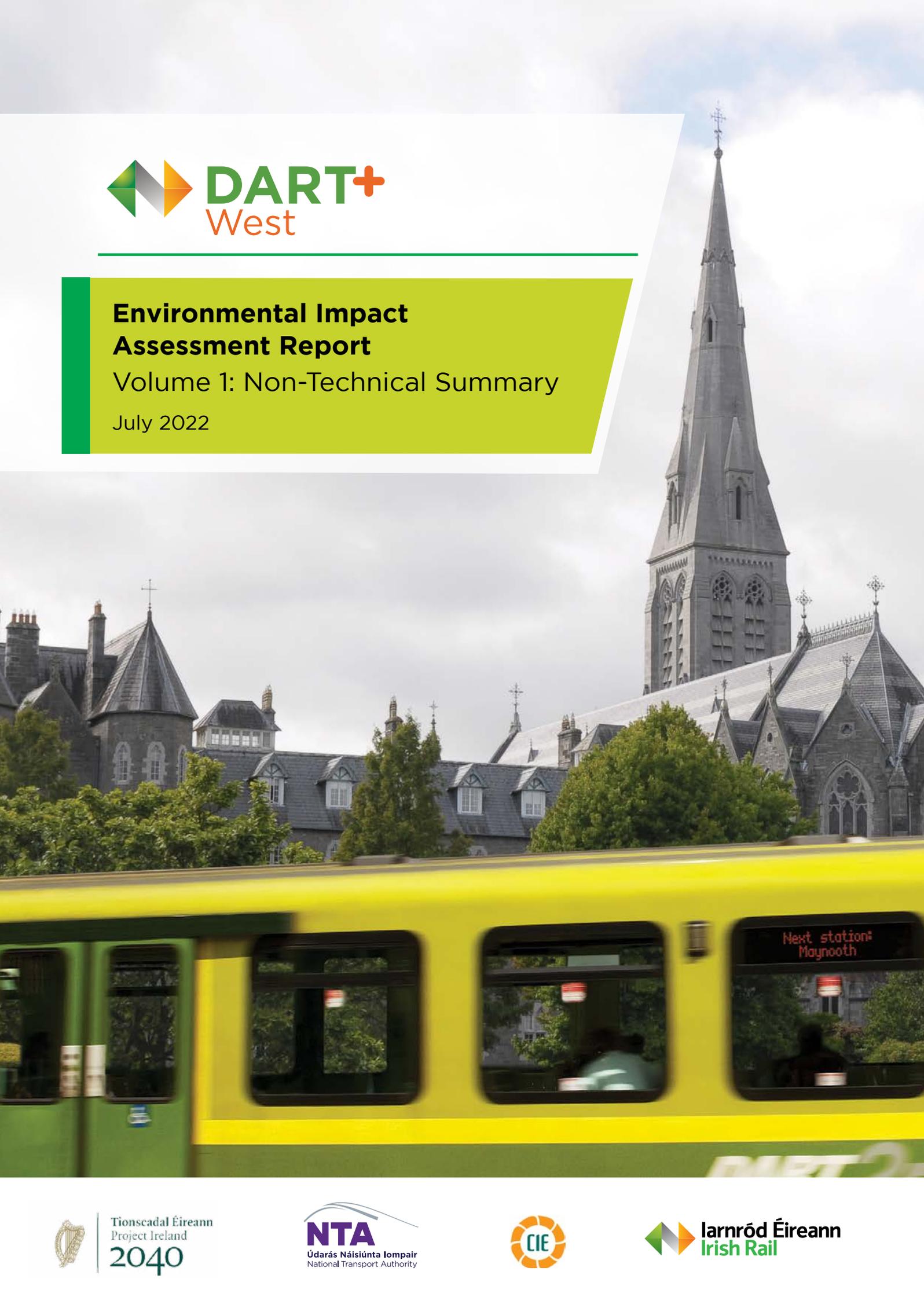




## Environmental Impact Assessment Report

Volume 1: Non-Technical Summary

July 2022



Tionscadal Éireann  
Project Ireland  
2040



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**APPENDIX A    Schematics**

## 1. INTRODUCTION

This Non-Technical Summary (NTS) is prepared for the Environmental Impact Assessment Report (EIAR) for the DART+ West project (“the proposed project” or “proposed development”).

The DART+ West project is seeking to significantly increase rail capacity on the Maynooth & M3 Parkway lines. This will be achieved by changing from diesel powered trains to electrified, high-capacity DART trains and increasing the frequency of trains from 6 to 12 trains per hour per direction. The passenger capacity will increase from 5,000 to 13,200. The project will involve the electrification of approximately 40 km of permanent way (railway line) from the Dublin City centre to west of Maynooth and to M3 Parkway Station and all associated supporting infrastructure.

The electrification of the rail line is located predominantly within the existing railway corridor within Iarnród Éireann (IÉ)/ Córas Iompair Éireann (CIÉ) owned lands however some works will involve the acquisition of private lands to facilitate the project.

The principal project components are as follows:

- Electrification and re-signalling of the Maynooth and M3 Parkway lines (approximately 40km in length).
- Capacity enhancements at Connolly Station (to include modifications to junctions and the station) to facilitate increased train and passenger numbers.
- Provision of a new Spencer Dock Station, which will better serve the north Docklands area and improve interchange with the Luas.
- Closure of level crossings and provision of replacement bridges where required.
- Construction of a new DART depot facility west of Maynooth to facilitate the maintenance and parking (stabling) of trains.
- Interventions at existing bridges over the rail line where there are insufficient clearances for the overhead electrification equipment.
- Substations, electrical buildings and all other civil and ancillary works as necessary to accommodate the project.

DART+ West will be the first project of the DART+ Programme to be delivered by IÉ. 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 (GDA) 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+ Programme will seek to maximise use of the existing railway corridors and implement a modernisation programme to achieve the capacity increase necessary to meet current and future demands. Figure 1-1 provides a schematic layout of the proposed DART+ West project.

The general arrangement drawings of the proposed development are presented in Appendix A of this NTS.

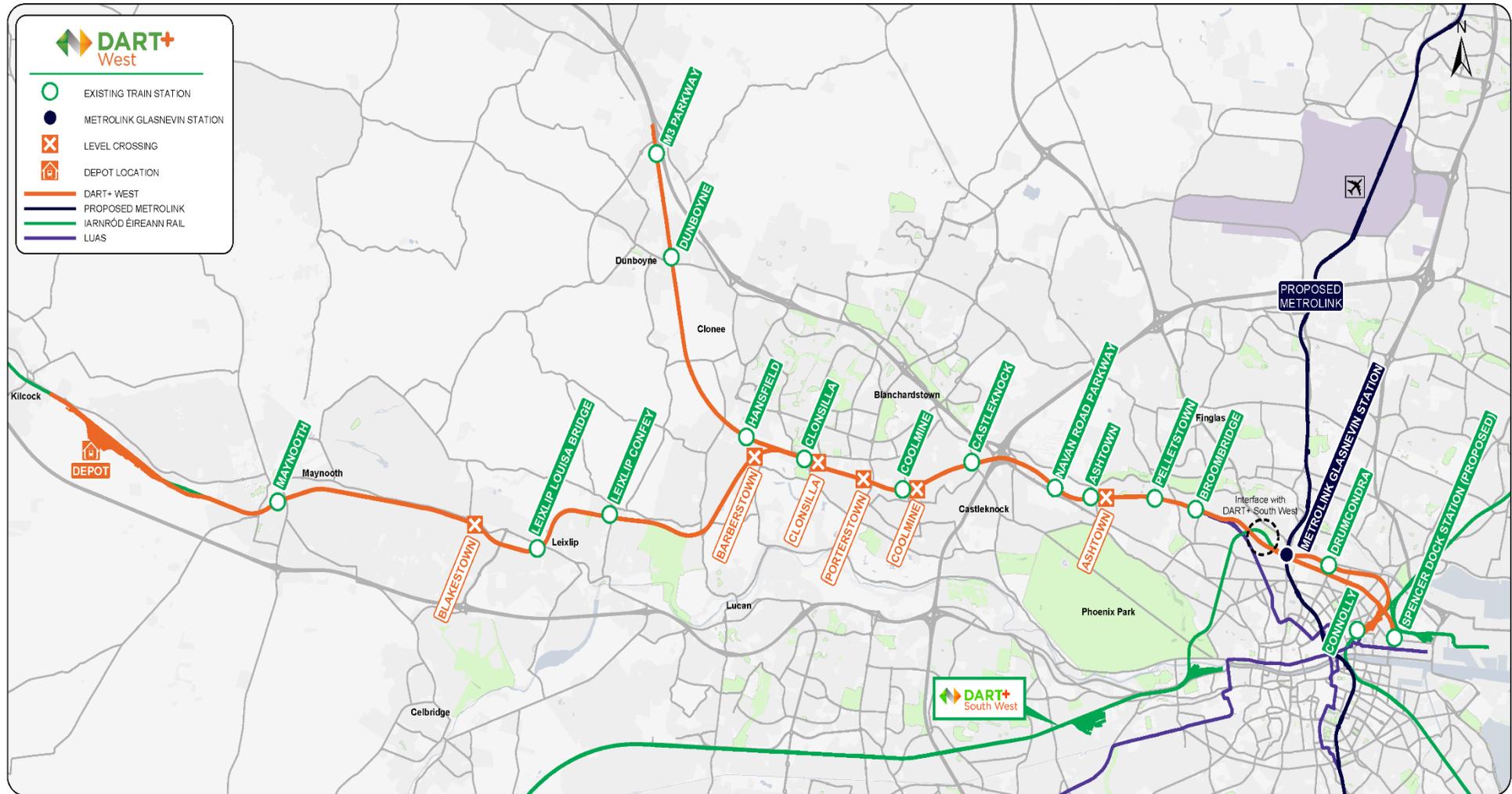


Figure 1-1 Schematic of DART+ West project

## 1.1 Aims and objectives

### 1.1.1 DART+ Programme objectives

DART+ Programme is a transformative programme of projects that aims to modernise and improve existing rail services in the Greater Dublin Area (GDA). It will see the DART network grow from its current 50 km in length to over 150 km.

The DART+ Programme's primary objective is to support urban compact growth and contribute to reducing transport congestion and emissions in the Dublin region by enhancing the heavy rail network between Dublin City Centre and the areas of Drogheda, Maynooth, Dunboyne, Celbridge and Greystones. It will provide a sustainable, electrified, reliable and more frequent rail service, improving capacity along these corridors.

### 1.1.2 DART+ West Project Objectives

The primary objective of the DART+ West project is to increase the carrying capacity on the route between City Centre and Maynooth/M3 Parkway and support the rapid transition required to deliver on a low carbon climate resilient transport system.

Sub-objectives include:

- To deliver a higher frequency, higher capacity, reliable, electrified rail service along the project route corridor to enable the provision of DART services between City Centre and Maynooth Station / M3 Parkway Station.
- To deliver solutions to meet the Train Service Specification (TSS).
- To deliver a sustainable, low carbon and climate resilient design solution including making the maximum use of existing railway infrastructure together with targeted interventions to remove capacity constraints.
- To identify cost effective solutions from a capital, operations and maintenance perspective.
- To minimise adverse impacts on existing rail services, road users and landowners associated with the construction, operation and maintenance of the project.
- To minimise adverse impacts on the natural and built environment associated with the construction, operation and maintenance of the project.
- To deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works.
- To deliver an improved customer experience and service for customers along the project corridors.

## 1.2 Railway Order

The Transport (Railway Infrastructure) Act 2001 (as amended and substituted) ("the 2001 Act") and as recently further amended by the European Union (Railway Orders) (Environmental Impact Assessment) (Amendment) Regulations 2021 in Statutory Instrument No. 743/2021 ("the 2021 Regulations") provides for the application for a Railway Order ("RO") by *inter alia* Coras Iompair Éireann to An Bord Pleanála ("the Board").

The Railway Order application is made pursuant to the provisions of section 37 of the 2001 Act. Section 37 of the 2001 Act requires, *inter alia*, that the application be made in writing and be accompanied by: (a) a draft of the proposed Railway Order; (b) a plan of the proposed railway works; (c) a book of reference to a plan describing the works which indicates the identity of the owners and of the occupiers of the lands described in the Plan; and (d) a statement of the likely effects on the environment of the proposed railway works (this Report).

A statement of the likely effects on the environment of the proposed railway works is addressed by the preparation of this Environmental Impact Assessment Report (EIAR) (previously referred to as an Environmental Impact Statement in section 39 of the 2001 Act).

A Railway Order is the statutory consent to an applicant providing authorisation to construct, maintain, improve and operate the railway or railway works. Railway works and the procedure for obtaining a Railway Order is governed by the Transport (Railway Infrastructure) Act 2001, as amended and substituted.

### 1.3 Requirement for an EIAR

This EIAR has been prepared in accordance with requirements of the EIA Directive (2011/92/EU *Assessment of the effects of certain public and private projects on the environment* as amended by Directive 2014/52/EU<sup>1</sup>) and includes the information set out in section 39 of the 2001 Act and has had regard to relevant guidelines and guidance documents.

### 1.4 The EIA Process

Environmental Impact Assessment (EIA) is a process undertaken as per the European Directives<sup>2</sup> for the assessment of the effects of development projects on the environment. An Environmental Impact Assessment Report (EIAR) is a statement prepared by the developer, providing information on the likely significant effects on the environment based on current knowledge and methods of assessment. It is carried out by competent experts, with appropriate expertise to provide informed assessment on the environmental factors as required under the EIA Directive which are as follows:

- traffic and transportation.
- population.
- biodiversity.
- land and soils.
- hydrology.
- hydrogeology.
- air quality.
- climate.
- noise and vibration.
- landscape and visual.
- material assets.
- archaeology and cultural heritage.
- architectural heritage.
- electromagnetic compatibility and stray current.
- human health.
- major accidents and disasters.
- cumulative effects.

An Bord Pleanála is the competent authority for the purpose of carrying out an environmental impact assessment of the proposed development.

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<sup>1</sup> The European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018) inter alia transposed the Directive.

<sup>2</sup> EU Directive 85/337/EEC as amended by Directive 2011/92/EU and Directive 2014/52/EU

### 1.4.1 Key Stages of the EIA Process

The key stages of the EIA process are illustrated in Figure 1-2. The figure also illustrates the role of consultation throughout the EIA process.

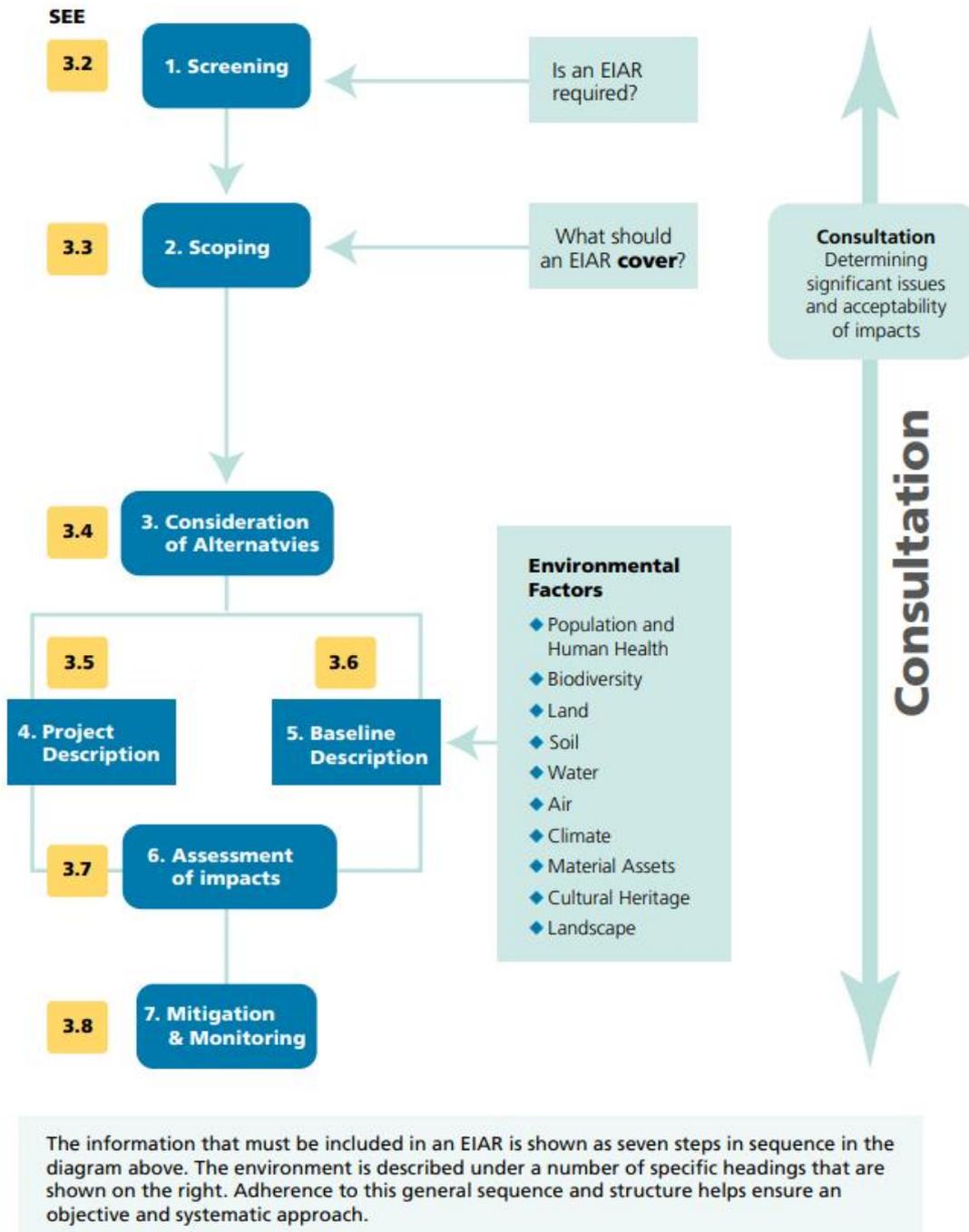


Figure 1-2 Key stages of the EIA process in sequence (EPA, 2022)

## 1.5 Structure of the EIAR

This EIAR has been prepared on behalf of Córas Iompair Éireann/ Iarnród Éireann (“the Applicant”) by IDOM with Roughan & O’Donovan and the assistance of a team of competent experts.

This EIAR is presented in five volumes:

- Volume 1:** Non-Technical Summary
- Volume 2:** Main Text
- Volume 3A:** Technical Figures
- Volume 3B:** Photomontages
- Volume 4:** Technical Appendices

### Supporting Environmental Documents

## 1.6 Consultation

Consultation during the design and environmental impact assessment process is a key element as part of any project. The main consultations stages as part of the project development include the following:

- Pre-Application Consultation with An Bord Pleanála (July 2020 –May 2022).
- Consultation on the Emerging Preferred Option - Non-statutory public consultation no.1 (26 August 2020 - 21 October 2020).
- Non-Statutory Informal EIA Scoping Report (March 2021).
- Consultation on the Preferred Option - Non-statutory public consultation no.2 (28 July 2021- 6 October 2021) & Revised Ashtown Preferred Option localised consultation (9 March 2022- 6 April 2022).
- Statutory consultation as part of the EIA / Railway Order application process.

The non-statutory consultation and feedback received during the consultation phases is addressed in greater detail in Appendix A3.1 Public Consultation No.1 Consultation Findings Report and Appendix A3.2 Public Consultation No.2 Consultation Findings Report in Volume 4 of this EIAR.

## 2. POLICY CONTEXT AND NEED FOR THE PROJECT

This section addresses the policy context and the need for the proposed DART+ West project. In addition, a separate Planning Report (see Supporting Documents of this EIAR) with further detail has been prepared as part of the suite of documentation for the Railway Order application package. The Planning Report sets out the proposed project's compliance with the key planning policy outlined within this chapter.

### 2.1 Project need and strategic fit

The rail network in Ireland and more particularly in the Dublin Metropolitan area is a 19th century legacy, which represent a significant national asset in that it provides high-capacity public transport corridors into and through the city centre. The expansion of the heavy rail network has been a key long-term objective of CIÉ, Iarnród Éireann and statutory transport plans for a significant period. The expansion of the heavy rail network has been stop-start in nature and influenced by available Exchequer funding. The commissioning of the DART in the 1980's is a huge public transport success. Subsequent funding has been provided in the 1990's and early 2000's to improve the rail network and increase capacity. However, due to the national economic downturn in 2008, capital investment was significantly constrained.

Project Ireland 2040 comprises the National Planning Framework 2040 (NPF) and the supporting investment package contained in the National Development Plan. The National Development Plan recommended that the DART+ Programme (previously termed DART Expansion) should proceed to deliver priority elements including investment in new train fleet, provision of new infrastructure and electrification of existing lines.

The NPF and NDP state that the focus should be on non-underground tunnel elements of the programme using existing tracks (i.e., using the Phoenix Park Tunnel branch line). On the 4 October 2021, the National Development Plan 2021-2030 was published in which the DART+ Programme is considered as the "cornerstone of rail investment" within the lifetime of Project Ireland 2040.

Advancement of priority elements of DART+ Programme is now approved in principle under the National Development Plan 2021-2030 and DART+ West will be the first of the DART+ Programme packages that will be lodged with An Bord Pleanála for the approval of a Railway Order application.

The requirement for increased capacity through the implementation of the DART+ Programme and specifically the DART+ West project, is multifaceted and will be transformative for the GDA transport landscape. The delivery of the proposed DART+ West project will enhance heavy rail infrastructure and will similarly contribute to the incremental transformation of the national heavy rail network. At an international level, the DART+ Programme supports Ireland's commitment to fulfil its obligation as an EU member state, regarding both the greenhouse gas emission reduction targets and the improved functionality of heavy rail services and integrated land use planning with sustainable mobility. DART+ West is a cornerstone transport project and will assist with supporting both the European Green Deal, and the Sustainable and Smart Mobility Strategy and climate action commitments.

Notwithstanding the benefits of improving sustainable transport options, the project is fundamental to supporting the economic and social growth that has been highlighted by the National Planning Framework and county development plans. The DART + West project will facilitate multi-modal journeys through the improved integration with other modes including LUAS, the proposed MetroLink, proposed BusConnects, proposed LUAS Finglas, the Royal Canal Greenway and other sustainable mobility infrastructure. The DART+ West is aligned with the implementation of Project Ireland 2040 and the National Planning Framework.

All existing stations on the railway corridor between Connolly Station and Spencer Dock Station to Maynooth Station and M3 Parkway Station will be catered for by more sustainable electrical rail network allowing a shift towards a low carbon emission passenger service through the introduction of a modernised electrified fleet.

The improved frequency and quality of service will provide a viable transport alternative to existing and future communities along the route and support a modal shift to help support a climate resilient low carbon economy.

## 2.2 Policy context

The DART+ Programme is central to the delivery of planning and transportation policy objectives at EU, national, regional and local level. A review of the key planning and policy documents at national, regional and local level is presented in the following sections.

### 2.2.1 European Union Policy

#### **EU White Paper on Transport: Roadmap to a single European Transport Area - Towards a competitive and resource efficient transport system**

In 2011, the European Commission adopted the White Paper Roadmap to a Single European Transport Area - Towards a competitive and resource efficient transport system in the context of the Union's 2020 growth strategy. The vision of the White Paper spans four decades, up to 2050, but also sets earlier goals for 2020 and 2030. The Commission's vision for a competitive and sustainable transport system involves transport that uses cleaner energy, better exploitation of modern infrastructure and a reduction in its negative impact on the environment.

The White Paper defines ten goals designed to guide actions and measure progress to achieve a 60% reduction in CO<sub>2</sub> emissions and comparable reduction in oil dependency. Goals to which the DART+ Programme is aligned:

- *1. Halve the use of 'conventionally fuelled' cars in urban transport by 2030; phase them out in cities by 2050; achieve essentially CO<sub>2</sub> free city logistics in major urban centres by 2030.*
- *4. By 2050, complete a European high-speed rail network. Triple the length of the existing high-speed rail network by 2030 and maintain a dense railway network in all Member States. By 2050 the majority of medium-distance passenger transport should go by rail.*

### 2.2.2 National Policy

#### **Project Ireland 2040: National Planning Framework – Ireland, Our Plan 2040, and; National Development Plan 2021-2030**

"Project Ireland 2040" was launched by the Government of Ireland in February 2018 and comprises the National Planning Framework (NPF) and the National Development Plan (NDP). Project Ireland 2040 is a long-term overarching strategy which for the first time aligns investment decisions with a clearly defined development strategy.

The NPF together with the NDP sets the context for each of the three regional assemblies to develop their Regional Spatial and Economic Strategies (RSESs) taking account of and co-ordinating local authority Development Plans in a consistent manner to ensure national, regional and local plans align with each other.

#### National Planning Framework 2040

The NPF guides development and the exchequer investment up to 2040. It is a blueprint to guide public and private investments to promote and enhance opportunities and infrastructure for an increasing population and sets out the development principles that subsequent plans must follow.

The NPF predicts and plans for an increase in population of one million people from 2016 figures, bringing the total population to 5.7 million by 2040. It is estimated that 2.85 million people will be located within the Eastern and Midlands region. Planning for and delivering sustainable mobility projects is a key objective of the NPF

and will help create a more integrated public transport system, enhance competitiveness, sustain economic progress and enable sustainable mobility choices for citizens.

There are ten National Strategic Outcomes (NSOs) identified within the framework. **NSO 4: Sustainable Mobility** is identified as being central to enhancing competitiveness, sustaining economic progress and enabling mobility choices for citizens. NSO 4 is supported by the delivery of the DART+ Programme whereby, the Framework aims to expand the range of public transport services available and to reduce congestion and emissions. NSO 4 also commits to invest in key transport projects such as the DART+ Programme, BusConnects and MetroLink.

The DART+ Programme will also support other NSOs identified within the Framework such as **NSO 1: Compact Growth** and **NSO 8: Transition to a Low Carbon and Climate Resilient Society**. NSO 1 identifies the need to deliver a greater proportion of residential development within existing built-up areas and the role that an integrated transport network will play in the regeneration and revitalization of urban areas while NSO 8 includes the electrification of transport fleets as a requirement to support a move away from polluting and carbon intensive propulsion systems.



The delivery of the DART+ programme is identified as a ‘key future growth enabler of Dublin’ along with the other rail projects set out in the Transport Strategy for the GDA including MetroLink, and Luas green line link to MetroLink. Delivery of the metropolitan cycle network and BusConnects project are also identified as enablers and will interact positively with DART+ West project.

National Development Plan 2021-2030

National Development Plan 2021–2030 (NDP) published in 2021 sets out the Government’s over-arching investment strategy and budget for the period 2021-2030. It is an ambitious plan that balances the significant demand for public investment across all sectors and regions of Ireland with a major focus on improving the delivery of infrastructure projects to ensure speed of delivery and value for money.

