay / Waterloo Rd. - Clondalkin	-	-	-	-	Yes	-
25 Merrion Sq. Towards Lucan (Dodsboro)	-	-	-	-	-	Yes
26 Merrion Sq. Towards Liffey Valley	-	-	-	-	-	Yes
25A Merrion Sq. - Lucan (Esker Church)	-	-	-	-	Yes	-
25B Merrion Sq. - Adamstown Rail Station	-	-	-	-	Yes	-

5.4.3. Access and Pedestrian and Cycle Facilities

The assessment of the impact that temporary closures would have on pedestrian and cycling movements is to be based on pedestrian count data from both pedestrian and junction turning counts (pedal cycles) at key locations. A particular focus will be placed on the pedestrian and cycling movements associated with the St. John of God Special School and the Irish National War Memorial Park to the north of Con Colbert Road. The two junctions nearest these points of interest are the Memorial Rd / Con Colbert Rd and the South Circular / Con Colbert Rd junctions. New pedestrian counts have been conducted in May 2021 at three locations in the vicinity of these sites. A summary of the proposed count data is shown in **Table 5.4**. The locations of the school, park and count data are shown in **Figure 5-6**.

Table 5.4: Pedestrian Counts

Count ID	Location	Type	Count Date
PC 1	Con Colbert Rd & Memorial Rd	New Pedestrian Count for 2021	06/05/2021
PC 2	South Circular Rd &Con Colbert Rd (Outbound)	New Pedestrian Count for 2021	06/05/2021
PC 3	South Circular Rd &Con Colbert Rd (Inbound)	New Pedestrian Count for 2021	06/05/2021

Figure 5-6 Pedestrian and Cycling Assessment Focus Area

5.5. Potential Impacts

5.5.1. Construction Phase

The construction impact assessment will be dependent on information from the design team on the construction methodologies, potential construction phasing, timing of works , traffic management measures etc. Once traffic management measures including road closures, diversions are established, the assessment will focus on suitability of the road network for accommodating temporary increases in construction traffic and how they will interface with sensitive receptors in the area. At the construction stage, the assessment will include:

- An analysis of the proposed construction traffic management, road closures and diversions. This will include assessing the impact on the capacity of any temporary diversions and the impact on pedestrians and cyclists.
- Considerations on maintaining/providing (and improving) accessibility to other public transport services, including addressing the impact of the construction phase on bus operations (if any) and identification of mitigation measures.
- Disruption to existing rail services associated with construction works;
- Disruption to traffic and transport at key junctions including South Circular Road Bridge and St John's Road Bridge, Memorial Road Bridge, Sarsfield Road Bridge, Kylemore Road Bridge and Le Fanu Road Bridge.

5.5.2. Operation Phase

At the operational phase the assessment will include:

- Estimated modal shift, traffic delays at road junctions and road crossovers;
- Impact on existing road users, changes to existing access arrangements and servicing of properties and ongoing public road maintenance;
- Impact on public transport routes; and
- Impact of multimodal connectivity through interchanges with other public transport networks i.e. the Luas at Heuston Station, linking with the Maynooth Line at Glasnevin interchange (via the Phoenix Park Tunnel Branch Line), BusConnects and proposed Metrolink; and
- Cumulative effects of related transport projects that are currently being developed in parallel with DART+ (i.e. BusConnnects, MetroLink and other projects proposed in the GDA Transport Strategy).

6. Population

6.1. Introduction

This chapter of the EIAR will identify the potential impacts of the proposed Project on Population. The assessment will:

- Consider the population profile, economic activity, social considerations, non-agricultural land-use, and non-agricultural properties.
- Establish the current socio-economic and community characteristics through a review and update of the demographics of the study area, e.g. population, profile, household size, etc., as well as community facilities, recreational opportunities, etc.
- Consider the potential and predicted impacts on local communities as a result of the proposed scheme.

6.2. Legislation, Policy and Guidance

Specific to the Population EIAR chapter, the following legislation, policy and guidance documents will be considered to inform the scope of the assessment:

Legislation

There is no specific legislation of relevance to this chapter other than the key legislation referenced in the preparation of the EIAR as outlined in Section 4.6.

Policy

- Project Ireland 2040 (National Planning Framework and National Development Plan 2021 – 2030);
- Eastern and Midlands Regional Assembly Regional Spatial and Economic Strategy 2019-2031;
- Dublin City Development Plan 2016-2022 (and draft plan 2022-2028 as available);
- South Dublin County Development Plan 2016-2022 (and draft plan 2022-2028 as available);
- Kildare County Development Plan 2017-2023 (and draft plan 2023-2029 as available);
- Adamstown Strategic Development Zone Planning Scheme;
- Clonburris Strategic Development Zone 2019;
- Park West - Cherry Orchard Local Area Plan 2019; and
- Celbridge Local Area Plan 2017-2023.

Guidance

There is no further specific guidance of relevance to this chapter other than the key guidance referenced in the preparation of the EIAR as outlined in Section 4.6 and that listed below:

- Highways England (HE, 2020), DMRB Volume 11 Section 3 LA 112 Revision 1 Sustainability and Environment, Appraisal, Population and Human Health.

- Fáilte Ireland (2011), Guidelines on the treatment of tourism in an Environmental Impact Statement.

6.3. Methodology

Analysis of potential impacts resulting from the proposed Project will be described in relation to a number of assessment themes, which will include the following:

- Land Use and Settlement Patterns;
- Demographics and Local Population;
- Economic Activity and Employment;
- Local Services and Amenity; and
- Property.

The focus of the chapter will be to establish the potential socio-economic impacts on population and employment in the area and on potential impacts to the community, including the resident and working population and those visiting the community. The chapter will consider severance, loss of rights of way or amenities, transference of traffic notably during construction works and changes likely to ultimately alter the character and use of the surroundings.

The issue of demolition, severance and loss of land for agricultural enterprise and non-agricultural properties will be assessed within Chapter 15 and 16 respectively.

This assessment will require significant interaction with other EIA disciplines throughout including Traffic and Transportation, Human Health, Agricultural Properties, Non-Agricultural Properties and Major Accidents and/or Disasters.

6.3.1. Study Area

The Population Study Area for the assessment will generally cover the area within which significant effects on population, employment and the local economy could occur. The spatial scope of the study area must therefore be sufficiently large to enable the identification of likely significant effects on population, employment and the local economy which could occur to be defined. As such, the study area relevant for consideration includes the proposed route (the railway corridor) and its immediate environs. This includes an area within 500m of the existing railway corridor and 1km from existing railway stations. Given the linear nature of the proposed project, the study area is consistent with the approach for other linear projects. It is not, however, meant to be overly stringent and impacts beyond this distance will also be considered, especially where community facilities and places of employment fall within close proximity of the scheme.

The assessment of impacts on Population will be undertaken at a community level rather than for individuals or identifiable properties.

6.3.2. Surveys

6.3.2.1. Desk Surveys

The Population baseline will consist of completing desktop analysis to identify surrounding land use & settlement patterns, demographics and local population; economic activity and employment; local services and amenity; property to support the characterisation of the study area and the surrounding area. The sources of information that will be searched and reviewed to inform the assessment are:

- Central Statistics Office (CSO) data website www.cso.ie;
- Economic and Social Research Institute (ESRI) Quarterly Economic Commentary;
- Pobal Mapping www.maps.pobal.ie.

The primary official record and analysis of demographic trends is the Central Statistics Office (CSO) Census of Population. The census records demographic information at state, county, and local levels. In this regard, the key geographical units distinguished by the 2016 Census is the Small Area (SA) and Electoral Division (ED). The most recent census was taken in 2016, however statistics and projections for various indicators are updated regularly outside of the national census. Information on the demographic and employment characteristics of the resident population will be sourced from the Census of Population, the Labour Force Survey (CSO) and the Live Register.

6.3.2.2. Field Surveys

A visual survey will be completed to confirm land uses and amenities around the Project elements and provide an overview of the area and its environs. No additional field surveys are proposed to inform the EIAR.

6.4. Technical Consultation

Public consultations will be carried out at various intervals throughout the EIA process. Relevant County Councils impacted by the proposed Project (Dublin City, South Dublin and Kildare) will be consulted. The feedback received will be considered and will inform the population impact assessment and potential impacts at the community level.

The Population, Human Health, Traffic and Transportation, Air Quality, Climate, Noise & Vibration, Agricultural and Non-agricultural specialist as well as the designers of the proposed Project, will assist in an interdisciplinary approach for the assessment of Population.

6.5. Receiving Environment

The DART+ South West passes through the administrative areas of three local authorities, notably Dublin City Council, South Dublin County Council and Kildare County Council and passes through the residential areas of Glasnevin, Cabra, Islandbridge, Kilmainham, Inchicore, Ballyfermot, Park West, Clondalkin, Adamstown and Hazelhatch.

The receiving environment along the railway corridor, is outlined in the following three sections:

- Hazelhatch & Celbridge Station to Park West & Cherry Orchard Station
- Park West & Cherry Orchard Station to Heuston Station

- East of St John's Road Bridge to Glasnevin Junction

6.5.1. Hazelhatch & Celbridge Station to Park West & Cherry Orchard Station

Hazelhatch, on the border between County Kildare and South Dublin marks the western extent of the DART+ South West Project. As the line approaches Dublin's city centre, it enters into the administrate area of Dublin City Council. The three relevant Development Plans (KCDP, SDCDP and DCDP) provide a spatial framework for land use and future settlement patterns along the railway corridor.

Celbridge's town centre is located circa 2km to the north west of where the DART+ South West Project commences at Hazelhatch & Celbridge Station. Heading east from Hazelhatch & Celbridge Station the line crosses the Grand Canal before heading into open countryside passing through the townland of Stacumny and onwards towards Adamstown Station. North of the railway has witnessed significant residential development at Adamstown and west of the R120 (Newcastle Road) at Hanstead and Tullyhall.

Continuing east, the line heads towards Kishoge Station (currently not in operation) and onwards to Clondalkin / Fonthill Station. Although undeveloped, this area is the location of Clonburris Strategic Development Zone (SDZ) where significant future development is envisaged focused on the two railway stations. To the north and south of these future development lands are established residential areas with supporting local centres, community and educational facilities.

As the line continues east, the landscape changes from a more open area to built-up industrial areas. The line passes through Clondalkin Industrial Estate and then passes under the M50 into Park West & Cherry Orchard Station. At this point, the line enters into Dublin City Council's administrative area.

6.5.2. Park West & Cherry Orchard Station to Heuston Station

The western end of this section begins at Park West & Cherry Orchard Station and runs east, through an area that is generally characterised by residential properties to the north (including Cherry Orchard Park) and industrial properties to the south (including Park West).

The line passes under a footbridge at Cherry Orchard and continues to Le Fanu Road Bridge and Kylemore Road Bridge. The lands to the north of the line comprise of existing residential communities including properties along, inter alia, Cherry Orchard Court, Cherry Orchard Parade, Cherry Orchard Crescent, Cherry Orchard Avenue, Cloverhill Road, Le Fanu Drive, Le Fanu Road, Kylemore Drive and Landen Road. To the south, the line is bounded by Park West Industrial Park.

Circa 350m to the east Kylemore Road Bridge (OBC5A), Inchicore Works front onto the existing rail line for approx 1km. The complex provides several track infrastructure and related facilities for the maintenance of rolling stock (Intercity trains), and offices for Iarnród Éireann.

From here, the rail line continues east to pass under Khyber Pass Footbridge, over Sarsfield Road and under Memorial Road Bridge where the line runs parallel to the Chapelizod Bypass. While this area is predominately residential, a more varied mix is included as the city centre is approached.

The line then approaches the South Circular Road at one of Dublin's busiest road junctions, with two bridges carrying traffic over the railway – South Circular Road Bridge and St John's Road Bridge. Notable uses in the area include Memorial Park and the Royal Hospital Kilmainham, as well as St.

John of God Special School. Higher density residential developments have recently been constructed in the area with an example being the Clancy Quay development at the former Clancy Barracks.

The line then takes a more northerly direction as it approaches the area where the Phoenix Park Tunnel Branch Line merges with lines into/out of the existing Heuston Station.

6.5.3. East of St John's Road Bridge to Glasnevin Junction

From the east of St. John's Road Bridge (Islandbridge) the line continues northwards over the River Liffey via the Liffey Bridge and under Conyngham Road Overbridge where it enters the Phoenix Park Tunnel. The Phoenix Park Tunnel extends approximately 700m under the Phoenix Park and has historically been used for freight and maintenance; however, it reopened in 2016 for regular passenger traffic.

The northern tunnel portal is close to the North Circular Road entrance to the Phoenix Park, in the environs of Garda Siochana HQ. The line then continues north under several road bridges. From here, the railway corridor is almost entirely located within steep cuttings (i.e., the rail level is below the surrounding ground level) with vegetation on the side slopes. Bridges along this northern section of the line are McKee Barracks Bridge, Blackhorse Avenue Bridge, Old Cabra Road Bridge, Cabra Road Bridge, Faussagh Avenue Bridge, Royal Canal and LUAS Twin Arch, the Maynooth Line Twin Arch and, heading east, under the Glasnevin Cemetery Road Bridge.

Glasnevin Cemetery is located to the north of the rail corridor while Prospect Cemetery is located just on the inside bend of the existing line to the south. The line then continues east and interfaces with the proposed DART+ West line (Maynooth line) at Glasnevin Junction.

Heuston Station environs includes the main Heuston Station building, ancillary buildings, platforms, track areas, car parks and maintenance facilities. There is existing pedestrian and vehicle access which extends from the proposed site, along the existing access road to the main Heuston Station and the LUAS Red Line stop which is located at the front entrance to Heuston Station.

The site for the proposed new station is located to the west of Heuston Station, adjacent to the Clancy Quay Development and the new National Train Control Centre (NTCC) site.

6.6. Potential Impacts

6.6.1. Construction Phase

The following potential impacts will be considered during the construction phase:

- Direct impacts on the population structure/settlement patterns and economic activity due to the employment of workers from outside the county that may choose to reside in the immediate local area during the construction period;
- Employment opportunities during the construction period;
- Permanent or temporary land take of community land (e.g. community facilities, parks and residential land);
- Changes to land use characteristics affecting existing land uses;

- Severance and accessibility effects on residential and commercial properties including temporary disturbance and nuisance;
- Temporary impacts on journey characteristics and journey amenity due to potential traffic diversions, detours during interventions required to bridges and other construction works; and
- Temporary impact on tourist locations such as Phoenix Park.

6.6.2. Operation Phase

The following potential impacts will be considered during the operation phase:

- Increased passenger capacity and enhanced train service and potential impacts on sustainable economic development and population growth, accessibility to jobs, education, and other social and economic opportunities;
- Benefits to commuter population from improved commuter rail services, improved frequency and reliability of services;
- Impacts on land use planning by catering for planned growth of existing and future transport-oriented development areas such as Adamstown, Clonburris, and Cherry Orchard and Park West;
- Modal shift from unsustainable private car usage to public transport, promoting sustainable travel patterns and integration with other public transport modes.

7. Biodiversity

7.1. Introduction

This chapter of the EIAR will identify the potential impacts of the proposed Project on Biodiversity. The presence of the existing line has reduced biodiversity potential along the route to a large degree however there remains areas of interest in relation to hedgerows, tree lines and structures for bats, in particular. Spread of invasive species is also of concern. This chapter will address the biodiversity impact from the development based on habitat types and species presence. The EIAR chapter will:

- Define the habitats present within the Zone of Influence (ZoI);
- Establish the potential for bridges, particularly old or historic, and the Phoenix Park Tunnel to contain roosting bats;
- Establish the extent of the loss of vegetated embankments and hedgerow along the denser part of the alignment, particularly with regard to loss of habitat for badger, bats, birds and near water, otter.
- Consider the crossing of the Liffey River and the habitats and species associated with the river and issues arising, especially during construction.
- Determine the significance of any potential impacts.

7.2. Legislation, Policy and Guidance

Specific to the biodiversity EIAR chapter, the following legislation, policy and guidance documents will be considered to inform the scope of the assessment:

European Legislation

- EU Birds Directive (79/409/EEC, as codified by 2009/147/EC);
- EU Environmental Liability Directive 2004/35/EC;
- EU Water Framework Directive (WFD) 2000/60/EC;
- EU Habitats Directive (Council Directive 92/43/EEC(1992));

National Legislation

- European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011) as amended ('the Habitats Regulations')
- The Wildlife Act 1976 (as amended)
- The Flora (Protection) Order, 2015

National Policy

- National Biodiversity Data Centre (March 2021), All Ireland Pollinator Plan 2021 - 2025
- Department of Culture, Heritage and the Gaeltacht (Sept 2019) Biodiversity - Climate Change Sectoral Adaptation Plan, Prepared under the National Adaptation Framework

- Department of Culture, Heritage and the Gaeltacht (2017), The National Biodiversity Action Plan (NBAP) 2017-2021
- Dublin City Council (2016), Dublin City Invasive Alien Species Action Plan 2016 - 2020
- Dublin City Council (2015), The Dublin City Biodiversity Action Plan 2015-2020
- Dublin City Development Plan 2016-2022 (and draft plan 2022-2028 as available);
- South Dublin County Development Plan 2016-2022 (and draft plan 2022-2028 as available);
- Kildare County Development Plan 2017-2023 (and draft plan 2023-2029 as available).

Guidance

- Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine, Version 1.1 (CIEEM, 2018);
- Guidelines on protection of fisheries during construction works in and adjacent to waters (IFI, 2014);
- Guidelines for Assessment of Ecological Impacts of National Roads Schemes, Revision 2 (NRA, 2009).

7.3. Methodology

This section summarises the methodology that will be used to assess the potential impacts and effects of the Project on biodiversity. The assessment will be made primarily with reference to the Chartered Institute of Ecology and Environmental Management's (CIEEM) Guidelines for Ecological Impact Assessment in the UK and Ireland (ver. 1.1, September 2018) but will also take into account the Guidelines for assessment of ecological impacts of national roads schemes (NRA, 2009) where applicable.

The assessment will comprise a review of desktop and baseline data gathered and the identification of Important Ecological Features (IEFs) with these valued based on available information/guidance and using professional ecological judgement. The valuation of an IEF will be considered within a defined geographical context.

Where applicable, the biodiversity EIAR chapter provides comprehensive information on habitat loss habitats and species disturbance, impacts on watercourses and impacts to sites designated for nature conservation.

7.3.1. Study Area

The study area for the assessment on biodiversity is defined as the area over which ecological features may be subject to significant impacts as a result of the Proposed Development. It is determined by the Zone of Influence (ZoI) of the project. The ZoI will vary for different ecological features depending on their sensitivity to an environmental change. It is therefore appropriate to identify different study areas for different features. The following study areas will extend outside the footprint of the proposed project:

- Catchment Management Unit for designated sites;
- 5km for protected species data search;

- 150m for otter along watercourses;
- 50m for badger;
- All relevant upstream, downstream and adjoining water features;
- Adjoining lands for habitat and protected flora (including invasive alien plant species); and
- All viable impact pathways to Internationally and Nationally designated sites for nature conservation.

7.3.2. Surveys

The ecology baseline will consist of completing a desktop study in combination with a multidisciplinary field survey of the route of the proposed Project. This work will include reference to the following published guidance:

- Best Practice Guidance for Habitat Survey and Mapping (Smith, et al., 2011);
- A Guide to Habitats in Ireland (Fossitt, 2000);
- Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes (NRA, 2009);
- Bat Surveys for Professional Ecologists: Good Practice Guidelines 3rd edition (Collins, 2016); and
- Bat Mitigation Guidelines for Ireland. Irish Wildlife Manuals, No. 25. (Kelleher and Marnell, 2006).

7.3.2.1. Desk Surveys

Information on the biodiversity along the Project route corridor and, where relevant, the potential ZoI will be collected through a detailed desktop collation and review of existing studies and datasets. The sources of information that will be searched and reviewed to inform the assessment are:

- EPA Unified GIS Application Guide http://gis.epa.ie/;
- NPWS online maps and data, site synopsis and conservation objectives www.npws.ie;
- National Biodiversity Data Centre (NBDC) online maps and data www.biodiversityireland.ie;
- Department of Housing, Planning and Local Government – River Basin Management Plan 2018-2021, available at https://www.housing.gov.ie/water/water-quality/river-basin-management-plans/river-basin-management-plan-2018-2021-0;
- Geological Survey of Ireland online mapping www.gsi.ie;
- Information on the conservation status of birds in Ireland (Colhoun & Cummins, 2013);
- OSI Map Viewer www.osi.ie; and
- Heritage Maps www.heritagemaps.ie

7.3.2.2. Field Surveys

Field surveys will be carried out to establish the baseline ecological conditions along the proposed Project footprint, including an appropriate buffer where relevant. This will include surveys of habitats, protected species habitat potential, and presence/absence of protected species to inform the impact assessment.

A multidisciplinary ecological survey will be carried out to establish the baseline ecological conditions along the project footprint including an appropriate buffer. Additional baseline aquatic and terrestrial surveys within the terrestrial areas of the Project route corridor and affected watercourses will be carried out to assess and confirm the ecological status along the Project route corridor. Surveys for mammals (badger, bats), amphibians, invasive alien species, birds and terrestrial and freshwater habitats will be carried out to inform the impact assessment.

A badger habitat survey has been carried out in the appropriate season to characterise and identify badger activity locations. This survey in 2021 was focused on the existing rail corridor. The bulk of the badger activity was noted between the northern opening of the Phoenix Park Tunnel and the Cabra road. This included a considerable number of fresh deposits including and a trail crossing the cutting.

Breeding bird survey visits have been carried out within the appropriate season at pre-determined locations along the route in 2021. The visits were made in the early morning to coincide with the peak period of bird activity and all species seen or heard in the survey area and immediate environs were recorded including those in flight. Visits were made during favourable weather conditions. Three visits were carried out in favourable conditions in March, April and June 2021.

An aquatic survey focussing on habitat quality has been completed at the six locations on the following four watercourses in August 2021: the Griffeen stream, the Lucan stream, the Castletown (09) stream, and the Coneyburrow (09) stream. Visual signs and/or presence of otter (Lutra lutra), an Annex II and IV species under the EU Habitats Directive, were noted during the aquatic survey.

The bulk of the rail corridor holds minimal potential for bat roost, with the exception of the section from Phoenix Park Tunnel Branch Line to Glasnevin which is in cut and has roosting potential within the bridge and tunnel structures. To assess bat commuting/foraging and roosting for the proposed development, a combination of active and static bat surveys were employed in the appropriate season. Bat emergence/re-entry surveys and static monitoring took place at pre-determined locations in 2021. The surveys were completed with cognisance of the Bat Conservation Trust publication - Bat Surveys for Professional Ecologists: Good Practice Guidelines (Collins, 2016).

Bat activity monitoring, using static bat detectors, has also been undertaken to characterise and identify bat activity at specific locations within the appropriate season. Static bat detectors remained in situ at pre-determined locations throughout the survey season. The static detectors used GPS to determine sunset and sunrise times and recorded bat activity from 30min before sunset to 30mins after sunrise each night.

7.3.3. Technical Consultation

As part of ecological impact assessment, specific consultation with the following stakeholders will be undertaken;

- National Parks and Wildlife Service;

- Inland Fisheries Ireland;
- Heritage Officers/ Biodiversity Officers of Dublin City Council, South Dublin County Council and Kildare County Council;
- Bat Conservation Ireland; and
- Birdwatch Ireland.

The Biodiversity, Population, Human Health, Traffic and Transportation, Air Quality, Climate, Noise and Vibration, Land and Soils, Water (Hydrology and Flood Risk) and Landscape and Visual specialist as well as the designers of the proposed Project, will assist in an interdisciplinary approach for the assessment of Biodiversity.

7.4. Receiving Environment

The receiving environment is dominated by the existing railway corridor which passes through both urban and suburban areas. The presence of the existing line has reduced biodiversity potential along the route, given the highly managed nature of rail corridors. Railway corridors can act as corridors for the spread of invasive species and can lead to direct impacts on protected species and habitats. The railway corridor consists of linear hedgerows and treelines, individual trees, historical masonry bridges or retained abutments, and managed trackside vegetation which occurs in areas along the rail corridor.

The River Liffey is traversed by the rail-line between Heuston station and the Phoenix Park tunnel. There are a number of smaller watercourses that are intersected by the existing railway, and all are culverted and maintained under the track to ensure that excess water on the track does not impede its safe operation.

There are no European Sites or nationally designated sites for nature conservation which are directly traversed by the DART+ South West Project. However there are a number of protected sites which may have a pathway to the project (namely hydrological connectivity). These sites are South Dublin Bay & River Tolka Estuary SPA (Code 004024), Rye Water Valley/ Carton cSAC (Code 001398), South Dublin Bay SAC (Code 000210) and North Dublin Bay SAC (Code 000206).

There are also several of Proposed Natural Heritage Areas (NHAs) which are in proximity, including South Dublin Bay pNHA (Code 000210), Rye Water Valley/ Carton pNHA (Code 001398), Grand Canal pNHA (Code 002104), Liffey Valley pNHA (Code 000128), Royal Canal pNHA (Code 002103) and North Dublin Bay pNHA (Code 000206).

7.5. Potential Impacts

7.5.1. Construction Phase

The following pathways for potential impacts on Biodiversity will be considered during the construction phase:

- Destruction and/or fragmentation of important ecological features;
- Spread of third schedule invasive alien species;
- Disturbance to protected species (e.g. nesting birds and roosting bats);

- Disturbance from noise, vibration, lighting and human presence;
- Surface water run-off carrying suspended silt or contaminants into local watercourses; and
- Changes of groundwater quality, yield and/or flow paths associated with earthworks.

7.5.2. Operation Phase

The following potential impacts on Biodiversity will be considered during the operation phase:

- Spread of third schedule invasive alien species;
- Disturbance to protected species (e.g. nesting birds and roosting bats);
- Disturbance from noise, vibration, lighting and human presence;
- Surface water run-off carrying suspended silt or contaminants into local watercourses; and
- Changes of groundwater quality, yield and/or flow paths.

8. Land and Soils

8.1. Introduction

The Land and Soils chapter of the EIAR has regard to the draft EPA guidelines (EPA, 2017) and includes the following scope for assessment, the potential impacts arising from the proposed Project on soils and geology .

In this chapter of the EIAR it is proposed to assess the potential impacts arising from the proposed project on Land and Soils including soils and geology , together with recommendations for mitigation measures to reduce or eliminate any significant negative impacts identified. The assessment will be informed by the ground investigation (GI) work which is currently ongoing for the project to inform and support the design of the DART+ South West Project. This GI work will inform the Land & Soils assessment for the EIAR.

The scope of the Land and Soils assessment does not include land take. It is focused specifically on ground conditions, Land quality, designated features, potential impacts on soils and for managing geotechnical risk during the construction and operational phases of the proposed Project. The impact adjoining on Agricultural and Non-agricultural properties (on a permanent and/or temporary basis) is covered in Chapters 15 and 16 respectively.

8.2. Legislation, Policy and Guidance

Specific to the Land & Soils EIAR chapter, the following legislation, policy and guidance documents will be considered to inform the scope of the assessment:

EU Legislation

- Directive 2004/35/CE of the European Parliament and of the Council of 21 April 2004 on environmental liability with regard to the prevention and remedying of environmental damage (Environmental Liability Directive)

National Legislation

- European Communities (Birds and Natural Habitats) Regulations, 2011 (S.I. No. 477 of 2011) as amended;
- European Communities (Environmental Liability) Regulations (S.I. No. 457 of 2008);

Policy

- Department of Housing, Planning and Local Government (April, 2018), The River Basin Management Plan for Ireland (2018-2021) and 3rd cycle in preparation.

Guidance

- Environmental Agency UK (EA, 2020), Guidance on Land Contamination Risk Management (LCRM);
- Transport Infrastructure Ireland (TII, 2019), DN-ERW-03083 Managing Geotechnical Risk

- Environmental Protection Agency (EPA, 2013), Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites;
- Institute of Geologists of Ireland (IGI, 2013), Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements;
- National Roads Authority (NRA, 2009), Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes; and
- Environmental Agency (EA, 2004). The Model Procedures for the Management of Land Contamination (CLR 11); and
- Institute of Geologists of Ireland (September 2002), 'Geology in Environmental Impact Statements – a Guide.

8.3. Methodology

The key issues for Land and Soils, including soils and geology are likely to be the removal of soils and subsoils, land use change, and the potential to encounter any contaminated materials. This will depend on the proximity of any overburden removal works and the potential to encounter contaminated materials. Areas of contamination will be identified through the ground investigation works carried out as part of this project.

The assessment will be informed by a desk study and ground investigations data, which will be undertaken to characterise baseline conditions within the study area. The following will be undertaken to inform the assessment:

- Review of available geotechnical data including GSI database and ground investigation data for the scheme, as well as the topographical survey being undertaken to inform the design;
- Review of ground investigation data to determine any onsite contamination encountered within the soils/groundwater during the intrusive works;
- Liaison with the project ecologists to identify any areas which may be impacted upon by geological features;
- Assessment of land use change / removal of soil;
- Assessment of local alterations to water table / dewatering; and
- Examine in-ground geo-environmental risks relating to Soils and Geology.

The general methodology adopted to assess the significance of a potential effect is based on the consideration of the sensitivity of the receptor affected (i.e. in terms of the intrinsic value or importance of its attributes) and the magnitude of the anticipated effect thereon. Criteria outlined in the 'Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes' (NRA, 2009) will be used for this assessment.

8.3.1. Study Area

The potential effect that the proposed Project may have on the Land and Soil, including soils and geology represents the principal consideration for this assessment. From a design perspective, ground

conditions need to be established which will enable identification, management and mitigation of geotechnical risks.

To understand the nature of the ground conditions relevant to the site, which will include considerations of the geological, geotechnical, geomorphological and geo-environmental conditions, the spatial scope of the study area must be sufficiently large to enable the general soil, geological and hydrogeological setting to be defined. As such, the study area relevant to consideration will be informed by the site specific ground investigation data and will extend outside of the proposed project red line boundaries.

8.3.2. Surveys

8.3.2.1. Desk Surveys

The Land and Soils, including soils and geology baseline will consist of completing a desktop survey. Publicly available data sources will be used to identify surrounding land use, sensitive receptors for soils and existing ground conditions to support the characterisation of the study area and the surrounding area. The sources of information that will be searched and reviewed to inform the assessment are:

- EPA Unified GIS Application Guide http://gis.epa.ie/;
- EPA Catchments - https://www.catchments.ie/;
- EPA online resources that include Hydronet (EPA Hydronet) and HydroTool (EPA HydroTool);
- GeoHive – https://www.map.geohive.ie;
- Geological Survey of Ireland (GSI) - https://www.gsi.ie/;
- National Parks & Wildlife Service (http://www.npws.ie/); and
- Office of Public Works (OPW) - http://www.floodinfo.ie/map/floodmaps.

Geotechnical site investigations are being undertaken as part of the Ground Investigations for the project design. The ground investigation work will include non-intrusive geophysical surveys and intrusive ground investigations. The purpose of these surveys is to establish the ground conditions and geology of the proposed route to inform the design and management of geotechnical risk of the project. This information will be reviewed by the hydrogeologist to inform the Land and Soils assessment.

8.3.2.2. Field Surveys

This geotechnical site investigations information in addition to the desktop survey will inform the soils and geology assessment by identifying potentially sensitive receptors such as:

- Geological National Heritage Areas,
- County Geological Sites,
- Existing quarries or pits,
- Economically viable or extractable mineral resources,
- Landfills.

In addition, the degree and extent of areas where there is soil contamination; and well-drained and/or high fertility soils will be identified.

No additional field surveys are proposed to inform the EIAR.

8.3.3. Technical Consultation

As part of Land and Soils, Geology & Hydrogeology impact assessment, specific consultation with the following stakeholders will be undertaken;

- Environmental Protection Agency;
- Geological Survey of Ireland;
- Relevant County Councils impacted by the proposed Project (Dublin City, South Dublin and Kildare).

The Land and Soils, Water (including Hydrology and Flood Risk), Hydrogeology, Biodiversity, Human Health and risk specialist as well as the designers of the proposed Project, will assist in an interdisciplinary approach for the assessment of Land and Soils (Soils and Geology).

8.4. Receiving Environment

The 20km linear site is located along the existing railway corridor between Hazelhatch in County Kildare to the west to Glasnevin Junction in the east and includes Heuston Station. The topography of the railway is generally at grade with sections of cuttings through urban areas of Dublin e.g. cuttings are encountered in localised areas between Le Fanu Bridge and the South Circular Road Bridge, and the Phoenix Park Tunnel Branch Line and Glasnevin Junction.

The eastern extents of the site are located adjacent to rural agricultural land. The adjacent land becomes gradually more urban as the route travels through the western suburbs of Dublin and into Dublin city centre. The site includes the CIÉ Inchicore Works Depot, and several overbridges and underbridges that all vehicles and pedestrians to cross the railway.

8.4.1. Geology

The proposed route is entirely underlain by the Lucan Formation bedrock (CDLUCN). The Lucan Formation was formed during the Dinantian Series of the Carboniferous Period and comprises of dark-grey to black, fine-grained, occasionally cherty, micritic limestones that weather paler, usually to pale grey. There are rare dark coarser grained calcarenitic limestones, sometimes graded and interbedded dark-grey calcar within the formation. The formation ranges from 300m to 800m in thickness. The bedrock is mapped by the GSI to be at or close to the surface at Ronanstown, Adamstown and east of Hazelhatch. There are no karst features within the Lucan Formation in Dublin City or to the west of Dublin City. The Lucan Formation is classified as a Locally Important (Ll) bedrock aquifer which is moderately productive only in local zones.

8.4.2. Soils/Subsoils

The soils/subsoils of Dublin and Kildare are in general characterised as glacial tills derived from the underlying limestone bedrock. Alluvial soils are associated with the rivers in the areas. The underlying bedrock geology is comprised of the “Calp” limestone. The dominant rock types are dark grey to black

limestone and shale. Generally, the Calp is described as strong to very strong fine-grained microcrystalline, argillaceous limestone inter-bedded with calcareous mudstone.

8.4.3. Historical Ground Investigations

Due to the historic and existing land use along the railway line, contaminated ground is likely to be encountered (e.g. diesel spillage, waste contamination, etc.). The IE site at Inchicore has potential for contamination. Soil and leachate sampling has been carried out at 11 No. boreholes at the Inchicore works in 2011 as part of the Kildare Route Project Phase 2. Exceedances for polycyclic aromatic hydrocarbons (total PAHs) occurred in three no. boreholes locations located at the eastern extremity of the proposed KRP scheme at the Inchicore Works. GI works carried out in 2011 did not reveal any evidence of ground contamination at possible construction compound locations, substation locations and at both Le Fanu and Kylemore Road Bridges; however areas of contamination will be identified through the ground investigation works as part of this project.

Ground investigation work is currently ongoing for the DART+ South West Project to verify the data obtained in the historical investigations.

8.4.4. Geological Protected Sites

The Phoenix Park is a County Geological Site (CGS), also recommended for designation as a Geological Natural Heritage Area (NHA) and ranked as a high importance receptor. It is the only CGS traversed by the existing rail line, however it has been heavily modified by human activity; the Phoenix Park Tunnel Branch Line runs underneath the park rather than directly through any surface geological features. The park represents a Quaternary (Ice Age) geological landscape, albeit very heavily altered. It's unusual for the complexity of its geomorphology and glacial forms.

Glasnevin Cemetery GCS is located approx. 150m to the north of the DART+ South West Project centreline. It is important for cultural and historic reasons and provides a range of worked rock types accessible to view. Further afield, the Guinness Wells CGS are located 600m to the east of Heuston Station; these are noted for their industrial and cultural heritage importance.

8.4.5. Quarrying & Economic Resources

There are no active quarries or pits within proximity to the rail line. However, there are a number of historical pits which date back from the early to mid-19th century and the early to mid-20th century. These are mostly gravel pits and several coincide with areas of exposed bedrock. One of these pits is traversed by the existing line near Islandbridge, an old gravel pit that dates to between 1900-1950.

The granular aggregate potential of the area around the River Liffey have been classed by GSI as having very low to moderate potential. The area surrounding the existing rail line is generally classed by the GSI as having moderate to very high crushed rock aggregate potential.

8.5. Potential Impacts

8.5.1. Construction Phase

The construction phase has the potential to affect Land and Soils (soils and geology) as follows:

- Short-term effects recharge through the infiltration of surface run-off within or adjacent to construction areas;
- Accidental emission / release of potentially hazardous substances (principally hydrocarbons), resulting in a short-term localised effect on soil;
- Accidental emissions and release of potentially hazardous substances during construction that may affect the quality of soils, most notably associated with cement, concrete materials (high alkalinity run-off), temporary oils and fuel particularly where below ground excavations are required;
- Potential to encounter contaminated land which could be disturbed during the construction works;
- Excavation of contaminated land and proposed remediation strategy;
- Impacts on surface waters as a result of stormwater run-off causing soil erosion and sedimentation to surface waterbodies.
- Loss of soil reserves through the construction of hardstanding and structures;
- Potential impacts to geological heritage areas;
- Land use change / removal of soil.

8.5.2. Operation Phase

During the operational phase of the proposed project, some impacts would be similar to those described for the construction phase. However, the impacts during the operational phase will be generally of a lower magnitude. The following impacts which may occur as a result of the operations will be considered within the assessment:

- Accidental emission / release of potentially hazardous substances (principally hydrocarbons), resulting in a short-term localised effect on soil; and
- Spills of fuel oils, solvents and lubricating oils may occur through ongoing activity and operation of substations.

9. Water (including Hydrology and Flood Risk)

9.1. Introduction

The Water including Hydrology and Flood Risk chapter of the EIAR has regard to the draft EPA guidelines (EPA, 2017) and includes the following scope for assessment, the potential impacts arising from the proposed Project on surface water quality, hydrology, flooding and drainage.

This chapter of the EIAR will present the baseline information on local hydrology and assess the likely significant effects of the proposed Project on the receiving water environment. The chapter will:

- Establish the baseline drainage and water quality conditions – to include the River Liffey and Grand Canal;
- Assess and quantify the impact on surface and groundwater water quality from the construction and operational phases; and
- Consider drainage and flooding impacts arising from the construction and operational phases, with due regard to impacts on surface water management in the area and on established utilities.

9.2. Legislation, Policy and Guidance

EU Legislation

- Directive 2013/39/EU of the European Parliament and of the Council of 12 August 2013, amending Directives 2000/60/EC and 2008/105/EC as regards priority substances in the field of water policy;
- Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risks; and
- Directive 2006/118/EC of the European Parliament and of the Council of 12 December 2006 on the protection of groundwater against pollution and deterioration (daughter to 2000/60/EC) (Groundwater Daughter Directive); and,
- Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy (Water Framework Directive).

National Legislation

- European Communities (Drinking Water) Regulations 2014 (S.I. No. 122 of 2014);
- European Communities (Birds and Natural Habitats) Regulations, 2011 (S.I. No. 477 of 2011) as amended;
- European Communities Environmental Objectives (Groundwater) Regulations 2009 (S.I. No. 9 of 2010);

- European Communities Environmental Objectives (Surface Waters) Regulations, 2009 (S.I. No. 272 of 2009);
- European Communities (Drinking Water) (No. 2) Regulations 2007 (S.I. No. 278 of 2007);
- European Communities (Water Policy) Regulations, 2003 (S.I. No. 722 of 2003).

Policy

- Department of Housing, Planning and Local Government (April, 2018), The River Basin Management Plan for Ireland (2018-2021) and 3rd cycle in preparation;
- Dublin City Development Plan 2016-2022 Strategic Flood Risk Assessment (SFRA) Volume 7 (and draft plan 2022-2028 as available);
- Strategic Flood Risk Assessment for South Dublin County Council Development Plan 2016-2022 (and draft plan 2022-2028 as available);
- Strategic Flood Risk Assessment of the Kildare County Development Plan 2017-2023 (and draft plan 2023-2029 as available).

Guidance

- TII (December 2017), Strategy for Adapting to Climate Change on Ireland's Light Rail and National Road Network;
- TII (March 2015), Road Drainage and the Water Environment, DN-DNG-03065
- TII (March 2015), Drainage Systems for National Roads, DN-DNG-03022
- IFI (2014), Guidelines on protection of fisheries during construction works in and adjacent to waters
- DEHLG/OPW (2009), The Planning System and Flood Risk Management – Guidelines for Planning Authorities
- NRA (2008), Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes
- CIRIA (2007), The SuDs Manual C697
- CIRIA (2001), Control of Water Pollution from Construction Sites - Guidance for Consultants and Contractors (CIRIA C532)

9.3. Methodology

The assessment will present baseline information on the local hydrology and assess the likely significant effects of the proposed project on the receiving water environment. Hydrological impacts can be either quantitative in the form of increased flood risk or qualitative in the form of water quality impacts on the receiving environment. The chapter will also assess both the flood risk and qualitative impacts, if any, of the proposed project.

The local hydrology and drainage for the project is inter-related with other topics and as such the assessment will require significant interaction with other specialist topics including Biodiversity and Land and Soils (Soils, Geology & Hydrogeology).

This assessment will be a desk study, based on field investigations undertaken as part of the drainage design and informed by a windshield survey of the proposed Project route corridor. The general methodology adopted to assess the significance of the effect upon Water (including Hydrology and Flood Risk) is determined by correlating the magnitude of the impact and the sensitivity of the receptor. Criteria outlined in the 'Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes' (NRA, 2008) will be used for this assessment.

9.3.1. Study Area

The potential effect that the proposed project may have on the water regime represents the principal consideration for this assessment. To understand the nature of the hydrology regime relevant to the proposed project, the spatial scope of the study area must be sufficiently large to enable the general environmental setting. As such, the study area relevant to consideration of water extends outside of the proposed Project red line boundary, to include the catchment area in which the site is located and the surface waters that the site discharges.

9.3.2. Surveys

9.3.2.1. Desk Surveys

Desktop information will be gathered with respect to existing water bodies, areas with environmental designations and flooding history which is set out below and will be used to inform the detailed assessment of the scheme. The following sources will be referenced in the preparation of this section of the EIAR:

- Online databases of the Environmental Protection Agency (EPA) https://gis.epa.ie/EPAMaps/, and www.catchment.ie, for information on:
  - Hydrometric data;
  - Surface water courses in the area and their respective water quality status;
  - Special Areas of Conservation & Special Protected Areas;
  - Water Framework Directive (WFD) data; and
  - EPA Water Quality Reports and Water Quality Monitoring Database
- Office of Public Works (OPW); www.opw.ie, www.floodinfo.ie and for Flood Studies Update (FSU) Web Portal http://opw.hydronet.com/ for flooding information and hydro-data mapping;
- Met Eireann www.met.ie for historic rainfall and evapotranspiration data;
- Ordnance Survey Ireland aerial photographs and historical mapping;
- National Parks and Wildlife Services (NPWS) http://webgis.npws.ie/npwsviewer/ for designated sites.

9.3.2.2. Field Surveys

Field Survey Data from investigations undertaken as part of the drainage design will be used to inform the Water assessment. This may include topographical surveys and flow estimations in selected stream crossings. Regarding drainage, the main goal is to achieve a compliant design which works consistently with the existing drainage networks. The assessment of new outfalls and discharge rates will be essential, so that a consistent drainage system is designed without increasing the existing flood levels. Attenuation requirements, which will depend on the potential additional flows and on the maximum allowable discharges will be also analysed so the environmental and flood risk requirements are met.

To inform the assessment, a windshield survey along the proposed route will be carried out. This will enable an appreciation to be gained of the existing condition of watercourses (i.e. low/ high flow, light/ heavily vegetated) that intersect the railway line, bridge crossing locations and general land uses in the area.

Water quality sampling data for the receiving waterbodies will be collected from existing sources (EPA, local Authorities) to inform the baseline assessment. A gap analysis will be undertaken to determine if additional sampling data is required at specific locations (e.g. proposed drainage outfall locations). Where additional sampling is required, this will be undertaken for a sufficient duration preceding any proposed works being undertaken.

9.3.3. Technical Consultation

As part of the Water (Hydrology and Flood Risk) assessment, specific consultation with the following organisations may be carried out:

- Environmental Protection Agency
- Office of Public Works
- Irish Water
- Relevant County Councils impacted by the proposed project (Dublin City, South Dublin and Kildare).

The Water (Hydrology and Flood Risk), Land & Soils, Biodiversity specialist as well as the designers of the proposed Project, will assist in an interdisciplinary approach for the assessment of Water (hydrology and flood risk).

9.4. Receiving Environment

Surface Waterbodies

All of the water features, rivers and streams within the study area are contained within the Liffey and Dublin Bay WFD catchment (Hydrometric Area No. 9). In general, watercourses within the study area flow in a south west to north east direction where they all ultimately drain into the River Liffey. The central river waterbody within this catchment is the River Liffey. The River Liffey is a key river to consider as it is the largest within the study area and is an important water course for fisheries habitat.

Waterbody Status

For the purposes of assigning water quality and "Ecological Status" under the Water Framework Directive (WFD, 2000/60/EC), rivers have been divided up into contiguous sections (water bodies). The WFD ecological status and their risk of not achieving their water quality objectives are outlined in **Table 9.1**.

Under 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 by 2022. Note that even where a water body may have achieved Good status, it may still be classed as *At Risk* or under *Review* by the EPA where there is evidence that indicates the water body may not maintain that status e.g. due to existing or increasing pressures on the water body, or due to its limited assimilative capacity, or more stringent quality objectives needed to support any protected area designation. In some cases, water bodies may be unclassified by the EPA. In such circumstances, this will be discussed directly with the EPA to establish an appropriate status for use in the assessment.