Public investment plays a significant role in addressing the opportunities and challenges faced by Ireland over the coming years such as Covid 19, Brexit, housing, health, climate action and population growth.

The NDP supports the delivery of Project Ireland 2040 through public capital investment over the next ten years and guides national, regional and local planning and investment decisions in Ireland. The NDP provides government departments with greater visibility of their investment capacity over the term. The NDP caters for

an increase in population of over 1 million people by 2040 and identifies €165 billion for investment in capital projects targeted at enhancing regional development and driving economic growth. For the first time in Ireland, climate and environmental assessment of the NDP measures have been undertaken.

The NDP identifies the DART+ Programme as the cornerstone of rail investment within the lifetime of Project Ireland 2040 and represents the single biggest investment in the Irish rail network. The programme comprising a number of infrastructural projects, namely: DART+ West, DART+ South West, DART+ Coastal North to Drogheda via Balbriggan, and DART+ Coastal South. It also includes the expansion and modernisation of the rail fleet, including both battery-electric multiple units (BEMUs) and electric multiple units (EMUs). At the time of the NDP publication, a Preliminary Business Case had been submitted for analysis and approved by the Government as required under the *Public Spending Code* allowing the proposed project to move into the Railway Order application process.

DART+ programme will alleviate some of the constraints on the Dublin City Centre rail network and provide for additional intercity rail services. The NDP supports NSO 4 Sustainable Mobility and outlines the importance of investing in high quality sustainable mobility (active travel and public transport) networks if the NPF population growth targets are to be supported sustainably. It is recognised that the investment in high-quality sustainable mobility will improve citizens’ quality of life, support Ireland’s transition to a low carbon society and enhance the country’s economic competitiveness. The NDP also highlights that the improved and expanded sustainable mobility services and infrastructure can also act as an enabler of the NPF’s commitment toward compact growth of the cities, towns and villages within their existing urban footprint.

### National Sustainable Mobility Policy

The Department of Transport’s National Sustainable Mobility Policy (NSMP) sets out a strategic framework to 2030 for active travel and public transport to support Ireland’s overall requirement to achieve a 51% reduction in carbon emissions by the end of this decade, targeting at least 500,000 additional daily active travel and public transport journeys by 2030.

The NSMP has been developed to align with and complement other international, European and national policies and frameworks, such as the UN Sustainable Development Goals, Paris Agreement, European Green Deal, EU Sustainable and Smart Mobility Strategy and National Planning Framework.

The policy is guided by three key principles, which are underpinned by 10 high level goals as detailed in Table 2-2 below.

**Table 2-2 Principles and Goals**

Principles	Goals
Safe and Green Mobility	<ol style="list-style-type: none"> <li>1. Improve mobility safety</li> <li>2. Decarbonise public transport</li> <li>3. Expand availability of sustainable mobility in metropolitan areas.</li> <li>4. Expand availability of sustainable mobility in regional and rural areas.</li> <li>5. Encourage people to choose sustainable mobility over the private car</li> </ol>
People Focused Mobility	<ol style="list-style-type: none"> <li>6. Take a whole of journey approach to mobility, promoting inclusive access for all.</li> <li>7. Design infrastructure according to Universal Design Principles and the Hierarchy of Road Users model.</li> <li>8. Promote sustainable mobility through research and citizen engagement</li> </ol>
Better Integrated Mobility	<ol style="list-style-type: none"> <li>9. Better integrate land use and transport planning at all levels.</li> <li>10. Promote smart and integrated mobility through innovative technologies and development of appropriate regulation.</li> </ol>

The DART+ West project supports the principles and goals outlined in the NSMP, removing at-grade level crossings from the rail and road network, whilst increasing the service capacity of the commuter rail services, improving the safety of all mobility options and supporting the Safe Routes to School Programme.

The DART+ programme is identified as a key focus for the Greater Dublin Area (GDA), by expanding the electric and battery electric fleet and rail network, with electrified services from 50 km to 150 km by 2030. The DART+ programme also expands and improves public transport services through improved railway infrastructure which is fundamental to achieving the target of an additional 500,000 daily active travel and public transport journeys by 2030.

The principles and goals of the National Sustainable Mobility Policy align with and support the DART+ West project.

### **National Investment Framework for Transport in Ireland (2021)**

In December 2021, the Department of Transport published the National Investment Framework for Transport in Ireland (NIFTI) which replaces the Strategic Investment Framework for Land Transport (SFILT) following the launch of Project Ireland 2040 in February 2018. NIFTI provides a framework to guide transport investment and deliver the infrastructure and services, aligning with the NPF and its National Strategic Outcomes (NSOs) to provide a consistent approach to investment across Government. Through the transport investment priorities identified it will contribute to Ireland's decarbonisation efforts, support vibrant and successful communities, deliver high performing transport systems, and promote a strong and balanced economy.

As part of the future network analysis completed to support investment priorities, NIFTI identifies consistent congestion as an issue in the five major cities in the country: Dublin, Cork, Galway, Limerick, and Waterford. It supports the development of new urban infrastructure supply across the five cities including the development of BusConnects and comprehensive cycle networks, while Dublin will also see heavy rail improvements in the form of DART+ and MetroLink among other things. The continued support of the DART+ Programme demonstrates the substantial investment in sustainable mobility being delivered under the National Development Plan 2021-2030.

The future network analysis undertaken to inform NIFTI has reiterated the importance of the DART+ Programme for the GDA as it will address existing congestion issues, cater for rising travel demand, and support sustainable public transport options across the GDA. The DART+ Programme will also encourage compact growth, transport-orientated development (TOD) and the decarbonisation of the sector to include the purchasing of electric powered trains. The proposed project also supports improvements and maximisation of existing transport infrastructure assets.

To address the transport challenges, NIFTI establishes four investment priorities namely:

1. Decarbonisation.
2. Protection and Renewal.
3. Mobility of People and Goods in Urban Areas.
4. Enhanced Regional and Rural Connectivity.

Projects must align with these priorities to be considered for funding. Moreover, as the NSOs are embedded in NIFTI future investment made in accordance with the priorities will support the delivery of the National Planning Framework over the coming decades. The DART+ Programme is fully aligned with these priorities and is supported under NIFTI. NIFTI investment priorities are outlined in Figure 2-1.



**Figure 2-1 National Investment Framework for Transport in Ireland – Investment Priorities**

### **Climate Action and Low Carbon Development (Amendment) Act 2021**

In July 2021, the Government signed the Climate Action and Low Carbon Development (Amendment) Act 2021 into law amending the 2015 Act. The ‘Climate Act’ provides for the first time, 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 Amended 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.

Transport is one of the key sectors in which substantial emissions reductions are required in order for Ireland to achieve a climate neutral economy by no later than 2050. The DART+ Programme will contribute to achieving this objective.

### **2.2.3 Regional Policy**

#### **Eastern and Midland Regional Spatial and Economic Strategy 2019-2031**

The Eastern and Midland Regional Assembly’s (EMRA) produced the Eastern and Midland Regional Spatial and Economic Strategy 2019-2031 (EM RSES), which is a strategic plan and investment framework and provides regional policy objectives for the Midlands, Eastern and Dublin region. The RSES addresses the implementation of Project Ireland 2040 at the regional level. It considers spatial and economic factors which relate to the future of the region and ensures that employment opportunities, services, ease of travel and the overall wellbeing of citizens is being addressed.

Throughout the strategy there are 3 cross cutting key principles; Healthy Placemaking, Climate Action and Economic Opportunity all of which are supported by the DART+ West project. The Strategy highlights the DART+ and its role in the consolidation of Dublin City and the regeneration of locations such as Dublin Docklands and Poolbeg. Along the North-West corridor, the DART+ West to Maynooth will enhance rail

services along the Dublin – Sligo line. The RSES also emphasizes the role of DART+ to increasing capacity to support the ongoing development of lands adjacent to the line at Leixlip and Maynooth and support the further development of compact sustainable development in existing urban centres.

Maynooth is a key town in the GDA and an economic driver for North Kildare. The delivery of the DART+ West project is identified as a 'enabling infrastructure' for the future sustainable development of Maynooth which is also included in the Metropolitan Area Strategic Plan (MASP).

Policy Objective **RPO 8.8:** *“The RSES supports delivery of the rail projects set out in Table 8.2, subject to the outcome of appropriate environmental assessment and the planning process”.*

The DART+ Programme is listed as one of the rail projects in Table 8.2: *“DART Expansion Programme - new infrastructure and electrification of existing lines, including provision of electrified services to Drogheda or further north on the Northern Line, Celbridge-Hazelhatch or further south on the Kildare Line, Maynooth and M3 Parkway on the Maynooth/ Sligo Line, while continuing to provide DART services on the South-Eastern Line as far south as Greystones”.*

The Strategy highlights the importance of provision of enabling infrastructure for growth in Maynooth, identifying that the *“DART+ project and proposed electrification of the rail line to Maynooth represents a significant opportunity for sequential growth in Maynooth”.* The DART+ West project also supports climate action and economic development across the region.

Project Ireland 2040 requires a Metropolitan Area Strategic Plan (MASP) to be prepared for Dublin as part of the EMRA RSES, which is an “integrated land use and transportation strategy” for the Dublin Metropolitan Area (Dublin, Meath, Kildare and Wicklow). The Dublin MASP contains several objectives for the Dublin Metropolitan Area, including:

**RPO 5.2:** *Support the delivery of key sustainable transport projects including Metrolink, DART and LUAS expansion programmes, BusConnects and the Greater Dublin Metropolitan Cycle Network and ensure that future development maximises the efficiency and protects the strategic capacity of the metropolitan area transport network, existing and planned.*

**RPO 5.3:** *Future development in the Dublin Metropolitan Area shall be planned and designed in a manner that facilitates sustainable travel patterns, with a particular focus on increasing the share of active modes (walking and cycling) and public transport use and creating a safe attractive street environment for pedestrians and cyclists.*

The DART+ West project aligns with the vision and regional policy objectives for MASP. It will support sustainable transport objectives and enabling infrastructure for key locations prioritised for future population and economic development including Dublin City centre and suburbs, Maynooth, Leixlip and Dunboyne.

### **Transport Strategy for the Greater Dublin Area 2016-2035**

The Transport Strategy for the Greater Dublin Area 2016-2035 is a policy framework document published by the National Transport Authority which outlines the delivery and planning of transport infrastructure for the Greater Dublin Area (GDA), which comprises of counties Dublin, Meath, Wicklow, and Kildare. This document integrates short, medium, and long-term plans for rail, bus, cycling, walking and roads with the aim to *‘contribute to the economic, social and cultural progress of the GDA by providing for the efficient, effective and sustainable movement of people and goods’.*

The Strategy recognises the many benefits metropolitan rail services would bring to areas due to increased use of the existing asset of the Maynooth Line stating it *“would have many advantages, particularly in the context of development at locations such as Hansfield and Pelletstown. As such, it is proposed to extend DART to Maynooth by electrifying this line and by removing the level crossings.”*

Some of the Heavy Rail Infrastructure provision identified in the Strategy includes the following:

- “Implement the DART Expansion Programme, which will provide DART services as far north as Drogheda; to Hazelhatch on the Kildare Line (including a tunnel connection from the Kildare Line to link with the Northern / South-Eastern Line); to Maynooth in the west and to the M3 Parkway.”
- Develop a new train control centre to manage the operation of the rail network.
- Construct additional train stations in developing areas with sufficient demand.
- Implement a programme of station upgrades and enhancement.
- Ensure an appropriate level of train fleet, of an appropriate standard, to operate on the rail network.

The Strategy also outlines its objectives for Transport Services and Integration, including bus and rail services, in relation to the rail service, the Strategy proposes the following:

- The DART services will operate to a high frequency with adequate capacity to cater for the passenger demand. It is anticipated that DART services in the city centre section of the network will operate to a regular ten minute service frequency in the peak hours from 2016 and will transition to a five minute service frequency following the completion of the DART Expansion Programme.

The DART+ West project supports the delivery of the Transport Strategy for the GDA.

#### 2.2.4 Local Policy

##### Dublin City Development Plan 2016–2022 (under review)

The Dublin City Development Plan is a local level policy document prepared by Dublin City Council (DCC). The plan provides an integrated, coherent framework for planning and development within the Dublin City Council boundary. The Dublin City CDP is produced to ensure that the city is developed in an inclusive way that improves the quality of life while making the city a more attractive place to visit and work. The Dublin City CDP remit includes the areas between Dublin Docklands and Ashtown level crossing. The DART+ West project aligns with and supports the following policies from the DCC CDP:

**Policy MT4:** *To promote and facilitate the provision of Metro, all heavy elements of the DART Expansion Programme including DART Underground (rail interconnector), the electrification of existing lines, the expansion of Luas, and improvements to the bus network in order to achieve strategic transport objectives.*

**Policy MT6:** *(i) To work with Iarnród Éireann, the NTA, Transport Infrastructure Ireland (TII) and other operators to progress a coordinated approach to improving the rail network, integrated with other public transport modes to ensure maximum public benefit and promoting sustainable transport and improved connectivity.*

##### Fingal Development Plan 2017 – 2023

The Fingal County Development Plan is a local level policy document prepared by Fingal County Council (FCC). The plan aims to sustainably improve the environmental, economic, social and cultural heritage assets of the Fingal area. The FCC CDP remit in the context of the DART+ West project includes the areas from the Ashtown level crossing west to Leixlip. The DART+ West project aligns with the following aims and objectives:

**Strategic Aim 15:** *Seek the development of a high-quality public transport system throughout the County and linking to adjoining counties, including the development of the indicative route for New Metro North and Light Rail Corridor, improvements to railway infrastructure including the DART Expansion Programme, Quality Bus Corridors (QBCs) and Bus Rapid Transit (BRT) systems, together with enhanced facilities for walking and cycling.*

**MT30:** *Support Iarnród Éireann and the NTA in implementing the DART+ Programme, including the extension of the DART line to Balbriggan, the design and planning for the expansion of DART services to Maynooth and the redesign of the DART Underground.*

### **Kildare County Development Plan 2017 – 2023**

The Kildare County Development Plan (KDCP) is a local level policy document prepared by Kildare County Council (KCC). The plan sets out an overall strategy for the proper planning and sustainable development of the functional area of County Kildare, over the 2017-2023 period and beyond. In the context of the DART+ Programme the KDCP relates to the areas from Leixlip extending west to the proposed Depot west of Maynooth. The DART+ West project aligns with the following policies and objectives from the County Development Plan:

**MT 1:** *Promote the sustainable development of the county through the creation of an appropriately phased integrated transport network that services the needs of communities and businesses.*

**PTO 7:** *Promote and support the upgrading of the Maynooth rail line and the Kildare rail line, in accordance with the Transport Strategy for the Greater Dublin Area 2016-2035 and in co-operation with the NTA.*

### **Meath County Development Plan 2021-2027**

The Meath County Development Plan is a local level policy document prepared by Meath County Council (MCC). The Plan outlines a series of policies and objectives and provides a development strategy for the county. The vision of this plan is to “*Improve the quality of life of all citizens in Meath by creating an environment that supports a vibrant growing economy and a well-connected place to live, learn and do business*”. The DART+ West project aligns with the following policies and objectives from the County Development Plan:

**ED OBJ 10** *“In accordance with RPO 4.33 of the Regional Spatial and Economic Strategy, to support the continued development of Maynooth, co-ordinated with the delivery of strategic infrastructure including pedestrian and cycle linkages within the town and to the Royal Canal Greenway, DART expansion and road linkages forming part of the Maynooth Outer Meath County Development Plan 2021-2027 Chapter 4 Orbital Route in a manner which supports future development and population growth and builds on synergies with Maynooth University promoting a knowledge-based economy”*

### 3. ALTERNATIVES

This section presents an overview of the reasonable alternatives studied during the development of the project which have been informed by relevant policy/ plans, previous studies and developed and refined as part of the ongoing design development and EIA process.

#### 3.1 Option selection process

The Multi-Criteria Analysis (MCA) technique has been applied to inform the option selection process to determine the end to end preferred option for the proposed development. The MCA was informed by the Common Appraisal Framework (CAF) for Transport Projects and Programmes (Department of Transport Tourism and Sport, March 2016 and updated October 2020). The CAF Guidelines require projects to undergo a MCA under a common set of six CAF criteria referred to as parameters. These include:

- **Economy** relates to impacts of a transport investment on economic growth and competitiveness which are assessed under the economic impact and economic efficiency criteria.
- **Integration** considers the extent to which the project being evaluated promotes integration of transport networks and is compatible with Government policies, including national spatial and planning policy.
- **Environment** embraces a range of impacts, such as emissions to air, noise, and ecological and architectural impacts.
- **Accessibility and Social Inclusion** embraces the notion that some priority should be given to benefits that accrue to those suffering from social deprivation, geographic isolation and mobility and sensory deprivation.
- **Safety** is concerned with the impact of the investment on the number of transport related accidents.
- **Physical Activity** relates to the health benefits derived from using different transport modes.

##### 3.1.1 Criterion

The criteria and sub-criterion are the measures of performance by which the options were assessed. It is appropriate that the approach should reflect the project objectives and the infrastructural element under consideration. The CAF Guidelines were used as a basis to inform the development of the respective sub-criterion which were adapted based on the individual infrastructural components under examination. For example, level crossing replacements sub-criterion may be different to the substations sub-criterion or construction compounds, etc. and were amended in the respective MCA methodology as appropriate.

This approach allows for consistency but also appropriate flexibility in the approach to the options assessment process. In some cases, some criteria were scoped out – if they were not deemed relevant to the option assessment under examination.

##### 3.1.2 Comparative assessment

The assessment undertaken is of a comparative nature (options compared against each other). This is based on the CAF criteria and based on professional judgement in respect of the items to be qualitatively evaluated, and comprehensively assessed against the key relevant criteria in accordance with CAF Guidelines and good industry practice.

The assessment compared the relevant options, identifying and summarising the comparative merits and disadvantages of each alternative under all the applicable criteria and sub-criteria leading to a Preferred Option.

A comparative assessment was undertaken for each option developed, where in general, for each positively scored option there must be an opposing negatively scored option. Table 3-1 provides an overview of the

comparative colour coded scale for assessing the criteria and sub-criterion. For illustrative purposes, this scale is colour coded with advantageous options graded to 'dark green' and disadvantaged options graded to 'dark brown'.

**Table 3-1 Comparative colour coded scale for assessing the CAF criteria and sub-criteria**

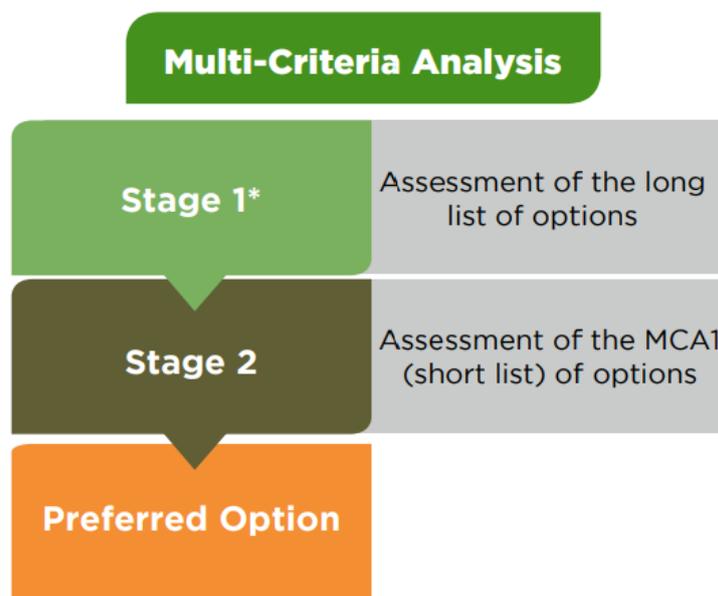
Colour	Description
Significant comparative advantage over all other options	Significant comparative advantage over all other options
Some comparative advantage over all other options	Some comparative advantage over all other options
Comparable to all other options	Comparable to all other options
Some comparative disadvantage over all other options	Some comparative disadvantage over all other options
Significant comparative disadvantage over all other options	Significant comparative disadvantage over all other options

**Stage 1**

In the Stage 1 assessment, the multi-criteria analysis (MCA) is called MCA1 and it is developed to facilitate a ranking of each option against a set of defined criteria. MCA1 comprises either a qualitative and/ or quantitative assessment of the options developed. The MCA1 assesses all options based on high level design or baseline data collection to screen and assess the long list of options. The long list of options is assessed against the defined sub-criterion, and the significance of the impacts to sift out options which do not fully meet the project objectives and/or identify options that are more advantageous over others, leading to a short-listing of options. For some design elements of the proposed project a Stage 1 assessment was sufficient and resulted in arriving at a preferred option.

**Stage 2**

In some cases, a more detailed multi-criteria analysis (MCA) is required. This is called a Stage 2 MCA. The Stage 2 MCA examined the shortlisted options from MCA1 in greater detail in some to determine a preferred option. The same general selection process is followed for both Stage 1 and Stage 2 MCAs. However, in the Stage 2 MCA additional design development / further studies and subsequently more detailed analysis / assessment is undertaken.



**Figure 3-1 Multi-Criteria Analysis**

## 3.2 Overview of Alternatives Considered

### 3.2.1 Do Nothing

In the Do-Nothing scenario the proposed development does not go ahead and therefore the capacity and potential of the public transport system would remain restricted. Without intervention there would be continued growth of traffic congestion and environmental emission targets will not be met. In the absence of enhanced capacity, journey time and reliability, the ability to attract new passengers is limited, particularly from private car users. The Diesel Multiple Unit DMU fleet will continue to operate along the Maynooth line and the reliance on fossil fuels continues. The risk of vehicle strikes at the level crossings is not alleviated and strategic objectives are not met.

### 3.2.2 Do Minimum

In the Do-Minimum scenario it is assumed that all level crossings along the Maynooth rail line are closed to vehicular traffic, with no replacement road infrastructure provided at any location. The Do-Minimum scenario consists of the closure of the crossings with no alternative access. Based on the proposed increase in train frequencies this would result in insufficient crossing time available to accommodate traffic, with barrier closures for up to an hour during peak time. With the retention of the crossings and no alternative access, this could lead to frustration for drivers and an increase in the likelihood of accidents (vehicle strikes) along the train line.

### 3.2.3 Do Something “Preferred Option”

The Do-Something “Preferred Option” scenario defines the proposed DART+ West project (as described in Chapter 3 Alternatives in Volume 2 of this EIAR), and project objectives are met. Under this scenario, the passenger capacity and frequency of trains is increased all while traffic congestion at the level crossings has been reduced. The frequency and quality of service that will be provided will provide a viable transport alternative to communities along the route and help encourage people from private car use to public transport. Sustainable economic development and population growth is supported through the delivery of an efficient, sustainable, low carbon and climate resilient heavy rail network. Ireland’s advancement towards a low emissions transport system and emission reduction targets are achieved. Multiple options were considered and assessed using the methodology outlined above under each of the following key infrastructural elements of the proposed development:

- Electrification, re-signalling and telecommunications.
- Structures (rail overbridges).
- Permanent way.
- Level crossings.
- Stations.
- Depot.
- Depot access.
- Construction compounds.
- Main Storage Distribution Centre (MSDC).

Detailed assessment of alternatives led to the identification of the “Preferred Option” for the Do-Something scenario which was brought forward and developed and has been the subject of Environmental Impact Assessment.

## 4. PROJECT DESCRIPTION

### 4.1 Description of Proposed DART+ West Development

#### 4.1.1 Overview

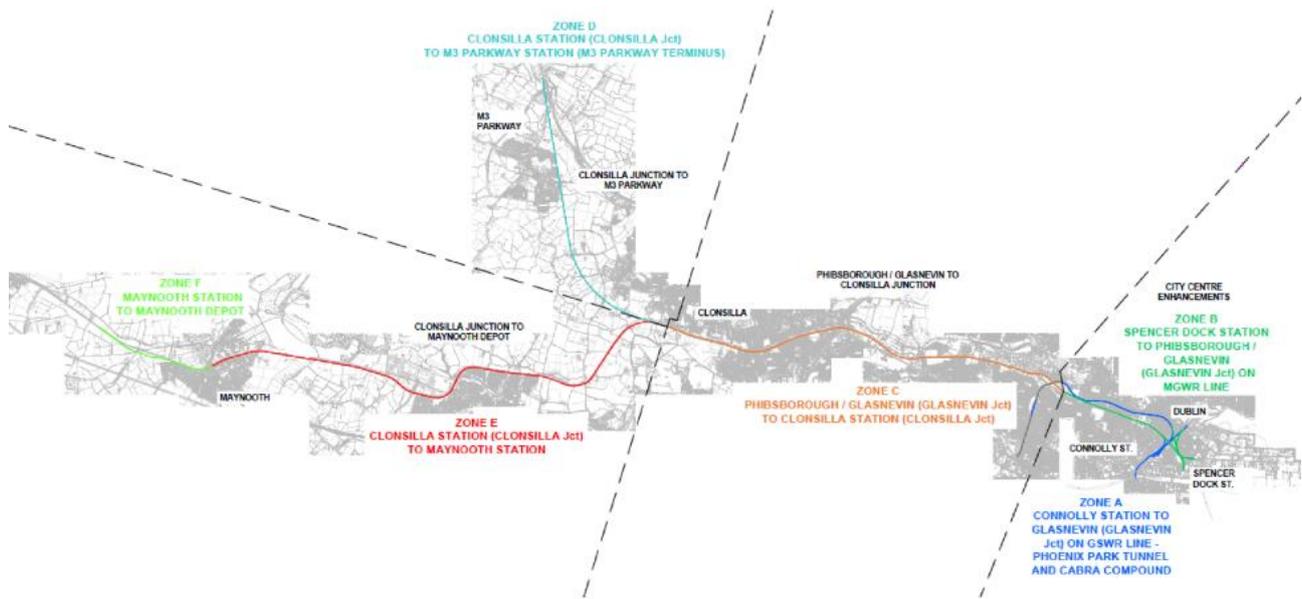
The proposed DART+ West project will consist of electrification and re-signalling of the existing Great Southern & Western Railway (GSR) and the Midland Great Western Railway (MGWR) rail lines from Dublin City centre extending west of Maynooth town as far as the proposed depot and to M3 Parkway Station. The works extend across four administrative areas/local authority areas, including Dublin City, Fingal, Kildare and Meath. The total length of the proposed development is approximately 40 kilometres.