Table 9.1: WFD Surface Water Status and Risk

EPA Waterbody Name [EPA River Name]	WFD Surface Water Status (2013-2018)	EPA-approved Water Body Risk of Not achieving WFD Objectives (WFD Cycle 3)
Liffey_150 [River Liffey]	Good	Review
Liffey_170 [River Lucan / Griffeen]	Good	Review
Liffey_190 [River Liffey]*	Moderate	At Risk
Camac_040 [River Camac]	Poor	At Risk
Castletown (Dublin-Kildare)_010 [River Shinkeen]	Unassigned	Review
Liffey Estuary Upper [Liffey Estuary – Transitional]**	Good	Review
Grand Canal Main Line (Liffey and Dublin Bay) [Grand Canal]	Good	Not at Risk

Source: *EPA Catchments, https://gis.epa.ie/EPAMaps/Water*

** **Note:** The Liffey_190 is not directly traversed by the project but it inputs into the Upper Liffey estuary which is crossed by the Sean Heuston Bridge.*

** ***Note:*** *The Liffey is a transitional waterbody at the point at which the project crosses the River Liffey via the Liffey bridge (UBO1).*

Protected Sites

There are no European Sites or nationally designated sites which are directly traversed by the project. However, there are a number of protected sites which may have a pathway to the project (namely hydrological connectivity). These sites are:

- South Dublin Bay & River Tolka Estuary SPA (Code 004024): approx. 5.6km to the east of the project.
- North Bull Island SPA (Code 004006): approx. 3.2km to the east of the project.
- Baldoyle Bay SPA (Code 004016): 10.4km east of the project.
- Ireland's Eye SPA (Code 004117): 14.2km east of the project.

- Howth Head Coast SPA (Code 004113): 14.6km east of the project.
- Dalkey Islands SPA (Code 004172): 15km southeast of the project.
- South Dublin Bay SAC (Code 000210): approx. 5.6km to the north-east of the project.
- North Dublin Bay SAC (Code 000206): approx. 6.3km to the east of the project.
- Baldoyle Bay SAC (Code 000199): 10km north east of the project.
- Howth head SAC (Code 000202): 12km east of the Project.
- Rockabill to Dalkey Island SAC (Code 003000): 12.3km east of the project.
- Ireland's Eye SAC (Code 002193): 14.3km north east of the project.

There are no NHAs traversed by or in proximity to the project. There are a number of Proposed NHAs which are in proximity, including:

- **South Dublin Bay pNHA (Code 000210)**: see SAC above.
- **Rye Water Valley/ Carton pNHA (Code 001398)**: 3km to the north and north-west of the project.
- **Grand Canal pNHA (Code 002104)**: less than 1km away from the south side of and running generally parallel to the existing rail line and the length of the project.
- **Liffey Valley pNHA (Code 000128)**: approx. 1.2km.
- **Royal Canal pNHA (Code 002103)**: less than 3.7km.
- **North Dublin Bay pNHA (Code 000206)**: see SAC above.

Flood Risk

The proposed project intersects a number of the water bodies listed above and thus areas at risk of flooding can pose a risk to proposed infrastructure. The Office of Public Works (OPW) flood maps (https://www.floodinfo.ie/map/floodmaps/) indicates the flood extent probabilities for fluvial and coastal flooding and the findings are discussed below.

The extents for the medium and high probabilities for coastal flooding (Liffey Estuary) were consulted. In terms of coastal flooding within the Liffey and Liffey Estuary, moderate (Annual Exceedance Probability (AEP) of 1%) to high (AEP of 10%) probabilities are noted.

Regarding the Castletown water body that intersects the railway line, this area is currently “under review” by the OPW and will be updated on the online maps in due course. More recent flood modelling conducted by RPS on behalf of the Kildare County Council for the Hazelhatch area indicated that Hazelhatch has low to high (AEP) probabilities for flood risk.

River flooding (Fluvial flooding) maps were consulted and the extents of the medium and high probabilities for fluvial flooding at each intersection of the railway line with a water course was examined. In general, river crossings along the railway line show medium (Annual Exceedance Probability (AEP) of 1%) to high (Annual Exceedance Probability (AEP) of 10%) probability of fluvial flooding particularly where the Liffey_170 [Griffeen] and the Liffey_190 [Liffey] intersect the development. These become increasingly apparent with Mid-Range Future Scenario extents.

The OPW maps on past flood events have also been reviewed and these maps indicate that a number of notable flood events have occurred along the existing Cork Mainline:

- Bridgewater Quay Apartments, Islandbridge, Dublin 8. on 24th Oct 2011;
- Beech Row, Ronanstown – recurring flooding issues (to west of Lucan-Newlands Road, L1015);
- Shinkeen, Hazelhatch River Road Nov 2000; and
- Shinkeen Hazelhatch Recurring – recurring flooding issues (to approx. 200m south east of the rail line, on the Hazelhatch Road, R405), and
- One flooding event along Hazelhatch railway lines caused closure of the southern train services (RPS, 2020).[6]

A Flood Risk Assessment (FRA) will be undertaken to inform the design process and will inform the hydrology chapter of the EIAR. The assessment will be carried out in accordance the requirements of "The Planning System and Flood Risk Management, Guidelines for Planning Authorities" and its Technical Appendices (Office of Public Works, November 2009).

The FRA will be a separate document to support the application for a Railway Order and will be included in Volume 5 – Supporting Environmental Documents.

9.5. Potential Impacts

9.5.1. Construction Phase

The following impacts on the hydrological regime as a result of construction activities will be considered within the assessment:

- Accidental emission / release of potentially hazardous substances (principally hydrocarbons), resulting in a short-term localised effect on surface water quality;
- Accidental emissions and release of potentially hazardous substances during construction that may affect the quality of surface waters, most notably associated with cement, concrete materials (high alkalinity run-off), temporary oils and fuel particularly where works are required in or adjacent to watercourses;
- Impacts on surface waters as a result of stormwater run-off causing soil erosion and sedimentation to surface waterbodies;
- Increased suspended sediment levels due to the accidental release of sediment to the water during construction works;
- General water quality impacts associated with potential contaminated run-off works machinery, infrastructure and on-land operations including the temporary storage of construction materials, oils, fuels and chemicals;

[6] RPS (2020) for Kildare County Council. Hazelhatch Further Study - Hydrological and Hydraulic Analysis Report.

- Potential impacts to the hydromorphology of watercourses where works take place adjacent to water channels, (rivers and streams). Physical damage can impact on the hydromorphology of the watercourse and therefore affect the ecological status;
- Potential hydrological modifications which may alter the current flows, discharges and the location of outfalls;
- Potential for changes in the natural hydrological regime due to discharges to watercourses arising from track drainage; and
- Potential for localised flooding due to disrupting local drainage systems during construction works associated with changes in the elevation of the track related to the electrification works, location of new infrastructure such as substations or extending the footprint of existing infrastructure.

9.5.2. Operation Phase

The following impacts on the hydrological regime as a result of operation will be considered within the assessment:

- General water quality impacts associated with potential accidental release from the storage of hydraulic oils, fuels and chemicals, and associated with the operation and maintenance of the mechanical and electrical equipment in substations;
- Potential for impacts on surface waters from accidental release of oils, fuel, chemicals, hydraulic fluids etc. from road service vehicles, trains and maintenance activities; and
- Potential for localised flooding due to additional increase in hardstanding areas, removal of floodplains, additional crossing of watercourses.

10. Hydrogeology

10.1. Introduction

The Hydrogeology chapter of the EIAR has regard to the draft EPA guidelines (EPA, 2017) and includes the following scope for assessment, the potential impacts arising from the proposed Project on hydrogeology.

In this chapter of the EIAR it is proposed to assess the potential impacts arising from the proposed project on hydrogeology, together with recommendations for mitigation measures to reduce or eliminate any significant negative impacts identified. The assessment will be informed by the ground investigation (GI) work which is currently ongoing for the project to inform and support the design of the DART+ South West Project. This GI work will inform the Hydrogeology assessment for the EIAR.

10.2. Legislation, Policy and Guidance

Specific to the Hydrogeology EIAR chapter, the following legislation, policy and guidance documents will be considered to inform the scope of the assessment:

EU Legislation

- Directive 2013/39/EU of the European Parliament and of the Council of 12 August 2013, amending Directives 2000/60/EC and 2008/105/EC as regards priority substances in the field of water policy;
- Directive 2006/118/EC of the European Parliament and of the Council of 12 December 2006 on the protection of groundwater against pollution and deterioration (daughter to 2000/60/EC) (Groundwater Daughter Directive); and,
- Directive 2004/35/CE of the European Parliament and of the Council of 21 April 2004 on environmental liability with regard to the prevention and remedying of environmental damage (Environmental Liability Directive);
- Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy (Water Framework Directive).

National Legislation

- European Communities (Drinking Water) Regulations 2014 (S.I. No. 122 of 2014);
- European Communities (Birds and Natural Habitats) Regulations, 2011 (S.I. No. 477 of 2011) as amended;
- European Communities Environmental Objectives (Groundwater) Regulations 2009 (S.I. No. 9 of 2010);
- European Communities Environmental Objectives (Surface Waters) Regulations, 2009 (S.I. No. 272 of 2009);
- European Communities (Environmental Liability) Regulations (S.I. No. 457 of 2008);

- European Communities (Drinking Water) (No. 2) Regulations 2007 (S.I. No. 278 of 2007); and
- European Communities (Water Policy) Regulations, 2003 (S.I. No. 722 of 2003).

Policy

- Department of Housing, Planning and Local Government (April, 2018), The River Basin Management Plan for Ireland (2018-2021) and 3rd cycle in preparation.

Guidance

- Environmental Agency UK (EA, 2020), Guidance on Land Contamination Risk Management (LCRM);
- Transport Infrastructure Ireland (TII, 2019), DN-ERW-03083 Managing Geotechnical Risk
- Environmental Protection Agency (EPA, 2013), Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites;
- Institute of Geologists of Ireland (IGI, 2013), Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements;
- Environmental Protection Agency (EPA, 2011). Guidance on the Authorisation of Discharges to Groundwater;
- National Roads Authority (NRA, 2009), Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes; and
- Environmental Agency (EA, 2004). The Model Procedures for the Management of Land Contamination (CLR 11); and
- Institute of Geologists of Ireland (September 2002), 'Geology in Environmental Impact Statements – a Guide.

10.3. Methodology

The key issues for hydrogeology are likely to be changing groundwater vulnerability class and potential for localised effects on the water table for boreholes and wells. This will depend on the proximity of any overburden removal works and the potential to encounter contaminated materials. Areas of contamination will be identified through ground investigation works carried out as part of this project.

The assessment will be informed by a desk study and ground investigations data, which will be undertaken to characterise baseline conditions within the study area. The following will be undertaken to inform the assessment:

- Review of available geotechnical data including GSI database and ground investigation data for the scheme, as well as the topographical survey being undertaken to inform the design;
- Review of ground investigation data to determine any onsite contamination encountered within the groundwater during the intrusive works;
- Liaison with the project ecologists to identify any areas which may be impacted upon by hydrogeological features;

- Identification of groundwater fed public water supply schemes served by springs or boreholes;
- Identification of areas served by private wells;
- Assessment of changing groundwater vulnerability class;
- Assessment of local alterations to water table / dewatering;
- Examine potential impacts to water abstractions for public supplies / private wells; and
- Examine in-ground geo-environmental risks relating to Hydrogeology.

The general methodology adopted to assess the significance of a potential effect is based on the consideration of the sensitivity of the receptor affected (i.e. in terms of the intrinsic value or importance of its attributes) and the magnitude of the anticipated effect thereon. Criteria outlined in the 'Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes' (NRA, 2009) will be used for this assessment.

10.3.1. Study Area

The potential effect that the proposed Project may have on hydrogeology represents the principal consideration for this assessment.

To understand the nature of the ground conditions relevant to the site, which will include considerations of hydrogeological and geo-environmental conditions, the spatial scope of the study area must be sufficiently large to enable the general hydrogeological setting to be defined. As such, the study area relevant to consideration will be informed by the site specific ground investigation data and will extend outside of the proposed project red line boundaries, to include the groundwater catchment area in which the site is located.

10.3.2. Surveys

10.3.2.1. Desk Surveys

The hydrogeology baseline will consist of completing a desktop survey. Publicly available data sources will be used to identify surrounding land use, sensitive receptors such as groundwater dependent terrestrial ecosystems, locally and regionally important aquifers, inner and outer source protection areas for water supplies, as well as locally important water supplies. The sources of information that will be searched and reviewed to inform the assessment are:

- EPA Unified GIS Application Guide http://gis.epa.ie/;
- EPA Catchments - https://www.catchments.ie/;
- EPA online resources that include Hydronet (EPA Hydronet) and HydroTool (EPA HydroTool);
- GeoHive – https://www.map.geohive.ie;
- Geological Survey of Ireland (GSI) - https://www.gsi.ie/;
- National Parks & Wildlife Service (http://www.npws.ie/); and
- Office of Public Works (OPW) - http://www.floodinfo.ie/map/floodmaps.

Geotechnical site investigations are currently ongoing as part of the Ground Investigations for the project design. The ground investigation work includes non-intrusive geophysical surveys and intrusive ground investigations. The purpose of these surveys is to establish the ground conditions and geology of the proposed route to inform the design and management of geotechnical risk of the project. This information will be reviewed by the hydrogeologist to inform the Hydrogeology assessment.

10.3.2.2. Field Surveys

This geotechnical site investigations information in addition to the desktop survey will inform the hydrogeology assessment.

No additional field surveys are proposed to inform the EIAR.

10.3.3. Technical Consultation

As part of Hydrogeology impact assessment, specific consultation with the following stakeholders will be undertaken;

- Environmental Protection Agency;
- Geological Survey of Ireland;
- Relevant County Councils impacted by the proposed Project (Dublin City, South Dublin and Kildare).

The Hydrogeology, Land and Soils, Water (including Hydrology and Flood Risk), Biodiversity, Human Health and risk specialist as well as the designers of the proposed Project, will assist in an interdisciplinary approach for the assessment of Hydrogeology.

10.4. Receiving Environment

The 20km linear site is located along the existing railway corridor between Hazelhatch in County Kildare to the west to Glasnevin Junction in the east and includes Heuston Station. The topography of the railway is generally at grade with sections of cuttings through urban areas of Dublin e.g. cuttings are encountered in localised areas between Le Fanu Bridge and the South Circular Road Bridge, and the Phoenix Park Tunnel Branch Line and Glasnevin Junction.

The eastern extents of the site are located adjacent to rural agricultural land. The adjacent land becomes gradually more urban as the route travels through the western suburbs of Dublin and into Dublin city centre. The site includes the CIÉ Inchicore Works Depot, and several overbridges and underbridges that all vehicles and pedestrians to cross the railway.

10.4.1. Hydrogeology

Groundwater Bodies (GWB) have been designated for the purpose of the Water Framework Directive (WFD) (Directive 2000/60/EC). GWBs are subdivisions of large geographical areas of aquifers that allow more effective management to protect the groundwater and linked surface water or groundwater dependent features.

The site is underlain by the Dublin Groundwater Body (GWB) (EPA Code: IE_EA_G_008), a poorly productive bedrock aquifer. The GWB spans across the counties of Dublin, Kildare and Meath. The

GWB itself is nutrient sensitive, the GWB is expected to flow towards the River Liffey and Liffey Estuary, both of which are surface waters in nutrient sensitive areas (according to the Urban Waste Water Treatment Directive).

The GWB will discharge directly to the Irish Sea along the coast and there will also be discharge to the overlying rivers if they are in hydraulic continuity with the aquifer. The general groundwater flow direction in this aquifer is towards the coast and also towards the River Liffey and Dublin City. Groundwater circulation from recharge to discharge points will more commonly take place over a distance of less than a kilometre. The majority of groundwater flow will be a rapid flow into upper weathered zone but flow in conduits is commonly recorded at depths of 30mbgl to 50mbgl.

The WFD Status 2013 to 2018 of the Dublin Groundwater Body is currently 'Good', the EPA risk classification of the GWB is currently under review.

Information obtained from the GSI website indicates that the groundwater vulnerability in general ranges from low at Glasnevin, through to moderate south of the Liffey and high at the M50 and Park West. The remainder of the proposed project runs through areas of generally high to extreme vulnerability. Extreme vulnerability is mainly due to the presence of a thin overburden where the rock is close to the surface, or where there is exposed rock. These areas are more vulnerable to groundwater pollution and runoff due to shallow or lack of soil/subsoil cover.

The GSI provide a general hydrogeological classification based on the geological setting. The GSI aquifer categories are intended to describe both resource potential (Regionally or Locally Important, or Poor) and groundwater flow type and attenuation potential (through fissures, karst conduits or intergranular). There are no gravel aquifers in the region and the regional bedrock aquifers are Locally Important or Poor bedrock aquifers. There are multiple north-south and east-west striking bedrock faults north west of Dublin City which are present in the bedrock aquifers.

Significant water strikes were previously encountered in the bedrock interface and within the porous layers of the limestone during the geotechnical investigation as part of the Kildare Route Project (KRP) Phase 2. There are several wells from the GSI's borehole and well database in proximity to the existing rail line. Due to the historic and existing land use along the railway line, contaminated ground is likely to be encountered (e.g. diesel spillage, waste contamination, etc.). The IE site at Inchicore has potential for contamination. Soil and leachate sampling has been carried out at 11 No. boreholes at the Inchicore works in 2011 as part of the Kildare Route Project Phase 2. Exceedances for polycyclic aromatic hydrocarbons (total PAHs) occurred in three no. boreholes locations located at the eastern extremity of the proposed KRP scheme at the Inchicore Works. GI works carried out in 2011 did not reveal any evidence of ground contamination at possible construction compound locations, substation locations and at both Le Fanu and Kylemore Road Bridges; however areas of contamination will be identified through the ground investigation works as part of this project.

Ground investigation work is currently ongoing for the DART+ South West Project to verify the data obtained in the historical investigations.

10.5. Potential Impacts

10.5.1. Construction Phase

The construction phase has the potential to affect Hydrogeology as follows:

- Local alterations to the water table and groundwater flow patterns during dewatering activities;
- Short-term effects on groundwater quality and recharge through the infiltration of surface run-off within or adjacent to construction areas;
- Accidental emission / release of potentially hazardous substances (principally hydrocarbons), resulting in a short-term localised effect on groundwater quality;
- Accidental emissions and release of potentially hazardous substances during construction that may affect the quality of groundwater, most notably associated with cement, concrete materials (high alkalinity run-off), temporary oils and fuel particularly where below ground excavations are required;
- Potential to encounter contaminated land which could be disturbed during the construction works;
- Excavation of contaminated land and proposed remediation strategy;
- Potential impacts to water abstractions for private wells; and
- Impacts on surface waters as a result of stormwater run-off causing soil erosion and sedimentation to surface waterbodies.
- Loss of soil reserves through the construction of hardstanding and structures..

10.5.2. Operation Phase

During the operational phase of the proposed project, some impacts would be similar to those described for the construction phase, such as the impacts on groundwater flow mechanisms. However, the impacts during the operational phase will be generally of a lower magnitude. The following impacts which may occur as a result of the operations will be considered within the assessment:

- Accidental emission / release of potentially hazardous substances (principally hydrocarbons), resulting in a short-term localised effect on groundwater quality; and
- Spills of fuel oils, solvents and lubricating oils may occur through ongoing activity and operation of substations.

11. Air Quality

11.1. Introduction

This chapter of the EIAR will identify the potential impacts of the proposed Project on Air Quality. The assessment will address both the positive and negative effects of the proposed scheme. The potential for significant impacts to air quality from the proposed Project will generally be positive once the Project is operational i.e. the electrification of the fleet and the modal shift to electrified public transport provides a significant positive effect on air quality (a reduction in direct diesel emissions from the existing heavy rail locomotives and a net decrease in national emissions of combustion gases and particulates) which will be presented in the assessment

The assessment will:

- Consider the potential for dusts (including general dusts and fine particulate matter) during construction leading to potential for nuisance and health impacts on receptors adjacent to the works (typically any property within 100 metres) and along the designated haul routes;
- Consider the effects of electrification of a larger portion of the rail fleet and the potential emissions exposure for properties along the rail line;
- Consider the effects of non-electrification of the fast rail lines which will carry Intercity services and the potential emissions exposure for properties along the rail line;
- Assess the effects of modal shift of current road traffic passengers to rail transport along the transport corridor; and
- Construction impacts to roads to facilitate modifications to the rail corridor.

11.2. Legislation, Policy and Guidance

Specific to the Air Quality EIAR chapter, the following legislation, policy and guidance documents will be considered to inform the scope of the assessment:

EU Legislation

- Ambient Air Quality and Cleaner Air for Europe (CAFE) Directive (2008/50/EC).

National Legislation

- Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011), as amended, which implements the CAFÉ Directive in Ireland;
- Air Pollution Act 1987 (S.I. No. 6 of 1987);

Guidance

- UK Department for Environment, Food and Rural Affairs (DEFRA, April 2021), Local Air Quality Management Technical Guidance TG16;

- UK Design Manual for Roads and Bridges (DMRB), Volume 11 Environmental Assessment, Section 3 Environmental Assessment Techniques, Part 1 LA 105 Air Quality, Revision 0 (UK Highways Agency 2019);
- UK Department for Environment, Food and Rural Affairs (DEFRA, April 2016), Local Air Quality Management Policy Guidance PG16;
- Institute of Air Quality Management (IAQM, 2014), Guidance on the Assessment of Dust from Demolition and Construction; and
- Transport Infrastructure Ireland (2011) Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes.

11.3. Methodology

The proposed methodology for assessing impacts to air will be based on the TII/NRA Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes, May 2011. This will include a desktop assessment of the EPA National Air Quality Monitoring Database and traffic modelling outputs provided by the transport team. Impacts as a result of any traffic alterations will be assessed using the techniques outlined in the TII Guidelines and the UK DMRB, LA 105 Air quality, Revision 0, 2019.

Railway Emissions

An air dispersion model will be created using proprietary air modelling software. The assessment of air emissions from railway associated with the operation of the railway line includes particulates (PM_{10} and $PM_{2.5}$) and nitrogen oxides (NO_2 and NO_X). The software used will be the US EPA approved AERMOD, which is the current regulatory model in the US and a recommended model under the EPA guidance. The model is a 'new-generation' steady-state Gaussian plume model used to assess pollutant concentrations associated with a range of sources including emissions from non-electric rail stock. The electrification of the line as part of the DART+ South West Project will result in an increase in train capacity by utilising new DART trains and lengthening existing diesel trains, operating at increased service frequency. The assessment will focus on the change of emissions to atmosphere associated with modified service frequency and type.

Road Traffic Emissions

The proposed project is linear in nature consisting of interventions and general linear works required to modernise and electrify the existing railway line as outlined in Chapter 3. TII Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes provides guidance on assessment procedures, the primary aspect of which relates to existing ambient air quality and sensitive receptors. Given the linear nature of the proposed project, the assessment approach will broadly follow the methodology outlined in this guidance. The guidance is intended for National Road Schemes and as such some adjustments will be required to take account of the regional and local nature of the roads impacted by the proposed Project.

Road Traffic Emissions (Local scale): Impacts as a result of the traffic alterations associated with the construction of the project will be assessed using the techniques outlined in the TII Guidelines and the UK DMRB, LA 105 Air quality, Revision 0, 2019. The scoping criteria within the UK DMRB, LA 105

based on the changes between the do something traffic (with the project) compared to the do minimum traffic (without the project) will be used to determine the road links required for inclusion in the assessment. Predictions of traffic-derived pollutant concentrations will be calculated at sensitive receptor locations to determine the impact of the project in terms of air quality.

Road Traffic Emissions (Regional Scale): Wider regional effects arising from modal shift will be derived from the Eastern Regional Model in consultation with the NTA.