The main infrastructure elements associated with the proposed development include the electrification of the existing railway corridor to support new Electrical Multiple Unit (EMU) trains, the construction of a new station at Spencer Dock in Dublin City centre, and the passenger capacity enhancements at existing train stations as required. It will require the closure of the six existing level crossings along the railway line to allow for increased train capacity. From east to west, these level crossing closures are at Ashtown, Coolmine, Porterstown, Clonsilla, Barberstown and Blakestown. The project includes road bridges or pedestrian and cycle bridges to maintain connectivity at the level crossing where required.

The project is described from east to west from Dublin City centre (Connolly Station/ Spencer Dock Station) to M3 Parkway Station and then reverts back to Clonsilla (east) and continues west to the proposed depot located west of Maynooth. For the purposes of describing the project, the description has been divided into six geographical zones as described in Table 4-1 and shown in Figure 4-1.

**Table 4-1 EIA geographical zones of the project**

Name	Section	Description
Zone A	Loop Line Bridge to Phibsborough/ Glasnevin (on GSR line) and East Wall Junction (on Northern line)	Loop Line Bridge (northern side) to Glasnevin (Glasnevin Jct) on GSR line (mainly on a viaduct) (including Cabra compound). On the Northern Line, Connolly Station to East Wall Junction (Tolka River Bridge).
Zone B	Spencer Dock Station to Glasnevin Junction	Spencer Dock Station to Phibsborough/Glasnevin (Glasnevin Jct) on MGWR line (primarily in cutting)
Zone C	Glasnevin junction/ Phibsborough to Clonsilla Station/Junction	Phibsborough/Glasnevin (Glasnevin Jct) to Clonsilla Station (Clonsilla Jct)
Zone D	Clonsilla Station/Junction to M3 Parkway Station	Clonsilla Station (Clonsilla Jct) to M3 Parkway Station (M3 Parkway terminus)
Zone E	Clonsilla Station/Junction to Maynooth Station	Clonsilla Station (Clonsilla Jct) to Maynooth Station
Zone F	Maynooth Station to Depot	Maynooth Station to Maynooth Depot, doubling the track



**Figure 4-1 EIAR geographical zones of the project**

#### 4.1.2 All Zones

To avoid repetition, elements common to all zones of the DART+ West project are listed in the general linear works below:

##### 4.1.2.1 General Linear Works

To avoid repetition, elements common to all sections of the project are listed in the general linear works section below and are not repeated at each location along the scheme. The following is a summary of the works required to enable the electrification of the line and the upgrade of the existing network:

- Overhead electrification equipment will be required to provide electrical power to the network’s new electrified train fleet. This will be similar in style to that currently used on the DART network.
- Twelve substations will be required at intervals along the full length of the line to provide power to the network.
- Signalling upgrades and additional signalling equipment will be required to the upgraded infrastructure to allow the delivery of the proposed train service specification.
- Improving boundary walls and fencing to ensure public safety due to the electrification of the line. This will require increasing the height of walls in some instances to provide the necessary protection and physical segregation between public areas and the railway corridor.
- Alterations to railway tracks, including minor realignment and track lowering.
- Utility diversions required to accommodate new and upgraded infrastructure, vegetation management and other ancillary works provided along the length of the project.

#### Overhead Electrical Equipment

The new DART trains will be electrically powered from overhead wires and associated support wires. The appearance of the proposed infrastructure will be similar to that used on the existing DART. In order to carry the wires, structural steel supports are necessary. A typical steel mast support has been selected and is illustrated below. Masts will typically rise to between 6.0 m and 8.5 m above rail level. It is anticipated they will be located at spacings of between 40 m and 50 m along the railway. The appearance of the proposed infrastructure will be similar to that used on the existing DART as shown in Figure 4-2. In particular instances where space is constrained, variants on the steel supports will be used to suit the constraints such as proximity to the Royal Canal or property boundaries.



**Figure 4-2 Sample DART OHLE Equipment**

### Signalling

The existing railway incorporates signalling infrastructure along its length in the form of underground cables, track level sensors and switches, and visible signals on posts or gantries which communicate instruction to the train drivers along the route. As part of DART+ West it is intended to replace the existing signalling system with modern technology which will serve the more frequent train service. The proposed signalling system will incorporate similar components to those already in use on the DART line. Signal masts, signals gantries and location cases (LOCs) are shown in Figure 4-3 below.



**Figure 4-3 Sample DART+ West signalling infrastructure (cantilever, signal, LOC, from left to right)**

### Communications system

Telecommunications for a rail project are critical to ensure all train movements are managed and regulated in a safe manner. The telecommunications provide a link between the remote signalperson, the lineside signal / communications infrastructure and the train driver. The telecommunications infrastructure includes underground cabling, lineside telecom location cases and localised building infrastructure. The telecommunications system also controls station infrastructure, such as cameras, telephones, loudspeakers, public information displays for trains, etc.

### Electrical substations

Electrical power will be supplied to DART+ West at twelve electrical substations located at intervals along the line. Electrical power from the ESB network will be supplied to the DART+ West substations and it will be converted to 1,500 V direct current to power the overhead line electrical system. Electrical substation buildings are approximately 5.0 m high x 30 m long x 10 m wide. The substations will be located within a secure compound, behind palisade fencing for security purposes.



**Figure 4-4 Sample electrical substation**

### Ancillary Equipment Cabins

There are a number of equipment cabins which are required to support the signalling, electrical and telecommunication infrastructure. These will be located within existing Iarnród Éireann lands where possible and will typically be within stations and where similar cabins are currently evident. The cabins are typically fenced off for security purposes. The various cabins required along the works are:

- Signalling Equipment Rooms (SERs).
- Principal Supply Points (PSP's).
- Telecommunication Equipment Rooms (TERs).



**Figure 4-5 Example Equipment cabinet**

### Trackwork Alterations

It is proposed to alter the existing track alignment where necessary to ensure there is sufficient space to fit the electrical infrastructure under bridges along the route and, in some instances to improve the track alignment in accordance with current standards. The alterations typically include lowering sections of the railway marginally and altering the associated drainage and utilities equivalently.

### Interventions at Bridges to Obtain Necessary Clearance

Sufficient height at bridges is a critical project requirement for DART+ West, as there needs to be sufficient space between the roof of trains and the underside of the bridge to accommodate the new overhead electrification system. There are a number of locations where space is insufficient and interventions are necessary. Alternative design solutions have been selected including the following:

1. Provision of specialist electrical solutions.

2. Lowering of the rail track with measures to protect against flooding and to ensure rail stability.
3. Modification of an existing bridge.
4. Replacement of access over an existing bridge with equivalent access over a proposed new bridge with appropriate architectural consideration.
5. Realignment of the rail corridor to avoid a bridge.
6. A combination of the above.

There are a number of locations along the scheme where structural interventions are required. These are:

- Modification of an existing flat deck bridge by raising the existing bridge deck by between 200 mm and 320 mm. This solution is proposed at Old Navan Road Bridge, and Louisa Bridge.
- Modification of an existing arch bridge with replacement precast arch to a higher profile and altering the spandrel and parapet walls. This applies at Broombridge, Castleknock railway bridge and Leixlip Confey Station railway bridge. A section of new railway alignment is proposed between Maynooth and the new depot, south of the existing railway corridor to avoid the requirement to reconstruct Jackson's bridge.

### **Level Crossing Removals**

There are a number of existing level crossings along the route. These are located at (east to west) Ashtown, Coolmine, Porterstown, Clonsilla, Barberstown and Blakestown. The level crossings constrain railway capacity due to the need to share the interface with cars, pedestrians and cyclists. In order to achieve the project objectives for passenger rail service increases it is not viable to retain the level crossings in their current form or with enhancements. The permanent removal of the level crossings is necessary to achieve the increased train frequency.

On removal of the level crossings, the boundary of the railway will be secured with palisade fencing 2.4 m high and gates which will allow Iarnród Éireann maintenance access to the railway. Where existing usage patterns of the level crossings exhibit significant activity, alternative equivalent access is proposed in the form of bridges and roadworks. Infrastructural proposals in respect of each of the level crossing locations is included in the zonal description of the proposed project.

### **Ancillary Works**

With the installation of electrified lines, interventions will be necessary at structures along the length of the scheme to provide protection from accidental or deliberate interference. Boundary walls along the railway will need to be raised to remove the risk of the public coming into contact with the electrification equipment, for example along the Royal Canal at Whitworth Road. Parapet walls on bridges crossing the railway will have to be raised in height to a minimum of 1.8 m above adjacent pavement level.

### **Utility Diversions**

Existing utilities such as water mains, electricity cables, telecommunications cables and gas mains, both underground and above ground will require temporary and permanent diversion to accommodate the scheme. This will typically involve the relocation of the existing services along new routes to make space for the new infrastructure.

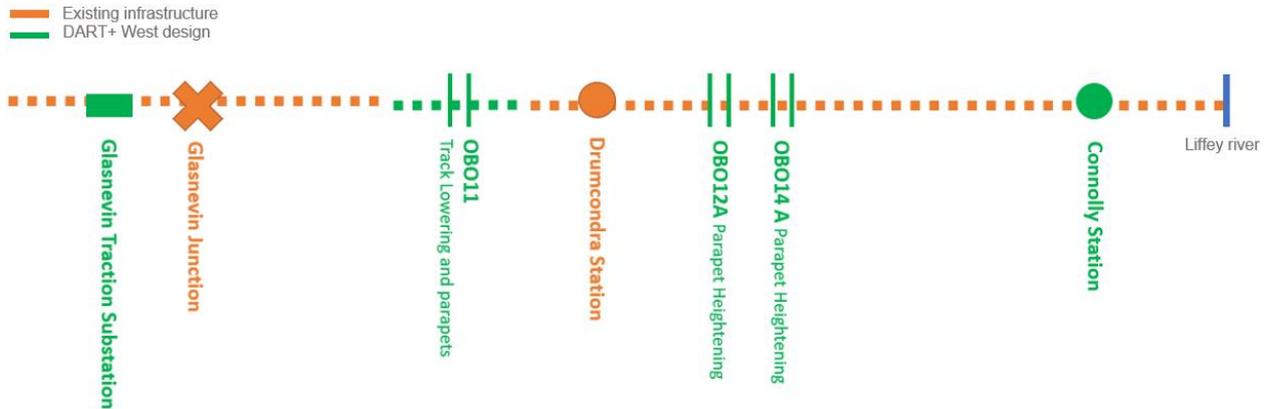
#### **4.1.3 Zone A**

Zone A runs east to west from the Loop Line above the Liffey River and Connolly station to Glasnevin junction in Dublin City along the GSWR line, together with a short section in the branch to the Phoenix Park around Cabra for the location of a temporary construction compound. The zone is approximately 4.65 km in length (without considering Cabra Compound). It also includes the Northern Line section between Connolly Station and the Tolka River in the north (1.15 km in length).

Works in Zone A will include:

1. Modifications in Connolly station.
2. Parapet heightening in OBO14 Drumcondra Station footbridge.
3. Parapet heightening in OBO12 Claude Road footbridge.
4. Track lowering and parapets heightening below OBO11 Prospect Road Bridge.
5. Construction of a new traction substation at Glasnevin.
6. Signalling, Electrification and Telecommunication (SET) installation.

No infrastructure works are required between the Loop Line Bridge and Connolly Station.



**Figure 4-6 Scheme of the DART+ West interventions in Zone A**

#### 4.1.3.1 Connolly Station

Zone A includes some interventions in Connolly Station due to the requirement to provide increased passenger capacity at the station. It will require a new access point at Preston Street through the currently disused vaults, a 19<sup>th</sup> Century protected structure, to connect with platforms 5, 6 and 7 and manage increased passenger numbers safely.

#### Station entrance at Preston Street

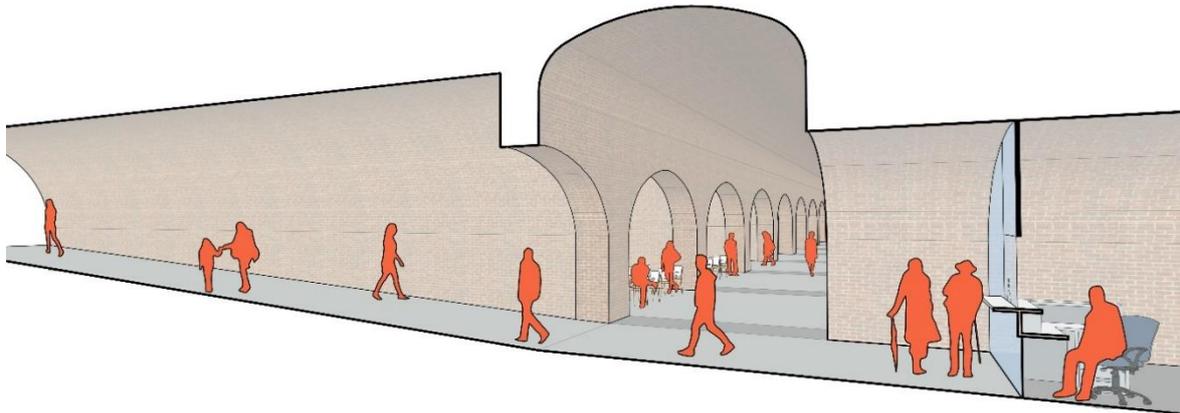
A new access to Connolly Station is proposed at Preston Street. At the end of the street, there is an arch that will be converted into the new station entrance. From that arch, passengers will enter into a vault leading directly to the vaults area's central corridor. Part of that central corridor will be transformed into a concourse. A new façade will be created at the entrance point to highlight the existence of the new access. The new Preston Street façade will also have an opening to a second vault for bicycle parking, which will also have direct access to the central corridor.



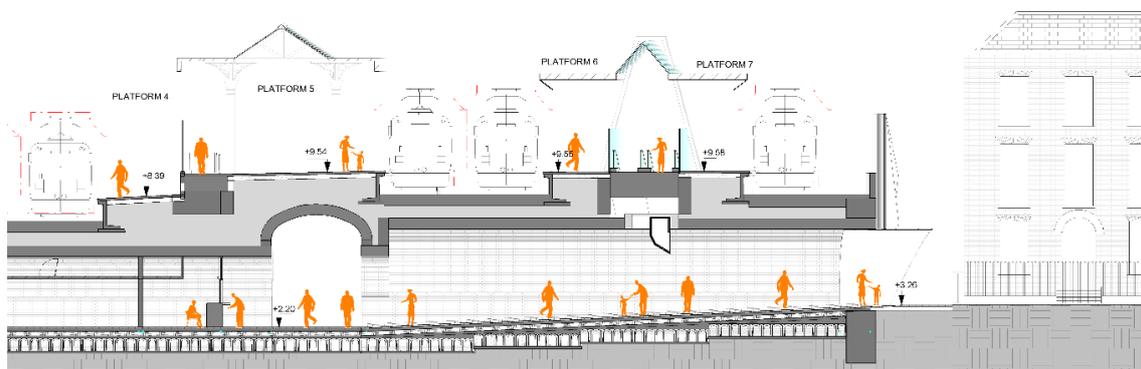
**Figure 4-7 Sketch of the proposed façade for the station's new entrance on Preston Street**

## Connolly Vaults

The station proposal creates a viable new use for the existing protected structure of the Connolly Vaults. The reuse of an existing structure is a central tenet of architectural conservation principles. The intervention in the vaults aims to fulfil another conservation principle well-known in the Heritage world – *to do as little as possible but as much as necessary* – to provide a pleasant and sustainable station space. For the historic vaults, the works are limited to cleaning and refurbishing damaged parts and providing low impact interventions that will provide suitable safe access and allow the historic fabric to be appreciated with a good lighting level leading to the platforms. The objective is to keep as much as possible of the 19<sup>th</sup> Century look and feel, trying to make all the vaults visible.



**Figure 4-8 Sketch of Connolly Station concourse, the entrance vault and the central corridor**



**Figure 4-9 Cross section of the design for Connolly Station**

### 4.1.4 Zone B

Zone B runs east to west from Spencer Dock station to Glasnevin junction along the MGWR line; connections to the Northern Line and the GSWR are included as well. This zone is approximately 3.05 kilometres in length.

Works in Zone B around Spencer Dock Area include:

1. New Spencer Dock Station.
2. OBD228 Sheriff Street Bridge Reconstruction.
3. Access ramp into Docklands' compound.
4. New slab track configuration at Spencer Dock-Docklands-East Wall area.
5. Track lowering and structural intervention at OBO36 Ossory Road Bridge.
6. Parapet heightening at OBO36 Ossory Road Bridge.
7. General track lowering along the MGWR line.
8. SET installation.



**Figure 4-10 Construction activities in Zone B**

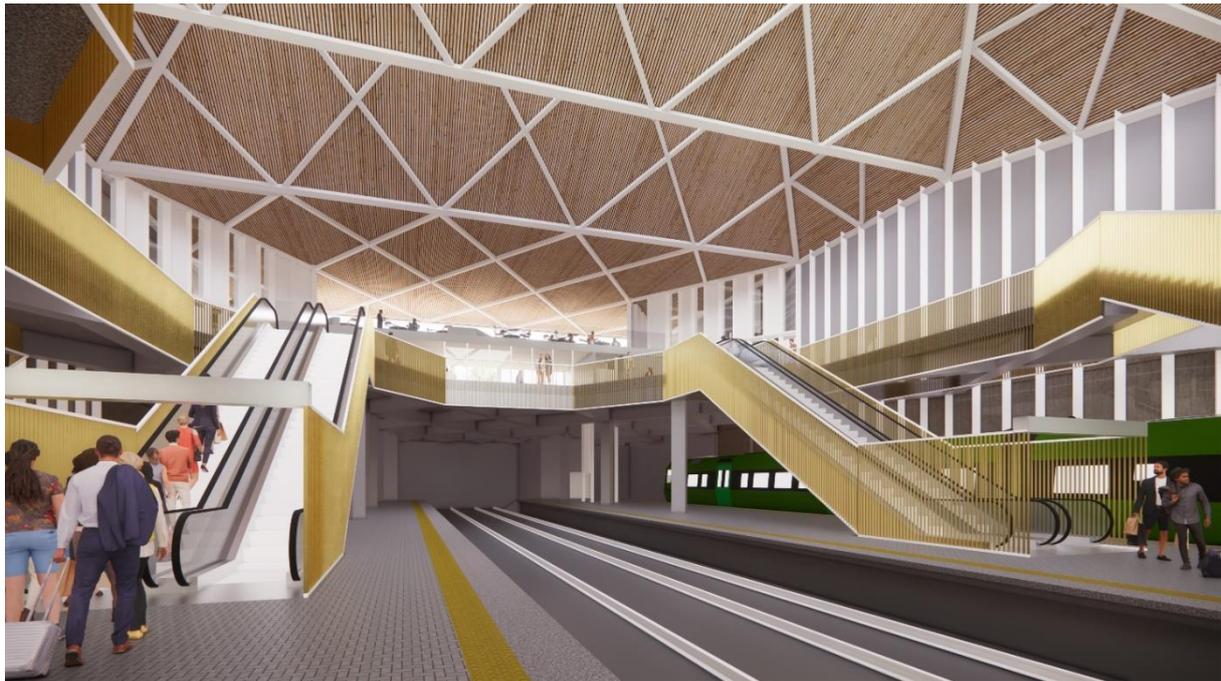
**4.1.4.1 Spencer Dock Station**

In order to achieve a high-level passenger experience, a state-of-the-art station is proposed at Spencer Dock. This new Spencer Dock station will represent a significant enhancement to the Dublin Docklands area, securing enhanced interchange with Luas, and local bus services making Spencer Dock a key transport interchange hub in the heart of the Dublin Docklands Development Area. The new Spencer Dock Station also provides good integration with the surrounding buildings by aligning the station's platform to the North Lotts and Grand Canal Dock Planning Scheme SDZ.

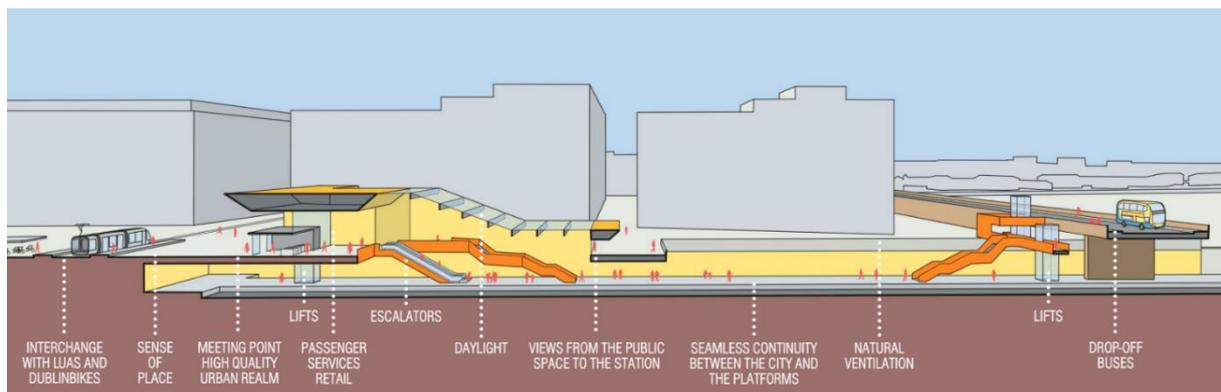
In order to achieve the optimal platform arrangements, the proposed railway tracks will be lowered by approximately 7.0 m to pass under the Spencer Dock Plaza providing an underground terminal station that will have four platforms with lifts, stairs and escalators linking passengers to the surface streetscape.



**Figure 4-11 View of Spencer Dock Station's main entrance**



**Figure 4-12 View from the platforms**

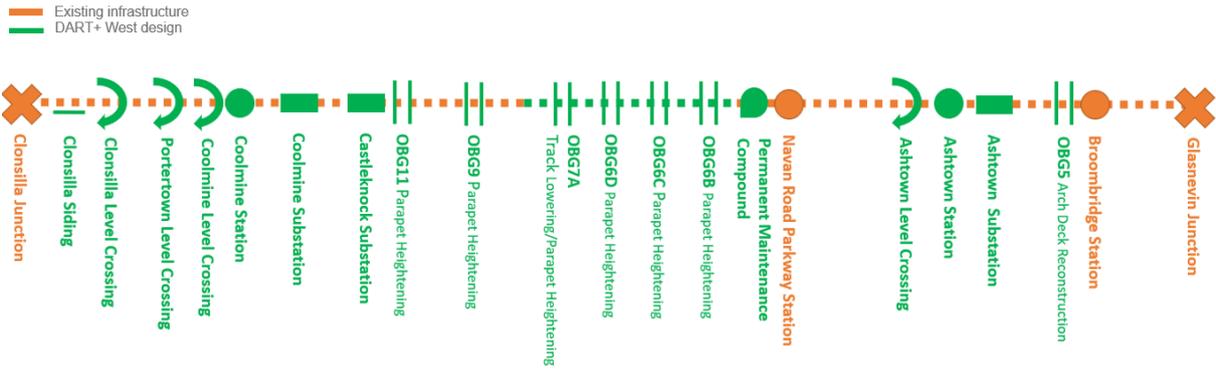


**Figure 4-13 Graphic illustrating the section and the primary elements of Spencer Dock Station**

#### 4.1.5 Zone C

Zone C runs east to west from Glasnevin Junction to Clonsilla Junction. The section is approximately 10.1 kilometres in length. Works in this section will include:

1. Parapet heightening for OBG4A, OBG6B, OBG6C, OBG11A, OBG11C, OBG12 and OBG12C bridge structures.
2. Track lowering at OBG6D, OBG6C and OBG7A bridge structures.
3. Arch deck reconstruction for OBG5 and OBG11 bridge structures.
4. OBG9 flat deck bridge modification.
5. Ashtown, Coolmine and Castleknock substations.
6. Level crossing closures in Ashtown, Coolmine, Porterstown and Clonsilla.
7. Ashtown and Coolmine station.
8. Navan road compound.
9. Clonsilla siding.
10. SET installation.



**Figure 4-14 Construction activities in Zone C**

**4.1.5.1 Ashtown Level Crossing**

It is proposed to remove the railway level crossing at Ashtown. The design requires the re-routing of Ashtown Road, diverting the new alignment west of the mill building to pass under both the railway and the canal and tying into Mill Lane north of the canal. The diverted road will provide for a 6.5 m carriageway with a 1.5 m rubbing strip on the western side of the road, and a 3.65 m wide cycleway along the eastern side of the road. A universal access pedestrian / cycle bridge is proposed at Ashtown Station.



**Figure 4-15 Photomontage of the proposed Ashtown underpass and footbridge**



**Figure 4-16 Photomontage of Ashtown Station after removal of level crossing**

#### **4.1.5.2 Coolmine Level Crossing**

The proposed design entails the construction of a new shared pedestrian / cycle bridge over the railway and canal to provide a connection between Carpenterstown Road and Coolmine Road. The provision of the new bridge will facilitate the closure of the level crossing and include the diversion of traffic to surrounding crossings of the railway at Dr. Troy Bridge and Castleknock Bridge.



**Figure 4-17 Photomontage of proposed Coolmine footbridge from Coolmine Road looking north**

Junction improvements are proposed on the surrounding highway network at the following junctions:

- Diswellstown Road Junction.
- Porterstown Road Junction.
- Clonsilla Road Junction.
- Castleknock Road Junction.

#### **4.1.5.3 Porterstown Level Crossing**

The proposed works involves the construction of a new pedestrian / cycle bridge over the railway and canal. The provision of the new bridge will facilitate the closure of the level crossing but would require diversion of

vehicular traffic to surrounding crossings of the railway. No improvements to the surrounding road network are proposed as part of the DART+ West project. Localised reconfiguration of the road network at the level crossing is proposed to provide vehicle turning facilities and passenger drop off.



**Figure 4-18 Photomontage of proposed Porterstown footbridge**

#### **4.1.5.4 Clonsilla Level Crossing**

The proposed works at Clonsilla involve the construction of a new pedestrian / cycle bridge over Clonsilla level crossing to facilitate access over the railway and canal. The provision of the new bridge will facilitate the closure of the level crossing but would require diversion of traffic to surrounding crossings of the railway. No improvements to the surrounding road network are proposed as part of the DART+ West project. Localised reconfiguration of the carriageway in the vicinity of the level crossing will be required to facilitate the proposed overbridge and provide adequate turning facilities for vehicles.



**Figure 4-19 Photomontage of proposed Clonsilla footbridge from Clonsilla road at Callaghan Bridge looking southwest**

#### **4.1.6 Zone D**

Zone D stretches from Clonsilla Junction to M3 Parkway Station and is approximately 7500 metres in length. Works in this section will include:

1. Hansfield, Dunboyne and M3 Parkway substations.

2. Track lowering at OBCN286 and OBCN290 bridge structures.
3. Parapet heightening for OBCN290, OBC290A, OBCN291 and OBCN295A bridge structures.
4. M3 Parkway sidings.
5. SET installation.