Dust Emissions

Dust dispersion has the potential to cause local impacts through dust nuisance at the nearest sensitive receptors and also to sensitive ecosystems. The potential for dust generation associated with the construction of the proposed project will be assessed on the basis of a review of the proximity of the planned construction activities to sensitive receptors. The potential for dust emissions from the proposed project will be addressed qualitatively in accordance with the TII Guidelines.

11.3.1. Study Area

The TII Guidelines outline assessment criteria for the impact of dust emissions from construction activities (with standard mitigation in place) on receptors, with a distance of up to 100m noted as the distance from a (major) source where effects are experienced with regard to soiling, distances of up to 25m are noted with regard to PM_{10} and vegetative effects. The IAQM Guidance on the Assessment of Dust from Demolition and Construction has outlined sensitivity distances for dust soiling effects on people and property, and human health impacts, with areas and receptors within distances ranging from <20m to <350m experiencing high to low impacts depending on receptor sensitivity, number of receptors and distance from source.

With consideration to the distances outlined in both the TII and IAQM guidelines, an Air Quality study area of distance 50-100m either side of the rail corridor has been selected for the purposes of this assessment.

11.3.2. Surveys

11.3.2.1. Desk Surveys

The air quality assessment will be carried out by means of a desktop review of available EPA and Local Authority information. Given the amount of existing air quality data from EPA and Local Authority monitoring it is not proposed to undertake an additional air quality monitoring programme. Existing air quality data from the EPA monitoring network and Local Authority monitoring network will be used to determine the spatial and temporal trends. Suitable representative data will be presented to identify the background air quality in the study area.

Existing air quality sources along the route will be documented , i.e. road traffic, rail, space heating, industrial etc. In addition, a review of the key environmental receptors including areas of residential housing, schools, hospitals, care centres, places of worship and amenity areas, i.e. locations where members of the public are likely to be regularly present in the area will be undertaken.

No site specific baseline surveying is proposed for the project. Localised diffusion tubes may be used for key road / rail interface where road traffic may be temporarily or permanently altered.

11.3.2.2. Field Surveys

To inform the assessment, a windshield survey along the proposed Project route corridor will be carried out. This will enable an appreciation to be gained of the existing general land uses in the area, the surrounding communities, sources of existing air pollution and identification of sensitive receptors.

11.3.3. Technical Consultation

As part of the Air Quality assessment, specific consultation with the following organisations may be carried out:

- EPA's Air Quality Monitoring Unit;
- Relevant County Councils impacted by the proposed project (Dublin City, South Dublin and Kildare).

The Air Quality, Traffic and Transportation, Population, Human Health, Biodiversity, Land & Soil specialist as well as the designers of the proposed Project, will assist in an interdisciplinary approach for the assessment of air quality.

11.4. Receiving Environment

Under the Clean Air for Europe (CAFE) Directive, EU member states must designate 'Zones' for the purpose of managing air quality. For Ireland, four zones were defined in the Air Quality Standards Regulations (2011). The zones were amended on 1 January 2013 to take account of population counts from the 2011 CSO Census and to align with the coal restricted areas in the 2012 Regulations (S.I. No. 326 of 2012). The CAFE Directive was transposed into Irish legislation by the Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011). The four air quality zones in Ireland are:

- Zone A: Dublin;
- Zone B: Cork;
- Zone C: Other cities and large towns comprising Limerick, Galway, Waterford, Drogheda, Dundalk, Bray, Navan, Ennis, Tralee, Kilkenny, Carlow, Naas, Sligo, Newbridge, Mullingar, Wexford, Letterkenny, Athlone, Celbridge, Clonmel, Balbriggan, Greystones, Leixlip and Portlaoise; and
- Zone D: Rural Ireland i.e. the remainder of the State excluding Zones A, B and C.

The proposed scheme is situated within Zone A – Dublin, and Zone C – Other cities and large towns (notably Celbridge's town centre is located circa 2km to the north west of where the DART+ South West Project commences at Hazelhatch & Celbridge Station).

Additionally, the majority of the study area is located within the 'Dublin City' Region of the EPA Air Quality Index for Health (AQIH), with parts also located within the 'Large Towns' AQIH Region. The AQIH currently indicates that the air quality for the 'Dublin City region' is '3-Good' and the air quality for 'Large Towns' is '2-Good'; both are currently below the ambient air quality limit values. Figure 11.1 shows the air quality index for Dublin and Kildare.

Source: *EPA Maps, environment and Wellbeing, Air Quality Index Regions, https://gis.epa.ie/EPAMaps/*

Figure 11-1 EPA Air Quality Index for Health

11.5. Potential Impacts

11.5.1. Construction Phase

During the Construction Phase there is potential for an impact on air quality from construction dust and construction related traffic. The following potential impacts on air quality will be considered during the construction phase:

- The potential for dusts (including general dusts and fine particulate matter) during construction leading to potential for nuisance and health impacts on receptors adjacent to the works (typically any property within 100 metres) and along the designated haul routes;
- The potential for dusts created where there is excavation of potentially contaminated land (for example the IÉ site at Inchicore has potential for contamination);
- Road traffic emissions from transport of personnel and materials associated with construction activities e.g. emissions of particulates (PM_{10}) and nitrogen oxides (NO_x);
- Road traffic emissions associated with temporary changes in traffic flows, road closures and diversions during construction of the scheme may result in both beneficial and adverse air quality effects.

11.5.2. Operation Phase

The potential for significant impacts to air quality from the proposed Project are generally positive once the Project is operational. The effects of electrification of a larger portion of the rail fleet will result in a reduction in direct diesel emissions from the existing heavy rail locomotives. This will result in a decrease in emissions exposure for properties along the north of rail line (between Hazelhatch to

Phoenix Park Tunnel) and a net decrease in national emissions of combustion gases and particulates. The following potential impacts on air quality will be considered during the operation phase:

- Potential air quality impacts associated with modified service frequency;
- Electrification of the line and transition of the fleet to new DART trains with removal of existing diesel trains from the electrified tracks;
- Changes to air quality emissions associated with estimated modal shift e.g. the effects of modal shift of current road traffic passengers to rail transport along the transport corridor;
- Changes to air quality emissions associated with existing road users due to changes to existing access arrangements and traffic re-routing.

12. Climate

12.1. Introduction

The 2014 EIA Directive now requires that climate be expressly considered in EIAR in terms of climate change mitigation and climate change adaptation. This requires consideration of the potential impacts of the project on climate change and the impacts of climate change on the project.

The electrification of the fleet and the modal shift to electrified public transport provides a significant positive effect on climate which will be considered in this assessment. The EIAR will generally include consideration of:

- Direct emissions - carbon savings to be achieved from electrification of the rail line compared to base case of heavy rail.
- Indirect emissions - carbon savings to be achieved from modal shift.
- Potential for climate impacts on the rail network.

12.2. Legislation, Policy and Guidance

Specific to the Climate EIAR chapter, the following legislation, policy and guidance documents will be considered to inform the scope of the assessment:

EU Legislation

- The Climate Action and Low Carbon Development (Amendment) Bill 2021, Bill 39 of 2021 (signed into law on the 23rd of July 2021)

National Legislation

- Climate Action and Low Carbon Development Act (No. 46 of 2015)

Policy

- Ireland's National Energy and Climate Plan (NECP) 2021 to 2030 (DCCAE,2020);
- Climate Action Plan, Government of Ireland (2019);
- Kildare County Council Climate Change Adaption Strategy 2019-2024;
- South Dublin County Council Climate Change Action Plan 2019-2024;
- Dublin City Development Climate Change Action Plan 2019-2024;
- National Adaptation Framework (DCCAE,2018);
- Strategy for Adapting to Climate Change on Ireland's Light Rail and National Road Network, (TII, December 2017)
- European Commission (EC) (2014) 2030 Climate and Energy Policy Framework;
- Climate Action and Low Carbon Development – National Policy Position Ireland, CCAE (2014).

Guidance

- Carbon Tool for Road and Light Rail Projects (TII, 2020);

- Publicly Available Specification (PAS) 2080: 2016 Carbon Management in Infrastructure
- Integrating Climate Change into Strategic Environmental Assessment in Ireland – A Guidance Note (EPA, 2015);
- EU Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment (2013); and
- Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes, TII (2011).

12.3. Methodology

The proposed project is linear in nature consisting of interventions and general linear works required to modernise and electrify the existing railway line as outlined in Chapter 3. Effects arising from the potential impacts on air quality are considered to impact on a local level, while impacts on climate are considered to impact on a national level. National and local data has been assessed where relevant and available.

Carbon dioxide (CO_2) emissions have a global climate warming effect. This is regardless of their rate of release, location, or the weather when they are released into the atmosphere. This is unlike pollutants that affect local air quality where the rate of release, location, and prevailing weather, as well as the amount of pollutant, determines the local concentrations and the impact. Local ambient concentrations of CO_2 are not relevant and there are no limits or thresholds that can be applied to particular sources of carbon emissions. Any amount of CO_2 released into the atmosphere will contribute to climate warming, the extent of which is determined by the magnitude of the release. Although CO_2 emissions are typically expressed as kilogrammes or tonnes per year, there is a cumulative effect of these emissions because CO_2 emissions have a warming effect which lasts for 100 years or more.

Existing climate data for the study area will be derived from the Met Éireann 30 year averages (1981 – 2010) for the nearest meteorological stations (Dublin Airport and Casement Aerodrome) to obtain the most representative meteorological conditions.

The assessment will be informed by a desktop assessment of national and regional climate mitigation and adaption policy, the EPA National Emissions Greenhouse Gas Inventories (in particular the transport sector), construction inputs and outputs (materials balance) and traffic modelling outputs provided by the Transport Team.

12.3.1. Study Area

Effects arising from the potential impacts on climate are considered to impact on a national to EU to global level. National data has been assessed where relevant and available to inform EU/global targets.

12.3.2. Surveys

No survey work is considered necessary for this topic. Desktop analysis will be completed as part of the assessment with reference to the most recent EPA's GHG Emissions Inventory.

12.3.3. Technical Consultation

As part of the climate assessment, specific consultation with the following organisations will be carried out;

- Climate Change Advisory Council;
- Environmental Protection Agency;
- National Parks and Wildlife Service;
- Relevant County Councils impacted by the proposed project (Dublin City, South Dublin and Kildare).

The Climate, Traffic and Transportation, Water (Hydrology and Flood Risk) specialist as well as the designers of the proposed Project, will assist in an interdisciplinary approach for the assessment of climate.

12.4. Receiving Environment

The weather in Ireland is influenced by the Atlantic Ocean, resulting in mild, moist weather dominated by maritime air masses. The prevailing wind direction is from a quadrant centred on west-southwest. These are relatively warm winds from the Atlantic and frequently bring rain. Easterly winds are weaker and less frequent and tend to bring cooler weather from the northeast in spring and warmer weather from the southeast in summer.

The National Policy Position on Climate Action and Low Carbon Development was published on the 23rd April 2014. The policy sets a fundamental national objective to achieve transition to a competitive, low-carbon, climate-resilient and environmentally sustainable economy by 2050. The policy states that Greenhouse Gas (GHG) mitigation and adaptation to the impacts of climate change are to be addressed in parallel national strategies – respectively through a series of National Mitigation Plans and a series of National Climate Change Adaptation Frameworks.

The National Policy Position envisages that development of National Mitigation Plans will be guided by a long-term vision of low carbon transition based on the following:

- An aggregate reduction in carbon dioxide (CO_2) emissions of at least 80% (compared to 1990 levels) by 2050 across the electricity generation, built environment and transport sectors; and
- In parallel, an approach to carbon neutrality in the agriculture and land-use sector, including forestry, which does not compromise capacity for sustainable food production.

Further to the National Policy Position, the Climate Action and Low Carbon Development Act 2015 (No. 46 of 2015) was enacted on the 10th of December 2015. The Climate Act sets out the proposed national objective to transition to a low carbon, climate resilient and environmentally sustainable economy by the end of 2050.

In July 2017, Ireland's first National Mitigation Plan was published. The aim of this plan is to set Ireland on the pathway to achieve the required level of decarbonisation. It should be noted that this plan was quashed by the Supreme Court in 2020 and is no longer national policy.

On the 19th of January 2018, Irelands first statutory National Adaptation Framework (NAF) was published, which has been developed under the Climate Action and Low Carbon Development Act 2015. The aim of the NAF is to build upon the work carried out under Ireland's first non-statutory National Climate Change Adaptation Framework (NCCAF) which was published in 2012. The NCCAF framework aimed to ensure that adaptation actions are carried out across key sectors and at local level to reduce the country's vulnerability to climate change. The NAF outlines a governmental and societal approach to climate adaptation in the Republic of Ireland, setting out a national strategy to reduce the vulnerability of the Ireland to the adverse effects of climate change and to take advantage of positive impacts.

A Climate Change Adaptation Plan for the Transport Sector was published in November 2019. This plan aims to set out a high-level policy for transport infrastructure in relation to climate change adaptation based on current understanding of climate change and its consequences for Ireland. The objective is to identify options that will help to build resilience within key transport networks, infrastructure and services against the impacts of climate change.

On 14th May 2018, the European Council adopted a regulation on GHG emission reductions, the EU effort Sharing Regulation, which sets out 2030 targets for member states. The starting point is an average of 2016 - 2018 emissions with binding emission reduction targets of 30% compared to 2005 levels.

Ireland's Draft National Energy and Climate Plan (NECP) 2021-2030 was submitted to the European Commission in December 2018. The NECP was updated in 2019 and incorporated all planned policies and measures that were identified up to the end of 2019 and which collectively deliver a 30 % reduction by 2030 in non-ETS greenhouse gas emissions (from 2005 levels).

In June 2019, the government of Ireland published the Climate Action Plan 2019 which identified the nature and scale of the challenges faced by Ireland in terms of climate change, and the commitments and actions required to tackle climate disruption. The plan outlines measures required to deliver targets. Of particular relevance to Transport and the Project is the following action within the Plan:

- Action 93: Extend the Dublin area railway electrification for the Maynooth Line (to Maynooth), Kildare Line (to Celbridge), and Northern Line (to Drogheda).

The Climate Action and Low Carbon Development (Amendment) Bill 2021 was signed into law into law in July 2021. It provides a governance framework setting out how Ireland will transition to 'Net Zero' and achieve a climate neutral economy by no later than 2050. The key features of the act are:

- Placing on a statutory basis a 'national climate objective', which commits to pursue and achieve, the transition to a climate resilient, biodiversity-rich, environmentally sustainable, and climate-neutral economy, by no later than 2050.
- Carbon budgets including a provision for setting sectoral targets.
- Actions for each sector to be included in an annually revised Climate Action Plan.
- Strengthened role for the Climate Change Advisory Council.
- New oversight and accountability by the Oireachtas.

- Public Bodies will be obliged to perform their functions in a manner consistent with national climate plans and strategies and furthering the achievement of the national climate objective.

The EPA estimate emissions to 2040 using two scenarios as follows:

- 'With Existing Measures' - scenario assumes that no additional policies and measures, beyond those already in place by the end of 2019, the cut off point for which the latest national GHG inventory data is available, are implemented; and
- 'With Additional Measures' - scenario assumes implementation of the 'With Existing Measures' scenario in addition to in addition to implementation of planned government policies and measures adopted after the end of 2019. Importantly, this includes Ireland's 2019 Climate Action Plan6. This plan, published in June 2019, sets out a programme of policies and measures aimed to help Ireland achieve its decarbonisation goals

Projections (published by the EPA in July 2021) show emissions from Transport decreasing by approximately 13.4% between 2020-2030 to 9.1 Mt CO_{2eq} under the With Existing Measures (WEM) scenario.

Emissions from Transport are projected to decrease by 13.4% between 2020 and 2030 to 9.1 Mt CO_{2eq} under the With Additional Measures (WAM) scenario. Under this scenario the impact of transport infrastructure projects such as Dublin Metro, Dart Expansion and Bus Connects programme is included.

EPA Data published in 2021 , has produced provisional estimates of greenhouse gas emissions for the time period 1990-2020. For 2020, provisional total national greenhouse gas emissions are estimated to be 57.70 million tonnes carbon dioxide equivalent (Mt CO_{2eq}) which is 3.6% lower (or 2.14 Mt CO_{2eq}) than emissions in 2019 (59.84 Mt CO_{2eq}) and follows a 4.0% decrease in emissions reported for 2019. The Provisional estimates of greenhouse gas emissions for the period 1990-2020 indicate that Ireland will exceed its 2020 annual limit set under the EU's Effort Sharing Decision (ESD) by 6.73 Mt CO_{2eq}.

Greenhouse gas emissions from the Transport sector decreased slightly by 0.3% or 0.04 Mt CO_{2eq} in 2019. This decrease was largely driven by an increase in biofuel use, +21.9% in 2019, which offset an overall increase in Transport energy consumption of 0.8%. Private diesel cars increased by 7.1% in 2019 while the number of passenger petrol cars decreased by 1.9%. Railways contributed 136.55 kt CO_{2eq} in 2019 or 0.2% of total emissions. This was up 4.6% on 2018 emissions. Road transportation accounted for 11,611 kt CO_{2eq} which is 19.4% of the total 2019 emissions.

EPA Data published in 2021, noted that Transport emissions decreased significantly by 15.7% in 2020 or 1.9 Mt CO_{2eq}. This was due to the impact of COVID restrictions on passenger car and public transport journeys. In 2020, railways contributed 108.8 kt CO_{2eq} or 0.2% of total emissions. Road transportation accounted for 9706.5 CO_{2eq} which is 16.8% of the total 2020 emissions.

12.5. Potential Impacts

12.5.1. Construction Phase

GHG emissions from construction traffic and embodied energy from construction materials will increase Ireland's GHG emissions potentially contributing to climate change and are expected to be the

dominant source of GHG emissions during construction of the proposed project. Emissions from the construction phase may arise from the following sources:

- Embodied emissions in site materials relative to other materials;
- Direct emissions from plant machinery/equipment; and
- Transport emissions from vehicles importing/exporting material to and from the Project development site.

Embodied emissions are the carbon footprint of a material, i.e. the total emissions released throughout the supply chain of the material. This includes the energy required for extraction, processing, operation and disposal of a material. For some materials, such as steel, the use of recycled materials has a lower embodied GHG emission than the use of virgin material. The assessment of greenhouse gas emissions from the construction stage will be carried out using the TII's Carbon Tool for Road and Light Rail Projects and the results will be compared to Ireland GHG legal commitments.

12.5.2. Operation Phase

The operational phase of the project has the potential to have a beneficial impact on greenhouse gas emissions. Electrification will provide a low carbon energy source for rail transport, reducing greenhouse gas emissions, and an additional fleet of electric trains will assist in the de-carbonisation of the transport sector, enable a transition away from fossil fuels and ultimately allow for reduction of CO_2 emissions by 2050 in line with Government targets.

During the operation phase, the proposed Project will generate greenhouse gases. The main potential for impacts on climate from the proposed Project during the operational phase is from vehicles and rail stock and road traffic-derived pollution.

The potential alterations to road junctions may impact on GHG emissions from road vehicles. This will depend on the impact that these changes have on journey length, road congestion and speeds. Impacts as a result of the traffic alterations associated with the scheme will be assessed using the techniques outlined in the Carbon Management Tool to identify the change from the baseline scenario. The magnitude of change of GHG emission will be determined as part of compilation of the EIAR for the proposed project.

The assessment of greenhouse gas emissions from the operation stage will be carried out using the TII's Carbon Tool for Road and Light Rail Projects and the results will be compared to Ireland GHG legal commitments.

In addition to GHG mitigation, the vulnerability of the proposed Project to climate change effects will also be assessed. In particular, the impacts of flooding, wind, rainfall and large-scale climatic events (i.e. storms, snow etc.) will be assessed. Relevant environmental data to climate will be considered from other environmental impact assessments in the EIAR. Key inputs will be cross referenced within the EIAR to aid transparency. In terms of climate adaptation, an assessment of flood risk will be dealt with under Water (Hydrology and Flood Risk) and the vulnerability of the project to potential natural disasters (including extreme weather events) will be dealt with under Major Accidents and Disasters.

13. Noise & Vibration

13.1. Introduction

The electrification of the DART+ South West Project will result in increased train passing frequency for both DART and Intercity trains. As such, a study of the airborne noise and ground vibration will be required to establish the baseline and extent of impact for communities and residences along the route. The EIAR will assesses the likely significant effects of noise and vibration associated with reference to key sensitive receptors in proximity to the proposed development.

The EIAR will generally include consideration of:

- Baseline noise – Identification of noise sensitive locations and development of a baseline study to characterise the baseline noise and vibration environment at selected sensitive locations along the proposed route;
- Construction noise - air-borne noise from general construction activities and material transport at both receptors adjacent to the proposed works and receptors along designated haul routes.
- Operational noise - while some reduction in locomotive noise is expected on the northern lines which are to be electrified some mechanical and airborne sources will remain particularly in relation to the fast tracks. The impact of increased passing frequency will be carefully considered;
- Any necessary mitigation measures which could prevent, minimise, reduce or offset the possible environmental effects identified in the EIA process.

13.2. Legislation, Policy and Guidance

Specific to the Noise & Vibration EIAR chapter, the following legislation, policy and guidance documents will be considered to inform the scope of the assessment:

EU Legislation

- Commission Directive (EU) 2015/996 of 19 May 2015 establishing common noise assessment methods according to Directive 2002/49/EC;
- European Council Directive 2002/49/EC relating to the assessment and management of environmental noise (the Environmental Noise Directive – END);

National Legislation

- European Communities (Environmental Noise) Regulations (S.I. No. 549 of 2018);

Policy

- Dublin Agglomeration Environmental Noise Action Plan 2018 – 2023;
- Kildare County Council Third Noise Action Plan 2019 – 2023.

Guidance

- Design Manual for Roads and Bridges (DMRB). LA 111 Sustainability & Environmental Appraisal. Noise and Vibration (2019) Rev 0;
- The Netherlands national computation method published 'Reken- en Meetvoorschrift Railverkeerslawaai '96, Ministerie Volkshuisvesting, Ruimtelijke Ordening en Milieubeheer, 20 November 1996, Calculation and Measurement Regulations Rail traffic noise (RMR); The Minister of Housing: Spatial Planning and the Environment.
- Transport Infrastructure Ireland (TII) publication Guidelines for the Treatment of Noise and Vibration in National Road Schemes (2004).

Standards

- BS4142:2014+A1:2019: Methods for rating and assessing industrial and commercial sound;
- ISO 1996-1: 2016: Acoustics – Description, measurement and assessment of environmental noise – Part 1: Basic quantities and assessment procedure;
- BS8223-2014: Guidance on Sound Insulation and Noise Reduction for Buildings;
- BS 5228-1:2009+A1:2014: Code of practice for noise and vibration control on construction and open sites – Part 1 Noise;
- BS 5228-1:2009+A1:2014: Code of practice for noise and vibration control on construction and open sites – Part 2 Vibration;
- BS6472-1:2008: Guide to Evaluation of human exposure to vibration in buildings, Part 1 Vibration sources other than blasting;
- ISO 9613-2:1996: Acoustics – Attenuation of sound during propagation outdoors, Part 2: General method of calculation;
- BS7385-2 1993: Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration.

13.3. Methodology

This assessment will be undertaken in line with best practice assessment procedures for environmental noise impact. The key components of the assessment will include the following:

Desktop & Baseline Noise

- A desktop study will be undertaken to identify noise sensitive locations closest to the proposed project and the key sources of above ground noise and vibration issues relevant to proposed project.
- A baseline noise and vibration survey will be undertaken at selected representative noise sensitive locations to determine the existing noise and vibration environment along the length of the proposed project.

Construction Noise

Construction noise modelling will be carried out using propriety acoustic modelling software (Brüel & Kjaer Type 7810 Predictor) in accordance with best practice guidance. The construction noise modelling will consider the following elements:

Construction related Rail Noise

Construction related activities associated with widening the rail corridor and bridge replacements and provision of electrification infrastructure have potential to give rise to airborne noise. The nature of the construction works, potential for works to be carried out during the night-time period and duration of works will be considered in the assessment.

Construction Related Traffic Noise

Construction works have the potential to result in disruption and diversions to the local and wider strategic road network. An assessment of potential noise and vibration impacts associated with temporary changes in traffic flows, road closures and diversions during construction of the scheme will be carried out. The data for will be provided from the traffic and transport assessment and will be used to predict changes in noise levels and the significance of such changes.

Construction Noise at Substation

Electrical substations will be required at intervals along the rail line to provide power to the network. The substations will be located adjacent to the railway line in the form of a fenced compound surrounding a building which will house all the necessary electrical switching and feeding equipment. The substations will be connected to the local power distribution network and the OHLE system using insulated cables. These cables will be installed in buried routes for additional protection.

Construction at the substation locations will be modelled, which requires the construction of a building on site and underground cable route. Due to the nature of the construction works, the duration of construction works and proximity to any sensitive locations, it is likely some noise impacts will occur.

Operational Railway Noise

Predictive noise calculations will be carried out using propriety acoustic modelling software. The noise modelling methodology will apply the Dutch (RMR) methodology for the assessment of railway noise. This is consistent with the approach followed by Iarnród Éireann as the designated noise mapping body for heavy rail for compliance with the requirements of strategic noise mapping under the Environmental Noise Directive (END). It is understood that there will be an increase in train capacity along the route, with an increase in electrified vehicles. The electrification of the line as part of the DART+ South West Project will result in an increase in train capacity by utilising new DART trains and lengthening existing diesel trains, operating at increased service frequency. This increase in rail traffic is anticipated to result in an increase in rail noise, particularly in the section of rail line at Cabra/Glasnevin where there are currently no significant rail movements. The assessment will focus on the potential noise impacts associated with modified service frequency.

Operational Vibration from Rail Traffic

The baseline vibration survey will identify sensitive locations which may be disturbed by vibrations from the railway and the existing rail vibration levels will be established at these selected locations. Ground

vibration measurements will be measured in three orthogonal directions, transverse, vertical and longitudinal (x, y and z axes). Historical vibration monitoring data as part of the delivery of the Kildare Route Project will also be reviewed. The key infrastructural element of the project will be electrification of the line with new electrified fleet and as such it is anticipated that operational vibration impacts are not likely to significantly increase.

Road Traffic

An assessment of potential noise and vibration impacts associated with modal shift will be carried out. The data for modal shift will be provided from the transport assessment and will be used to predict changes in noise levels and the significance of such changes. The Design Manual for Roads and Bridges (DMRB) is a guidance document which was created for the purpose of assessing noise and vibration impacts from road projects. This guidance states that a change in noise level of 1dB $L_{A10,18h}$ is equivalent to a 25% increase or a 20% decrease in traffic flow, assuming other factors remain unchanged and a change in noise level of 3dB $L_{A10,18h}$ is equivalent to a 100% increase or a 50% decrease in traffic flow.

Operational Substation Noise

The substations will be located adjacent to the railway line in the form of a fenced compound surrounding a building which will house all the necessary electrical switching and feeding equipment. The substation operational noise will be modelled using the ISO 9613-2 methodology Attenuation of Sound During Propagation Outdoors. The ISO document specifies the engineering method for calculating the attenuation of sound during propagation outdoors in order to predict levels of environmental noise at a distance from a variety of sources.

13.3.1. Study Area

Noise (including vibration) associated with the construction, operation and maintenance, have the potential for adverse effects on nearby people, which can affect the use of their residential property, their enjoyment of outdoor recreation areas, or other activities for which noise might otherwise disturb. Noise and vibration can also have potential for adverse effects on protected wildlife. Together, these uses are identified as noise and vibration sensitive locations (NSLs). A noise sensitive location incorporates a dwelling, house, hotel or hostel, health building (providing patient services), nursing/retirement home, educational establishment, place of worship or entertainment, or other facility which may justifiably require for its proper use the absence of noise at levels likely to cause significant effects.

In relation to vibration, there are vibration standards defined for dealing with human comfort, equipment sensitivity and for dealing with structural or cosmetic damage to buildings. As such, a sensitive location may vary from;

- one in which the inhabitants may be disturbed by vibrations,
- protected structures,
- residential day care centres,
- operating theatres, premises with optical microscopes, microbalances, large turbines and data centres, premises with electron microscopes; and

- Premises with sensitive lithography equipment.

The proposed project is linear in nature consisting of interventions and general linear works required to modernise and electrify the existing railway line as outlined in Chapter 3. There are no national guidelines for the assessment of rail noise, therefore the assessment approach will generally follow the methodology for National Road Schemes. This is considered appropriate given the linear nature of the proposed development. As such, the sources of noise associated with the operation of the railway line will consider noise sensitive locations within 300m of the railway line.

In relation to the construction phase, the key study areas during construction will include areas where surface construction works will take place, including construction compounds, ancillary structures (modifications to bridge structures), junction layouts, substation locations and traffic haul routes. As such, the assessment of construction noise is likely to extend to consider noise sensitive locations up to 300m from construction noise sources.

13.3.2. Surveys

A detailed baseline study will be undertaken to characterise the baseline noise and vibration environment at selected sensitive locations along the length of the proposed project to determine existing noise and vibration levels.

It is proposed that unattended baseline noise measurements will be carried out selected representative locations along the length of the project over a period of approximately 24 hours. The surveys will be undertaken through the use of a noise monitoring terminal installation (unattended measurement). All measurements will be taken using Type 1 Precision Digital Sound Level Meters and associated hardware. The meter will be calibrated before and after each round of surveying to ensure that no unacceptable deviation from the standard calibration occurred during the measurement period and that results presented are reliable and accurate. The calibration certificate of the relevant equipment to be utilised during the survey will be provided with the final report as standard best practice. The survey methodology will be in accordance with ISO 1996-1:2016 - Description and Measurement of Environmental Noise.

Similarly, vibration monitoring will be conducted at selected sensitive locations along the proposed project to assess current level of vibration associated with the operation of the existing rail line. The vibration monitoring will be carried out using a Vibration Monitoring Terminal (unattended measurement).

13.3.3. Technical Consultation

As part of the Noise & Vibration assessment, specific consultation with the following organisations may be carried out;

- Relevant County Councils impacted by the proposed project (Dublin City, South Dublin and Kildare).

The Noise and Vibration, Traffic and Transportation, Population, Human Health, Landscape & Visual, Archaeologist and Architectural Heritage (Conservation Architect) specialist as well as the designers of the proposed Project, will assist in an interdisciplinary approach for the assessment of Noise and Vibration.

13.4. Receiving Environment

The study area is located predominantly within the administrative area of Dublin City Council with the remaining sections of the line located within the administrative areas of South Dublin County Council and Kildare County Council and passes through the residential areas of Glasnevin, Cabra, Islandbridge, Inchicore, Park West, Clondalkin, Adamstown and Hazelhatch. As such, the baseline receiving noise environment is a mix of urban, suburban and rural areas, with various noise sources (industrial, road, rail) depending on the location.

The starting principle for the proposed project is to upgrade the existing railway corridor and undertake all works, within the railway corridor. This can be achieved over the majority of the route, however some works will require an increase in the width of the existing rail corridor and this will have a potential impact on adjoining property owners at isolated locations in the vicinity of the proposed four-tracking between Park West and Heuston Station. As such, the baseline environment for sensitive locations in close proximity to the railway corridor is characterised and influenced by rail movements on the existing railway corridor. At some locations where there are interchanges and junctions with the road network it is expected that road traffic noise will also be a significant contributor to the baseline noise environment.

13.5. Potential Impacts

13.5.1. Construction Phase

During the Construction Phase there is potential for noise and vibration impacts from construction works and construction related traffic. The following potential impacts will be considered during the construction phase:

- Potential noise and vibration impacts arising from construction related rail noise and provision of electrical infrastructure;
- Potential noise and vibration impacts arising from construction activities; including construction associated with structural works for overpasses/structures, general construction activities and material transport at receptors adjacent to the works;
- Potential noise and vibration impacts arising from the construction of substations;
- Noise impacts associated with key road realignments and road closures.

13.5.2. Operation Phase

Like the construction phase, the operational phase has potential for noise and vibration impacts. The following potential impacts will be considered during the operation phase:

- The potential noise and vibration impacts associated with modifications to the track alignment, new electrified fleet (DART), improved service and frequency of trains, the cumulative noise impacts with new and existing fleet;
- The potential noise and vibration impacts associated with the operation of substation locations;
- The potential noise and vibration impacts associated with modal shift from the transport assessment.

14. Landscape and Visual

14.1. Introduction

This chapter of the EIAR will present the assessment of landscape and visual effects arising from the proposed Project. The objective of this assessment will be to:

- To describe the landscape and visual baseline within a defined study area;
- Assess and describe the likely potential effects of the proposed Project on landscape elements, landscape character and visual amenity; and
- Identify and describe mitigation measures, including measures incorporated into the design of the proposed Project to mitigate potential adverse landscape and visual effects.

14.2. Legislation, Policy and Guidance

Specific to the Landscape & Visual EIAR chapter, the following legislation, policy and guidance documents will be considered to inform the scope of the assessment:

Legislation

- Planning and Development Act 2000 as amended

Policy

- The European Landscape Convention (ELC), ratified by Ireland 2002 European Landscapes Convention 2010. (The Department of the Environment, Heritage and Local Government 'Landscape and Landscape Assessment Guidelines' have been in draft form since 2000, however the Draft National Landscape Strategy (NLS) was launched in July 2014);
- National Landscape Strategy for Ireland 2015-2025;
- Dublin City Development Plan 2016-2022 (and draft plan 2022-2028 as available);
- South Dublin County Development Plan 2016-2022 (and draft plan 2022-2028 as available);
- Kildare County Development Plan 2017-2023 (and draft plan 2023-2029 as available).

Guidance

- TII, Landscape character assessment (LCA) and landscape and visual impact assessment (LVIA) of Specified Infrastructure Projects - Overarching Technical Document, PE-ENV-01101, December 2020;
- TII, Landscape character assessment (LCA) and landscape and visual impact assessment (LVIA) of Proposed National Roads - Standard, PE-ENV-01102, December 2020.
- Technical Guidance Note 06/19 Visual Representation of Development Proposals (The Landscape Institute, 2019);
- Landscape Institute and Institute of Environmental management and Assessment, Guidelines for Landscape and Visual Impact Assessment (GLVIA 3), 3rd Edition, (2013).

14.3. Methodology

The assessment of effects on landscape resources and visual amenity are separate but interconnected. Landscape is defined, in the European Landscape Convention (ELC, Ref. 6.), as *"an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors"*.

A clear distinction has been drawn between landscape and visual effects as described below:

- Landscape effects relate to the effects of a proposed Project on the physical characteristics of the landscape and its resulting character and quality; and
- Visual effects relate to the effects on views experienced by visual receptors (e.g. residents, footpath users, tourists etc.) and on the visual amenity experienced by those people.

The criteria for determining the significance of effects is a two-stage process that involves defining the sensitivity of the receptors and the magnitude of the impacts.

The likely landscape and visual effects of the proposed Project have been assessed by considering the changes that would occur to the existing landscape and visual amenity as a result of the introduction of the proposed Project. The assessment of effects is arrived at by combining judgements concerning the sensitivity of the landscape or visual receptor (person) with judgements concerning the predicted magnitude of impact resulting from the proposed change. It is important to note that significance is determined on a case by case basis using professional judgement with the methodology below as a guide and this approach accords with the guidance in GLVIA 3.

The sensitivity of the landscape and visual receptors is arrived at by combining judgements concerning susceptibility (ability to accommodate change) and value. The magnitude of impact is arrived at by combining judgements concerning size and scale of the change, the geographic extent of the change and its duration and reversibility.

The landscape and visual impact assessment will be informed by a desk study of county development plans, ordnance survey maps, aerial photography and fieldwork.

The baseline or receiving environment will consider county and city development plan policy of relevance to landscape and visual amenity along with the baseline landscape, including landscape character, designated landscapes and land use zonings of relevance. Separately the baseline visual amenity will consider designated views and prospects along with viewpoint locations selected for the purpose of this assessment.

14.3.1. Study Area

A study area covering a maximum 1km distance on either side of the project centreline was identified for the purpose of identifying sensitive landscape and visual receptors that may be significantly affected by the proposed DART+ South West Project. The selected distance is representative of the nature of the proposed infrastructure and proposed interventions/ changes which may be visible in the landscape and by viewers on a local scale.

14.3.2. Surveys

14.3.2.1. Desk Surveys

The desk based study of the baseline will be informed by county development plans and map data sources as follows together with details of the proposed development:

- Dublin City Development Plan 2016-2022;
- Kildare County Development Plan 2017-2023;
- South Dublin County Development Plan 2016-2022;
- Ordnance survey maps at varying scales; and
- Aerial photography.

The baseline receiving environment will document policy of relevance to landscape and visual amenity along with the baseline landscape (landscape character, designated landscapes and land use zonings) and separately the baseline visual amenity (designated views and prospects, viewpoint locations).

14.3.2.2. Field Surveys

Site visits will be undertaken to identify and document the landscape and visual baseline including identification of both sensitive landscape and visual receptors. The site work will also consider and inform the assessment of effects of the proposed Project on the landscape and visual baseline.

14.3.3. Technical Consultation

As part of the scope of the landscape and visual assessment, specific consultation with the following organisations may be carried out;

- Relevant County Councils impacted by the proposed project (Dublin City, South Dublin and Kildare).

The Landscape & Visual, Land & Soils, Archaeologist, Architectural Heritage (Conservation Architect) and Noise & Vibration specialist as well as the designers of the proposed Project, will assist in an interdisciplinary approach for the assessment of Landscape and Visual.

14.4. Receiving Environment

The study area is located predominantly within the administrative area of Dublin City Council and also that of South Dublin County Council and Kildare County Council. The receiving environment comprises a diverse range of urban, suburban, industrial and rural farmed landscapes. The change from rural to urban extends from the western end of the study area in Kildare and South Dublin to Dublin City at the eastern end of the study area.

The study area features a range of designated landscapes, including parks and designed landscapes of historic importance in Dublin City. Waterways include The River Liffey, Royal and Grand Canals.

There are a number of designated conservation areas, landscape designations, and zoning objectives which will need to be considered within the assessment.

14.4.1. Zoning – Landscape

The key landscape constraints are outlined with reference to current city / county development plans for Dublin City, South Dublin County, Kildare County and Celbridge Local Area Plan.

14.4.1.1. Dublin City Development Plan 2016-2022

- **Designated Conservation Areas:** The Grand Canal, Royal Canal; Phoenix Park; River Liffey; Royal Hospital Kilmainham; War Memorial Gardens Islandbridge; Botanic Gardens and Open spaces adjacent to the Cammock River.
- **Zoning Z2 – Townscapes zoned as residential conservation areas:**
  - North Circular Road (including houses on both sides of the road) extending south to the boundary of the Phoenix Park; and
  - Inchicore (area south of Sarsfield Road);
- **Zoning Z9 – To preserve, provide and improve recreational amenity and open space:**
  - Public Parks at or close to the proposed change including those designated as conservation areas and additionally Glasnevin Cemetry;
- **Zoning Z11 – To protect and improve canal, coastal and river amenities.** Particular locations include:
  - Grand Canal
  - Royal Canal;
  - River Liffey;
  - Tolka River; and
  - Cammock River.

14.4.1.2. South Dublin County Development Plan 2016-2022

- **Zoning OS – Public Open Space:**
  - This includes a number of locations adjacent or close to the rail line, in particular The Grand Canal.

14.4.1.3. Kildare County Development Plan 2017-2023

- **Landscape Character Area (LCA):**
  - River Liffey Valley LCA categorised as being of class 4 special sensitivity.
- **Designated Landscape – Area of High Amenity:**
  - River Liffey Area of High Amenity;
  - Grand Canal Area of High Amenity.

14.4.1.3.1. Celbridge Local Area Plan 2017-2023

- **Historic Landscape Area – the historic demesnes of:**

- Castletown House, St Wolstans and Donaghcumper;and
- Oakley Park and Celbridge Abbey.

14.4.2. Visual Amenity

The key constraints are outlined with reference to current city / county development plans for Dublin City, South Dublin County, Kildare County and Celbridge Local Area Plan. These include Protected Views and Prospects and Scenic routes.

14.4.2.1. Dublin City Development Plan 2016 - 2022

Reference to Views and Prospects is made in the CDP. The Plan states that a views and prospects study is due to be undertaken and also makes reference to important views in the city in Figure 4 of the Plan entitled Key Views and Prospects (Indicative). Those Key views and prospects of relevance are located as follows:

- View north west towards The Wellington Monument, Phoenix Park; and
- View east along the River Liffey;
- Royal Hospital, Kilmainham;
- Heuston Station; and
- Collins Barracks.

14.4.2.2. South Dublin County Development Plan 2016-2022

Views and Prospects as key constraints are not identified in South Dublin.

14.4.2.3. Kildare County Development Plan 2017-2023 and Celbridge Local Area Plan 2017-2023

The following views and prospects are documented in the CDP and LAP as follows:

- **Scenic Routes:**
- Scenic Route no. 31 refers to Views within Castletown – Donaghcumper rural area
- Scenic Route no. 32 which is located on the R403 Regional Road north of the proposed change.
- **Scenic Protected Views:**
- Scenic View RL 2 – Views of the River Liffey from New Bridge, New Bridge Coneyburrow.
- Scenic View RL 3 – Views of the River Liffey from Celbridge Bridge, Celbridge Bridge, Celbridge; and
- Views relating to the Castletown Demesne referenced in the Celbridge LAP.

14.5. Potential Impacts

14.5.1. Construction Phase

The following potential impacts and effects to landscape elements and landscape character and visual amenity will be considered during the construction phase:

- Visual disturbance due to construction activity associated with track widening and demolition works;
- Loss of woodland or hedgerows due to construction;
- Visual disturbance associated with the introduction of new structures including earthworks, substations, OHLE, modifications to existing bridges (changes to parapets), new bridge crossings, boundary walls, SUDS areas;
- Light spillage due to construction lighting; and
- Impact interactions with biodiversity and cultural heritage.

14.5.2. Operation Phase

The following potential impacts and effects to landscape character and visual amenity will be considered during the operation phase:

- Changes to landscape character and/or visual amenity due to the presence of permanent elements of the proposed Project including earthworks, substations, OHLE, modifications to existing bridges (changes to parapets), new bridge crossings, boundary walls, SUDS areas;
- Light spillage due to operational Lighting; and
- Changes to landscape character and/or visual amenity due to changes to the frequency of passing train traffic.

15. Material Assets: Agricultural Properties

15.1. Introduction

This chapter of the EIAR will assess the potential effects on agricultural enterprise as a result of the proposed project in terms of disturbance, nuisance, severance and landtake.

15.2. Legislation, Policy and Guidance

Specific to the agricultural enterprise EIAR chapter, the following legislation, policy and guidance documents will be considered to inform the scope of the assessment:

Policy

- Dublin City Development Plan 2016-2022 (and draft plan 2022-2028 as available);
- South Dublin County Development Plan 2016-2022 (and draft plan 2022-2028 as available);
- Kildare County Development Plan 2017-2023 (and draft plan 2023-2029 as available).

Guidance

- Highways England (HE, 2020), LA 104 Revision 1 Environmental assessment and monitoring, DMRB 11.2.5. Design manual for roads and bridges (DMRB);
- Highways England (HE, 2020), DMRB Volume 11 Section 3 LA 112 Revision 1 Sustainability and Environment, Appraisal, Population and Human Health;
- Irish Forest Service Soil Classification, (Teagasc/EPA, 2009);
- Guide to Process and Code of Practice for National Road Project Planning and Acquisition of Property for National Roads (NRA, March 2003) [revised 2005]; and
- Agricultural Land Classification of England and Wales (MAFF, 1988).

15.3. Methodology

Proposed infrastructure may result in land take and severance along with nuisances and disturbances related to increased levels of dust and noise on agricultural enterprise and practices. As such, consideration and assessment will be required to establish the extent of impacts on the relevant and surrounding agricultural properties and practices.

The assessment will be informed by a desktop assessment of current land uses and agricultural practices and information from the Landowner Engagement Team as part of the design phase.

The general approach for the impact assessment is as follows:

- Present the existing environmental baseline data established from desk studies and specific landowner consultation;
- Present the potential environmental effects on agricultural properties and practices arising from the Project, based on the information gathered;
- Identification of mitigation measures, if required, to reduce identified significant impacts.

- Assessment of residual impacts following the implementation of mitigation.

The criteria for determining the significance of effects is a two-stage process that involves defining the magnitude of the impacts and the sensitivity of the agricultural receptors. Criteria outlined in the Highways England (HE, 2019), LA 104 Environmental assessment and monitoring, DMRB 11.2.5. Design manual for roads and bridges (DMRB), Revision 1, 2020 and Highways England (HE, 2020), LA 112 Sustainability and Environment, Appraisal, Population and Human Health will be used for this assessment.

15.3.1. Study Area

The study area comprises of lands which as a whole are affected by the project and corridor of 100m beyond the physical boundary of the construction works themselves.

15.4. Surveys

15.4.1.1. Desk Surveys

A desktop assessment of current land uses and agricultural practices will be carried out. The following sources will be referenced in the preparation of this section of the EIAR:

- Review of aerial photography;
- Census of Agriculture 2010, available from CSO and any data from the Census of Agriculture 2020 (if available);
- Map of National Soil Types available from EPA/Teagasc;
- An Post Geo Directory (OSI Prime2);
- Property Registration Authority Ireland (PRAI).

15.4.1.2. Field Surveys

A windshield survey to identify landuses and agricultural practices along the proposed Project route corridor will be carried out as part of the assessment for the EIAR.

15.4.2. Technical Consultation

Consultation with landowners will be an ongoing throughout the project and will be carried out to allow for meaningful engagement and ensure current agricultural practices are understood and considered in the assessment process.

15.5. Receiving Environment

The study area is located predominantly within the administrative area of Dublin City Council with the remaining sections of the line located within the administrative areas of South Dublin County Council and Kildare County Council. The receiving environment is a mix of urban, sub-urban and rural areas.

The western extents of the Project route corridor are located adjacent to rural agricultural land. The adjacent land becomes gradually more urban as the route travels east through the western suburbs of Dublin and into Dublin city centre.

While the majority of interventions proposed will be accommodated within the existing rail corridor, due to the scale of the DART+ South West Project some interventions outside the existing railway corridor will be required e.g. for the provision of substations, construction compounds etc. These interventions will require the acquisition of lands from third parties through a CPO process.