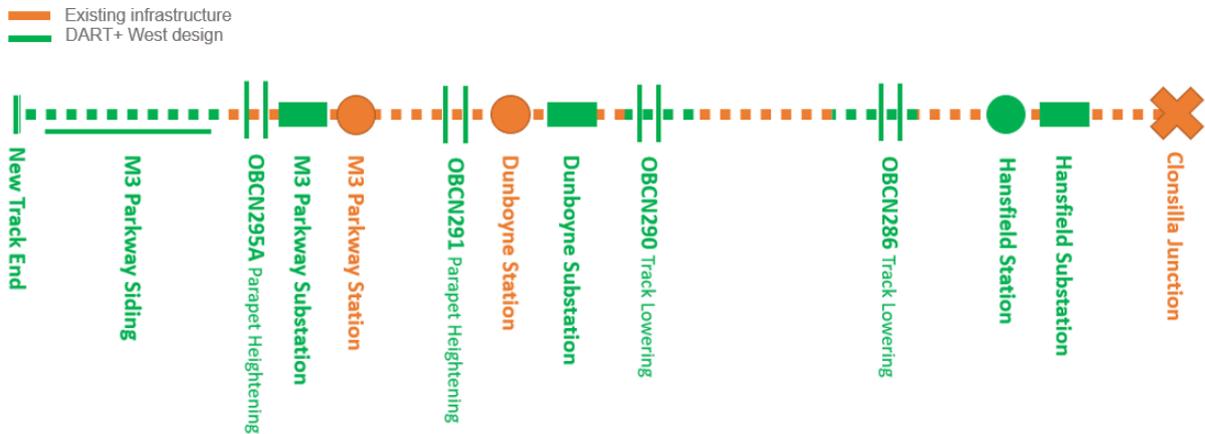


Figure 4-20 Construction activities in Zone D

#### 4.1.7 Zone E

Zone E stretches from Clonsilla Station to just east of Maynooth Station and is approximately 15.6 kilometres in length. Works in this section will include:

1. Barberstown and Blakestown level crossings.
2. Track lowering at OBG13 and OBG18 bridge structures.
3. Parapet heightening for OBG13, OBG15A and OBG18 bridge structures.
4. OBG14 Cope Bridge reconstruction and widening.
5. Leixlip Confey and Blakestown substations.
6. OBG16 flat deck bridge reconstruction.
7. SET installation.

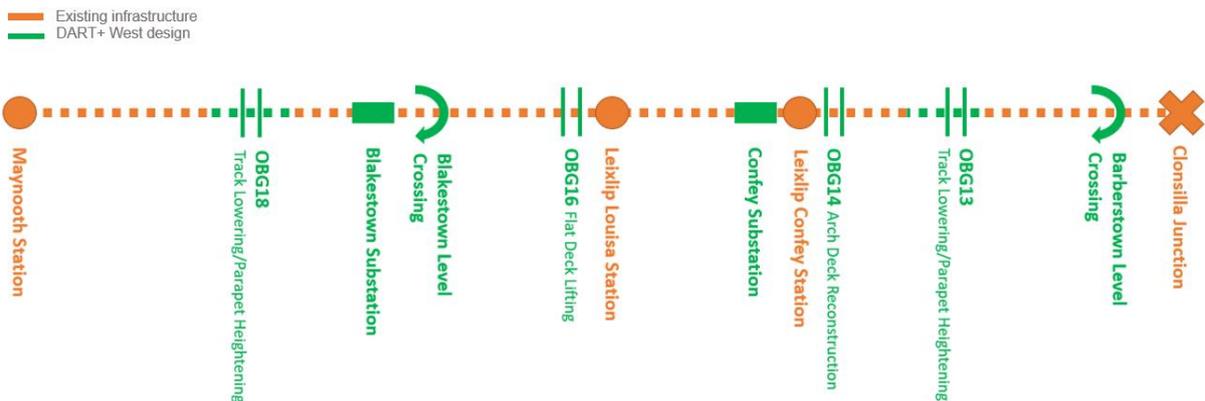
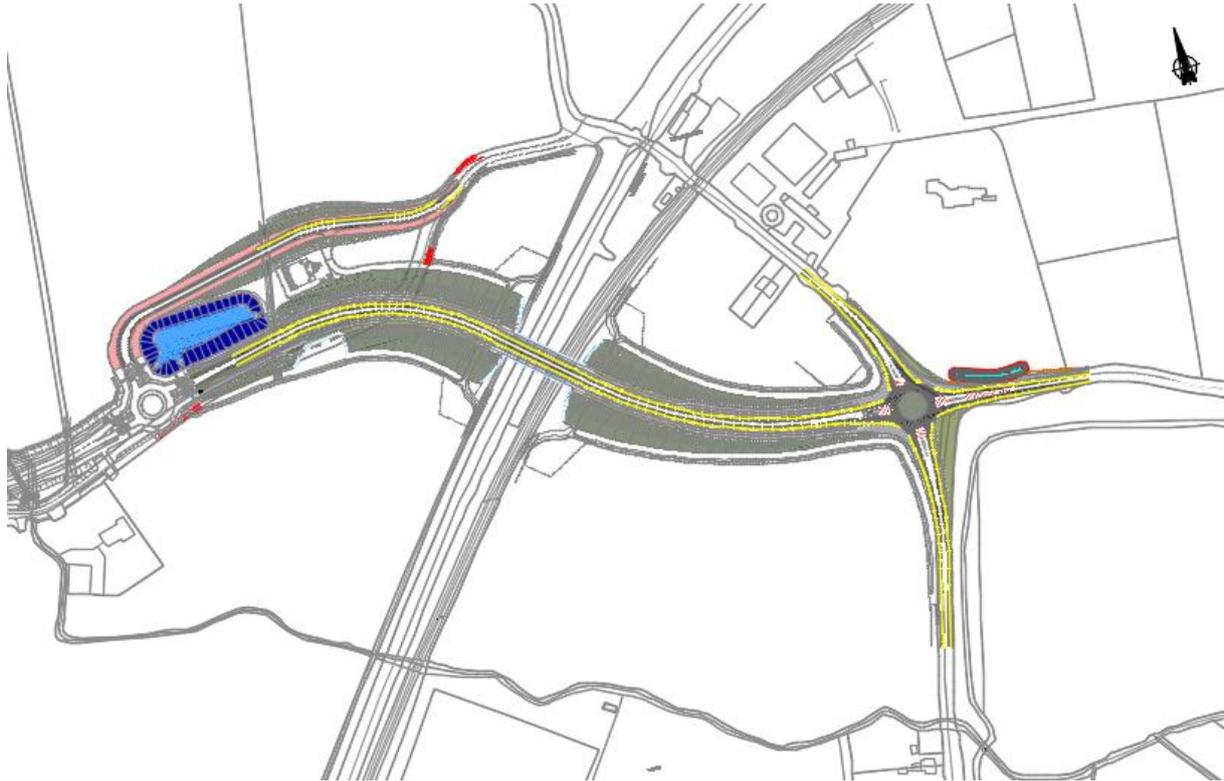


Figure 4-21 Construction activities in Zone E

##### 4.1.7.1 Barberstown Level Crossing

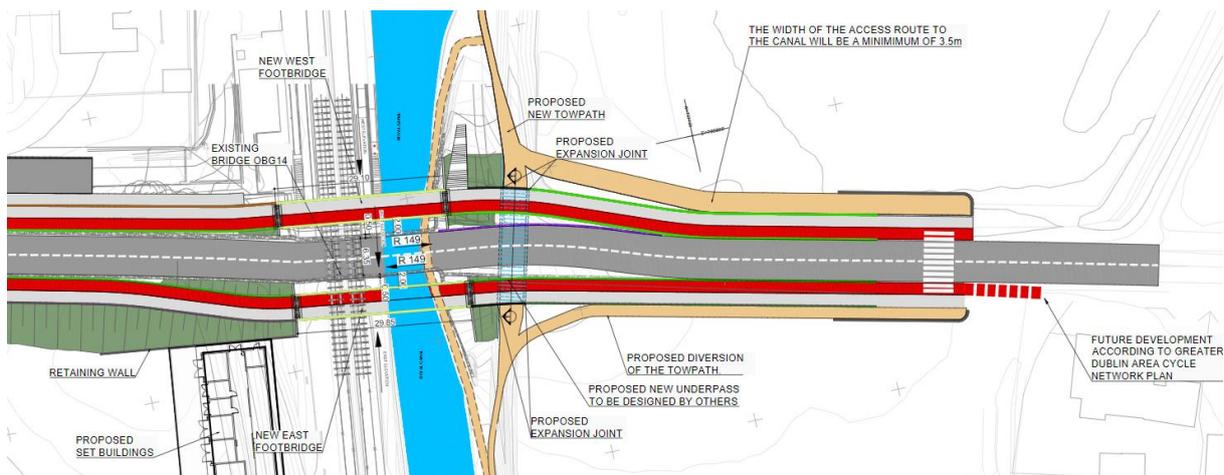
The proposed works at Barberstown Level Crossing include the construction of a new road bridge with pedestrian and cycle facilities which crosses the Dublin to Sligo railway and the Royal canal approximately 200m west of the existing level crossing. The proposals include for the construction of approach roads on raised embankment which tie into the proposed Barnhill to Ongar Road scheme to the north and to the existing road network south of the railway.



**Figure 4-22 Barberstown level crossing general arrangement**

**Cope Bridge**

A bridge upgrade of OBG14 has been proposed to meet Kildare County Council (KCC) requirements, to accommodate future development plans for the area, and provide an opportunity to benefit the wider community. The proposed widening solution is to build two pedestrian and cycle bridges adjacent to the existing OBG14, spanning both the railway line and the Royal Canal, to accommodate two lane traffic on the existing OBG14 bridge. The new walkways are parallel to the bridge in such a way that they allow users to maintain views of the surroundings and the existing bridge, as well as increase their safety.



**Figure 4-23 Proposed East and West footbridge widening at Cope Bridge in plan view**

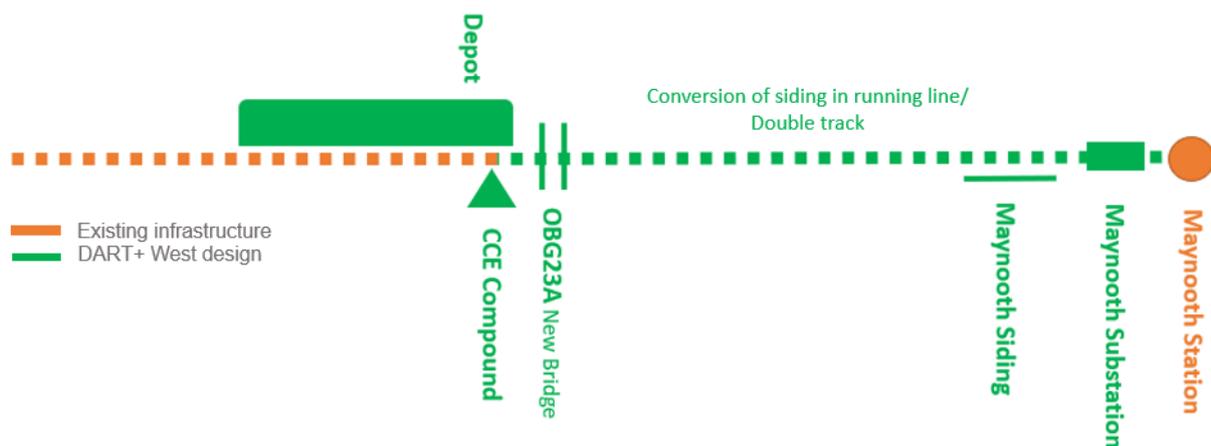


**Figure 4-24** Photomontage of proposed footbridges at Cope Bridge looking southwest from the Royal Canal

#### 4.1.8 Zone F

Zone F runs east to west from Maynooth Station to the depot. The zone is approximately 10.8 km in length. Works in this section include:

1. Modifications to the Maynooth Station.
2. Construction of the new Maynooth Substation.
3. Modifications to the existing siding at Maynooth Station.
4. Track doubling from Maynooth Station to the new depot.
5. L5041 road diversion and construction of the new UBG22A, UBG22B, and OBG23A structures.
6. Construction of the new depot.
7. Construction of the new depot access road.
8. SET installation.
9. Railway fencing installation.



**Figure 4-25** Construction activities in Zone F

##### 4.1.8.1 Track doubling from Maynooth Station to the new depot

The rail line (referring to the mainline) is currently a single line west of Maynooth. This will be upgraded to a twin-track between Maynooth and the proposed depot. The new track will generally be parallel to and south of the existing track and will begin at Maynooth Station. West of Maynooth the twin track configuration will

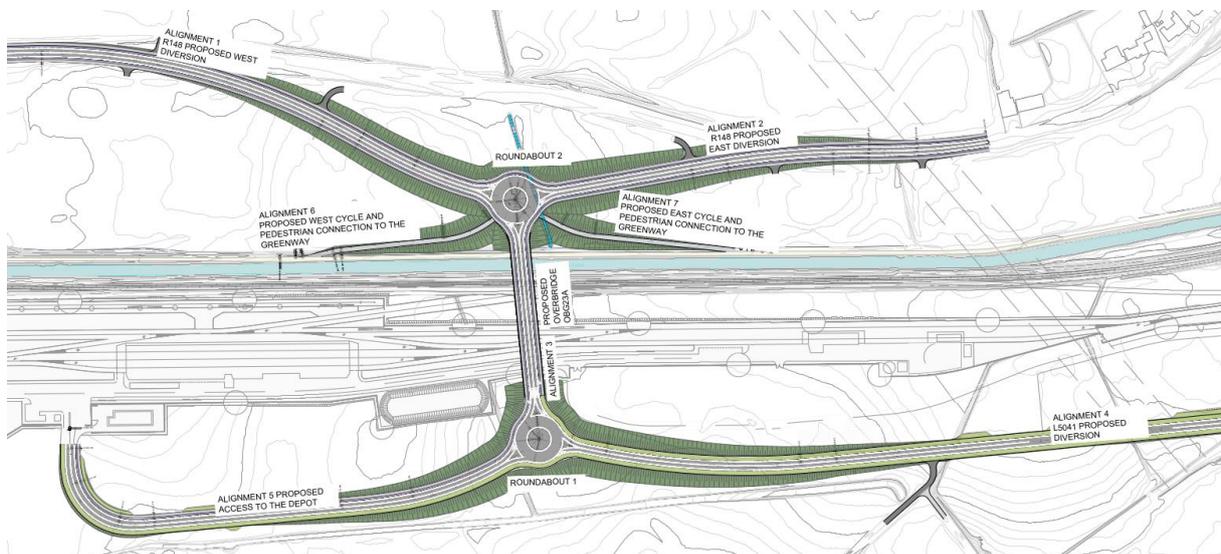
divert onto a new railway embankment, running parallel to the existing railway on the approach to the proposed depot. This is due to pre-existing flooding issues on the site and due to the heritage value of Jackson's Bridge west of Maynooth. The proposed works will include trackwork, electrification, signalling and telecommunications works, platform modifications in Maynooth Station, embankment construction, drainage works with attenuation and compensatory storage within the floodplain of the Lyreen River and tributary. The works will also include electrification of the existing siding south of the railway in Maynooth.



**Figure 4-26** Left photo: siding to be converted into a running line. Right photo: siding with wood sleeper and without cant

**4.1.8.2 L5041 diversion and construction of the new structures**

Due to the new proposed railway alignment to the south of Jackson's Bridge it is necessary to realign the existing L5041 local road and a section of the R148. South of Jackson's bridge the L5041 will be realigned to the west. The realignment will continue west towards the proposed DART+ West depot for approximately 900m. The L5041 will then turn north via a new roundabout and cross the eastern end of the proposed depot, existing railway and Royal Canal via a new proposed overbridge. The western arm of the new roundabout will provide access to the DART+ West depot. On the northern side of the railway and Royal Canal the realigned L5041 will meet the realigned R148 at a new roundabout. Approximately 800m of the R148 is required to be realigned to provide adequate vertical gradients to allow the new overbridge to connect with the R148. Access for pedestrians and cyclists will be maintained under the proposed realigned section of railway to Jackson's Bridge. The L5041 will be diverted through the new OBG23A that also serves as access to the Depot. The construction of new structures across Lyreen River (UBG 22B and UBG 22A) are also proposed, which allows a crossing over a stream and a pedestrian and cycle underpass.

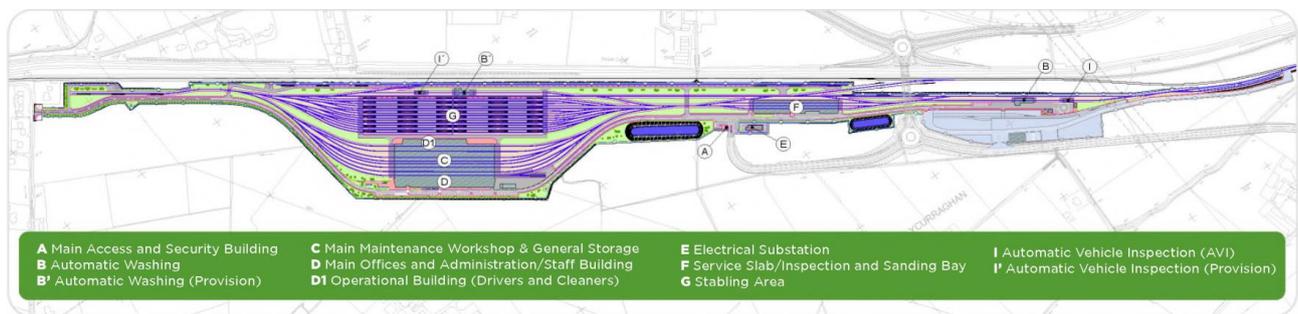


**Figure 4-27** Road alignment sections for the OBG23A road network

#### 4.1.8.3 Depot

The new depot near Maynooth includes stabling with two-ended tracks and a main building adjacent in the central area resulting a length along the main line of around 2.58 km. The configuration of the depot is a through type, with several two-ended tracks in the maintenance shed. All movements are enabled using shunting tracks when necessary. The access to the workshop and the stabling yard are direct from the main line. However, since the stabling yard is parallel to the maintenance shed, shunting movements will be necessary between both facilities. The following facilities are located at the eastern side of the site:

- Automatic vehicle inspection (AVI).
- Automatic washing plant (AWP).
- Permanent way compound.
- Service Slab building.
- Main access and security building.
- Substation.



**Figure 4-28 Depot layout**

The main building and stabling are located in the central area of the depot site. A shunting track is proposed on the western side to provide connection between the tracks for the stabling area and the workshop. The main building will be the largest and most complex facility within the depot. Administrative, operational and maintenance tasks will be carried out there. Also, the Depot Control Centre (DCC) will be located within the main building, from where the movement, control and security of vehicles within the depot will be managed. Staff will be able to access the depot by car, walking or by cycling from the road access. A new track maintenance facility will be provided adjacent to the depot to maintain the railway in the operational phase.



**Figure 4-29 Photomontage of the Main depot building**

## 5. CONSTRUCTION STRATEGY

### 5.1 Sustainable Construction Principles

Iarnród Éireann is committed to contributing to the achievement of the United Nations Sustainable Development Goals (SDGs) and together with the CIÉ Group of Companies has developed a Sustainability Strategy that coordinates actions that assist in addressing national economic, social and environmental challenges.

The key themes used as a focus while designing the project include:

- Avoid, mitigate and if not possible reduce the adverse effects on communities during the construction of the project.
- Reduce the carbon footprint of the project during the design, construction, and operation and encourage more sustainable transport modes.
- Support for cleaner energy and lower emissions through implementation of an electrically powered fleet.
- Facilitating population and sustainable development growth, and a low carbon climate resilient economy.
- Designing for resilience against future demand changes and climate needs.
- Minimising waste during construction of the project, while focusing on using sustainable and reusable materials and construction methods.

These key themes will be considered throughout the entire duration of the construction of the project using the following enabling measures:

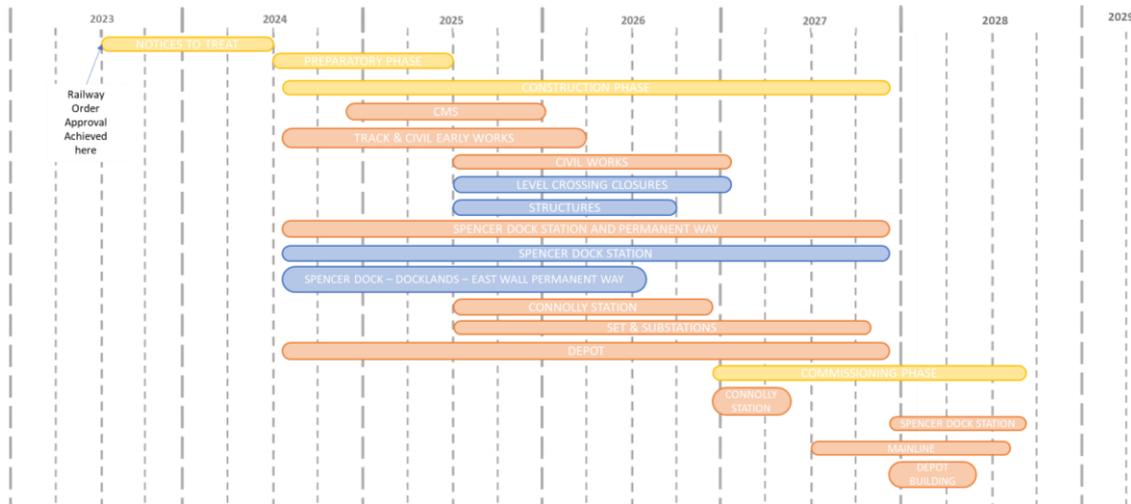
- Ensuring a clear plan detailing goals related to each stage of the construction process beginning from the development stage and ending at the maintenance and ultimately, a renewal stage.
- Ensuring that sustainability precedes the construction process during the procurement process and the partners associated with that stage.
- Allowing and encouraging innovation during the construction process and ensuring sustainable measures are safely and efficiently implemented in the later stages of the project.
- Working with local communities and publicly sharing information regarding the project's sustainability measures while remaining open to accepting and implementing feedback.

### 5.2 Construction Programme

The construction phase of the proposed development will take place over approximately 47 months. The construction programme has been developed considering the efficiency of works and to reduce the potential for environmental impacts. The approximate duration of the main activities is as follows:

- Spencer Dock 39 months
- Connolly Station 18 months
- SET 32 months
- Civil, Track and Building Works 29 months
- Depot 39 months

The high-level indicative construction programme is set out in Figure 5-1 below identifying the key construction phases and likely construction years.



**Figure 5-1 Indicative construction programme DART+ West**

### 5.3 Construction Working Hours

The proposed construction working hours for the project are as follows:

Daytime:

- Monday to Friday: 12 hours. From 07:00 to 19:00.
- Saturday: 6 hours. From 07:00 to 13:00.
- Sunday / Bank Holidays: none except where agreed in advance with the local authority and CIÉ or as part of a possession/closure.

Night-time & weekend possessions (note hours indicate times when track is physically closed to allow for the works, but there will be additional time for mobilisation/demobilisation activities outside of the hours listed below):

- Night-time track possession (weekdays): 4-hours. From 01:00 to 05:00.
- Night-time track possession (Saturday nights): 6-hours. From 01:00 to 07:00.
- Full weekend track possession: 52 hours. Saturday 01:00 to Monday 05:00.
- Bank holiday weekend track possession: 76 hours. Saturday 01:00 to Tuesday 05:00.
- Total closure: 24 hours per day for a specified duration.

### 5.4 Preparatory Phase

Pre-construction works will involve archaeological investigation and targeted diversion of services/utilities. Advanced vegetation clearance and fencing may also be undertaken at this stage.

### 5.5 Construction Phase

The general linear works required along the full extent of the project to enable the electrification of the line and the upgrade of the existing network include:

1. HV (high voltage) traction substations and Overhead Line Equipment (OHLE) will be required to provide electrical power to the network's new electrified train fleet. They will be similar to that currently used on the DART network.
2. The upgraded infrastructure will require signalling upgrades and additional signalling furniture to allow the trains to run at a higher frequency. Signalling infrastructure will be required at intervals along the entire length of the line. It will include the provision of a low voltage power supply to provide power to the network and telecommunications buildings.
3. Improvements to boundary walls and fencing will be provided to ensure that public safety is maintained after the line's electrification. These improvements will require increasing the height of walls in some locations to provide protection and physical segregation between public areas and the electrified railway corridor.
4. Alterations to railway tracks, including minor realignments and track lowerings, will be required at some locations along the tracks to ensure sufficient space for the overhead electrical lines.
5. Utility diversions are required to accommodate new and upgraded infrastructure.
6. Vegetation management and other ancillary works are also required along the length of the project.

The main works will also include the following:

1. Cable Management System: To protect the existing trunk cables in the IÉ network by constructing the new CMS at this first stage of the project.
2. Civil works: to remove the current level crossings through new over and underbridges (vehicular and pedestrian/cyclist as per location), to construct the underbridges UBG22A and UBG22B and culvert near the depot as well as to modify the bridges on the railway line.
3. Station works: to enhance Connolly, Ashtown and Coolmine stations, as well as to build the new station of Spencer Dock.
4. Depot: to construct the new depot for the railway line.
5. New maintenance facilities at East Wall yard and permanent electrification compound in Navan Road.

## 5.6 Construction Compounds

The construction compounds are temporary facilities that support the construction of the different elements of the project. Construction compounds are required at specific site locations, such as level crossing closures, associated replacement works, or structure modification works. Compounds will also be distributed along the railway for linear works (mainly SET installation) to allow tasks to be performed.

The potential environmental effects are linked to the compound's location, the activities to be carried out inside the facility and the construction traffic that the compound generates. The potential impacts range from direct, such as the temporary land take or vegetation removal, to indirect effects (noise, impact on air quality, lighting, etc.).

The complete programme of works dictates the compound duration. The life cycle of a construction compound ranges from several months (in the case of the building of substations or overbridge modification) to several years (for instance, those servicing the new Spencer Dock station construction or the depot construction).

These compounds will be operational 24/7 to service the various worksites. These compounds will be serviced by a Main Storage and Distribution Centre (MSDC) located to the north west of Dublin Airport. The materials will be delivered to site using the N2 and M50 routes.

## 5.7 Environmental Management Plans

A Construction Environmental Management Plan (CEMP) has been prepared, presenting the approach and application of environmental management and mitigation for the proposed project's construction. It aims to ensure that adverse effects from the proposed project's construction phase on the environment and the local communities are avoided or minimised. It does not describe mitigation measures relating to the operation and decommissioning of the proposed development. These are provided in the mitigation sections of the respective Volume 2 chapters in this EIAR, and summarised in Chapter 27 Summary of Mitigation and Monitoring Measures in Volume 2 of this EIAR.

The implementation of the requirements of the CEMP will ensure that the construction phase of the project is carried out following the commitments made by CIÉ/IÉ in the Railway Order application process for the proposed development and as required under the Railway Order. Once commenced, the CEMP is considered a living document that will be updated according to the project's changing circumstances and reflect current construction activities. The CEMP will be reviewed on an ongoing basis during the construction process and include information on the review procedures.

## 6. TRAFFIC AND TRANSPORTATION

### 6.1 Introduction

The traffic and transportation assessment identifies and assesses the likely significant effects that the construction and operation phases of the proposed development will have on all traffic and transport modes in the study area. The assessment considers the projected changes arising from the DART+ West project against a baseline in both the construction and operation phase and draws conclusions about the relevance and significance of those changes in the context of current environmental guidance and policy. Potential effects are discussed, and mitigation measures are presented as appropriate.

The direct and indirect impacts of the proposed development were considered with reference to the following study area extents:

- Direct Study Area - immediate vicinity of the alignment of the proposed development.
- Indirect Study Area - due to proposed level crossing closures at Ashtown, Coolmine, Porterstown, Clonsilla and Barberstown, wider study areas around Blanchardstown and Ashtown were included in the assessment.

The traffic and transportation assessment presents the findings from technical transport planning and transport assessment methods, which is based on an established transport evaluation logic model, that determines how an effect is expected to occur as a result of the proposed development. This process includes a desk study through:

- Establishing baseline conditions, including traffic, pedestrian, cyclist, and public transport user flows and the facilities provided for each mode across the study area.
- Determining the potential effects of the construction of the scheme on traffic flows, pedestrians, cyclists, public transport users as well as junctions and roads within the study area, as this is potentially a very disruptive period for existing users, although temporary in duration.
- Determining the potential effects of the operation of the enhanced line and the closure of the level crossings on traffic flows, pedestrians, cyclists, public transport users as well as junctions and roads, which are the longer-term impacts of the DART+ West project.
- Determining the mitigation measures that are possible and may be required during construction, development and future use, while also identifying any residual impacts, and their significance.

The methodology followed is a systematic approach designed to take into account a wide set of potential transport effects using available evidence, to predict the potential effects that may materialise in the future. The methodology used when assessing the potential magnitude of impacts of the proposed development on Vehicle Travellers, Pedestrians and Cyclists and Public Transport Users is based on the IEMA guidance "*Guidelines for the Environmental Assessment of Road Traffic 1994*" and *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2022)*.

### 6.2 Receiving Environment

The proposed DART+ West project benefits from being located in a corridor of high population density, especially along the eastern section. Those stations located along the west of the proposed project capture those travelling from the wider area enabling much-needed modal shift from the private car by providing a high-quality frequent alternative mode.

The original train line was built in the nineteenth century, at a time of very different transport technology, infrastructure and travel patterns. One of the major constraints that limits train capacity on this line is the presence of level crossings, where rail traffic and road traffic intersect.

The design team assessed the viability of delivering the capacity requirements of the proposed DART+ West project whilst retaining the level crossings. Due to the planned increase in train services and frequency, the level crossing gates would be permanently lowered during the extended peak hours, with consequential significant effects on road transportation movement for pedestrians, cyclists and vehicles. A solution to this was devised with the proposed DART+ West project seeking to permanently close all existing level crossings along the scheme whilst providing new bridge crossings where required, or re-routing traffic onto the existing road network at others.

### 6.3 Potential Impacts and Mitigation Measures

A considerable number of detailed transport models exist for the study area, and the transport assessment utilised this detailed data and includes those junctions and links along the length of the line including anticipated development across the city. These models allow the dynamic redistribution of vehicles during the peak hours without and with the proposed development in place in order for the impact to be captured, measured and mitigated against.

The highest level of heavy goods vehicles (HGV) trips generated during the construction phase is likely to occur during the earthworks stage. As with the construction of many infrastructure projects, the proposed development involves the temporary provision of a number of construction compounds along the route. The impact of these early construction effects will be significant in places such as at Ashtown - due to an accumulation of traffic; at the proposed depot in Maynooth; and in the area around the proposed Spencer Dock station where significant construction works will be undertaken. At other locations, the impact is considered to be significantly less and shorter in duration.

For the purpose of the assessment of the construction phase effects, the peak construction phase at each temporary construction compound was used. It was assumed that all works in a specific zone (Zones A to F) would occur at the same time so that the 'worst case' scenario is assessed. Any effects are temporary, with traffic during the remainder of the construction phase likely to be significantly lower. Assumptions on the temporary construction effects were derived from expert advice of the designers and are based on the best available information at the time of undertaking the assessment.

The main impact will be the need for construction vehicles to visit each of the construction compounds, however these will not all be operational at the same time; therefore, the impact of construction will be limited to certain areas at certain times. There will be a number of road closures, which for all but one, are considered to be temporary. The longest closure will occur at Sherriff Street where the road will close for a period of 18 months and result in the diversion of traffic in this area. Where road closures are to take place across the rest of the network, these will be planned so as not occur at the same time in order to limit the impact and where possible, partial reopening of the roads will take place to reduce the impact. Facilities for pedestrians and cyclists will be provided to ensure that travel by these modes can continue.

Mitigation measures will be required to reduce the impact on traffic during the construction phase. This will include a Construction Traffic Management Plan and a Mobility Management Plan to manage both construction vehicles and workers. Work on the railway line will take place where possible at night and on weekends to reduce the impact on all modes of transport especially during the peak periods.

The Construction Traffic Management Plan will set out the proposed traffic management for the proposed development and set out how this will be managed. The Mobility Management Plan will set out how construction workers will be managed in terms of their journeys to and from the proposed scheme so that the impact of the worker traffic is as minimal as possible. Both documents will be subject to agreement with the local authorities and require input from the contractor.

It is envisaged that a "monitor and manage" approach will be undertaken in relation to the parking provided at each of the stations, especially those where construction compounds will be provided. This will ensure that

any parking provision for use by those travelling on the railway line (which will remain operational during construction) have sufficient spaces to park thus avoiding off-site parking which could potentially impact on residents and businesses in proximity to the stations. Parking spaces taken by construction compounds will be restored for commuters/station users as the construction progresses.

Where road closures are required, alternative routes have been identified for all users and where possible, the facilities for pedestrians and cyclists will be reopened as quickly as possible to reduce the impact. Temporary footpaths will be provided where necessary.

As a result of the road closures during construction, there will be an impact on bus routes. Diversions were identified for these routes, and discussions are ongoing on the placement of temporary bus stops.

During the construction phase, it is considered likely that traffic will choose alternative routes and avoid those locations where construction is ongoing.

One of the impacts during the operational period will be the reduction in car-based journeys due to a shift in mode to the improved rail service. The existing strategic Park and Ride at M3 Parkway is considered to be sufficient in capturing the demand on this spur. Other strategic Park and Rides are proposed as part of the National Transport Authority's Greater Dublin Area Strategy. The levels of existing car parking in more urban areas along the proposed development are not proposed to be extended as part of the DART+ West project, however increased provision of cycle parking is proposed to encourage the use of active modes where possible. 'Embedded' mitigation in the form of new facilities for pedestrians, cyclists, public transport users will encourage trips by these modes and improved junctions on the network will ensure higher protection and safety of active modes users.

## 6.4 Residual Effects

The construction phase of the proposed development has been developed to minimise the impact on rail, road, pedestrian and cyclist users in its vicinity. Following the implementation of mitigation measures, the overall residual effects are considered to be *neutral* and *slight positive*.

Following opening, the proposed development will provide more frequent and better levels of service with greater capacity to cater for the additional demand provided for those within walking, cycling and public transport distance of the DART+ West project, while also capturing those who travel from the wider catchment into the city centre. Overall, the operational phase will result in localised, *neutral* to *slight / moderate positive* effects.

## 7. POPULATION

### 7.1 Introduction

The population assessment identifies and assesses the likely significant effects that the construction and operation phases of the proposed development will have on the population. The assessment includes the examination of land use change; impact on journey characteristics and journey amenity; community infrastructure; severance; and, economic activity, including tourism and employment. The assessment is informed by desktop studies, walkover surveys, and feedback from consultations. The population assessment addresses impact at a community level rather than for individuals or identifiable properties, although population effects for individual properties are discussed where these are significant and/or located within proximity to the proposed development.

The criteria used to describe the potential population effects are in accordance with the *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2022)*. The study areas to inform the population assessment, comprise:

- Land uses within 500m either side of the proposed development.
- Demographic data based on the Electoral Divisions (EDs) pertaining to the proposed development which is further informed by the relevant county level demographic data for counties Dublin, Fingal, Meath and Kildare.

### 7.2 Receiving Environment

From east to west the proposed development will travel through Dublin City centre which can be categorised as a high density established/developing urban, mixed-use area. Currently, there is significant development occurring, and zoned for development in the Docklands area. As the line extends westward, the proposed development travels through Ashtown, Castleknock, Coolmine, Porterstown and Clonsilla which are well established suburban neighbourhoods with infill/brownfield development taking place in certain areas. As the line continues westwards into Fingal, Kildare and Meath, the character of the area becomes more suburban in nature, with agricultural or zoned greenfield sites present along both side of the rail corridor. Lands zoned for significant future development are predominantly located at Barberstown and Blakestown level crossings. The proposed depot will be located in unzoned agricultural lands, less than 1 kilometre from Kilcock, and is situated adjacent to the Royal Canal.

Land use: The study area can be split into three main existing land uses categorisations, comprising:

1. CIÉ railway corridor and supporting infrastructure associated with the Great Southern & Western Railway (GSWR) and the Midland Great Western Railway (MGWR) rail lines running from Dublin City centre extending west of Maynooth town, and to the M3 Parkway Station.
2. The developed urbanised areas of Dublin City and its suburbs, and the towns of Maynooth, Leixlip and Dunboyne.
3. Existing agricultural and/or greenfield sites, either zoned or un-zoned along the Railway line located in Fingal, Meath and Kildare.

Population: The population of the Greater Dublin Area (GDA), a region comprising Dublin and the counties of Meath, Kildare and Wicklow, is estimated to be 2.02 million, or 40.5% of the total population, as of April 2021. The population of the GDA is set to grow to 2.2 million by 2031 with transport demands also increasing across all modes.

Journey characteristics: Consecutive Census continually report that the private car is the most popular means of transport to work, school or college in Ireland, and across the study area. Census 2016 reports that the use of public transport (including bus and rail) as means of travel is the highest in Dublin City at 22%, followed by

Fingal at 21%, Kildare and Meath are 14% and 13% respectively. Dublin City has the highest percentage of people travelling by foot and bicycle at 36%, followed by Fingal, Kildare and Meath at 18%, 16%, and 14% respectively. 10% of the population in Maynooth use rail transport - the highest out of the four main settlements in the study area. Maynooth is closely followed by Leixlip at 9%, Dublin City and suburbs at 7% and Dunboyne at 6%.

Passenger capacity on the Maynooth line is projected to increase from 5,000 per hour per direction in 2019 to 13,200 passengers per hour per direction. The Irish Heavy Rail Census 2019 reports that the Kildare line has increased in proportional terms significantly from 8% in 2003 to 14% in 2019, due to year-on-year growth in patronage from 2012.

Severance: There is currently perceived severance at all level crossing due to the closures required to facilitate passing trains, particularly pronounced during peak hour commuting times which affects local population, access to community facilities and economic activity.

Economic activity: The Eastern and Midland Region generated 51% of the national Gross Domestic Product (GDP) in 2018, estimated to be €166 billion. County Dublin alone contributed 40% to the national GDP in 2018 (Census 2016). Dublin City, Fingal, Kildare and Meath have a significant percentage of the population 'At Work', with the percentage for each county above the State average. Dublin City and the surrounding areas provide a rich tourism and amenity offering, with several tourist and cultural heritage sites across the study area and attract large populations. The Royal Canal Way is a national waymarked trail which travels adjacent to the proposed development. The rail network is an important asset for the tourism sector as a means of transportation across the GDA and further afield.

### 7.3 Potential Impacts

The main population effects are influenced by the nature, location and characteristics of the works taking place during both the construction and operation phases. The key land use and population effects of the proposed development are associated with:

- Scheme wide effects associated with the signalling, electrification and modifications required to the railway line as well as the impacts due to the temporary construction compounds.
- Construction of the proposed Spencer Dock Station.
- Modifications to Connolly Station.
- Level crossings closures and replacement works at Ashtown, Coolmine, Porterstown, Clonsilla, Barberstown and Blakestown.
- Construction of a new train maintenance depot east of Maynooth, located 1km from Kilcock in County Kildare.

The population assessment first considers scheme wide effects and focuses on the key infrastructural works described in Chapter 4 and Chapter 5 of this EIAR. A summary of the likely significant impacts on population that are common to all zones is described. The likely significant impacts that are unique to the EIAR Zones A-F are then described from east to west, across the defined EIAR Zones A-F as illustrated in the schematics associated with this NTS.

Construction Phase impact assessment: The total construction phase for the proposed development is approximately 47 months which will take place over a phased basis. Section 5 provides details of the various construction works and indicative construction programmes. Due to the linear nature of the project, construction activities will be shorter in many places as work to the railway line moves along the line. The works require several temporary construction compounds dispersed across the development boundary, some are in CIÉ owned lands while others are located on private lands and/or public open spaces which can be located in proximity to residential areas. Due to the nature of the works and requirement to reduce impact on rail services much of the works to the railway and associated operation of construction compounds will take

place at night-time which has the potential to have negative, temporary to short-term, significant effects on neighbouring populations.

The assessment determined the potential negative impacts that will occur during the construction phase throughout the study area include the following:

- *Slight to significant* impacts on rail travel in the area throughout the construction phase.
- *Slight, temporary to short-term, direct and indirect* impacts to land use characteristics including on private property, community facilities, open spaces and neighbouring residential areas.
- *Slight to moderate, short-term, direct and indirect* impacts to journey characteristics due to diversions, traffic restrictions on the road and rail network, and effects to journey amenities due to construction related noise, dust emissions, traffic and nuisance effects during day and night.
- *Slight, temporary to short-term, direct and indirect impacts due to diversions to all road users including pedestrians and cyclists and equestrian uses.*
- *Slight to significant, temporary to short-term, direct and indirect effects due to disturbance and nuisance to residential properties, businesses, and communities within proximity of all construction works and compounds.*

The positive effects include the creation of approximately 1,166 direct construction related jobs that will be available to both the skilled and unskilled labour force, at various stages during the construction stage. There will be indirect effects on the local economy due to construction related purchases of materials and food, etc. The resulting effect is a slight to moderate, short-term indirect positive effect on the local economy and spin-off industries.

Operational Phase impact assessment: The proposed development aims to increase train frequency from the current 10-minute frequency to a 5-minute all-day frequency and to increase trains from four to eight carriages. This will be achieved by increasing services from the current 6 trains per hour per direction to 12 trains per hour per direction by 2027, in certain locations. The improvements will facilitate an increasing passenger capacity from 5,000 to 13,200, subject to passenger demand.

The operation of the proposed depot will generate employment for approximately 220 direct jobs, comprising 113 jobs for the day shift and approximately 107 jobs for the night shift. Further indirect spin-off benefits to the local economy are likely due to supply of goods and services to the depot as well as the spin-off workforce benefits to the local economy. The additional employment will have a *positive, moderate, long-term* effect on the economy.

Overall, the proposed development will support economic development and competitiveness of the region over the long-term.

The likely significant operational impacts on the population include:

- The increased frequency of train services will have a *significant, positive long-term* effect on rail passenger travel, accessibility to employment and will promote sustainable travel patterns and future development opportunities across the study area and beyond.
- By removing the road and rail interface at the existing level crossings there will be *positive significant long-term* effects on journey characteristics, journey amenity, reduced perceived community severance and improvements in safety.
- The development will contribute to the overall economic activity of the region by providing enhanced reliable, smarter and cleaner public transport network which will have a *positive, slight to moderate, long-term* effect on economic activity in the area and improve competitiveness of the region.
- Reduced congestion at level crossings will have a *positive, slight to moderate, long-term* effect on local populations, the local transport network and economic activity around stations and level crossings.
- The DART+ West project will help support the societal response required to combat unsustainable transport and travel patterns by providing a more sustainable, cleaner and reliable public transport

train service. The proposed project will have an indirect, *positive long-term* effect on the tourism sector and recreational resources within the region.

- Potential in-direct positive effects are likely on the population due to the long-term investment in sustainable travel and infrastructure influencing land use patterns, journey characteristics and journey amenities, and access to community infrastructure including open spaces.

A series of mitigation measures have been proposed in Chapter 7 in Volume 2 of this EIAR to avoid, reduce or remediate, wherever practicable significant negative effects on population for construction and operation phase of the proposed development.

## 7.4 Residual Effects

After the implementation of mitigation measures during the construction and operation phases no significant negative effects will occur to the population. There is likely to significant positive residual and cumulative effects as a result of the proposed development.

## 8. BIODIVERSITY

### 8.1 Introduction

The process of identifying, analysing and evaluating the potential impacts of the DART+ West project (“the proposed development”) on the topic of Biodiversity, i.e. habitats, species and designated sites, was undertaken in accordance with guidance on ecological and environmental survey and assessment provided by the Heritage Council, the Environmental Protection Agency, Transport Infrastructure Ireland and the Chartered Institute of Ecology and Environmental Management. These guidelines informed the planning and conducting of field survey work, and the analysis and evaluation of the potential impacts of the proposed development on Biodiversity.

A desk study was undertaken to establish the “zone of influence” of the proposed development, i.e. the geographical area over which any effects are likely to be significant, and to examine any recent or historical records of features of ecological significance in this area, including any sites designated for nature conservation at the national or international level. As part of the desk study, statutory consultees and relevant stakeholders, e.g. the National Parks & Wildlife Service, were consulted. Consultees were invited to submit observations in relation to ecology and nature conservation.

### 8.2 Receiving Environment

It was determined that four European sites, namely the South Dublin Bay & River Tolka Estuary Special Protection Area (SPA), the North Bull Island SPA, the North Dublin Bay Special Area of Conservation (SAC) and the Rye Water Valley/Carton SAC, occur within the “zone of influence”, and that the South Dublin Bay SAC occurs adjacent to the “zone of influence”. The South Dublin Bay SAC is not considered to be in any way connected to the proposed development as the Great South Wall forms a barrier against any impacts from the proposed development to the Qualifying Interests of this site.

Other internationally designated sites including the Dublin Bay UNESCO Biosphere Reserve, the Dublin Bay Important Bird Area (IBA), and the Sandymount Strand/Tolka Estuary Wetland of International Importance (WII) have connectivity to the proposed development. Some of these designated sites refer to the same areas. Five nationally designated sites: the Royal Canal proposed Natural Heritage Area (pNHA), the Rye Water pNHA, the Liffey Valley pNHA, the Dolphins, Dublin Docks pNHA and the North Dublin Bay pNHA lie within the “zone of influence.”

Field survey work carried out to establish the ecological baseline included multidisciplinary walkover surveys of the development site and an appropriate buffer zone around the site to describe and map the habitats, species and evidence of species present. Habitats were classified and mapped in accordance with guidelines published by the Heritage Council.

Dedicated surveys for rare and protected flora and fauna, as well as invasive alien species, were also undertaken during the optimal survey seasons. Following the desk study and field surveys, Key Ecological Receptors (KERs) were identified. These are features of ecological significance at the local (higher level) scale or above and should be a material consideration in the decision-making process. A total of nine Key Ecological Receptors were identified within the study area: Royal Canal pNHA, Railway Line Ecological Corridor, Badger, Otter, Bats, Watercourses, Amphibians, Bird and Invasive Species. Each Key Ecological Receptor was evaluated in terms of its conservation value on a geographical scale.

### 8.3 Potential Impacts and Mitigation Measures

The key ecological potential impacts associated with the project include habitat loss, habitat fragmentation and barrier effect, disturbance to species, direct mortality, introduction and spread of invasive species as well as reduction in water quality. The biodiversity impact assessment analysed the potential impacts of the proposed development on the Key Ecological Receptors and characterised these impacts in terms of their magnitude, extent, duration, frequency and reversibility, thereby evaluating their significance on a geographical scale.

Various elements of the proposed development including the construction of the depot, the new pedestrian/cycle bridges over the Royal Canal as well as the temporary and permanent construction compounds will result in habitat loss and fragmentation. The effect of these impacts will be a reduction in overall habitat area within the footprint of the proposed development. The proposed development will require vegetation clearance to facilitate the construction including installation of enhanced fencing along the railway. The Ballycaghan Stream will be diverted. A section of the Royal Canal will be dewatered to facilitate the construction of the underbridge and aqueduct at Ashtown.

Disturbance will occur during construction and operation of the proposed development as a result of noise, lighting and vibration and will affect species both within and outside the construction footprint. Direct mortality is possible as a result of site clearance, tree felling and vegetation removal. The presence of new structures spanning the Royal Canal and the OHLE poses a risk of collision to certain groups of birds. Water quality impacts arising from both the construction and the operation of the proposed development have the potential to affect a wide range of habitats and species directly and indirectly. There is not considered to be any potential for impacts on biodiversity as a result of electromagnetic radiation.

The assessment determined that, in the absence of mitigation, the construction and operation of the proposed development had the potential to have significant negative effects on the Key Ecological Receptors. In light of this finding, appropriate mitigation measures were proposed, aimed at eliminating or minimising these effects. Mitigation measures proposed include construction phase, general and specific measures designed for each Key Ecological Receptor.

Key mitigation measures include the timing of works to avoid sensitive ecological receptors, the implementation of water quality protection measures as well as measures to prevent the spread of invasive species. Measures to minimise habitat loss and vegetation removal have been devised. Specific measures for the protection otter and badger breeding and resting places have also been developed. The lighting has been designed to avoid and minimise impacts on bats. Bird deflectors will be installed on OHLE to prevent bird collision.

In addition to mitigation of the likely ecological effects on the proposed development, the biodiversity assessment also proposed a number of ecological enhancement measures aimed at having a positive impact on ecology, wherever possible. These include the incorporation of wetland habitats into the design of flood compensatory storage areas, the widespread planting of native Irish species of trees, shrubs and wildflowers and the installation of bat and bird boxes across the proposed development.

### 8.4 Residual Effects

In the case of all Key Ecological Receptors, it was found that any residual effects following the application of the proposed mitigation measures would not be significant at any geographical level. With the implementation of the proposed mitigation measures described in the EIAR, there will be no significant residual effects on biodiversity in the Zone of Influence.

## 9. LAND AND SOILS

### 9.1 Introduction

The land and soils assessment considers the likely significant impacts with regards to land and soils associated with both the construction and operational phases of the proposed development. 'Land' in the context of this chapter refers to the existing soil and geological characteristics of the receiving environment.

As a result of the existing railway corridor and tight constraints on these lines, the study area is taken as no more than a 100 m corridor along most of the existing railway lands, with local widening of areas at the proposed new works locations, including the new Spencer Dock Station, the new depot and the level crossing replacement where the area extends to the relevant tie-in points.

Extensive site inspections were carried out during the period between June 2020 and June 2021 along the proposed development in both trackside and off-track locations. Existing information such as mapping and aerial photographs were used during initial desktop studies to plan the ground investigations. Sources of historical information, geological maps and/or features had been established during the geotechnical desktop study of the area including a review of information from various previous projects and site developments.

Ground investigations were undertaken in different phases with the precise purpose of designing and assessing the proposed development. The first phase utilised geophysical surveying as a non-intrusive campaign during Autumn 2020, predominantly aimed at the various proposed route options at the level crossings, the proposed depot and in the docklands area. Intrusive surveys were also progressed, including locations in trackside, on public roads and lands, and in private properties along the proposed route. This started in December 2020 and continued through to Summer 2022, to determine the soil, bedrock, ground water conditions and to establish the environmental condition of the soil.

### 9.2 Receiving Environment

The proposed development begins in the Docklands area, which is historically an industrial area with port related activities located adjacent to the River Liffey. While port related activities are still present, the area has been subject to extensive mixed use urban regeneration developments in recent years, which is still ongoing in the area. The majority of the soils reflect the urban setting, with 'made ground', that is associated with the construction of the port and canal at the end of the 19th Century. Some of these deposits have been contaminated from historic uses. Some hazardous materials are present, predominantly in areas at Spencer Dock, Connolly Station and along the MGWR and GSWR lines where other railway and industrial uses were long established.

The study area overlies various deposits, primarily glacial such as the Dublin Boulder Clay sequence. Other characteristic glacial features are recorded at the Phoenix Park however this is outside the study area. Soft soils and shallow bedrock are present in many areas.

The land and soils of the area is mainly quite a uniform soil profile with progressive changes in soil and rock conditions notable along its length, the main exceptions being present in between Leixlip and Maynooth, and nearer to the Docklands where the effects of the Dublin Estuary can be seen.

### 9.3 Potential Impacts and Mitigation Measures

The potential impact of the proposed development on the soils and geology environment has been assessed by classifying the importance of the relevant attributes and quantifying the likely magnitude of impact on these

attributes. This assessment methodology is consistent with impact assessment criteria outlined *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2022)*.

During construction phase, unmitigated, there is a potential risk of localised contamination from construction materials leaching into the underlying soils by exposure, dewatering or construction related spillages resulting in a permanent negative impact on the soils. There is also the potential for hydrocarbon release during construction works and the use of vehicle and construction plant, which may contaminate the soils.

There is potential for pollutants derived from construction materials to be mobilised by flood waters, namely at the proposed depot location due to realignment works of the Lyreen Stream and extensive earthworks. Given its susceptibility to flooding and the considerable volume of earthworks required, the works required for the compensatory storage areas poses the greatest risk of pollution as a result of flood events.

All suitable material excavated within the cut sections shall be used to the greatest possible degree as fill material on the development to minimise both the disposal impacts and import requirements. Where material is to be removed from the construction site it will have to be undertaken by a Contractor competent to handle such works and using appropriately licenced facilities. Aside from the general and selected import fill materials to be provided, the main soil materials to be used on an ongoing basis during operations will be ballast. The construction will require excavation works to remove any existing materials containing potential contamination. Once in service, the operational removal of ballast is much less likely to be affected by contamination from diesel materials in particular and the materials will therefore remain cleaner than is currently likely during maintenance works in the existing environment. On this basis, after construction there will likely be a beneficial effect over the existing conditions. The large area of land at the new depot and adjacent compensatory flood area shall experience changes due to the sealing over and compaction of soils as a residual effect after the proposed development.