15.6. Potential Impacts

15.6.1. Construction Phase

The following potential impacts to agricultural enterprises will be considered during the construction phase:

- Land to be acquired (permanent and temporary);
- Area and orientation of lands severed;
- Removal or severance of buildings and/or facilities;
- Noise occurring during the construction phase, can be an issue for livestock, particularly horses and/or poultry;
- Farm enterprises – Some farm enterprises are less able to absorb effects of a development and as such are more sensitive. Typically, these are farms associated with dairy or equine but, depending on landtake and severance, may also affect other enterprises such as beef and tillage;
- Reinstatement of land following construction works, can result in damage to land drainage, damage to lands and soils; and
- Additional traffic during construction works, albeit temporary can results in disturbance of farming operations e.g. harvesting operations.

15.6.2. Operation Phase

The following potential impacts to agricultural enterprises will be considered and assessed during the operational phase:

- Permanent landtake resulting in a reduction in agricultural lands will affect agricultural productivity and will require a change in current management practices and possibly enterprise type.
- Permanent Severance – will require a change in current management practices and may require a change in current enterprise type. This is particularly relevant to stock farms requiring access on a regular basis to and from grazing areas to facilities. The severance of large fields leaving triangulated plots will create increased management difficulties and potentially reduce the effectiveness of large machinery operations; and
- Noise from the operation of the railway line will potentially affect livestock. It is understood that there will be an increase in rail traffic, albeit with an increase in electrified vehicles. There will also be an increase in rail traffic on the fast rail lines which will carry Intercity services.

16. Material Assets: Non Agricultural Properties

16.1. Introduction

This chapter of the EIAR will assess the potential effects on non-agricultural properties as a result of the proposed project in terms of disturbance, nuisance, severance and landtake.

16.2. Legislation, Policy and Guidance

Specific to the non-agricultural properties EIAR chapter, the following legislation, policy and guidance documents will be considered to inform the scope of the assessment:

Policy

- Dublin City Development Plan 2016-2022 (and draft plan 2022-2028 as available);
- South Dublin County Development Plan 2016-2022 (and draft plan 2022-2028 as available);
- Kildare County Development Plan 2017-2023 (and draft plan 2023-2029 as available).

Guidance

- Highways England (HE, 2020), LA 104 Revision 1 Environmental assessment and monitoring, DMRB 11.2.5. Design manual for roads and bridges (DMRB);
- Highways England (HE, 2020), DMRB Volume 11 Section 3 LA 112 Revision 1 Sustainability and Environment, Appraisal, Population and Human Health; ; and
- Guide to Process and Code of Practice for National Road Project Planning and Acquisition of Property for National Roads (NRA, March 2003) [revised 2005].

16.3. Methodology

Proposed infrastructure may result in land take and severance along with potential changes to current land-uses. As such, consideration and assessment will be required to establish the extent of landtake and severance impacts on the relevant and surrounding lands.

The assessment will be informed by a desktop assessment of current land uses and property boundaries obtained from the Property Registration Authority Ireland (PRAI) website and information from the Landowner Engagement Team as part of the design phase.

The general approach for the impact assessment is as follows:

- Present the existing environmental baseline data established from desk studies and specific landowner consultation;
- Present the potential effects on of landtake and severance of non-agricultural properties (e.g. residential, commercial and other property types) arising from the Project, based on the information gathered;
- Identification of mitigation measures, where required, to reduce identified significant impacts.

- Assessment of residual impacts following the implementation of mitigation.

16.3.1. Study Area

The study area will comprise of those lands which as a whole are affected by the Project and will include a wider area of 100m beyond the physical boundary of the construction works themselves.

16.3.2. Surveys

16.3.2.1. Desk Surveys

A desktop assessment of current land uses will be carried out. The following sources will be referenced in the preparation of this section of the EIAR:

- Review of aerial photography;
- An Post Geo Directory (OSI Prime2); and
- Property Registration Authority Ireland (PRAI).

16.3.2.2. Field Surveys

A windshield survey to identify land uses along the proposed Project route corridor will be carried out as part of the assessment for the EIAR.

16.3.3. Technical Consultation

Consultation with non-agricultural landowners (e.g. residential, commercial and other property types) will be an ongoing throughout the project and will be carried out to allow for meaningful engagement.

16.4. Receiving Environment

The study area is located predominantly within the administrative area of Dublin City Council with the remaining sections of the line located within the administrative areas of South Dublin County Council and Kildare County Council. The receiving environment is a mix of urban, sub-urban and rural areas.

The western extents of the Project route corridor are located adjacent to rural agricultural land. The adjacent land becomes gradually more urban as the route travels east through the western suburbs of Dublin and into Dublin city centre. As such, the baseline environment will consist of non-agricultural properties including residential, amenity, commercial, community and development lands. The line passes through the residential areas of Islandbridge, Inchicore, Park West, Clondalkin, Adamstown and Hazelhatch and in proximity to several industrial areas such as Clondalkin and Grangecastle.

While the majority of interventions proposed will be accommodated within the existing rail corridor, due to the scale of the DART+ South West Project some interventions outside the existing railway corridor will be required e.g. for the provision of substations, construction compounds etc. These interventions will require the acquisition of lands from third parties through a CPO process.

16.5. Potential Impacts

16.5.1. Construction Phase

The following potential landtake and severance impacts to non-agricultural properties (e.g. residential, commercial and other property types) will be considered during the construction phase:

- Temporary acquisition of lands during the construction of retaining walls along the rail corridor;
- Temporary acquisition of lands during construction activities during widening of rail corridor and for substations;
- Potential impacts on services/utilities resulting in impacts to non-agricultural properties.

16.5.2. Operation Phase

The following potential landtake and severance impacts to non-agricultural properties (e.g. residential, commercial and other property types) will be considered during the operational phase:

- Potential permanent acquisition of lands relating to widening of the rail corridor and for substations.

17. Material Assets: Utilities

17.1. Introduction

This chapter of the EIAR will consider the potential impact of the project on utility infrastructure (electricity, gas, telecommunications and water) in the local area during the construction and operational phases of the Project.

17.2. Legislation, Policy and Guidance

There is no specific legislation, policy or guidance on the assessment of impact on utilities. There is no specific guidance of relevance to this chapter other than the key guidance referenced in the preparation of the EIAR as outlined in Section 4.6. The following policy documents will be considered to inform the scope of the assessment:

Policy

- Dublin City Development Plan 2016-2022 (and draft plan 2022-2028 as available);
- South Dublin County Development Plan 2016-2022 (and draft plan 2022-2028 as available);
- Kildare County Development Plan 2017-2023 (and draft plan 2023-2029 as available).

17.3. Methodology

Due to the project, there will potentially be an impact on existing utilities along the route, such as gas, power or water pipes, drainage structures, telecoms equipment, etc. Utilities will be constraints during both the design and construction phases. As such, their treatment in the temporary and permanent situations has been carefully considered during the development of options.

From a design perspective, available records of all existing utilities within the project area will be collated to establish existing utilities (buried and overhead) so that the design can avoid creating unnecessary impact on them as well as to inform the relevant utility company in case there are any clashes or issues.

As part of the desktop study to inform the assessment, the following information sources will be consulted:

- OSi 50,000 Mapping;
- Aerial Photography;
- Google EarthTM imagery;
- Existing project mapping;
- An Post Geo Directory (OSI Prime2);
- Utility Providers; and
- Consultation responses.

The impact assessment process will utilise information gathered as part of the design review process and will include the following:

- Identification of existing utilities and associated infrastructure;
- Identification of any future alterations and/or expansion of existing utilities are planned;
- Identification of potential diversions and the extent of proposed services diversions (including any advance works or temporary diversions that may be required);
- Assessment of the likely impact (if any) on each element and implications for the project and for the utility company. This will include liaison with the utility company and private operators to understand the potential impacts and determine exact requirements;
- Characterisation of the magnitude and significance of any potential impacts such as diversions, disruption of service, relocation etc;
- Identification of mitigation measures to minimise impacts; and
- Assessment of the significance of any residual effects after mitigation.

17.3.1. Study Area

The study area will comprise of the railway line and corridor, substation locations and locations along the proposed project locations that may be impacted by the construction and operation, particularly where utility and infrastructural diversions are proposed.

17.3.2. Surveys

17.3.2.1. Desk Surveys

As part of the design of the project a comprehensive Utilities Impact Report and utilities conflict schedule will be developed by the design team to inform the design of the proposed Project. This information will be reviewed to inform the assessment.

17.3.2.2. Field Surveys

No additional field surveys are proposed to inform the EIAR.

17.3.3. Technical Consultation

As part of the design of the project, specific consultation with the services and utility providers is being carried out.

17.4. Receiving Environment

The study area is located predominantly within the administrative area of Dublin City Council with the remaining sections of the line located within the administrative areas of South Dublin County Council and Kildare County Council. The receiving environment is a mix of urban, sub-urban and rural areas, with a significant number of utilities typical of an urban environment.

The utilities that cross the existing rail corridor along the Project route corridor are generally concentrated in road bridges and train stations. There are also several utilities that cross underneath

the tracks or run parallel to the tracks, such as Irish Water pipes (including both water supply and wastewater) and ESB ducts.

Service providers with network assets are likely to include the following:

- Electricity: ESB Networks
- Gas: Gas Networks Ireland
- Telecoms: Aurora Telecom, BT Ireland, Eir, Virgin Media
- Sewers: Irish Water (Foul & Storm Water)
- Watermain: Irish Water
- Public Lighting: Dublin City Council, South Dublin County Council, Kildare County Council.

The design review will identify and record the details of all potential conflicts with utilities along the proposed Project route corridor.

17.5. Potential Impacts

17.5.1. Construction Phase

The main potential construction phase impact will arise from conflicts with existing established utilities which may require temporary diversions or repositioning and specification for permanent reinstatement of services. The design and construction methods will be developed to minimise disruption to utilities and services disruption to the live railway. Whilst the disruption and service interruption will be minimised as much as possible, this cannot be avoided completely.

17.5.2. Operation Phase

Potential impacts during operation may include:

- Permanent alterations to utility services i.e. access for maintenance;
- Power demands & service supply connections (e.g. ESB etc) associated with the operation of substation locations; and
- Permanent alterations to the track drainage network (i.e. surface water drainage infrastructure) where the system does not have the capacity for the additional flow rates.

18. Material Assets: Resource and Waste Management

18.1. Introduction

This chapter of the EIAR will consider the potential impact of waste (hazardous and non-hazardous) generated by the Project during the construction and operational phases of the Project. The chapter will consider any waste likely to arise from the construction works, outlining how materials arising from construction activities will be managed. Furthermore, due to the historic and existing land use along the railway line, contaminated ground is likely to be encountered. This chapter will consider and assess the potential impact of unearthing contaminated material during the construction process.

18.2. Legislation, Policy and Guidance

Specific to the Waste Management EIAR chapter, the following legislation, policy and guidance documents will be considered to inform the scope of the assessment:

European Legislation

- Directive (EU) 2018/851 of the European Parliament and of the Council of 30 May 2018 amending Directive 2008/98/EC on waste;
- Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives, (the Waste Framework Directive);

National Legislation

- Waste Directive Regulations 2020 (S.I. No. 323 of 2020);
- Waste Management Act 1996, as amended, and the Waste Directive Regulations 2011 (S.I. No. 126 of 2011), as amended.

Policy

- EU Circular Economy Action Plan (2020);
- DCCAE (2020), A Waste Action Plan for a Circular Economy, Ireland's National Waste Policy 2020-2025;
- Eastern Midland Waste Region, Eastern Midland Region Waste Management Plan 2015 – 2021;
- EPA (2014), National Hazardous Waste Management Plan 2014 – 2020 (and draft plan 2021-2027 as available)

Guidance

- EPA (2020), Draft By-Product Guidance Note, A guide to by-products and submitting a by-product notification under Article 27 of the European Communities (Waste Directive) Regulations 2011 (S.I. No. 126 of 2011);

- EPA (2019), Guidance on Soil and Stone By-products: in the context of article 27 of the European Communities (Waste Directive) Regulations 2011, Version 3, June 2019;
- Transport Infrastructure Ireland (TII Dec 2017), GE-ENV-01101 The Management of Waste from National Road Construction Projects;
- Department of the Environment and Heritage Local Government (2006), Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects;
- Construction Industry Research and Information Association (CIRIA 1997). Document 133 Waste Minimisation in Construction.

18.3. Methodology

The assessment will be informed by a desk study, ground investigations data and proposed construction strategy. The following approach will be undertaken to inform the assessment:

- Review of ground investigation data to determine any onsite contamination encountered within the soils/groundwater during the intrusive works;
- Identification of all materials and waste materials including waste volumes that will arise from the construction, operation and maintenance of the project based on project outline design information and identification of potential re-use options to minimise waste quantities and;
- Identification of suitable waste facilities in the region to accept waste material arising from the construction, operation and maintenance of the project. Including assessment of their suitability, proximity and available capacity to accept waste arisings from the project;
- Identification of historic waste facilities or pits/quarries that may contain land filled material which could be potentially significant impacted by the proposed construction works.

The circular economy is an alternative approach to the typical 'linear' way of using resources. The concept of a circular economy is one in which materials are used sustainably, resources are conserved, and waste is managed in such a way as to promote secondary raw materials and recycling while ensuring minimal environmental and human health impacts through the use of products and materials. The assessment will identify suitable re-use opportunities for materials (as a by-product) in addition to identifying opportunities to minimise material use and waste production.

18.3.1. Study Area

The Waste Study Area will comprise of the functional aspects described as follows;

- Regionally - the location of waste facilities within the Region that are suitable, and have sufficient capacity to accommodate waste materials arising from the construction, operation and maintenance, of the Project;
- Locally - a suitably defined corridor within which the actual components of the project are situated, and which may, in the construction of these components, potentially impact existing or historical waste facilities that are within 300m of the Project; and

- The Project - the waste generated during the construction, operation and maintenance of the project.

18.3.2. Surveys

18.3.2.1. Desk Surveys

The Waste Management assessment will be carried out by means of a desktop review of available EPA, OSI and Local Authority information. The sources of information that will be searched and reviewed to inform the desktop assessment are:

- EPA Unified GIS Application Guide http://gis.epa.ie/ for information on waste facilities, landfills;
- Geological Survey of Ireland online mapping www.gsi.ie;
- OSI Six-inch mapping:1833-1946: Pits;
- OSI Six-inch mapping:1833-1946: Quarries; and
- Local Authority Waste Facility Register.

18.3.2.2. Field Surveys

Data from the geotechnical site investigations undertaken as part of the Ground Investigations will be used to inform the assessment. The ground investigation work to inform the design of the Project includes non-intrusive geophysical surveys and intrusive ground investigations. This data may identify areas where onsite contaminated may be encountered and remediation and management of contaminated material is required. Data from the surveys undertaken as part of the inter-related technical disciplines where relevant will also be used to inform the assessment.

No additional field surveys are proposed to inform the EIAR.

18.3.3. Technical Consultation

As part of the assessment, specific consultation with the following organisations as required may be carried out;

- Environmental Protection Agency
- Geological Survey of Ireland
- Relevant County Councils impacted by the proposed project (Dublin City, South Dublin and Kildare).

18.4. Receiving Environment

The study area is located predominantly within the administrative area of Dublin City Council with the remaining sections of the line located within the administrative areas of South Dublin County Council and Kildare County Council.

Due to the historic and existing land use along the railway line, contaminated ground is likely to be encountered (e.g. diesel spillage, waste contamination, etc.) within the existing rail corridor. There is potential for ground contamination to be encountered in areas where track widening is required.

Railway corridors can also act as corridors for the spread of invasive species which may require specialist treatment for eradication.

18.5. Potential Impacts

18.5.1. Construction Phase

Potential impacts during construction may include:

- Potential for encountering contaminated material during excavations which is unsuitable for reuse and requires disposal at a suitable licensed facility;
- Generation of surplus non-hazardous excavated material and potential for opportunities for re-use;
- Generation of surplus non-hazardous excavated material in excess of quantities required by other construction projects within the area leading to volumes requiring disposal;
- Generation of surplus materials and wastes where material supply exceeds material demand;
- Potential for waste materials to be a source of nuisance to neighbouring communities; and
- Potential for direct and indirect impacts on environmental factors such as Air Quality (due to odour, dust), traffic, noise, soils (contaminated land), landscape and visual (visual impact etc), hydrology (runoff) etc.

18.5.2. Operation Phase

It is anticipated that once the proposed Project is operational, waste from passenger trains, waste generated by track maintenance and other ancillary infrastructure will be managed in accordance with the waste hierarchy and the waste management policy and procedures of Irish Rail. The operational phase waste generated will be insignificant in comparison to the likely construction phase waste quantities.

19. Archaeology and Cultural Heritage

19.1. Introduction

This chapter of the EIAR will identify, describe and present an assessment of the likely significant effects of the proposed project on Archaeology and Cultural Heritage. The assessment will examine the potential impacts during the construction and operational phases. The assessment of Architectural Heritage (including industrial heritage) is covered in Chapter 20.

19.2. Legislation, Policy and Guidance

Specific to the Archaeology and Cultural Heritage EIAR chapter, the following legislation, policy and guidance documents will be considered to inform the scope of the assessment:

International Legislation

- The European Landscape Convention (ELC), ratified by Ireland 2002 European Landscapes Convention 2010. (The Department of the Environment, Heritage and Local Government 'Landscape and Landscape Assessment Guidelines' have been in draft form since 2000, however the Draft National Landscape Strategy (NLS) was launched in July 2014);
- Council of Europe Framework Convention on the Value of Cultural Heritage for Society, ('Faro Convention)' (2005);
- The UNESCO World Heritage Convention, 1972;
- Council of Europe Convention for the Protection of the Architectural Heritage of Europe (Granada) 1985, ratified by Ireland in 1997;
- European Convention on the Protection of the Archaeological Heritage (the 'Valletta Convention') ratified by Ireland in 1997;
- Charter for the Conservation and Restoration of Monuments and Sites (Venice 1964).

National Legislation

- National Monuments (Amendments) Acts, 1930-2014, as amended.
- The Planning and Development Act 2000, as amended.
- Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act, 2000 and the Planning and Development Act 2000.
- Heritage Act, 1995 (as amended).

Policy

- Dublin City Development Plan 2016-2022 (and draft plan 2022-2028 as available);
- Dublin City Strategic Heritage Plan 2022-2026.
- South Dublin County Development Plan 2016-2022 (and draft plan 2022-2028 as available);
- Kildare County Development Plan 2017-2023 (and draft plan 2023-2029 as available).

- Kildare County Council Heritage Plan 2019-2025.

Guidance

- Historic England (2017). The Setting of Heritage Assets, Historic Environment Good Practice Advice in Planning Note 3 (Second Edition).
- National Landscape Strategy for Ireland 2015-2025, Department of Arts, Heritage and the Gaeltacht.
- Guidance on Heritage Impact Assessments for Cultural World Heritage Properties – A publication of the International Council on Monuments and Sites, January 2011.
- The Heritage Council (2010), Proposals for Irelands Landscapes; and International Council on Monuments and Sites (2011), Guidance on Heritage Impact Assessments for Cultural World Heritage Properties.
- Historic Scotland (October 2010), Managing Change in the Historic Environment;
- Guidelines for the Assessment of Architectural Heritage Impact of National Road Schemes, 2006, NRA.
- Guidelines for the Assessment of Archaeological Heritage Impact of National Road Schemes, 2006, NRA.
- Guidelines for the Testing and Mitigation of the Wetland Archaeological Heritage for National Road Schemes, 2006, NRA.
- Code of Practice between the National Roads Authority (NRA) and the Minister for Arts, Heritage and the Gaeltacht, June 2000.
- Frameworks and Principles for the Protection of the Archaeological Heritage, 1999, Department of Arts, Heritage, Gaeltacht and Islands.
- ICOMOS International Charters including:
    - Salalah guidelines for the management of public archaeological sites – 2017.
    - ICOMOS Charter for Places of Cultural Significance (The Burra Charter) 2013.
    - Joint ICOMOS – TICCIH Principles for the Conservation of Industrial Heritage Sites, Structures, Areas and Landscapes 2011.
    - The Valletta Principles for the Safeguarding and Management of Historic Cities, Towns and Urban Areas 2011.
    - ICOMOS Charter on Cultural Routes 2008.
    - ICOMOS Charter for the Interpretation and Presentation of Cultural Heritage Sites (also known as the 'Ename Charter') 2008.
    - ICOMOS Xi'an Declaration on the Conservation of the Setting of Heritage Structures, Sites and Areas, 2005.

- International Cultural Tourism Charter – Managing Tourism at Places of Heritage Significance 1999.
- Charter on the Built Vernacular Heritage 1999.
- Charter for the Protection and Management of Archaeological Heritage 1990.
- Charter for the Conservation of Historic Towns and Urban Areas (Washington Charter) 1987.
- Historic Gardens (Florence Charter) 1981.

19.3. Methodology

The assessment of the archaeological and cultural heritage of the proposed Project is based on a desk study of published and unpublished documentary and cartographic sources. A review of existing documentation and supplementary research and field surveys will take place where necessary in order to evaluate the archaeological and cultural heritage constraints in terms of avoidance and mitigation measures.

Archaeological and cultural heritage sites are a non-renewable resource and cultural heritage material assets are generally considered to be location sensitive. In this context, any change to their environment, such as construction activity and ground disturbance works, could adversely affect these sites. In accordance with the EPA draft Guidelines (EPA 2017), the context, character, significance and sensitivity of each heritage asset requires evaluation.

19.3.1. Study Area

The potential effect that the proposed Project may have on the archaeological and historical assets as well as features of cultural heritage merit represent the principal consideration for this assessment. To understand the archaeological and cultural heritage environment, the spatial scope of the study area must be sufficiently large to enable the nature of the context, character, significance and sensitivity of assets to be defined. As such, the study area relevant to consideration will extend to 250m either side of the railway corridor and of the associated landtake and development areas. This area will be assessed for known and previously unrecorded sites and areas of archaeological and cultural heritage significance.

19.3.2. Surveys

19.3.2.1. Desk Surveys

A review of the following information sources will take place in order to inform the desk top review:

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

- Designated Zones of Archaeological Potential (RMP and Dublin City Development Plan)
- General Areas of Archaeological Potential
- The Irish archaeological excavations catalogue i.e., Excavations bulletin (excavations.ie) and Dublin County Archaeology GIS, online (The Heritage Council);
- A review of the topographical files held in the National Museum of Ireland;
- Dublin City Development Plan 2016-2022;
- South Dublin County Development Plan 2016-2022;
- Kildare County Development Plan 2017-2023;
- Cartographic sources including the Down Survey maps c.1656 (www.downsurvey.tcd.ie), the first edition of the Ordnance Survey (OS) six-inch maps (1837-1838) and the OS 25-inch maps (1907-1909) (www.map.geohive.ie); and a topographical survey of the proposed development;
- Townland Names (www.logaim.ie) and OS Name Books (askaboutireland.ie) and National Folklore Collection (Duchas.ie);
- National Folklore Collection (Duchas.ie); and
- Aerial imagery (online sources Google Earth 2001–2020, Digital Globe, Bing 2013; OSi 1995, 2000, 2006).
- Place names; Townland names and toponomy (loganim.ie);
- Dublin City Industrial Heritage Record (DCIHR) (DCC 2003-2009).