At the proposed Spencer Dock Station, changes from existing ground level to proposed track level within a deep excavations comprising secant piled retaining walls over a large footprint. Some of the arisings are expected to be hazardous and the excavation will require dewatering. This will have an indirect small permanent adverse effect due to the required disposal and treatment of the excavated materials. The material will be reused and/or treated where economically / environmentally desirable as fill material on the development to minimise the disposal impacts. This may be dependent on a suitable haulage method to locations on site requiring such materials where present and/or treated to achieve acceptable criteria meeting specification requirements.

The proposed depot facility west of Maynooth will also have a significant footprint, with associated access roads, flood compensatory storage areas with civil works and buildings to deliver the projects requirements. The Buildings and Service Slab will be built on isolated concrete foundations. This will have a large local negative earthworks balance, requiring the import of over 300,000 cubic metres of fill and the removal of over 90,000 cubic metres of soils assumed to be unacceptable for reuse without some form of processing. The excavation and removal of topsoil will result in a moderate to significant adverse and permanent effect to soils and geology of the depot area, with such a large area being locally sealed and compacted. There will also be an indirect significant negative effect, in finding and transporting suitable materials to site to fill to the required levels.

The volumes arising on-site involve 480,820 cubic metres to be excavated, of which approximately 50 to 65% is assumed to be reusable. Over 687,000 cubic metres of fill is required to build the project, with an estimated net deficit of the order of 404,000 cubic metres, however this volume is dependent on the sequencing of material movement which may be dependent on excavations, transport and the filling operations possible within the site.

Approximate volumes of soil arisings requiring disposal are of the same magnitude at 220,200 cubic metres, to be brought to suitably licensed landfill locations, predominantly as inert waste and non-hazardous waste but also including those approved to take hazardous waste where relevant. Volumes of ballast shall also be

developed, with over 22,000cubic metres to be removed and disposed of, and just over 30,000 cubic metres to be imported for the new track construction.

A Construction Environmental Management Plan (CEMP) will be implemented to manage the excavations, temporary stockpiling, haulage and placement of materials, particularly in respect of how the soils will be contained and transported to suitable locations during construction. This is likely to contain several constituent elements such as a Sediment and Erosion Control Plan (SECP) to manage aspects like the potential for soil pollution of watercourses and control of dust.

#### **9.4 Residual Effects**

The large area of land at the new depot and adjacent compensatory flood area shall experience changes due to the sealing over and compaction of soils as a residual effect after the proposed development.

Other improvements in the treatment of ground contamination and enabling more electrified services are likely to result in a benefit to the wider environment with less contamination of ballast due to diesel combustion.

## 10. HYDROLOGY

### 10.1 Introduction

The hydrological assessment identifies and assesses the likely significant effects that the construction and operation phases of the proposed development will have on hydrology. The assessment includes a review of published literature available and web-based search for relevant material. Site specific topographical information and aerial photography has been reviewed to locate any potential features of hydrological interest, and these have been investigated on the ground by a walkover survey undertaken from March 2020 through to June 2021, in order to assess the significance of any likely environmental impacts.

The hydrological impact assessment methodology as per the guidance outlined in Sections 5.6 and 5.7 of the TII 'Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes, 2009' has been used to inform this chapter. The impact category, duration and nature of impact have been assessed in this Chapter, as per the guidelines. The criteria for assessing the importance of hydrological features within the study area (site boundary + 250 m) and the criteria for quantifying the magnitude of impacts follow the TII guidelines and the EPA (2022) 'Guidelines on the Information to be contained in Environmental Impact Assessment Reports'. Consideration is also given to the surface waterbodies that are potentially hydrologically linked to the study area, this includes the Tolka and Liffey estuaries.

### 10.2 Receiving Environment

The majority of the proposed development is located within the Liffey and Dublin Bay Water Framework Directive (WFD) catchment. This catchment includes the area drained by the River Liffey and by all watercourses entering tidal water between Sea Mount and Sorrento Point, Co. Dublin, draining a total area of 1,616km<sup>2</sup>. The main storage and distribution centre (MSDC) is located within the Nanny-Delvin WFD Catchment. This catchment includes the area drained by the Rivers Nanny and Delvin and by all streams entering tidal water between Mornington Point and Sea Mount, Co. Dublin, draining a total area of 711 km<sup>2</sup>.

Within the Liffey and Dublin Bay catchment and Nanny-Delvin catchment the proposed development crosses 7 no. WFD Subcatchments. The waterbodies within these Subcatchments have been assessed regarding their key pressures. These pressures are diverse and include agriculture, urban runoff and wastewater, rural domestic wastewater, hydromorphology and industry. Eleven of the twelve waterbodies within the study area have a WFD status of less than "Good" with the majority being "At Risk" of not meeting WFD objectives by the 2027 target.

### 10.3 Potential Impacts and Mitigation Measures

The Site-Specific Flood Risk Assessment undertaken for the scheme identified multiple locations with historic or predicted flooding issues. The most significant of these locations are:

- Between Maynooth and Kilcock. Extreme fluvial events result in considerable flooding in lands south of the canal affecting both the proposed depot lands and lands around Jackson's Bridge.
- The Dublin Docklands. The Docklands area indicated as liable to flood from coastal sources. However, municipal flood risk management measures are in place to mitigate the risk.

Construction activities within and alongside surface waters can contribute to the deterioration of water quality and can physically alter the riverbed and bank morphology, with the potential to alter erosion and deposition rates locally and downstream. Activities (such as earthworks, sheet piling or concreting) within or close to the

watercourse channels can lead to increased turbidity through re-suspension of bed sediments and release of new sediments.

As is normal practice with infrastructure projects, a Construction Environmental Management Plan (CEMP) and an Environmental Operating Plan (EOP) and will be prepared for the proposed development. These will be developed by the selected contractor to suit the detailed construction methodology and allocate responsibilities to individuals in the construction team.

There is potential for flood events to occur during the construction phase. The construction works will increase the number of people near known sources of flooding, thus increasing the potential for flood risk related impacts on human health. There is also potential for pollutants derived from construction materials to be mobilised by flood waters. Mitigation in place during the construction phase will limit flood risk and reduce the potential for pollution events.

Throughout the construction phase there will be considerable disruption to the Royal Canal and its adjacent walking paths either directly through the aforementioned instream works or indirectly via noise pollution e.g. the Depot. The Ashtown aqueduct works will close a section of the canal, with flow through the closed section being maintained via pipes. Recreational users of the canal will not be able to navigate this section of the canal at Ashtown for the duration of the works. There is no proposed mitigation for this impact. The likely effects are *negative, moderate to significant, short term*.

The Site-Specific Flood Risk Assessment carried out for the proposed development has concluded that the vast majority of the proposed development is within flood zone C as per the OPW guidelines and is at low risk of flooding. The notable exceptions are at Docklands / Newcomen and the lands between Maynooth and Kilcock. The scheme design between Maynooth and Kilcock will ensure that the proposed development is defended to the 0.1% AEP event and will not exacerbate flooding elsewhere. The overprovision of compensatory storage areas at the proposed depot will cause a minor reduction in peak runoff from the Ballycaghan stream. The likely effects on flooding between Maynooth and Kilcock is *negative, imperceptible to slight long term*.

## 10.4 Residual Effects

Following the implementation of the mitigation measures, there will be *negative, slight, temporary* residual effects on water quality during the construction phase of the proposed development.

Overall, the likely effects to water quality during the operational phase are envisaged to range from a *slight negative to a slight positive permanent*. The assessment also considers the likely impact to the Water Framework Directive Status of Waterbodies. The assessment concludes that the proposed development will have negligible impact on waterbody status and the attainment of Good status (or good ecological potential for the Royal Canal).

## 11. HYDROGEOLOGY

### 11.1 Introduction

The hydrogeological assessment identifies and assesses the likely significant effects that the construction and operation phases of the proposed development will have on hydrogeology. The hydrogeological impact assessment methodology is as per the relevant guidance published by the EPA (2015 & 2022), and the Institute of Geologists of Ireland (IGI) *Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements* (2013). Key hydrogeological attributes that have been considered within the study area include:

- Groundwater supplies to multiple households and their surrounding Source Protection Areas (SPAs);
- Low-yielding wells used for individual dwellings.
- Any significant natural hydrogeological features (including large springs or groundwater dependent habitats).
- The nature of the aquifer(s) underlying the proposed development including aquifer extent, recharge characteristics, and flow patterns within.

### 11.2 Receiving Environment

The majority of the study area is covered by deposits of glacial till derived from limestone. Along the main rivers are bands of alluvium and gravels derived from limestone. The majority of the proposed development is dominated by the Lucan Formation, a locally important aquifer, with smaller areas of the Tober Colleen calcareous shales and limestone. The Water Framework Directive Groundwater Body which covers the whole proposed development currently has good quantitative and chemical status.

The study area is serviced by private and public water supply schemes, which are surface water and groundwater fed. Whilst the majority of the study area is serviced by public water schemes, a single public group scheme is groundwater fed. The public group scheme is situated at Dunboyne in Zone D, immediately south of the M3 Parkway. Fingal, Kildare and Meath County Councils were contacted as they have small private water supplies listed on the EPA registry. The only supplies identified in this process are in the Dunboyne area, with two in the centre of the town circa 500 m east of the railway and one north 300 m north of the works at the M3 Parkway.

There are Groundwater Dependent Terrestrial Ecosystems within the study area. Tufa springs are found within the Ryewater SAC, which is crossed by the railway line on a man-made embankment and bridge. A single spring has also been recorded in the Deep Sinking (ITM 706155 737768) on the north bank of the canal. Tufa Springs correspond to the priority Annex I habitat 'Petrifying springs with tufa formation (Cratoneurion)' (7220).

### 11.3 Potential Impacts and Mitigation Measures

Impacts to the groundwater environment which may occur as a result of construction activities during the project are as follows:

- Permanent alteration in groundwater flow patterns and levels through activities such as dewatering (i.e. controlling groundwater levels).
- Discharges or releases of potential contaminants such as hydrocarbon-based pollutants from mechanical plant used during the construction phases of the project which may lead to both soil and groundwater impacts in the area.
- Potential for high alkalinity run-off recharging to ground as a result of the use of concrete based materials.

The impacts from the construction of the majority of elements of the scheme were assessed to have an imperceptible impact on the groundwater environment. The main focus of the construction phase assessment was on Zone B. The construction works in Zone B involve a combination of below ground works which will be undertaken beneath the local water table including: piling activities, excavation and dewatering to control groundwater levels, and the construction of concrete slabs.

During the construction phase the Spencer Dock and Zone B works could have potential effects, including:

- Dewatering operations have the potential to mobilise fine grained materials within the soils which surround the footprint of the excavation causing instability issues to surrounding structures, However, dewatering activities will be designed to prevent the removal of fine grained material during construction works.
- Generated contaminated water from the dewatering process that would require treatment and disposal.

A dewatering strategy will be developed to address these issues and dewatering water generated will be discharged in an accordance with a discharge licence.

Impacts during the construction phase on groundwater abstractions and the Ryewater Tufa springs were separately assessed. Limited works will occur near these sensitive features so no potential impact linkages were identified.

Several elements of the scheme have the potential to cause ongoing hydrogeological effects during operation phase through the following broad impact mechanisms:

- Alteration of groundwater levels and flow pathways or changes to recharge through the development of structures beneath the ground surface, or the creation of new drainage routes and impermeable surfaces.
- Increase the vulnerability of groundwater to pollution through the creation of new pollution pathways or decreasing the depth to the water table.
- Creation of ongoing potential pollution sources.

After a screening process, detailed assessments were undertaken for several elements including: Ashtown underpass, the Spencer Dock area and Zone B, Depot and Zone F, and sections of track lowering.

The assessment identified that additional data collections and analysis is required during detailed design stage to assess the impact of the piling and slab work on groundwater. This may require the development of a groundwater model. If this identifies that there will be an increase in groundwater levels, additional mitigation may need to be incorporated into the design to address increased groundwater flooding risk. However, it should be possible to incorporate such mitigation within the existing footprint of the design. The surrounding area has a number of similarly scaled basements for which impacts have successfully been mitigated. Depending on the solution, additional discharge consents may be required to dispose of the water.

## 11.4 Residual Effects

Taking into account embedded mitigation, all likely effects were assessed to be *imperceptible*, with the exception of changes in recharge to the aquifer beneath the depot which was assessed to be *slight* due to the reduction in infiltration across the site.

## 12. AIR QUALITY

### 12.1 Introduction

This assessment considers the potential air quality impacts as a result of emissions to air associated with the construction and operation phases of the proposed development. The assessment involved a review of available published data, a review of applicable guidelines, air quality monitoring at sensitive locations along the proposed development and calculations to assess air quality impacts that may occur as a result of the proposed development.

The statutory ambient air quality standards in Ireland are outlined in S.I. No. 180 of 2011 Air Quality Standards Regulations 2011 (hereafter referred to as the Air Quality Regulations), which incorporate the ambient air quality limits set out in Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe (hereafter referred to as the CAFE Directive), for a range of air pollutants. National and European Union air quality standards are set for the protection of human and ecological health.

### 12.2 Receiving Environment

As part of the implementation of S.I. No. 271/2002 - Air Quality Standards Regulations 2002, four air quality zones have been defined in Ireland for air quality management and assessment purposes (EPA 2021a). Dublin is defined as EPA Air Quality Zone A and Cork as EPA Air Quality Zone B. EPA Air Quality Zone C is composed of 23 towns with a population of greater than 15,000. The remainder of the country, which represents rural Ireland but also includes all towns with a population of less than 15,000, is defined as EPA Air Quality Zone D. In terms of air monitoring zoning, the area of the proposed development is located within EPA Air Quality Zone A, C and D. EPA Air Quality Zone A monitoring stations have been found to exceed air quality limit values and therefore are of the most concern.

Site specific NO<sub>2</sub> monitoring was conducted at 19 monitored locations in the vicinity of the proposed development over the six-month period from 17/09/2020 to 04/03/2021. The highest six-month average concentration was recorded at a roadside location at Glasnevin (Location 4) which was the closest monitoring location to the City Centre. Concentrations at this location were 36.1 µg/m<sup>3</sup> or 90% of the annual mean limit value.

### 12.3 Potential Impacts and Mitigation Measures

The impacts assessed for the construction phase include dust emissions from activities such as site clearance and preparation, construction works, road and junction, construction works and landscaping.

The proposed development's primary objective is to provide a higher frequency, higher capacity, electrified heavy rail service. During the operational phase the impact of the electrification of the rail line and increased service level have been modelled. The emissions associated with the heat and power associated with operation of the proposed depot, Spencer Dock station and substations have been included in the assessment. In addition, operational phase road traffic impacts are also assessed.

Mitigation measures to ensure that construction dust nuisances do not occur include:

- A Dust Management Plan will be generated and applied throughout the construction phase.
- Vehicles delivering material with dust potential (e.g. soils) will be enclosed or covered with tarpaulin at all times to prevent dust escaping to the air; Materials will be stored on-site away from wind sources.
- Surfaces will be sprayed with water if dusty activities are necessary during dry or windy periods.

- Public roads outside the proposed development will be regularly inspected for cleanliness and cleaned as necessary.
- Hoarding will be provided around the Construction Compounds.

When the dust minimisation measures are implemented, fugitive emissions of dust from the site are not predicted to be significant and pose no nuisance, human health or ecological risk to nearby receptors. Thus, there will be no residual construction phase dust impacts. The air dispersion modelling assessment of construction phase traffic emissions has found negligible results at all modelled locations. The construction phase of the assessment identifies a negligible impact on air quality in the vicinity of the proposed development. Therefore, overall, it is considered that the residual effects with the EPA Guidelines (EPA 2022) and considering the potential impact of emissions from the proposed development construction, the likely effects are considered overall *short-term* and *not significant*.

The regional mass emissions modelling for the rail line found that for the proposed future operational scenario the emissions are decreased compared to the Do Nothing (without DART+ West project) emissions which are currently exceeding emission limit ceilings. The impact in emissions due to the change in energy source is significant enough that the increased frequency and capacity of the service does not result in an overall significant adverse impact. The air dispersion road traffic modelling assessment has found that in 2028 and 2043 all receptors will have ambient air quality in compliance with the ambient air quality standards for the Do Something (and Do Nothing) scenario. There are no slight, moderate or substantial adverse effects expected as a result of the operational phase of the proposed development.

No mitigation measures will be required during the operational phase as all ambient air pollutant levels are predicted to comply with air quality standards. The assessment identifies a generally *neutral, long-term* and *not significant* effects on air quality as a result of the proposed development.

## 12.4 Residual Effects

It is considered that the residual effects with the EPA Guidelines (EPA 2022) and considering the potential impact of emissions from the operational phase of the proposed development, the likely effects are considered overall *positive, significant and long-term*.

## 13. CLIMATE

### 13.1 Introduction

This assessment considers the potential climate impacts associated with the proposed development. Climate is defined as the average weather over a period of time. Climate change is a significant change to the average weather, and while climate change is a natural phenomenon, human activities in recent years have negatively impacted on the climate, through the release of greenhouse gases.

The assessment involved a review of greenhouse gas emissions, a review of applicable guidelines and predictive calculations to assess climate impacts. The proposed development was also assessed in terms of its vulnerability to climate change.

The Institute of Environmental Management and Assessment (IEMA) guidance note on “Assessing Greenhouse Gas Emissions and Evaluating their Significance” (IEMA 2022) states that “*the crux of significance regarding impact on climate is not whether a project emits GHG emissions, nor even the magnitude of GHG emissions alone, but whether it contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050*”.

### 13.2 Receiving Environment

Given the circumstances of Ireland's declaration of a climate and biodiversity emergency in May 2019 and the November 2019 European Parliament approval of a resolution declaring a climate and environment emergency in Europe, in conjunction with Ireland's current failure to meet its EU binding targets the Regulation (EU 2018/842), changes in GHG emissions either beneficially or adversely are of more significance than previously viewed prior to these declarations. Thus, the baseline climatic environment should be considered a highly sensitive environment for the assessment of impacts.

### 13.3 Potential Impacts and Mitigation Measures

The impacts assessed during the construction phase included emissions from activities such as site clearance and preparation, construction materials and their transport, waste materials and excavation works (where required), water and fuel usage. Construction traffic routes are also assessed as part of the assessment.

The proposed development's primary objective is to provide a higher frequency, higher capacity, electrified heavy rail service. During the operational phase the impact of the electrification of the rail line and increased service level have been modelled. The emissions associated with the heat and power associated with operation of the proposed depot, Spencer Dock station and substations have been included in the assessment. In addition, operational phase road traffic impacts are also assessed.

In addition to the proposed development's impact on climate change, the vulnerability of the proposed development to climate change has been considered. The assessment found that mitigation measures are in place to ensure that there are no residual potentially significant impacts on the proposed development receptors due to climate change.

A series of mitigation measures incorporated into the construction design to reduce the embodied carbon associated with the construction phase of the proposed development include:

- The careful selection of construction materials with less embodied carbon.
- Use of a Corporate Power Purchase Agreement (CPPA) to ensure of 80% renewables in the operational phase electricity use.

- Reducing waste of materials due to over-ordering and poor timing of delivery and the reuse of materials within the site, as much as possible.
- Site-specific mitigation measures to ensure that construction traffic emissions will be reduced, such as not leaving engines idling and maintaining and regularly servicing all plant and machinery.
- A Traffic Management Plan will be implemented to avoid congestion and to reduce greenhouse gas emissions.

The operational phase of the proposed development can be considered to beneficially contribute to Ireland's target of net zero. However, the impacts of embodied carbon from the construction phase results in a residual impact of 1,273 tonnes CO<sub>2</sub> annually or 0.0038% of Ireland's 2030 CO<sub>2</sub> targets. The residual impact is equivalent to five return flights from Dublin to New York annually.

IEMA significance (IEMA 2022) notes that:

*“Minor adverse impact (not significant): A project that is compatible with the budgeted, science based 1.5°C trajectory (in terms of rate of emissions reduction) and which complies with up-to-date policy and ‘good practice’ reduction measures to achieve that has a minor adverse effect that is not significant. The project may have residual impacts but is doing enough to align with and contribute to the relevant transition scenario. A ‘minor adverse’ or ‘negligible’ non-significant effect conclusion does not necessarily refer to the magnitude of GHG emissions being carbon neutral<sup>3</sup> (i.e. zero on balance) but refers to the likelihood of avoiding severe climate change and achieving net zero by 2050. A ‘minor adverse’ effect or better is a high bar and indicates exemplary performance where a project meets or exceeds measures to achieve net zero earlier than 2050.*

## 13.4 Residual Effects

The overall residual effect of the proposed development is considered *non-significant* and *minor adverse* in the *short term*, however as Ireland further progresses towards net carbon zero and the percentage of renewables within electricity utilised for rail further increases the long-term impact of the proposed development has the potential to be considered *not significant* and *negligible* or even *significant* and *beneficial*.

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<sup>3</sup> Carbon Neutral: “When anthropogenic emissions of greenhouse gases to the atmosphere are balanced by anthropogenic removals over a specified period irrespective of the time period or magnitude of offsets required.”

## 14. NOISE AND VIBRATION

### 14.1 Introduction

An assessment has been made of the noise and vibration impacts relating to the proposed DART+ West project. The assessment focused on the following elements:

- A survey of the existing noise and vibration environment in the vicinity of the proposed development.
- Specification of appropriate noise and vibration criteria with reference to national and international guidance.
- Prediction and assessment of the likely noise and vibration impacts during the construction and operational phase of the DART+ West project.
- Specification of noise mitigation measures to achieve the criteria set for the proposed development.

The criteria used to describe the potential population effects are in accordance with the *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2022)*. The existing Dublin to Maynooth railway line passes through a mixture of urban and semi-urban landscapes which serves a frequent intercity, regional and sub-urban rail service. The existing environment through which the rail line passes is predominately urban to semi urban in nature. Noise and vibration from the existing operational rail line forms part of the existing environment at the nearest residential properties. The study area for the noise and vibration assessment is the area immediately adjacent to the red line of the development, nominally within a range of 50 to 100 m of the project boundary. Noise and vibration impacts are assessed to the closest sensitive locations to the proposed development.

### 14.2 Receiving Environment

Baseline noise measurements were made over mostly unattended periods, typically for periods of 24 hours, and some short term attended surveys. In total over 50 locations were selected. Noise levels measured were found to be typical of the environment under assessment, with passing trains contributing to the overall baseline noise levels in addition to road traffic, local estate traffic, industrial sources and activities within residential gardens.

Vibration measurements were made over unattended periods, typically for periods of 24 hours to assess the current vibration levels from passing rail. At the majority of locations assessed, the range of vibration levels were found to be within guidance of acceptable levels of continuous vibration for humans.

### 14.3 Potential Impacts and Mitigation Measures

During the construction phase there is potential for significant noise and vibration impacts to occur at times for locations in closest proximity to the works. In particular due to the need to carry out construction at night in many areas the significance of noise impacts increases.

Mitigation measures in the form of localised screening, scheduling of works during daytime where possible, noise and vibration monitoring and the use of low noise construction methods where practicable will be implemented to minimise the impacts as much as possible.

The key noise and vibration impacts associated with the development are associated with the following:

- Diverted road traffic along new or upgrade roads as a result of the closed level crossings.
- Increased rail traffic along the upgraded line.
- Fixed plant items.

- PA announcements.
- Permanent compounds and Maintenance Works.
- Operation of the depot.
- Spencer Dock Station.

During the operational phase incorporating increased service frequency of new DART+ trains the majority of locations experience a slight impact with some areas predicted to experience an overall reduction in rail noise levels. However, the adopted noise criteria were exceeded at several locations and mitigation measures have been specified at these locations in the form of noise barriers. These locations include:

- Ossory Road (between OBD 227A and OBD226 on the MGWR up track side requiring approx. 175 m of noise barriers).
- Ardilaun Square (on the MGWR) up track side requiring approx. 50 m of noise barriers.
- Drumcondra Park/Portland Lock (between OBD224 to OBD223 on both up (requiring approx. 110 m and 130 m of noise barriers) and down (requiring approx. 285 m of noise barriers) sides of the track).
- Maynooth to Maynooth Depot (from OGB21 requiring approx. 1,260 m of noise barriers on the westbound track edge).

The likely noise effects from fixed plant, PA announcements, permanent compounds and maintenance, depot operation and Spencer Dock station have been found to be *negative, slight and long-term*.

The likely operational vibration levels effects have been found to be *not significant*.

#### 14.4 Residual Effects

Residual negative, significant noise and vibration impacts will remain during construction, however, the effects will be *brief* in many locations and *short-term* in all areas.

With mitigation in place the overall likely effects of rail noise during operation phase can be summarised as follows,

- Zone A – *Negative, Neutral and Positive, slight, long term effects*
- Zone B – *Negative, slight, long term effects*
- Zone C – *Negative, Neutral and Positive, slight, long term effects*
- Zone D – *Positive, slight to moderate, long term effects*
- Zone E – *Negative, Neutral and Positive, slight, long term effects*
- Zone F – *Neutral to Negative, slight, long term effects*

The likely residual noise effects due to changes to road traffic on the local road network are at most locations *long-term, neutral and not significant*. At some locations close to the closures of level crossings the likely residual effects are *long-term, positive and significant*.

The likely residual vibration effects are *negative, not significant and long-term*.

## 15. LANDSCAPE AND VISUAL

### 15.1 Introduction

An assessment has been made of the landscape / townscape and visual impacts relating to the proposed DART+ West project. This assessment is informed by data collection and collation based on initial desk studies, supported by site walkovers and augmented by further specific localised reviews along the corridor of the proposed development. The survey also involved the selection and preparation of verified Photomontages of the proposed development, which are presented in Volume 3B Photomontages in this EIAR.

This assessment has been supported by the professional experience and expertise of the assessor and informed by the following guidance documents:

- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2022).
- Landscape Institute and the Institute of Environmental Management and Assessment (IEMA) Guidelines for Landscape and Visual Impact Assessment ('GLVIA') 3rd edition (Landscape Institute and IEMA 2013).
- Landscape Institute Technical Information Note 05/2017 (Revised 2018) on Townscape Character Assessment ('TCA') (Landscape Institute 2018).

### 15.2 Receiving Environment

The landscape / townscape character within Zones A to F of the proposed development are summarised below:

**Zone A:** This zone passes through a gradient of varying townscape characters; from the River Liffey and inner-city commercial and mixed-use residential areas surrounding Connolly Station; through areas of relatively dense inner-city residential areas in North Strand; to outer city centre suburbs in Phibsborough, Drumcondra and Cabra. The area around Connolly Station is predominantly historic commercial and residential in nature, with recent prominent medium-rise development in the Custom House Harbour/ Quay areas. The inner-city residential areas are composed of a mix of 19<sup>th</sup> century terraces with modern infill including higher density blocks. 19<sup>th</sup> century terraces are also the dominant typology in the Drumcondra / Phibsborough suburbs. The suburbs of Cabra are largely 20<sup>th</sup> century with some large institutional uses.