19.3.2.2. Field Surveys

To inform the assessment, a windshield survey along the proposed Project route corridor will be carried out. This will enable an appreciation to be gained of the context, character, significance and sensitivity of the baseline receiving environment, into which the proposed Project will fit. Additional field surveys will take place where necessary in order to identify archaeological, historical and heritage assets as well as features of cultural heritage merit that may be subject to direct or indirect impacts as a result of the proposed Project and to evaluate the constraints in terms of avoidance and mitigation measures.

19.3.3. Technical Consultation

As part of the Archaeology and Cultural Heritage assessment, specific consultation with the following organisations as required may be carried out;

- Relevant Heritage Officer of the County Councils impacted by the proposed project (Dublin City, South Dublin and Kildare).
- Dublin City Archaeologist
- Department of Housing Local Government and Heritage – Development Applications Unit
- National Monuments Service
- Architectural Policy and Built Heritage Section

- An Taisce - The National Trust for Ireland
- The Heritage Council
- Office of Public Works
- National Museum of Ireland
- Arts Council of Ireland

The Archaeologist, Architectural Heritage (Conservation Architect), Landscape & Visual and Noise & Vibration specialist as well as the designers of the proposed Project, will assist in an interdisciplinary approach for the assessment of archaeology and cultural heritage.

19.4. Receiving Environment

There are two National Monument in the ownership of the state that is recorded within the study area; Kilmainham Gaol (DU018-125) and Phoenix Park (DU018-007001). Both sites are managed by the Office of Public Works (OPW) on behalf of the Minister for Housing, Local Government and Heritage.

The area of greatest archaeological potential and significance within the scheme is within the Zone of Archaeological Potential (ZAP) for Dublin DU018-020). This zone incorporates the sites of 3 early medieval burial sites stretching from Inchicore to Heuston StationThe full extent of the Viking Age cemeteries in Islandbridge and Kilmainham is unknown. Excluding the ZAP's there are 24 RMP sites within a 250m radius of the rail line. There is also a large zone of potential around Phoenix Park (DU018-020272).

The stretch of railway from Inchicore (War Memorial Park) eastward to Heuston Station has significant potential to reveal medieval burials and artefacts. In 1960 human remains (RMP DU018-302 Burial) were discovered during construction work at St. John's Road, near Islandbridge, and just outside of the rail corridor. The remains lay extended with the head to the east (D 0.46m) (NMI, Cahill & Sikora 2011). This discovery highlights the potential for burials to survive undisturbed within the immediate vicinity of the existing rail corridor in this area.

RMP sites in proximity to the rail line at Heuston station and included within the ZAP include:

- Kilmainham Ecclesiastical site (DU018-020283), cross (-020-284), burials at Bully's Acre
- Military Road (DU018-020293)
- Infirmary (DU018-020292)
- Mill race (DU018-020293447)
- Dr Steevens' Hospital (DU018-020341)
- Hospital (DU018-020292)
- 18th-19th Century House (DU018-020255)
- Designed landscape feature (DU018-020528)
- Bronze Age Pit Burial (DU018-112)

The Phoenix Park is also an area of archaeological potential and any earthmoving works here also has the potential to reveal archaeological remains.

Unlike RMP sites which are location specific archaeological soils or features that may potentially exist within the ZAP are subsurface in nature and is not a consideration that can influence design, and as such any development within the ZAP will be a significant issue for the construction of the corridor where archaeology must be considered at the earliest stages of the construction or enabling works phase.

There is a castle, gatehouse, church and graveyard site (DU 018-031/001-004), at Ballyfermot Lower c. 215 m to the north and the site of a castle at Adamstown (RMP DU017-029) 85m to the north of the railway line. There are no upstanding remains associated with Adamstown, the field located immediately to the north of it has been archaeologically tested and no finds, features or structures of any archaeological significance were uncovered (Licence No. 05E1295, Excavation.ie Ref. 2005:379). An Early Christian cemetery site was revealed during the construction of the Park West Business Park (DU017-083) in Gallanstown, this was previously unknown, and demonstrates the general archaeological potential of greenfield sites.

Other sites in the vicinity of the railway line include an enclosure site (RMP DU017-036) located 30m to the south of the existing railway in the townland of Cappagh. From the townland of Ballyfermot Lower westwards, there are no known monuments or stray finds adjacent to this section of railway line. The closest sites are in Stacumny where there is an enclosure site c. 110m south west and an enclosure, church and graveyard c. 185m to the north west at Kylemore Road Bridge (OBC5A), there is a generally low potential area.

19.5. Potential Impacts

Potential impacts on the receiving archaeological and cultural heritage environment can be classified in three categories:

- Direct physical impacts – those development activities that directly cause damage to the fabric of a heritage asset. Typically, these activities are related to construction works; for example, excavation works associated with the proposed development,
- Indirect physical impacts – those processes, triggered by development activity, that lead to the degradation of heritage assets; and
- Impacts on setting – how the presence of a development changes the surroundings of a heritage asset (archaeological, architectural or cultural heritage sites) in such a way that it affects (positively or negatively) the heritage significance of that asset. Visual impacts are most commonly encountered but other environmental factors such as noise, light or air quality can be relevant in some cases. Impacts may be encountered at all stages in the life cycle of a development from construction to decommissioning but they are only likely to be considered significant during the prolonged operational life of the development.

19.5.1. Construction Phase

During the Construction Phase there is potential for direct and indirect impacts on heritage assets. The following potential impacts will be considered during the construction phase:

- The removal or part removal of a heritage asset due to construction activities;
- Ground disturbance and excavation, caused by construction activities which may lead to the damage or destruction / removal of recorded or previously unknown (newly revealed) heritage assets; and
- The degradation of the setting and amenity of a monument or the severance / fragmentation of interrelated features.

19.5.2. Operation Phase

The potential disturbance of heritage assets due to the development of the proposed Project is anticipated to be largely restricted to the construction phase. Potential direct and indirect impacts on heritage assets during operation may include the following:

- Operational activities may comprise maintenance activities however the impact risk to recorded or previously identified archaeological features or cultural heritage assets is considered to be low;
- A change that negatively impacts on a sense of place (i.e. detracts from the setting of historic features) and that cannot be mitigated has the potential to be considered a significant or profound impact throughout the operational life of the proposed Project; and
- Potential visual impacts on archaeological and cultural heritage features during the operational phase may be incurred as a result of the proposed Project and result in a change in the character of the receiving historic environment. This change may have a positive or negative affect on the heritage asset.

20. Architectural Heritage

20.1. Introduction

This chapter of the EIAR will identify, describe and present an assessment of the likely significant effects of the proposed project on Architectural Heritage. The assessment will examine the potential impacts during the construction and operational phases. The assessment of Archaeology and Cultural Heritage is covered in Chapter 19.

20.2. Legislation, Policy and Guidance

Specific to the Architectural Heritage EIAR chapter, the following legislation, policy and guidance documents will be considered to inform the scope of the assessment:

International Legislation

- Council of Europe (2005) Framework Convention on the Value of Cultural Heritage for Society, 'Faro Convention';
- 'Florence Convention' on Landscape (2000);
- Council of Europe Convention for the Protection of the Architectural Heritage of Europe (Granada) 1985, ratified by Ireland in 1997;
- UNESCO World Heritage Convention, 1972;
- UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage (Paris, 2003);
- Venice Charter (1965)

National Legislation

- National Monuments Act, 1930 to 2014;
- Planning and Development Act 2000 (as amended);
- Heritage Act, 1995 (No. 4 of 1999);
- Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act, 1999 (No. 19 of 1999);

Policy

- Dublin City Development Plan 2016-2022 (and draft plan 2022-2028 as available);
- Dublin City Strategic Heritage Plan 2022-2026;
- South Dublin County Development Plan 2016-2022 (and draft plan 2022-2028 as available);
- Kildare County Development Plan 2017-2023 (and draft plan 2023-2029 as available).
- Kildare County Council Heritage Plan 2019-2025.

Guidance

- National Landscape Strategy for Ireland 2015-2025, (DAHLG);

- ICOMOS Charter for Places of Cultural Significance (The Burra Charter) 2013
- International Council on Monuments and Sites (ICOMOS) Xi'an Declaration on the Conservation of the Setting of Heritage Structures, Sites and Areas, 2005
- Department of Arts, Heritage and the Gaeltacht. Architectural Heritage Protection Guidelines for Planning Authorities, (DAHLG, 2011);
- Action on Architecture 2002-2005 (DAHG, 2002)
- Guidance on Heritage Impact Assessments for Cultural World Heritage Properties – A publication of the International Council on Monuments and Sites, January 2011;

20.3. Methodology

The assessment of the architectural heritage of the proposed Project is based on a desk study of published and unpublished documentary and cartographic sources. A review of existing documentation and supplementary research and field surveys will take place where necessary in order to evaluate the architectural heritage constraints in terms of avoidance and mitigation measures.

The main guidance in Ireland with respect to the assessment of impacts on the architectural heritage is the 2004 publication Architectural Heritage Protection Guidelines for Planning Authorities (referred to hereunder as AHPG) by the Department of the Environment, Heritage and Local Government.

The AHPG with respect to Architectural Heritage Impact Assessment states:

85.16 Impact Assessment

> *The assessment should contain an evaluation of the quality and importance of the [receiving environment] . In addition, it should contain a comprehensive assessment of the implications of the development for the character of the [receiving environment] and the area in which it is located. This should highlight how the elements of this character (those which contribute to its special architectural, historical, archaeological, artistic, cultural, scientific, social and/or technical interest) would be materially altered by the development.*

20.3.1. Study Area

The potential effect that the proposed Project may have on the architectural heritage assets and their setting or curtilage represent the principal consideration for this assessment. To understand the architectural heritage environment, the spatial scope of the study area must be sufficiently broad to enable the nature of the context, character, significance and sensitivity of assets to be defined. As such, the study area relevant to consideration will extend to 50m either side of the railway corridor and of the associated landtake and development areas. This area will be assessed for areas of architectural heritage significance.

20.3.2. Surveys

20.3.2.1. Desk Surveys

A review of the following information sources will take place in order to inform the assessment:

- Record of Protected Structures (RPS) - DCC, SDCC and KCC;

- Architectural Conservation Areas (ACAs);
- Conservation areas;
- Industrial heritage features as outlined on each county's Industrial Heritage Record or Survey;
- Cartographic sources including the Down Survey maps c.1656 (www.downsurvey.tcd.ie), the first edition of the Ordnance Survey (OS) six-inch maps (1837-1838) and the OS 25-inch maps (1907-1909) (www.map.geohive.ie); and subsequent OS maps;
- Historic drawings, plans and photographs (NLI, IAA, IRRS, IE etc); and
- Aerial imagery (online sources Google Earth, Digital Globe).

20.3.2.2. Field Surveys

To inform the assessment, a windshield survey along the proposed Project route corridor will be carried out. This will enable an appreciation to be gained of the context, character, significance (including social history) and sensitivity of the baseline receiving environment, into which the proposed Project will fit.

Additional field surveys will take place where necessary in order to identify architectural heritage assets that may be subject to direct or indirect impacts as a result of the proposed scheme and to evaluate the constraints in terms of avoidance and mitigation measures.

20.3.3. Technical Consultation

As part of the Architectural Heritage assessment, specific consultation with the following organisations as required may be carried out;

- Relevant Architectural Conservation Officers of the County Councils impacted by the proposed Project (Dublin City, South Dublin and Kildare)
- Department of Housing Local Government and Heritage – Development Applications Unit
- An Taisce - The National Trust for Ireland
- Irish Georgian Society
- ICOMOS Ireland
- Fáilte Ireland
- The Heritage Council

The Architectural Heritage (Conservation Architect), Archaeologist, Landscape & Visual and Noise & Vibration specialist as well as the designers of the proposed Project, will assist in an interdisciplinary approach for the assessment of architectural heritage.

20.4. Receiving Environment

In a wider context, the railway line itself is part of Kildare and Dublin's industrial heritage; the Dublin Heuston to Cork Kent Railway line was opened in 1846-47 and was operated by the Great Southern & Western Railways (GSWR). While much of the old line has been replaced over the years, the route itself remains in operation. Heuston Station likewise has numerous heritage designations (NIAH, RPS

and Industrial Heritage). As the terminus of the GSWR, then known as Kingsbridge, the station opened in 1846. It forms an imposing landmark at the western end of Dublin's quays. The Phoenix Park Tunnel extends 690m under the Phoenix Park and has historically been used for freight and maintenance; however, it reopened in 2016 for regular passenger traffic. This section of the GSWR was built in 1876-77 to link the GSWR with the Midland and Great Western Railway via this tunnel.

Some of the other key architectural heritage features along the existing rail line include the following:

- Identified assets on the Record of Protected Structures (RPS) such as, for example, the Cabra Road Bridge and the CIE Railway Estate Boundary Wall;
- Structures recorded on the NIAH such as road/foot bridges and tunnels;
- Non-designated structures of merit such as overbridges and underbridges, the Lime kiln at Stacummy, signal houses and locomotive sheds e.g. the signal box and locomotive shed at Inchicore;
- Features on the Dublin, Kildare and South Dublin County Council Surveys of Industrial heritage;
- There are several identified Architectural Conservation Areas (ACA) within the wider area in both Dublin City, South Dublin and Kildare. None, however, are traversed by the rail line or located within 250m of the DART+ South West Project centreline. There is also a Conservation Area (CA) - adjacent to the Liffey Railway Bridge, adjacent to the proposed route.

20.5. Potential Impacts

20.5.1. Construction Phase

During the Construction Phase there is potential for direct and indirect impacts on architectural heritage features. The following potential impacts will be considered during the construction phase:

- Widening of the corridor for four-tracking may have direct impacts on built heritage features including permanent removal or relocation;
- Modifications/interventions to bridges to achieve vertical and horizontal clearances;
- Physical damage to designated and non-designated architectural heritage assets during construction works;
- Impacts on designated architectural heritage features and other elements of architectural heritage due to the construction works (utility diversions and main infrastructure works) and permanent landtake;
- Impacts on the settings of any heritage features such as demesne landscapes and associated features, boundaries and gate lodges due to temporary and permanent landtake; and
- Visual impacts on Architectural Conservation Areas and Conservation Areas during construction works.

20.5.2. Operation Phase

The following potential impacts will be considered during the operation phase:

- Visual impacts to Architectural Conservation Areas and Conservation Areas (ACAs & CA's respectively);
- Visual impact to architectural heritage assets due to fixed infrastructure such as Overhead Line Equipment (OHLE) including line conductors, supporting poles and gantries;
- Indirect negative impacts associated with the operation of the proposed Project, where it is located in close proximity to architectural heritage structures.

21. Electromagnetic Compatibility & Stray Current

21.1. Introduction

This chapter of the EIAR will outline the impacts arising from Electromagnetic Fields (EMF) and Electromagnetic Interference (EMI) as a result of the proposed Project.

Electric trains such as DART are one of many manmade sources of static magnetic fields. The assessment will therefore consider the influence of electromagnetic emissions from substations and power lines on sensitive receptors from the operational phase of the proposed Project.

21.2. Legislation, Policy and Guidance

Specific to the Electromagnetic Compatibility and Stray Current EIAR chapter, the following legislation, policy and guidance documents will be considered to inform the scope of the assessment:

European Legislation

- European Directive on Electromagnetic Compatibility (2014/30/EU);
- Low Voltage Directive (2014/35/EU);
- Radio Equipment Directive (2014/53/EU).

National Legislation

- European Union (Radio Equipment) Regulations 2017 (S.I. No. 248 of 2017)
- European Union (Low Voltage Electrical Equipment) Regulations 2016 (S.I. No. 345 of 2016); and
- European Communities (Electromagnetic Compatibility) Regulations 2016 (S.I. No. 145 of 2016).

Standards

- EN 50121-1 (2017) Railway applications - Electromagnetic compatibility - Part 1: General;
- EN 50121-2 (2017) Railway applications - Electromagnetic compatibility Part 2: Emissions of the whole railway system to the outside world;
- EN 50121-3-1 (2017) Railway applications - Electromagnetic compatibility Part 3-1: Rolling stock - Train and complete vehicle;
- EN 50121-3-2 Railway applications - Electromagnetic compatibility Part 3-2: Rolling stock – Apparatus;
- EN 50121-4 Railway applications - Electromagnetic compatibility Part 4 – Emission and Immunity of the Signalling and Telecommunications Apparatus; and
- EN 50121-5 Railway applications - Electromagnetic compatibility Part 5 - Emission and Immunity of Fixed Power Supply Installations and Apparatus.

Guidance

- ICNIRP. Guidelines for limiting exposure to electromagnetic fields (100 kHz to 300 GHz). Health Phys 118(5):483-524; 2020; and
- 1999/519/EC Council Recommendation of 12th July 1999 on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz).

21.3. Methodology

Electromagnetic fields and the electromagnetic forces they represent are a fundamental part of the physical world. Electromagnetic forces are partly responsible for the cohesion of material substances and they mediate all the processes of chemistry, including those of life itself. EMF occur naturally within the human body (through nerve and muscle activity) and also arise from the magnetic field created by the Earth and electric fields in the atmosphere.

In the built environment, man-made sources that generate electromagnetic fields include electric appliances, power systems and communication networks (e.g. TV, radio, mobile phones and power lines). EMF can be divided into different bands, each having a range of frequencies that can interact in different ways with living organisms. Depending on the frequency, EMF can be divided into three categories: static electric and magnetic fields (0 Hz), extremely-low frequency (ELF) fields (1 Hz – 3 kHz) and radiofrequency (RF) fields (3 kHz – 300 GHz), which includes microwaves (300 MHz - 300 GHz) as outlined in **Figure 21-1**.

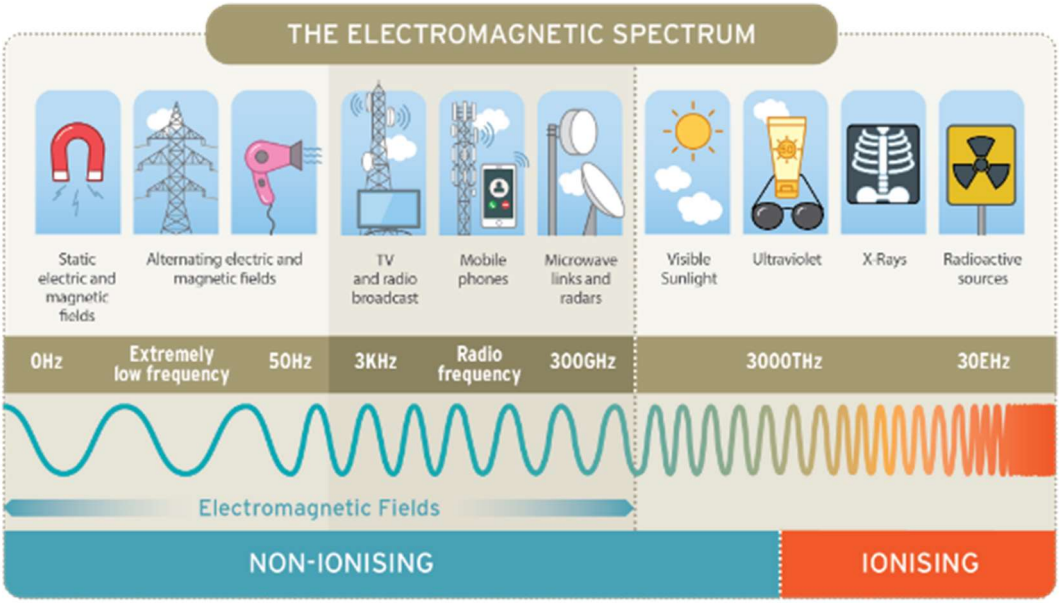


Figure 21-1 The Electromagnetic Spectrum (Source: EPA)

The proposed project will be an electrified Direct Current (DC) rail system with non-ionising electromagnetic radiation. The DART+ Programme will adopt a 1500V Direct Current (DC) system which provides synergy with the existing DART network with traction power provided to the train by Overhead Line Equipment (OHLE). The construction and operation of the new system poses the potential for Electromagnetic Interference (EMI) on receptors and is the subject of this assessment.

The assessment will be informed by a combined Electromagnetic Compatibility (EMC) and Earthing and Bonding (E&B) route-wide desktop survey led by the design team which will enable the production of a comprehensive asset register. The register will contain all identified equipment and assets which may be of interest when considering EMC and E&B along the railway line. The register will include (but is not limited to) sensitive third-party installations along the line of route (hospitals, schools and emergency service dispatch centres), existing electricity transmission networks and towers, GSM-R, known buried services and mobile communications masts as well as electrical systems at existing stations or places of interest.

The general approach for the desktop assessment is as follows:

- Sensitive locations/receptors will be identified along the line of route in the form of an asset register;
- EMC zones along the entire length of the route will be defined to visually assess and quantify the levels of EMC risk for assets that fall within (or are adjacent to) these zones;
- As part of the design of the project, the need for any EMC, electrical or earthing modelling of will be identified and carried out in accordance with European Standards EN 50121;
- An EMC strategy will be completed to ensure ongoing compliance with EMC or E&B legislation.

21.3.1. Study Area

Electric and magnetic field strength decrease with distance from the source so the extent of any interference will be limited to only a short distance from the railway corridor. Existing published calculations and measurements of EMF from power lines indicate that the strength of both the magnetic and electric field would be expected to reduce proportionate to approximately the inverse square or inverse cube (depending on design, phasing) of distance from the source.

The precise distance at which EMI could be considered not an influence will very much depend on the sensitivity of individual receptors. The protection distance provided in the European Directive on Electromagnetic Compatibility (2014/30/EU) is 10m and therefore all systems located 10m or greater from the rail system should not encounter radio frequency interference. However, due to the potential for extremely sensitive equipment used in medical, research or manufacturing facilities the corridor of influence is extended to precautionary 100m. **Table 21.1** lists the study area either side of the alignment.

Table 21.1: Study Area relevant to EMF and Stray Currents

Criteria	Width of Study Area (each side of the alignment)
Potential impacts from Direct Current (DC) fields	100m
Potential impacts from Alternating Current (AC) fields	10m
Potential impacts from Radiofrequency (RF) and microwave fields	100m
Potential impacts from stray currents	100m

The following potentially sensitive receptors will be considered in the assessment:

- Local residents and the community
- Domestic and industrial electrical equipment
- Telecommunications infrastructure (including wireless radio services);
- Data centres containing computer servers;
- Sensitive medical and research equipment;
- Utilities; and
- Mainline rail, suburban rail and light rail systems.

21.3.2. Surveys

21.3.2.1. Desk Surveys

A desktop assessment will be carried out. The following sources will be referenced in the preparation of this section of the EIAR:

- Review of aerial photography;
- An Post Geo Directory (OSI Prime2); and
- Consultations with stakeholders.

21.3.2.2. Field Surveys

No additional field surveys are proposed to inform the EIAR.

21.3.3. Technical Consultation

As part of the assessment, specific consultation with the following organisations as required may be carried out;

- Environmental Protection Agency;
- Utility service providers;
- Identified sensitive third-party installations (hospitals, schools and emergency service dispatch centres etc) where sensitive equipment may be housed.

21.4. Receiving Environment

The study area is located predominantly within the administrative area of Dublin City Council with the remaining sections of the line located within the administrative areas of South Dublin County Council and Kildare County Council. The receiving environment is a mix of urban, sub-urban and rural areas.