Key landscape / townscape features include areas of recent medium-rise regeneration around Custom Key; prominent elements of historic railway infrastructure, and a key historic railway station and areas of historic inner-city at Connolly Station; traditional residential areas and suburbs dominated by terraces. A large cemetery (Glasnevin Cemetery), McKee Barracks and An Garda Síochána Headquarters in the west of the zone. Additionally, there is a very large urban open space at Phoenix Park at the southwest end of the route.

**Zone B:** This zone passes through a gradient of varying urban townscape characters; from the medium-rise, modern mixed-use residential areas at Spencer Dock; through mixed-use areas in North Dock; to historic city suburbs surrounding the Royal Canal. The area around Spencer Dock has been heavily regenerated in recent years with large blocks of medium-rise buildings dominating the townscape. The inner-city residential areas are composed of a mix of 19<sup>th</sup> century terraces with some modern infill including higher density blocks. A major institutional use exists in the form of Mountjoy Prison, south of the Royal Canal, and a major amenity / sport use exists at Croke Park stadium.

Key landscape / townscape features include areas of recent medium-rise regeneration around Custom Key; prominent elements of historic railway infrastructure, and a key historic railway station and areas of historic inner-city at Connolly Station; traditional residential areas and suburbs dominated by terraces. A large

cemetery (Glasnevin Cemetery), McKee Barracks and An Garda Síochána Headquarters in the west of the zone. Additionally, there is a very large urban open space at Phoenix Park at the southwest end of the route.

**Zone C:** This zone passes through Dublin and Fingal local authority areas. The zone runs from the inner-city suburbs and modern industrial areas of Cabra, through relatively undeveloped areas of the Tolka Valley, through to the outer-city suburbs of Clonsilla and beyond to rural areas to the south of Clonsilla and to the west of Castleknock.

Key landscape / townscape features include historic railway infrastructure following the line of the Royal Canal; the M50 motorway and junction; large scale 20<sup>th</sup> century suburban residential areas; and areas of modern industry and regeneration. Phoenix Park, a major urban open space, is located 450 m to the south.

**Zone D:** This zone passes through Fingal and Meath local authority areas. The zone runs from the outer-city suburbs of Clonsilla and the rural areas to the south of Clonsilla and to the west of Castleknock, which are separated by the railway line, through lowland rural areas past the eastern edge of Dunboyne and through to meet the M3 motorway at M3 Parkway. The railway forms a defined outer boundary to the Dublin Conurbation at Clonsilla / Hansfield, and a defined eastern boundary to Dunboyne.

Key landscape / townscape features include modern railway infrastructure following a historic railway route. The western edge of the Dublin conurbation and Dunboyne form the main built-up areas. The Royal Canal at the southern end of the zone; the M3 motorway, M3 Parkway Park and Ride, and R157 junction.

**Zone E:** This zone passes through Fingal and Kildare local authority areas. The zone runs from the outer-city suburbs of Clonsilla and the rural areas to the south of Clonsilla and to the west of Castleknock, through lowland rural areas past the northern edge of Leixlip and through Maynooth Station in the centre of Maynooth. The railway forms a defined northern boundary to Leixlip.

Key landscape / townscape features include modern railway infrastructure following a historic canal / railway route. The western edge of the Dublin conurbation, Leixlip and Maynooth form the main built-up areas which are separated by rural landscapes which are largely agricultural with amenity uses in the form of golf courses within historic demesnes.

**Zone F:** This zone passes through Kildare local authority area. The zone runs from the centre of Maynooth through rural areas further to the west terminating halfway to Kilcock. The landscape is rural and lowland in character with predominantly arable uses which has led to an expansion of field sizes, however, some notable hedgerows with mature trees are still present.

Key landscape / townscape features include modern railway infrastructure following a historic canal / railway route. Maynooth forms the only substantial built-up area which is separated from other settlements by areas of rural landscape.

### 15.3 Potential Impacts and Mitigation Measures

Assessment of potential landscape / townscape effects involves classifying the sensitivity of the baseline environment of the landscape / townscape resource and describing and classifying the magnitude of change in the landscape / townscape resulting from the proposed development.

Visual impact assessment is concerned with changes that arise in the composition of available views and the overall effect on the visual amenity of an area. This includes effects on protected and designated views as well as on the typical range of views available from within the public realm or private areas and properties.

The primary study area is a boundary-to-boundary rail corridor located along the proposed development, which incorporates the immediately adjoining landscapes and properties, including open spaces, parks, gardens, and other land use areas, together with amenity, landscape / townscape and visual planning considerations.

This study area also extends where required to incorporate wider viewpoints to the proposed development (e.g. views along the Royal Canal corridor).

The proposed development will give rise to some degree of townscape and visual impact, most notably during the construction phase. These impacts arise especially where there is temporary and / or permanent acquisition of lands associated with residential or other properties including amenities; where major construction and disturbance is located in proximity to amenities and properties, and where significant tree removal is required. The proposed development includes for replacement of disturbed boundaries, reinstatement of the Construction Compound areas, and return of temporary acquisition areas.

A series of mitigation and management measures are proposed to avoid, reduce or remediate, wherever practicable significant negative landscape (townscape) and visual effects of the construction and operation phase of the proposed development.

## 15.4 Residual Effects

In the operational phase some residual effects will remain for properties experiencing permanent land acquisition, (e.g. Ashton House), where major development is proposed (e.g. depot west of Maynooth) and in the loss of trees (e.g. from tree preservation objectives at Barberstown). However, the proposed development will also provide for a significantly enhanced level of service for public transport and for improved and safe pedestrian / cycle connectivity across the existing railway. Likewise, the proposed development provides for localised improvements in the public urban realm notably at Spencer Dock Station and Connolly Station as well as at Ashtown Road, Coolmine Station, and Clonsilla Station. Landscape mitigation measures propose replacement or additional tree and other planting where possible along the proposed development which will in time ensure best integration of the proposed development into the surrounding townscape and landscape areas.

## 16. MATERIAL ASSETS – AGRICULTURAL PROPERTIES

### 16.1 Introduction

Chapter 16 Material Assets – Agricultural Properties assesses the impact of the proposed DART+ West project on agricultural property during the construction and operation phase. It describes and assesses the likely direct and indirect significant impacts of the proposed development on agricultural property.

### 16.2 Receiving Environment

The study area is comprised of agricultural properties directly impacted by the proposed development. There is a relatively low number of agricultural properties within the study area, and these are often isolated or located in small numbers in an urban setting or in close proximity to urban development. This is evident where lands are included within county development plans or local area plans and are zoned for development.

There are a range of agricultural farm enterprises within the study area and these include tillage, equine, beef, dairy and lands leased on a short term basis for livestock grazing or crop production.

### 16.3 Potential Impacts and Mitigation Measures

The proposed development will involve a total land-take of 93.1 ha from 18 agricultural holdings involving permanent landtake of 84.3 ha and temporary landtake of 8.8 ha. Permanent landtake is comprised of 83.5 ha agricultural lands and 0.8 ha public road. Temporary landtake is comprised of 8.0 ha agricultural lands and 0.8 ha public road.

This permanent acquisition of 83.5 ha of agricultural land is not significant on a national or county level.

The significance of the impact of the proposed development on agricultural properties was determined by combining the magnitude of impact with the baseline rating for that farm. The significance of the effect on affected agricultural properties ranges from *slight to profound*.

On one agricultural property the effect is *profound*. These impacts are due to the individual or combined impact of land-take, land severance and / or the impact on essential farm buildings or facilities. The impact is such that the farm enterprise cannot continue in the absence of any mitigation. On seven agricultural properties, the effect will be *significant*. On six agricultural properties, the level effect is *moderate*.

Mitigation measures are proposed for both the construction and operation phases of the proposed development. Key mitigation measures include the reinstatement of land to existing agricultural condition. Measures will be considered on a site-by-site basis, subject to proposed construction works. Access will be restored, as soon as possible, to lands where it is removed or restricted by the proposed development. The location of such access will be at a suitable location and, where possible, with the agreement of the landowner.

### 16.4 Residual Effects

Following the implementation of these measures, the likely residual effects of the proposed development has been assessed. On one agricultural property the residual effect is *profound*. There are no agricultural properties on which the residual effect is predicted to be *very significant*. There are five agricultural properties on which the residual effects are predicted to be *significant*. This represents a reduction of two agricultural properties with a significant effect. On three farms, the residual effects will be rated as *moderate*. On three

farms, the residual effects will be rated as *slight*. On five farms, the residual effects will be rated as *not significant*.

## 17. MATERIAL ASSETS – NON AGRICULTURAL PROPERTIES

### 17.1 Introduction

The Material Assets: Non-agricultural properties chapter of the EIAR assesses the impact of the proposed DART+ West project on non-agricultural property during the construction and operation phase. This chapter describes and assesses the likely direct and indirect significant effects of the proposed development on non-agricultural property.

The study area is comprised of non-agricultural properties directly impacted by the proposed development. Non-agricultural property includes the following:

- Residential property.
- Commercial property.
- Community property – Public park, open space or lands that are used for recreation amenity.
- Development land – Lands zoned for development (with or without planning permission) and sites with planning permission.
- Non-agricultural land – Lands not zoned for development, non-amenity lands, waterbodies, public road, etc.

### 17.2 Receiving Environment

The study area is comprised of properties directly impacted by the proposed development and range from those located in an urban setting in Zones A, B and C to properties in a more rural setting in Zones D, E and F.

### 17.3 Potential Impacts and Mitigation Measures

The assessment of the effects on non-agricultural property includes the effects of the construction impacts. Construction activity associated with the proposed development will give effect to further impacts on non-agricultural property such as:

- Temporary landtake.
- Access to property.
- Noise and vibration.
- Dust.
- Disturbance of drainage systems.
- Disturbance of services.

The construction works for the proposed development will involve a total temporary land-take of 28.3 ha consisting of 19.5 ha non-agricultural lands and 8.8 ha public road. The non-agricultural lands will comprise of a wide range of land types including residential lands, commercial lands, development lands, car park areas, amenity lands, canal, canal bank, tow-paths and non-agricultural greenfield areas.

The proposed development will involve a permanent land-take of 10.0 ha, consisting of 9.4 ha non-agricultural lands and 0.6 ha public road, and a right of way area of 2.3 ha.

An assessment of the impact of the proposed development on property was carried out. The significance of the effect, which is determined by combining the baseline rating and magnitude of impact for a given property, ranges from *imperceptible to profound*.

There will likely be a *profound* effect on one commercial property and one development property. There is *significant* effect on 13 properties consisting of one residential property, two commercial properties, five community properties and five development properties.

Measures to mitigate the adverse effects of the proposed development are described in Chapter 17 in Volume 2 of this EIAR. At this stage measures such as compensation for land acquisition and disturbance are not considered. These matters will be agreed, if possible, with landowners or their representative(s) once approval for the proposed development has been granted. If agreement is not possible, such compensation will be decided upon by an arbitrator.

Key mitigation measures include the reinstatement of lands temporarily acquired, where required. Access will be maintained to all affected property as much as possible and if interrupted will be restored without unreasonable delay. Traffic management measures will be put in place during construction where temporary or minor diversions are required.

Where part of the curtilage of a property is to be permanently acquired, the acquiring authority will hold discussions with the property owner and generally agree to replace boundaries on a like-for-like basis where possible, subject to safety considerations.

## 17.4 Residual Effects

Following mitigation, there are two properties on which the non-agricultural residual effects will be *profound*. There is a residual *profound* effect on one commercial property and one development property. There are residual *significant* effects on three properties which consist of one commercial property, one community property and one development property. This represents a reduction of 10 properties with a profound or significant impact following the implementation of recommended mitigation. There is a *moderate* level of effect on two properties, a *slight* effect on 55 properties, a *not significant* effect on 45 properties and an *imperceptible* effect on 7 properties.

## 18. MATERIAL ASSETS – UTILITIES

### 18.1 Introduction

Chapter 18 in Volume 2 of this EIAR provides an overview of the different utilities present in the vicinity of the proposed works, and sets out the baseline conditions, impacts and proposed works to be carried out to the utility assets.

Utilities refer to the services provided to consumers that fall under the following criteria:

- Gas transmission and distribution pipework.
- Potable water mains.
- Foul or combined sewers.
- Surface water sewers.
- Electricity transmission and distribution networks (underground cables and overhead lines).
- Fibre telecommunications.

Following the data collection, impacts of the works on existing utilities were identified. In some cases, diversions were evaluated as necessary (e.g. where bridges are to be reconstructed). In other cases, utility protections were evaluated as sufficient. Initial proposed diversion routes were presented to utility providers to gain agreement in principle and feedback regarding the proposals have been incorporated into the design.

### 18.2 Receiving Environment

The receiving environment is defined as the existing environment against which future changes can be measured. The baseline infrastructure and utilities environment has been defined through a desktop study, consultation with relevant stakeholders and field surveys. The baseline environment is then categorised using the criteria outlined in Chapter 18 and baseline ratings are assigned. These baseline ratings are then used to inform the assessment of impact significance.

The baseline environment is assigned a baseline rating according to the importance and sensitivity of the receiving environment. For the purposes of this Chapter, the importance of infrastructure and utilities has been based on their functionality.

### 18.3 Potential Impacts and Mitigation Measures

The impacts will occur predominantly during the construction phase. As well as utility diversions, the proposed project also requires the provision of new connections to services during both the construction and operational phases.

The data compiled as part of the Data Collection and Collation process was overlaid against the proposed temporary and permanent works required as part of the project. A “clash analysis” was undertaken to determine potential clashes. Potential diversions or alterations were discussed and agreed in principle with the utility providers during consultations.

For the purposes of this assessment, the magnitude of impact for infrastructure and utilities has been considered in terms of the duration of service interruption (outage). The outage duration will be finalised with the relevant utility provider or consumer (in the case of private utilities), in accordance with their service level/business interruption requirements. However, this assessment is based upon consultation undertaken for the purpose of Railway Order design with stakeholders and although durations may be subject to some changes, the assumed duration of potential outages/service disruption is considered to be reliable.

Mitigation measures are proposed as part of Chapter 18 to avoid impacting on the existing utilities.

## 18.4 Residual Effects

Provided the mitigation measures described in Chapter 18 of this EIAR are put in place, the residual effect of the proposed development on infrastructure and utilities is considered to be *neutral*.

## 19. MATERIAL ASSETS – WASTE MANAGEMENT

### 19.1 Introduction

The assessment identifies and assesses the likely significant effects that the construction and operation phases of the proposed development will have on resources and waste management. The assessment has been produced in accordance with the *Design Manual for Roads and Bridges (DMRB) (UK) LA110 Material Assets and Waste (Highways England, Transport Scotland, Welsh Government & Department for Infrastructure NI, August 2019)*. This assessment was informed by a desk study and included identifying the types of waste that could be generated by the proposed development, a review of existing and proposed waste management facilities as well as the potential reuse of materials. Additionally, the resource use required for the construction and operation of the proposed development was identified.

Key elements that are likely to result in potential impacts on waste and resources include:

- Materials required for use during the construction and operational phase.
- Demolition works.
- Earthworks.

Estimates of waste generation during the demolition, construction and operational phases of the proposed development have been calculated by the design team based on the current design information. Similarly, the estimates of resource use in terms of reusability and other materials required, have been calculated by the design team and have been used to inform this assessment.

### 19.2 Receiving Environment

The proposed project will consist of the electrification of the existing Great Southern and Western Railway (GWSR) and the Midland Great Western Railways (MGWR) rail lines from Dublin City centre extending west of Maynooth town as far as the proposed depot and M3 Parkway Station. There is generally a low level of intervention required, except for the proposed Spencer Dock station, the new depot and at the level crossing replacements. The total length of the proposed development is approximately 40 kilometres.

The proposed project begins in the Docklands area which is historically an industrial area where some soil deposits have been contaminated from historic uses. For most of its length, the MGWR runs adjacent to the Royal Canal. The route travels through Dublin's northern inner city extending westwards through the Fingal County Council administrative area and on to Meath and Kildare.

### 19.3 Potential Impacts and Mitigation Measures

This assessment included two study areas. The first study area is based on the construction footprint/project boundary (including compounds and temporary land take). This study area includes the associated storage areas and construction compound sites. The second study area includes the local authorities covered by the project namely Dublin City, Fingal, Kildare and Meath. In terms of waste management, all four of these local authorities fall under the Eastern- Midlands Region (EMR) waste management region. The second study area includes the location of feasible sources, and availability of construction materials required to construct the main elements of the project, in addition to suitable recovery and waste management infrastructure (that are licensed for the associated waste type) that could accept arisings and or waste generated by the project.

The choice of whether to use primary or secondary or recycled aggregates, or a combination of both, will be made by the Principal Contractor and they are assumed to consider several factors, such as materials availability, quality, specification, production, transport and cost. It should also be noted Iarnród Éireann are

committed to implementing and maintaining the Green Public Procurement process and therefore circular economy principles will apply. The assessment considers the achievement of material recovery/ reuse of non-hazardous C&D waste to substitute use of the primary materials and the recycled/re-used content of imported aggregates. For the proposed development, the effects are assessed as being *moderate adverse and significant* as the average reusability is at 60%.

The proposed development would result in more than 1% reduction or alteration in the regional inert and non-hazardous landfill capacity. The effects are therefore assessed as being *moderate adverse and significant*. There is significant scope for re-use and recycling of materials and waste (such as earthworks surplus, topsoil) from the proposed development but the quantity achievable will be dependent on the Contractor, and therefore cannot be determined more accurately at this stage. However, the construction sector seeks to recycle and re-use construction waste in response to legislative, fiscal and policy drivers as well as cost minimisation, which would result in a likely reduction in the quantity of material that would leave site and require disposal to a landfill.

An estimated 54,985 tonnes of hazardous waste have been identified and would need to be disposed of outside of the EMR and possibly exported. Therefore, the effects are assessed as being *moderate adverse and significant*.

DMRB LLA110 (2019) guidance specifies that the environmental assessment should report on the construction phase and first year of operational activities (opening year). No significant maintenance activities would occur during the first year of operation, and therefore no significant materials consumption is anticipated. Operational impacts associated with material waste management at the new Spencer Dock station has also been scoped out of the assessment as the only waste anticipated is small quantities of general waste generated by the public.

For the general and inert waste streams assumed to be generated by the operation of the depot, the proposed development would result in less than 1% reduction or alteration in the regional inert and non-hazardous landfill capacity and therefore assessed as being *slight adverse and not significant*. The hazardous waste streams would need to be disposed of outside of the Eastern Midlands Region and possibly exported. Therefore, the effects are assessed as being *moderate adverse and significant*.

Mitigation measures will be implemented to avoid or reduce negative impacts on waste and resources during the construction and operational phases. All materials consumed and waste generated by the proposed development will be managed in accordance with circular economy principles and the waste management hierarchy, with prevention, reuse and recycling and other recovery methods favoured over disposal. This will be managed by implementing a Construction Environmental Management Plan (CEMP) along with a Construction and Demolition Waste Management Plan (CDWMP).

## 19.4 Residual Effects

After the implementation of mitigation measures, the potential residual effects on material assets with respect to the recovery of construction and demolition waste and the use of aggregate comprising re-used/recycled content in line with the relevant regional or national target by the project is negative, and slight adverse. The potential residual effects on the project's management and disposal of hazardous waste is *negative*, and *moderate adverse*.

## 20. ARCHAEOLOGY AND CULTURAL HERITAGE

### 20.1 Introduction

The archaeology and cultural heritage assessment identifies and assesses the likely significant effects that the construction and operation phases of the proposed development will have on archaeology and cultural heritage. This assessment was informed by a desk study in order to a) establish the nature of the receiving baseline environment, b) compile a list of documented archaeological and cultural heritage constraints and c) identify any previously unrecorded constraints. Further to this, field inspections were carried out and a geophysical survey undertaken. The criteria used to describe the potential effects are in accordance with the *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2022)*.

### 20.2 Receiving Environment

The proposed development includes the electrification of the railway between Dublin and Maynooth. This will include a terminus at Spencer Dock, off Sheriff Street, and another route connecting into the present DART line at Connolly Station, Amiens Street. To cater for the additional passenger numbers the facilities at Connolly Station will need to be upgraded and this will include a new entrance to the station at Preston Street, availing of extensive vaults beneath the present railway lines and platforms, where works will need to be carried out in the vaults to provide for access, lifts, stairways, retail outlets and other facilities. Works will be carried out in Preston Street to enhance the street, with a new station entrance at the end of the street.

The route of the proposed development leads westward from the two stations will run along two existing railway lines. The northern of the two is to run along the existing route via Drumcondra Station, on a line built by the Great Southern and Western Railway Company and known as the GSWR line. The southern route is to run alongside the Royal Canal, in an existing railway cutting below road level on a line originally built by the Midland Great Western Railway Company and known as the MGWR line. The two lines meet up at Glasnevin, on the western side of Prospect Road and westward from that point there will be a single route to Maynooth. To the west of Maynooth a substantial new depot is to be provided on existing farmland.

The archaeological and cultural heritage assessment examines the area within 100 m of the proposed development in the Dublin City administrative area and 250 m within the administrative areas of Meath, Fingal and Kildare. The assessment establishes what effect the works may have sites and areas of archaeological and cultural heritage potential within that study area.

Within that study area there are 36 recorded archaeological monuments. Within the Dublin City administrative area, a total of 48 records included within the Dublin City Industrial Heritage Record (DCIHR) have been identified within the study area. These represent the site of structures whereas Chapter 21 (Architectural Heritage) includes 53 records that possess upstanding remains. In total 87 Cultural Heritage (CH) sites have been identified within the study area, along with 24 Areas of Archaeological Potential (AAPs). Sixty-five townland boundaries, or the sites of same, have been identified within the proposed development area.

### 20.3 Potential Impacts and Mitigation Measures

Overall, the proposed development will be relatively low impact in terms of the archaeological and cultural heritage resource and this is due to the primary fact that the existing railway line will be electrified with associated works being carried out in areas that have already been disturbed or subject to development. The key areas where potential impacts may occur upon the archaeological and cultural heritage resource are those areas of existing greenfield that are required for associated works, compounds and a large-scale depot (with compensatory storage areas), to the west of Maynooth. Due to the large-scale greenfield nature of the depot

site, a programme of geophysical survey was carried out within the site. Whilst access to all of the lands was not possible, the survey did not identify any large-scale previously unrecorded sites of archaeological significance.

No direct or indirect effects have been predicted at the operation phase of the proposed development. During the construction phase a number of *very significant* (direct negative) and *significant* (direct negative) effects have been identified. Significant effects will occur at AAP02, 06, CH042, AAP07, 09, 10, 11, 13, 15, 18, 19, 20, 21, 23, 25, 26, CH083, CH084, AAP27, CH086, CH085, AAP29 sites, where AH represents Archaeological Heritage sites, CH represents Cultural Heritage sites and AAP represents Areas of Archaeological Potential. See Chapter 20 Archaeology and Cultural Heritage in Volume 2 of this EIAR for further description of these sites. Unmitigated, *very significant* effects will occur at AAP14, AH37 and AH39 built heritage sites. Remaining impacts are *moderate negative*. Many of the sites identified will not be affected by the proposed development as there will not be changes within the study area that affect the archaeological or cultural heritage resource.

A suite of mitigation measures will be carried out prior to the commencement of construction, under the management of a Project Archaeologist appointed by Iarnród Éireann. Mitigation measures will include further geophysical survey, archaeological test trenching, archaeological excavation (preservation by record), archaeological waste surveys and archaeological monitoring. Dependant on the results of further assessments, additional mitigation may be required. All mitigation will require the approval of the National Monuments Service of the DoHGLH and relevant local authority.

## 20.4 Residual Effects

Following the implementation of mitigation, there will be no significant residual effects upon the archaeological or cultural heritage resource.

## 21. ARCHITECTURAL HERITAGE

### 21.1 Introduction

The architectural heritage assessment identifies and assesses the likely significant effects that the construction and operation phases of the proposed development will have on architectural heritage. This assessment was informed by a desk-based assessment and field inspections. The study involved detailed interrogation of the historical and architectural nature of the receiving environment. The criteria used to describe the potential effects are in accordance with the *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports* (EPA, 2022) and TII's *Guidelines for the Assessment of Architectural Heritage Impacts of National Road Schemes* (NRA, 2005).

### 21.2 Receiving Environment

The proposed development includes the electrification of the railway between Dublin and Maynooth. This will include a terminus at Spencer Dock, off Sheriff Street, and another route connecting into the present DART line at Connolly Station, Amiens Street. To cater for the additional passenger numbers the facilities at Connolly Station will need to be upgraded and this will include a new entrance to the station at Preston Street, availing of extensive vaults beneath the present railway lines and platforms, where works will need to be carried out in the vaults to provide for access, lifts, stairways, retail outlets and other facilities. Works will be carried out in Preston Street to enhance the street, with a new station entrance at the end of the street.

The route of the proposed development leading westward from the two stations will run along two existing railway lines. The northern of the two is to run along the existing route via Drumcondra Station, on a line built by the Great Southern and Western Railway Company and known as the GSWR line. The southern route is to run alongside the Royal Canal, in an existing railway cutting below road level on a line originally built by the Midland Great Western Railway Company and known as the MGWR line. The two lines meet up at Glasnevin, on the western side of Prospect Road and westward from that point there will be a single route to Maynooth. To the west of Maynooth a substantial new depot is to be provided on existing farmland.

The architectural heritage assessment examines the area within 50 metres on either side of the route to establish what effect the works may have on buildings and other structures that are of architectural heritage significance. Within that study area there are 198 structures of significance, including 76 protected structures and 7 proposed protected structures. A total of 123 structures in the study area are included in the National Inventory of Architectural Heritage (NIAH), many of which are also protected structures. The Dublin City Industrial Heritage Record (DCIHR) includes 57 structures of industrial heritage significance within the study area, some of which are also protected structures. The railway lines that are to be electrified run through four local authority areas – Dublin City, Fingal, Meath and Kildare – and there are structures of architectural heritage significance in all four local authority areas.

### 21.3 Potential Impacts and Mitigation Measures

The most prevalent effect that the proposed electrification will have on architectural heritage will affect bridges along the line. A total of 71 bridges lie within the study area, including overbridges, where a road bridge or pedestrian bridge crosses over a railway, underbridges, where a road, pedestrian way or river runs under a railway, and this total also includes tunnels. Of these, 28 of the bridges are protected structures (RPS), 3 are proposed protected structures and a further 8 are included in the National Inventory of Architectural Heritage (NIAH). The railway line between Connolly Station and the depot at Maynooth runs alongside the Royal Canal and in some cases the bridge over both canal and railway is considered to be a single bridge, while in other cases it is more appropriate to consider them to be separate bridges; there are also several level crossings where there is a canal bridge and no railway bridge.

The works to bridges to provide for the electrification includes the need to erect structures on a bridge to carry the power cables, where the bridge carries the railway over a road, a canal or a river. In other cases, where the railway runs beneath a bridge, it is necessary to run the power cables below the arch or deck of the bridge. Where there is insufficient room beneath a bridge to allow for the provision of power cables it is sometimes possible to lower the track to achieve the necessary headroom. In other cases, however, it is not possible to lower the track because of the possibility of flooding on the line, and in those instances, it is necessary to remove the bridge arch or deck and reconstruct it at a higher level.

In three cases the original arched railway bridges built in the 1840s will need to have their arches replaced at a higher level to accommodate the cables. Cope Bridge, to the north of Leixlip, is a proposed protected structure and the works will involve replacement of the railway arch of the bridge and the attachment of pedestrian/cycle bridges on either side of the existing bridge. The railway bridges at Broombridge Road and Castleknock Road are not protected structures, though the adjacent canal bridges are protected, and the National Inventory of Architectural Heritage includes the canal and railway bridges at Broombridge Road as a single bridge. Both railway bridges will have their arches replaced to facilitate the power cables. Two railway bridges with concrete beam decks, at the Old Navan Road, Blanchardstown and at Louisa Bridge Station, will need their decks raised. Neither of these bridges is a protected structure, though both are adjacent to historic canal bridges. At Sheriff Street a section of the bridge over a former railway line will be taken down and rebuilt to facilitate the new railway station at Spencer Dock.

In all cases where road or pedestrian bridges cross one of the railways it will be necessary to raise the parapets of the bridges to ensure that no person on the bridge can reach the power cables. In all cases the proposed raising of the parapet has been designed to reduce the visual impact on the character of the bridge as far as is possible. A number of the affected bridges are protected structures or are included in the NIAH.

Other works to facilitate the project include the elimination of level crossings. At Ashtown this will involve the provision of a new road that would run beneath the canal and railway, affecting the front boundary of Ashton House, which is a protected structure. In several locations, including Ashtown, Carpenterstown, Porterstown and Clonsilla, it is proposed to erect a new cycle and pedestrian bridge to facilitate the closure of level crossings, and this will have some impact on the settings of historic structures in the vicinity.

This assessment provides a suite of mitigation measures for each affected structure and include protection of the structure from damage during construction and recording of those structures that are to be removed prior to works commencing. Where masonry arch bridges are to have their arches removed and replaced with concrete arches the geometry and design of the concrete arch should be prepared in consultation with a Grade 1 conservation architect.

## 21.4 Residual Effects

The most prevalent residual impact on architectural heritage will relate to various overbridges along the route, refer to Section 21.6 in Chapter 21 Architectural Heritage in Volume 2 of this EIAR for full list of structures and the residual impact. The character of a significant number of underbridges of architectural heritage significance will be altered through the erection of OHLE on the bridge decks. There will be a loss of some of the masonry arch railway bridges due to the replacement of the original arch with a concrete arch with consequent loss of character. The raising of the parapets of many historic railway bridges will also alter their character and will have negative impacts on the settings of adjacent canal bridges.

The proposed bridges for pedestrians and cyclists to replace existing level crossings will have negative effects on structures of architectural heritage significance in the vicinity, including the former schoolhouse at Porterstown, the canal bridges adjacent to the level crossings and the signal box at Clonsilla Station.

There will also be positive residual effects, including the bringing into public use of the vaults at Connolly Station and the upgrading of the public realm at Preston Street. In a number of instances there will be positive residual impacts on canal bridges, including those that will no longer carry motorised traffic once the adjacent

level crossings are closed. There will also be residual positive effects to Jackson Bridge, where the provision of a new road crossing will bypass the requirement to use the protected structure bridge.

## 22. ELECTROMAGNETIC COMPATIBILITY AND STRAY CURRENT

### 22.1 Introduction

The electromagnetic compatibility and stray current assessment identifies and assesses the likely significant effects that the construction and operation phases of the proposed development will have on electromagnetic compatibility and stray current. Electromagnetism is a phenomenon associated with all electrical (e.g. TVs, mobile phones etc.) and electromechanical (e.g. motors, relays etc.) systems. All these systems, when powered, emit electromagnetic radiation and the presence of all of them together make up the baseline electromagnetic environment.

Before release into the market place for sale and use, equipment and systems must ensure that they can operate harmoniously in the electromagnetic environment and therefore are typically assessed for electromagnetic compatibility (EMC). This is to ensure that new equipment introduced into the electromagnetic environment does not interfere with the operation of other equipment already present. Conversely, the new equipment should be able to operate as intended without experiencing interference itself when introduced into the electromagnetic environment.

The baseline electromagnetic environment was defined through expert opinion, questionnaires, consultations and electromagnetic radiation surveys. The surveys resulted in the acquisition of measurements across the electromagnetic spectrum to identify its frequency characteristics such as background noise and any radio equipment that may currently be in operation along the route. While the questionnaires and consultations helped identify receivers (equipment) within the environment that would need to be considered in terms of their sensitivity to potential interference from the proposed project.

This chapter discusses the construction and operational impacts on the electromagnetic environment predicted for the proposed project. Along with electromagnetic compatibility, electromagnetic radiation and human exposure is also discussed with respect to the proposed project.

Finally, potential stray current impacts during operation are covered. This is a phenomenon associated with electrified rail systems that does not fall under the umbrella of electromagnetic compatibility but is nonetheless a consequence of passing currents over long distances through rail lines.

### 22.2 Potential Impacts and Mitigation Measures

There are no radiation and stray current impacts anticipated for the construction of the project. Therefore, there are no specific mitigation measures required during the construction phase of the proposed scheme.

Potential levels of electromagnetic radiation and stray current during the testing and commissioning of the trains and traction power supply system are expected to be within those required by the applicable standard limits. With regard to any sensitive equipment, despite the system meeting emissions requirements, relocation (even a short distance) may be possible.

Measures to minimise stray current have been incorporated into the design specifications and will be implemented during the construction and operation of the proposed scheme.

During normal operation, the expected Direct Current (DC) magnetic field effects have been modelled. These levels are unlikely to pose a threat to the normal operation of any receptors along the alignment. In addition, Alternating Current (AC) and Radiofrequency (RF) levels are predicted to be well within EU guidelines. These levels are unlikely to pose a threat to the normal operation of receptors located along the alignment.

### 22.3 Residual Effects

Equipment such as MRI machines, NMRs, SEMs etc. typically have manufacturer specified operational environmental conditions which, as well as temperature, humidity etc., will state the recommended electromagnetic environment for optimum performance. End users will then survey locations within their campus and attempt to locate this equipment away from sites containing electrical transformers, high current or high voltage cabling and even traffic and ferromagnetic objects which can cause DC magnetic field perturbations. After construction and commissioning of the proposed development locations within 100 m of the line may not be suitable for the installation of equipment sensitive to DC and quasi-DC magnetic fields without the implementation of some of the mitigation measures discussed in Chapter 22 in Volume 2 of this EIAR.

Future developments such as extensions and new building at locations including theatres, musical venues, stadiums, domestic or commercial premises that bring unapproved audio equipment within 20 m of the lines could potentially experience interference in the audio frequency range (AC fields).

Despite applied mitigation measures to minimise the magnitude of Stray current, it is an inevitable phenomenon associated with DC rail systems. Continued monitoring of the performance of the traction circuit with respect to current returns to the substation will be required.

## 23. HUMAN HEALTH

### 23.1 Introduction

This chapter has considered and assessed the likely significant effects to human health impacts relating to the construction and operational of the DART+ West project. Actual and perceived impacts of the proposed development on the human health may arise from various aspects of the proposed development. These impacts are dealt with throughout this EIAR with interactions across many chapter.

The human health assessment included a desktop study and a walkover survey, in addition to consultation with statutory, non-statutory groups, the public. There is no national guidance available for determining an appropriate study area for the purpose of human health assessments therefore the study area was defined with reference to the potential for impacts from the proposed development and available relevant health information. Two study areas were defined for the purpose of this assessment: 100 m from the proposed development, and County level data relating to Counties Dublin, Fingal, Meath and Kildare.

### 23.2 Receiving Environment

The baseline environment is informed by relevant health related information. Census 2016 reports that a significant proportion of the population in the study area perceive their health as 'good/very good'. Dublin City has the highest percentage of people with disabilities in the study area at 15%, followed by Kildare and Meath at 12% respectively, and Fingal at 11%.

The existing level crossings in the study area have reports of road safety incidents and collisions, four collisions were reported between 2005-2016 in the vicinity of the Coolmine level crossing, in addition to several minor collisions on approach to the level crossings in Ashtown, Porterstown and Clonsilla. Between 2015-2020, several incidents at level crossings, such as vehicle strike to level crossing barriers, trespassing on the live railway and interference with barriers, were recorded.

There is one Seveso site identified at Intel, located in Leixlip, Co. Kildare, which is located approximately 100m from the proposed development.

Sensitive receptors to noise, vibration, air quality and climate effects include all of the populations within the study area. The noise survey assessment in Chapter 14 indicates that the study area and sensitive receptors are influenced by noise from the existing adjacent railway and road traffic. Existing construction noise located in proximity to the proposed Spencer Dock Station is also recorded as being a dominant noise source in this area. The duration, nature and extent of construction activities associated with the construction phase of the proposed development categorise it within the high-risk category.

Electromagnetic effects from Direct Current (DC) electrified rail is relatively low risk to human health.

The proposed development is located adjacent to the Royal Canal greenway, which includes an area for walking, cycling and is also an amenity (blue/green way) which can also have benefits to well-being.

### 23.3 Potential Impacts

The construction stage impact assessment determined the following likely significant effects

- Impacts of emissions to air (dust emissions).
- Impacts of noise emissions (construction noise).
- Impact of emissions to hydrology (flood risk).

- Impact of emissions to hydrogeology (drinking water quality).
- Impact of emissions to soils and geology (contaminated land).
- Impacts of collisions/risks of accidents (traffic impacts).
- Psychosocial hazards (nuisance/ stress).
- Effects on physical activity.

The human health assessment determined that there are no likely significant effects to human health during the construction phase.

Operational Phase: As the proposed development will permanently close the six level crossings at Ashtown, Coolmine, Porterstown, Clonsilla, Barberstown and Blakestown, there will be a significant positive, permanent effect on human health due to improvements in road and rail safety.

### 23.4 Residual Effects

Residual effects are those unintended effects after mitigation is applied. There are no adverse effects on human health as result of the proposed development.

From a health protection perspective, the project will result in *significant positive long-term* residual effects to the community due to removal of a source of conflict and congestion at the level crossings, development of a modernised, safer and more comfortable railway system allowing more reliable and comfortable journeys while also facilitating improvements in the noise and air quality environment.

There is also potential to have wider positive societal health improvements associated with improved public transport infrastructure due to improved access to employment for all but particularly for disadvantaged communities. There is also potential for greater access to services including health prevention (hospitals, health care facilities, etc.) and will support economic development across a wider area. Improved access and reduced congestion at level crossings will decrease traffic in built up areas, promote walking and cycling and public transport options in favour of the private car. The residual effect will be *positive*.

## 24. MAJOR ACCIDENTS AND DISASTERS

### 24.1 Introduction

Chapter 24 Major Accidents and Disasters in Volume 2 of this EIAR assessed the significant adverse effects of the proposed DART+ West Project in terms of its potential to cause major accidents and disasters, and its vulnerability to the negative impacts of potential major accidents and disasters during its construction and operation.

This Chapter differs from the other specialist Chapters of this EIAR in that it does not deal with *likely* effects. Rather, its scope is limited to sudden events of *low likelihood*, which *may conceivably occur*, and which would result in *major negative impacts* on infrastructure, human health, cultural heritage and / or the environment (or events of “*low likelihood but potentially high consequence*”. Minor accident risks of relatively low consequence, e.g., crime/civil unrest, cyber-attacks, and terrorism have been scoped out of the assessment. Such events are addressed, where appropriate, in the relevant specialist Chapters in Volume 2 of this EIAR.

This Chapter does not deal with the impacts of gradual trends associated with climate change, e.g. sea level rise or increasing annual rainfall volumes. It does, however, address sudden events whose frequency may be increased as a result of climate change related trends, e.g. extreme weather events.

### 24.2 Potential Impacts

From examining all potential risk events associated with the proposed DART+ West project, scenarios that were considered to be of the highest risk in terms of project vulnerability and its potential to cause such an event include, but are not limited to, the following:

- Major road traffic events.
- Events leading to structural collapse / damage.
- Water pollution events.
- Extreme weather flooding events
- Train derailment events.
- Events leading to building fire / failure.

The assessment considered mitigation by design (where appropriate) and it was determined whether these are sufficient to mitigate the associated risk level(s) to be As Low As Reasonably Practicable (ALARP).

Where necessary, secondary mitigation measures have been specified in Chapter 24 in Volume 2 of this EIAR which will be incorporated into the design of the proposed development to mitigate the associated risk level(s) to be ALARP.

### 24.3 Residual Effects

Following the implementation of secondary mitigation measures identified in Chapter 24 in Volume 2, all associated risk level(s) are expected to be ALARP. No significant residual effects are likely.

## 25. INTERACTIONS

In addition to the assessment of impacts on individual environmental topics, the potential interactions between these factors have also been considered. Table 25.1 shows the principal interactions / interrelationships identified for the proposed development. The nature and magnitude of all identified interactions / interrelationships was assessed, and it was concluded that, provided the proposed mitigation measures are fully implemented, no significant adverse effects will arise as a result of interactions / interrelationships between the various environmental topics considered, either during construction or operation.

**Table 25-1 Matrix of Interactions**

Interaction	Traffic and Transportation		Population		Biodiversity		Land and Soils		Hydrology		Hydrogeology		Air Quality		Climate		Noise and Vibration		Landscape and Visual		MA: Agricultural properties		MA: Non- Agricultural Properties		MA: Utilities		MA: Resources and Waste Management		Archaeology and Cultural Heritage		Architectural Heritage		EMC & SC		Human Health	
	Cons.	Op.	Cons.	Op.	Cons.	Op.	Cons.	Op.	Cons.	Op.	Cons.	Op.	Cons.	Op.	Cons.	Op.	Cons.	Op.	Cons.	Op.	Cons.	Op.	Cons.	Op.	Cons.	Op.	Cons.	Op.	Cons.	Op.	Cons.	Op.	Cons.	Op.		
Traffic and Transportation			✓	✓	✓	✓	✓	x	✓	✓	x	x	✓	✓	✓	✓	✓	✓	✓	✓	x	x	x	x	x	x	✓	x	x	x	x	x	x	x	✓	✓
Population					x	x	✓	x	x	x	x	x	x	x	x	x	x	x	✓	✓	✓	✓	✓	✓	✓	✓	✓	x	x	x	✓	x	x	x	x	x
Biodiversity							✓	x	✓	✓	✓	x	✓	✓	x	x	✓	✓	x	✓	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	✓
Land and Soils									✓	x	✓	x	✓	x	x	x	✓	x	✓	✓	✓	x	✓	x	x	x	✓	x	✓	x	x	x	x	x	✓	x
Hydrology											✓	x	x	x	✓	✓	x	x	x	x	✓	✓	x	x	✓	x	x	x	x	x	x	x	x	x	✓	x
Hydrogeology													x	x	x	x	x	x	x	x	✓	x	✓	x	x	x	x	x	x	x	x	x	x	x	✓	x
Air Quality															✓	✓	x	x	x	x	x	x	x	x	x	x	✓	x	x	x	x	x	x	x	✓	✓
Climate																	x	x	x	x	x	x	x	x	x	x	✓	✓	x	x	x	x	x	x	x	✓
Noise and Vibration																					✓	✓	✓	x	✓	✓	x	x	x	x	✓	x	✓	x	x	✓
Landscape and Visual																							✓	✓	x	x	✓	x	✓	✓	✓	✓	x	x	x	✓
MA: Agricultural properties																							x	x	x	x	x	x	x	x	x	x	x	x	✓	✓
MA: Non-Agricultural Properties																									x	x	x	x	x	x	x	x	x	x	✓	✓
MA: Utilities																													x	x	x	x	x	x	✓	x



## 26. CUMULATIVE EFFECTS

Cumulative effects result from the addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects. Additional cumulative effects can be caused due to incremental changes by other past, present or reasonably foreseeable projects together with the proposed development.

This assessment identifies the likely direct, indirect, secondary, cumulative, transboundary effects short-term, medium term or long-term both positive or negative effects as a result of the identified plans or projects with the proposed development. The detailed methodology for identifying and assessing the cumulative effects is detailed in the sections below. The significance of effects follows *Table 3.4 Description of effects* defined by the EPA in the 2022 Guidelines replicated in Section 1 of this NTS.

The likelihood of the occurrence of cumulative effects were assessed by looking at developments within the last ten years and current developments for which planning has been received within 550m of the proposed development boundary. A consideration of development objectives in the current development plans in the area was also carried out. The likelihood of the occurrence of cumulative effects of the proposed development in combination with the identified plans / projects was assessed and it was considered that there is no potential for the occurrence of significant adverse in-combination effects on environmental parameters.

The main aspect of the cumulative effects assessment (CEA) relates to the assessment of existing and/ or approved plans and projects with the proposed development. However, with respect to the DART+ West project there is potential for cumulative effects associated with other aspects. These have been split into four tiers or types of potential cumulative effects as shown in Table 26-1 below.

**Table 26-1 Tiered approach to identifying and assessing potential cumulative effects**

Tier	Description	Level of detail
<b>Tier 1</b>	Cumulative effects of many minor or significant effects resulting from the entirety of the project. (Assessed under each environmental factor as appropriate).	
<b>Tier 2</b>	Development that is functionally or legally interdependent on further development(s) not included in the application for consent approval	
<b>Tier 3</b>	Existing or approved projects (Staged approach) Plans or programmes to include relevant land use, planning and transport plans/strategies relevant to the project.	
<b>Tier 4</b>	'Other' identified NTA projects that are in the public domain/at preliminary design i.e., not active/granted but have the potential for cumulative effects with the project	

### Tier 1 cumulative assessment

The previous chapters of this EIAR have identified the likely significant environmental, positive and/or negative impacts under each environmental factor, which identifies and assesses the impacts associated with the totality of the project.

The 'Tier 1' cumulative assessment deals with the combined impact of proposed development on each environmental factor. For example, for architectural heritage, the cumulative assessment considers the total impact of interventions to a number of heritage features which feature on the Record of Protected Structures (RPSs). These assessments are presented in the respective chapters of this EIAR as appropriate and should be referred to for the 'Tier 1' cumulative assessment.

It is not always appropriate to undertake a cumulative assessment of effects resulting from the totality of the project on all environmental factors. This is the case for noise and vibration due to the nature of noise and

vibration and the fact that the impacts only occur while construction activity is ongoing. Once works stop, the impact stops and therefore cumulative effects of the phased approach to construction do not occur.

**Tier 2 cumulative assessment**

The 'Tier 2' development(s) relates to development that is functionally or legally interdependent on further development(s) not included in the application for consent approval. The Tier 2 types of project involved for the proposed DART+ West project is the ESB electricity supply connections required to operate the project and the Irish Water utility connections required to supply water and wastewater connections to the proposed depot.

It would be outside of CIÉs control to apply for such works as part of the Railway Order however it is recognised that it is functionally dependent on the operation of the project and hence the methodology for assessing the cumulative effects required a unique methodology which is detailed in Chapter 26 Cumulative Effects in Volume 2 of this EIAR.

**Tier 3 cumulative assessment**

The Tier 3 includes the assessment of existing and/ or approved plans or projects.

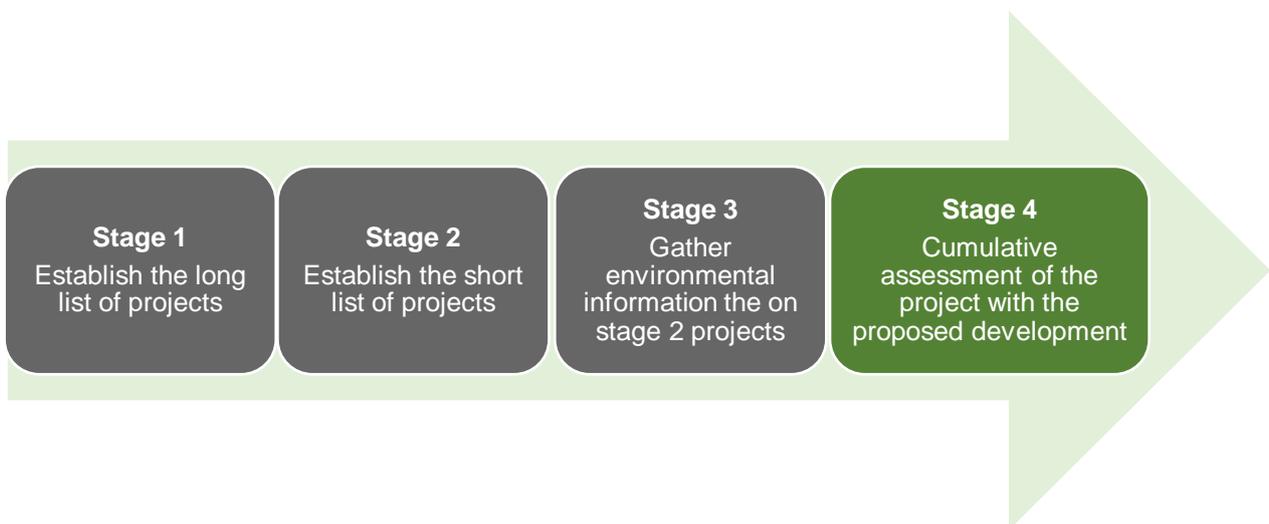
Identification of plans

A list of relevant national, regional and local plans and programmes identified as having the potential to have a cumulative effect with the proposed development was collated. The list of plans was circulated to Iarnród Éireann (IÉ) and local authorities in advance of completing the assessment to ensure all relevant plans were considered and addressed in the cumulative assessment. The assessment of plans is detailed in Chapter 26 Cumulative Effects in Volume 2 of this EIAR.

Identification of existing and/ or approved projects

To identify and assess the likely significant cumulative effects with existing and/or approved projects, a four staged approach was adopted which is summarised in the figure below.

A staged approach is adopted for projects and is informed by *Advice Note seventeen: Cumulative effects assessment relevant to nationally significant infrastructure projects*, published in 2019 by the Planning Inspectorate, an executive agency of the Ministry of Housing, Communities and Local Government of the United Kingdom (MHCLG, 2019) referred hereafter as 'Advice Note 17'.



**Figure 26-1 Staged approach for Tier 3 cumulative assessment**

A description of each of the four stages is presented in Chapter 26 Cumulative Effects in Volume 2 of this EIAR.

#### **Tier 4 Cumulative Assessment**

'Other' identified NTA projects that are in the public domain/at preliminary design (i.e., not in the planning system or granted) but have the potential for cumulative effects with the project are also assessed as part of the CEA. There is no legal requirement to assess these projects. The project team have been in close consultation with several of the other NTA funded projects that are currently at public consultation and/or are in the public domain. As such it was deemed prudent to include these planned NTA transportation projects that are reasonably foreseeable and are likely to have cumulative effects with the DART+ West project and therefore are included as part of the CEA.

A separate matrix for the 'other projects' has been created for the assessment. The assessment information depends on the stage of the project, and these projects are likely to have limited and differing levels of environmental information available that can be used to inform the likely significant effects of this CEA.

At the time of completing this EIAR, the identified 'Tier 4' projects will be in the process of seeking statutory approval and/ or will be at early stages of design. Therefore, there is likely to be differing levels of environmental information available to the public and it is unlikely that there will be a published EIAR available to consider as part of the CEA. The CEA is a precautionary but pragmatic approach based on the best available information where baseline data is not available or is incomplete. Therefore, publicly available information or information made available by the delivery agents of the individual projects has informed the respective Tier 4 assessments.

The Tier 4 projects include the following:

- DART+ South West.
- DART+ Coastal North.
- DART+ Coastal South.
- MetroLink.
- BusConnects projects.
- Luas Finglas.
- Royal Canal Greenway – DCC Phase 4.
- Royal Canal Greenway – Fingal greenway.

The cumulative assessments undertaken under each of the four tiers is presented in Chapter 26 Cumulative Effects in Volume 2 of this EIAR.

## 27. MITIGATION AND MONITORING MEASURES

Chapter 27 Summary of Mitigation and Monitoring Measures presents a summary of the mitigation and monitoring measures identified as a result of undertaking the environmental impact assessments carried out in the preceding chapters of this EIAR.

From the inception of the design and environmental assessment process of the proposed DART+ West project (referred to hereafter as the 'proposed development/proposed project') the project team has strived to avoid, prevent and reduce adverse effects which are incorporated into the design drawings and specifications of the project that have been assessed as part of this EIAR.

Avoidance of impacts is most applicable at the earliest stages of a project, whilst prevention has taken place during the design and environmental assessments process between the design team and EIA team. Mitigation is a last resort and can include a remedy or offsetting adverse effects. For example, this can apply when projects cannot avoid significant effects due to their need to locate on a particular site, etc.

Where likely significant environmental effects have been identified during the environmental impact assessment process, measures have been proposed to mitigate these effects as much as reasonably possible, with any residual effects identified in the relevant chapters of this EIAR. The objective of this chapter is to provide a central location where all measures from the preceding chapters are presented together for both ease of reference and inclusion in the contract documents at a later stage of the project.

All of the mitigation and monitoring commitments in Chapter 27 in Volume 2 of this EIAR are incorporated into the Construction Environmental Management Plan (CEMP) submitted as part of this Railway Order application.

## 28. NEXT STEPS

Section 40 of the Railway Infrastructure Act 2001, as amended by the SID Act 2006, details the procedures required when an application for a railway order is made. At the time of the submission of the Railway Order application to An Bord Pleanála the applicant shall:

- Deposit and keep deposited the application at such a place(s) which is easily accessible for not less than 6 weeks following the public notice;
- Publish a public notice in one or more newspaper circulating in the area to notify the public of the application:
  - Indicate the application will be made for an order.
  - Stating the time and place(s) during which a copy of the application can be inspected over a period of 6 weeks.
  - Stating that the Board will consider any submission in relation to the proposed order or in relation to the likely effects on the environment of the proposed railway works which are submitted in writing to it by any person within the 6 week consultation period.
  - Stating that a copy of or extract from the application can be purchased on payment of a fee not exceeding the reasonable cost of making such a copy or extract.

It is at the discretion of the An Bord Pleanála whether or not a public inquiry/oral hearing will be held.