Electric and magnetic fields are produced wherever electricity is used. The electric field is produced by voltage and the magnetic field by current. Existing electricity transmission networks and towers, GSM-R, known buried services and mobile communications masts as well as electrical systems at existing stations or places of interest will be identified as part of the receiving environment.

The proposed project will be an electrified Direct Current (DC) rail system. The construction and operation of the new system poses the potential for Electromagnetic Interference (EMI) on receptors. Along the railway corridor, the following infrastructure including transformer units, engine cabs, overhead cables, substations, all have the potential to emit EMFs.

21.5. Potential Impacts

21.5.1. Construction Phase

Power supplies used for construction are generally not sufficient to generate significant levels of EMI. As such, it is considered that there will be no impacts on the public from an EMI, EMF or stray current perspective during the construction phase of the project. This will be assessed further in the EIAR.

21.5.2. Operation Phase

The operation of the electrified line including the OHLE and support systems will be in-line with current best practices in relation to design and installation. Potential impacts during operation may include:

- Impacts to the project itself as a result of external identified electromagnetic field sources;
- Impacts to third party systems as a result of EMI generated from the project;
- Stray currents and the impact on buried structures or utilities such as buried tanks, water pipes and other utilities which run parallel to the system;
- Non-linear fluctuations resulting in “flicker” of lights and dimming causing nuisance to local residents and sensitive receptors;
- Excessive harmonics on the electricity supply can lead to heating and vibration in motors which can shorten their operational lifetime and/or cause substantial damage to motors; and
- Generation of transient emissions that are not controlled by EMC regulations and which can pose a threat to the operation of neighbouring electrical and electronic equipment.

It should be noted that the existing electrified DART network currently operate within the guideline limits on human exposure to EMF. No impacts on public health from EMF are envisaged during the operational phase of the proposed Project, however this will be assessed further in the EIAR.

22. Human Health

22.1. Introduction

Prior to the 2014 EIA Directive (2014/52/EU), the assessment of Human Health was dealt with largely though assessment of precursors to health impacts, including air quality, noise exposure and emissions to soil or water. This was set with reference to standards and limits set to protect human health under these existing EIA topic.

The 2014 EIA Directive now explicitly requires the consideration of human health and this has been embraced by stakeholders on recent projects, particularly those of a transport nature. It is important to note that the potential hazards associated with transport projects are well known, understood and are inherently addressed through the regulatory assessment process set to be protective of health. However, due to the multidisciplinary nature of health, they are structured into individual technical disciplines with their own legislative requirements, polices and guidance.

The purpose of a standalone Human Health chapter is therefore to draw from and expand upon the EIAR outputs of the other relevant chapters to improve the consultation process and form an overarching health conclusion.

The health assessment will:

- Consider an appropriately scoped health assessment, informed by engagement with the Institute of Public Health (IPH) and other health stakeholders as part of an integrated EIAR consultation process;
- Establish an appropriate health and wellbeing baseline which (where data permits) recognises the variation in local community circumstance, and relative sensitivity along the entire length of the proposed project;
- Consider perceived and actual risks raised during consultation, responding to both, and setting any residual risk into context; and
- Include identification and assessment of health determinants including electric and magnetic fields (EMF), water, air, noise, vibration, community severance and socio-economic factors (i.e. income and employment).

A separate chapter and assessment of the potential effects of Electromagentic Compatibility and Stray Current is covered in Chapter 21. The potential effects of EMF on human health will be explored as part of the health assessment, having particular regard to the operational phase of the proposed project, where there is potential for interference with equipment and machines in sensitive locations such as hospitals.

22.2. Legislation, Policy and Guidance

The following guidance documents which relate to the definition and assessment of health will be considered to inform the scope of the assessment and are outlined in further detail below:

Legislation

There is no specific legislation of relevance to this chapter other than the key legislation referenced in the preparation of the EIAR as outlined in Section 4.6 .

Policy

While not specific to health, the following strategic policy documents will be considered to inform the scope of the assessment:

- National Planning Framework: Project Ireland 2040;
- Healthy Ireland Framework 2019 – 2025; and
- Health Impact Assessment (Institute of Public Health Ireland 2009).

Guidance

There is no further specific guidance of relevance to this chapter other than the key guidance referenced in the preparation of the EIAR as outlined in Section 4.6 and that listed below:

- Highways England (HE, 2020), DMRB Volume 11 Section 3 LA 112 Revision 1 Sustainability and Environment, Appraisal, Population and Human Health.
- The Institute of Environmental Management and Assessment (IEMA, 2017), Health in Environmental Impact Assessment: A Primer for a Proportionate Approach.

22.3. Methodology

The health assessment will apply a broad socio-economic model of health that encompasses conventional health impacts such as disease, accidents and risk, along with wider health determinants vital to achieving good health and wellbeing such as employment and local amenity and delivers evidence-based recommendations to maximise health gains and reduce or remove potential negative impacts or inequalities.

The health determinants assessed, and methods employed in the health chapter will be tailored to meet the particular assessment requirements of the proposed Project.

The health assessment draws from and builds upon key outputs from inter-related EIA technical disciplines to assess potential population health outcomes (both adverse and beneficial) and inform an evidence based judgement on their significance.

The assessment methodology will follow a source-pathway-receptor model to identify and assess health effects that are plausible and directly attributable to the proposed project.

A hazard source by itself does not constitute a health risk. It is only when there is a hazard source, a receptor and a pathway of exposure that there is any potential risk to human health. The same is true for potential human health benefits, where a positive influence must be present alongside a pathway of exposure and a receptor for there to be a potential health improvement. Where a source-pathway-receptor linkage exists, it is then the nature of the specific hazard source or positive influence; the magnitude of impact via the pathway of exposure; and the sensitivity of the receptor that will determine what level of health risk or benefit is predicted, if any

22.3.1. Study Area

The survey envelope and receptors assessed within the health chapter will remain consistent with the representative receptors defined by the inter-related EIAR technical disciplines which inform the health chapter.

22.3.2. Surveys

22.3.2.1. Desk Surveys

Local health, wellbeing and socio-economic circumstance within the study area will be collected through a detailed desktop review of publicly available datasets. Data will be collected for County Dublin and County Kildare. Where appropriate and available, data relating to certain public health indicators may be collected at the Electoral Division (ED) level. The sources of information that will be searched and reviewed to inform the assessment are:

- Central Statistics Office (CSO) – for information on Population age structure and change; housing occupancy (tenure); unemployment/employment; educational attainment; disability; population general health; all-cause mortality; cancer mortality; respiratory disease mortality; circulatory disease mortality; and deaths by suicide;
- An Post Geo directory (OSI Prime2);
- Department of Education – for information on Educational institutions (schools, colleges, universities etc.);
- Health Service Executive – for information on Hospitals and healthcare centres; nursing homes;
- Institute of Public Health (IPH) – for information on Physical inactivity; healthy eating; hypertension prevalence; stroke prevalence; angina/heart attack prevalence; hospital admissions for circulatory disease; hospital admissions for respiratory disease; hospital admissions of people aged >15 with principal diagnosis of asthma; life expectancy; hospital admissions for alcohol related conditions; hospital admissions for drug related conditions; hospital admissions for anxiety or depression;
- Lenus, the Irish Health Research repository and the HSE – for County Health Profiles 2015;
- Pobal – for deprivation indices;
- Eurostat – for healthy life expectancy; and
- EPA – for radon monitoring locations and radon levels map.

Different communities have varying susceptibilities to health impacts and benefits as a result of social and demographic structure, behaviour and relative economic circumstance.

The baseline will outline local health, wellbeing and socio-economic circumstance of existing communities along the route of the proposed Project. The data collected will form the basis to any concentration exposure response assessment and mitigation/community support initiatives tailored to local health circumstance and public health priorities.

22.3.2.2. Field Surveys

Data from the surveys undertaken as part of the inter-related technical disciplines will be used to inform the health assessment. These surveys in addition to the desktop land use survey will inform the population and health assessment by identifying potentially sensitive receptors for these disciplines, such as schools, hospitals, residential properties, tourism and recreational amenities.

22.3.3. Technical Consultation

As part of the health assessment, specific consultation with the Institute of Public Health (IPH) and other health stakeholders such as the Health Service Executive (HSE) will be undertaken. In addition, the health specialist will work closely with the stakeholder team to establish the views of key stakeholders and local communities to inform the evidence base and tailor the consideration of health to local circumstance. Consultee responses relevant to human health will be reviewed to ensure that the health assessment is appropriately and proportionately scoped This will be done primarily through the EIAR scoping and public consultation process.

To keep the chapter as concise and accessible as possible, the health assessment cross-refers to any key outputs used from inter-related EIA technical disciplines and does not seek to repeat or replicate text unnecessarily.

22.4. Receiving Environment

The DART+ South West Project passes through the administrative areas of three local authorities, notably Dublin City, South Dublin and Kildare and passes through the residential areas of Glasnevin, Cabra, Islandbridge, Kilmainham, Inchicore, Ballyfermot, Park West, Clondalkin, Adamstown and Hazelhatch.

The Cork Mainline passes adjacent to and in proximity to a range of community facilities, amenities and tourism features as it makes its way from Glasnevin Junction toward Heuston and out to Hazelhatch.

22.5. Potential Impacts

22.5.1. Construction Phase

Health determinants that will be considered during the construction phase of the EIAR comprise:

- The potential health effect from changes to traffic nature and flow rate (community severance, access to services and risk of accident/injury);
- The potential health effect from changes in air quality (including PM_{10}, NO_2 and nuisance from dust);
- The potential health effect from changes in noise and vibration exposure; and
- The potential health benefits due to socio-economic factors (income and employment).

22.5.2. Operation Phase

Health determinants that will be considered during the operational phase of the EIAR comprise:

- The potential health effect from changes to traffic nature and flow rate (community severance, access to services, risk of accident/injury);
- The potential health effect due to improved operating capacity of rail services (i.e. public transport users/rail passengers and road safety, particularly due to the elimination of rail-road interaction);
- The potential health effect from changes in air quality associated with electrification of a large proportion of the rail fleet;
- The potential health effect from changes in noise and vibration exposure;
- The potential health benefits due to socio-economic factors (income and employment); and
- The potential health effect due to EMF exposure.

23. Major Accidents & Disasters

23.1. Introduction

This chapter of the EIAR will presents an assessment of the likely significant adverse effects on the environment arising from the vulnerability of the proposed Project to risks of major accidents and/or natural disasters.

The assessment of the vulnerability of the proposed Project to major accidents and natural disasters is carried out in compliance with the EIA Directive which states the need to assess:

'the expected significant adverse effects of the project on the environment deriving from the vulnerability of the project to risks of major accidents and/or natural disasters which are relevant to the project concerned.'

The underlying objective of this assessment is to ensure that appropriate precautionary actions are taken for those projects which '*because of their vulnerability to major accidents and/or natural disasters, are likely to have significant adverse effects on the environment'*.

Based on the requirements of the EIA Directive, this chapter of the EIAR will seek to determine:

- The relevant major accidents and/or natural disasters, if any, that the proposed Project could be vulnerable to;
- The potential for these major accidents and/or natural disasters to result in likely significant adverse environmental effect(s); and
- The measures that are in place, or need to be in place, to prevent or mitigate the likely significant adverse effects of such events on the environment.

23.2. Legislation, Policy and Guidance

Specific to the Major Accidents & Disasters EIAR chapter, the following legislation, policy and guidance documents will be considered to inform the scope of the assessment:

European Legislation

- Directive 2016/798 of the European Parliament and of the Council of 11 May 2016 on railway safety;
- Regulation (EU) No 402/2013 of 30 April 2013 on the common safety method for risk evaluation and assessment and repealing Regulation (EC) No 352/2009;
- Directive 2012/18/EU of the European Parliament and of the Council of 4 July 2012 on the control of major-accident hazards involving dangerous substances, amending and subsequently repealing Council Directive 96/82/EC (Seveso III Directive).

National Legislation

- European Union (Railway Safety) Regulations 2020, S.I. No. 476 of 2020;
- A Guide to the Chemicals Act (Control of Major Accident Hazards Involving Dangerous Substances) Regulations 2015 (S.I. No. 209 of 2015) (HAS 2015);

Policy

- Dublin City Council Major Emergency Plan 2015
- SDCC (Dec 2016), Major Emergency Plan 2016, Version 6.0
- KCC (May 2010), Major Emergency Plan, Version 1.1
- Dublin City Development Climate Change Action Plan 2019-2024;
- Kildare County Council Climate Change Adaption Strategy 2019-2024;
- South Dublin County Council Climate Change Action Plan 2019-2024;

Guidance

- A National Risk Assessment for Ireland 2020 (Government of Ireland, 2021);
- Major Accidents and Disasters in EIA: A Primer (IEMA, September 2020);
- National Risk Assessment 2019 Overview of Strategic Risks (Department of the Taoiseach, 2019);
- The Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (August 2018);
- Guidance on Assessing and Costing Environmental Liabilities (EPA, 2014);
- A Guide to Risk Assessment in Major Emergency Management (Department of Environment, Heritage and Local Government (DoEHLG, 2010); and
- A Framework for Major Emergency Management, Guidance Document 1, A Guide to Risk Assessment in Major Emergency Management (DoEHLG, 2010)

23.3. Methodology

The requirement to carry out an assessment of the vulnerability of the proposed Project to major accidents and natural disasters is set out in the EIA Directive (2014/52/EU). Current EIA practice already includes an assessment of some potential accidents and disaster scenarios such as pollution incidents to ground and watercourses as well as assessment of flooding events. These will be described in detail in the relevant EIAR assessment chapters (Refer to Chapters 8, 9 and 10 for further detail).

The assessment will follow a risk based approach derived from the EPA guidance on assessing environmental liabilities. The assessment will be carried out following the below 3-staged approach:

- Identification and Screening - identification of plausible risks associated with major accidents and/or disasters;
- Risk Classification – the likelihood of their occurrence assigning a rating from 1 (Extremely Unlikely) to 5 (Very Likely), and the potential resulting consequences assigning a rating from 1 (Minor) to 5 (Catastrophic);
- Risk Evaluation - Once classified, the likelihood and consequence ratings will be multiplied to establish a ‘risk score’ to support the evaluation of risks by means of a risk matrix. This matrix

provides a visual tool. The risks will be colour coded in the matrix to provide a broad indication of the critical nature of each risk ranging from High (15 - 25), Medium (8 -12) and Low (1 to 6).

EU regulation 402/2013 on the "adoption of a Common Safety Method on risk evaluation and assessment" (CSM), sets out a risk management process that applies to all significant technical, organisational and operational changes which may impact on the operating conditions of the railway system. The design team will identify hazards (either planned or unplanned) associated with the whole life-cycle of the project; including the scope of design, construction or operation of the project. Information associated with operational rail safety i.e. hazards of an electrified railway line from the design team will be reviewed to inform the assessment.

Following identification, classification and evaluation of each identified risk; mitigation will be proposed for any occurrences which are categorised as medium or high risk.

23.3.1. Study Area

The potential effect of the proposed Project to cause accidents and/or disasters and the vulnerability of the project to potential disasters/accidents, both natural disasters and man-made disasters represents the principal consideration for this assessment. The spatial scope of the study area will be sufficiently large to enable the representative survey envelope and receptors defined by the inter-related EIAR technical disciplines to inform the assessment.

23.3.2. Surveys

23.3.2.1. Desk Surveys

Desktop analysis will be completed as part of the assessment. In addition, data from the desktop studies and field surveys undertaken as part of the inter-related technical disciplines will be used to inform the assessment.

23.3.2.2. Field Surveys

No additional field surveys are proposed to inform the EIAR.

23.3.3. Technical Consultation

As part of the assessment, specific consultation with the following organisations as required may be carried out;

- Health and Safety Authority (as the regulator under the COMAH Regulations)
- Office of Public Works
- Commission for Railway Regulation
- Relevant County Councils impacted by the proposed project (Dublin City, South Dublin and Kildare).

The risk specialist as well as the designers of the proposed Project, will assist in an interdisciplinary approach for the assessment of Major Accidents and Disasters. The assessment will also require interaction with other specialist discipline leads including Traffic & Transportation, Population, Human

Health, Biodiversity, Land & Soils (Soils, Geology and Hydrogeology), Water (including Hydrology and Flood Risk), Air Quality, Climate, Utilities and EMF.

23.4. Receiving Environment

Ireland's geographic position means it is less vulnerable to natural disasters such as earthquakes or tsunamis, which might pose risk to projects of this nature and scale in other locations. However, in recent times there has been an increase in the number of severe weather events in the country, particularly those leading to flooding and flash flood incidents.

The proposed project intersects a number of the water bodies listed as identified in Chapter 9 and thus areas at risk of flooding can pose a risk to proposed infrastructure. A Flood Risk Assessment (FRA) will be undertaken to inform the design process and will inform the hydrology chapter of the EIAR. The assessment will be carried out in accordance the requirements of "The Planning System and Flood Risk Management, Guidelines for Planning Authorities" and its Technical Appendices (Office of Public Works, November 2009). The FRA will be a separate document to support the application for a Railway Order and will be included in Volume 5 – Supporting Environmental Documents.

The Major Accidents (Seveso III) Directive (2012/18/EU), is an EU Directive that seeks to prevent major industrial accidents involving dangerous substances and to limit the consequences of such accidents on people and the environment. In Ireland, the Chemicals Act (Control of Major Accident Hazards involving Dangerous Substances) Regulations 2015 (S.I. No. 209 of 2015) (the "COMAH Regulations"), implements the Seveso III Directive.

The COMAH Regulations place an obligation on operators of establishments that store, handle or process dangerous substances above certain thresholds to take all necessary measures to prevent major accidents and to limit the consequences for human health and the environment. Under the Regulations, an establishment may qualify as upper tier or lower tier, depending on the inventory of dangerous substances; sites that store, handle or process dangerous substances below a certain threshold do not qualify as establishments under the Regulations. The occurrence of a major emission, fire or explosion resulting from a COMAH establishment has the potential to give rise to a major accident or disaster, immediate or delayed, inside or outside the establishment, and involving one or more dangerous substances.

There are three Seveso sites in proximity to the existing rail line, one upper tier site and two lower tier sites are identified within County Dublin[78]:

- BOC Gases Ireland Ltd. PO Box 201, Bluebell Industrial Estate, Dublin 12 (Upper Tier).
- Iarnród Eireann. Iarnród Éireann Maintenance Works, Inchicore, Dublin 8 (Lower Tier).
- Kayfoam Woolfson. Bluebell Industrial Estate, Naas Road, Dublin 12 (Lower Tier).

[7] https://www.hsa.ie/eng/your_industry/chemicals/legislation_enforcement/comah/list_of_establishments/upper_tier_sites_22dec2020.pdf

https://www.hsa.ie/eng/your_industry/chemicals/legislation_enforcement/comah/list_of_establishments/lower_tier_sites_6april21.pdf

Regarding Seveso sites there is a need to account for consultation distances and consultation with the Health and Safety Authority (HSA) as a result.

There are several EPA licensed facilities in proximity to the existing rail line. These are:

- Industrial Emissions facility: Henkel Ireland Operations and Research Limited (Ballyfermot) [EPA Licence: P0078-01]
- Industrial Emissions/ Waste Facility: Thorntons Recycling Centre (Ballyfermot) [EPA Licence: W0044-02]
- Industrial Emissions/ Waste Facility: Greyhound Recycling & Recovery [EPA Licence: W0205-01]
- Industrial Emissions facility: Metal Processors Limited [P0401-01]

The Henkel facility (which manufactures superglue) may require further engagement with respect to the potential to encounter groundwater contamination. Publicly available licence enforcement documents from the EPA indicates that there is evidence of historical ground contamination at the site.

23.5. Potential Impacts

23.5.1. Construction Phase

Key risks during construction of the proposed Project could include the following:

- Major road traffic accident due to movements of construction vehicles along public roads as a result of traffic management measures for the construction phase;
- Excavation of contaminated land during construction works; and
- Damage to existing rail infrastructure during construction activities resulting in disruption in rail services.

23.5.2. Operation Phase

Key risks during operation of the proposed project could include:

- Train Derailment risk and any other rail safety issues;
- Power failure due to overhead line damage from weather events;
- Infrastructure failures such as Signalling Failure, Bridge Strike, Bridge Collapse, Tunnel Collapse;
- Increased societal risk due to greater proximity of rail passenger population to Seveso sites; and
- Increased societal risk due to increased proximity to residential properties.

24. Interactions and cumulative impacts

24.1. Interaction of Effects

Article 3(1) of the 2014 EIA Directive requires that the interaction between the environmental factors (population and human health, biodiversity, land, soil, water, air and climate, material assets, cultural heritage and the landscape) is identified, described and assessed in the EIAR.

Each of the specialists will consider interactions between environmental factors in their assessment however, a summary of these effects will be outlined in a matrix and provided in a separate chapter.

The interactions assessment will be carried out with regard to The Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions (EC, 1999) and the guidance outlined in Section 4.6 .

24.2. Cumulative Impact Assessment

Annex IV of the EIA Directive (2014/52/EU) Part 5(e), a description of the likely significant effects resulting from: 'the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources'.

The EIAR will include a chapter which will assess the cumulative impact of the proposed Project with other proposed developments. In order to identify any reasonably foreseeable major developments which have the potential to result in a cumulative impact with the proposed Project, a number of planning resources will be referenced. These will include:

- Local Authority planning lists;
- Local Authority planning websites;
- An Bord Pleanála website;
- National Planning Application Database; and
- The EIA Portal maintained by the Department of Housing, Planning and Local Government.

The cumulative assessment will include an assessment of planning applications that may result in positive, negative direct or indirect effects with the project. This will include the assessment of related transport projects that are currently being developed in parallel with DART+ (i.e. BusConnnects, MetroLink and other projects proposed in the GDA Transport Strategy) which will form part of the dynamic future baseline for the transport assessments in the EIAR.

The following guidelines will be considered in undertaking the CIA:

- The EPA Draft Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA, 2017);
- Advice Note Seventeen: Cumulative Effects Assessment. Approach to Cumulative Impact Assessment methodology UK Planning Inspectorate (PINS, 2015); and

- Guidelines on the Assessment of Indirect and Cumulative Impacts as well as Impact interactions (EC,1999).

25. Conclusion

Using this EIA Scoping Report as the basis, Iarnród Éireann is seeking feedback from stakeholders on the following:

- The key issues to be addressed in the EIAR;
- The proposed content of the EIAR and the potential impacts that have been scoped in/out;
- The proposed assessment methodologies to assess the potential impacts; and
- Any other data that the environmental assessments should consider and address in the EIAR.

This consultation process for EIA Scoping will commence on 10th November 2021 and continue for a 5-week period, concluding on 17th December 2021.

All feedback can be submitted up to the 17th of December 2021 to DARTSouthWest@irishrail.ie and should be marked “DART+ South West EIA Scoping”.

TTAJV will continue to scope the EIAR as further assessment is undertaken on the Proposed DART+ South West Project and in consultation with the design team. Scoping will be ongoing through the preparation of the EIAR.

All feedback received during the scoping process will be considered by IÉ and the project team and the EIAR scope updated as required. The EIAR will record all issues raised during Scoping and how they have been addressed in the EIAR. General Data Protection Regulations will apply to all feedback.