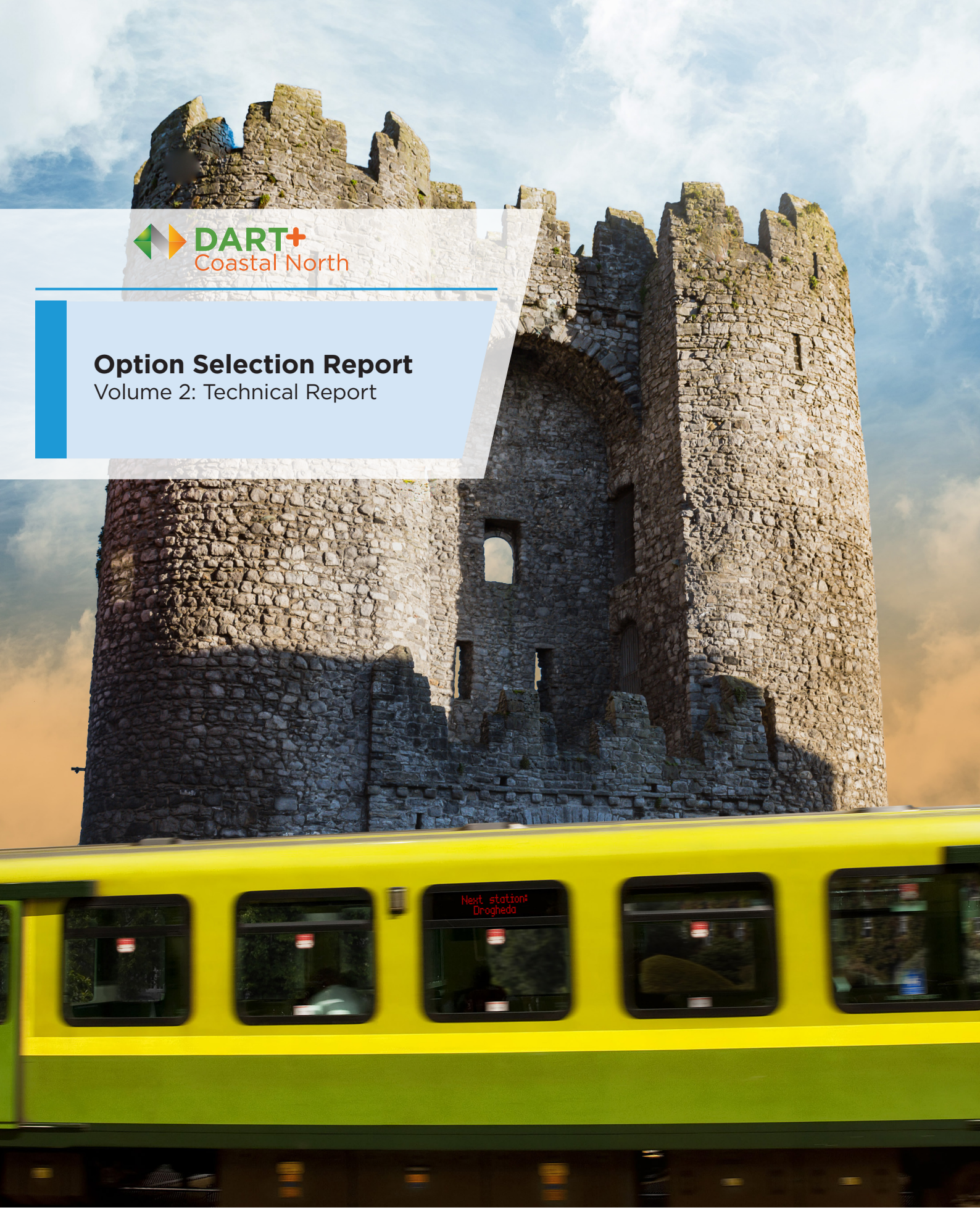


DART+
Coastal North

# Option Selection Report

## Volume 2: Technical Report

NTA
Údarás Náisiúnta Iompair
National Transport Authority

Rialtas na hÉireann
Government of Ireland

Tionscadal Éireann
Project Ireland
2040

Iarnród Éireann
Irish Rail

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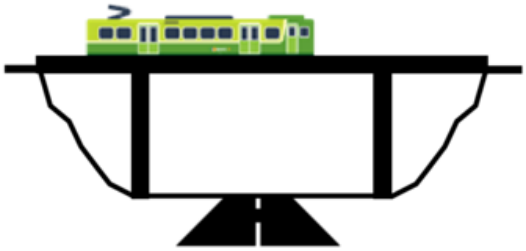
**TABLES**

# GLOSSARY OF TECHNICAL TERMS

| Abbreviation | Definition |
|---|---|
| AA | Appropriate Assessment |
| ABP | An Bord Pleanála |
| CAF | Common Appraisal Framework |
| CAWS/ATP | Continuous Automatic Warning System/Automatic Train Protection |
| CBI | Computer Based Interlocking |
| CCTV | Closed-Circuit Television |
| CIÉ | Córas Iompair Éireann |
| CSO | Central Statistics Office |
| CRR | Commission for Rail Regulation (formerly RSC – Railway Safety Commission) |
| CTC | Central Traffic Control |
| DART | Dublin Area Rapid Transit |
| DC | Direct Current |
| DMU | Diesel Multiple Unit |
| DTTAS | Department of Transport, Tourism and Sport |
| DOO | Driver Only Operation |
| DTTAS | Department of Transport, Tourism and Sport |
| EIA | Environmental Impact Assessment |
| EIAR | Environmental Impact Assessment Report |
| EPA | Environmental Protection Agency |
| ERM | Eastern Regional Model |
| ESB | Electricity Supply Board |
| ECS | Empty Coaching Stock |
| EU | European Union |
| FLU | Full Length Unit (one FLU train consists of two HLUs) |
| GAA | Gaelic Athletic Association |
| GI | Ground Investigation |
| GDA | Greater Dublin Area |
| GDP | Gross Domestic Product |
| GFRP | Glass Fibre Reinforced Plastic |
| HLU | Half Length Unit (one FLU train consists of two HLUs) |
| IÉ / IR | Iarnród Éireann / Irish Rail |
| ITM | Irish Transverse Mercator |
| LAP | Local Area Plan |
| MCA | Multi-Criteria Analysis |
| MDC | Multi-Disciplinary Consultant |
| NDP | National Development Plan |
| NIAH | National Inventory of Architectural Heritage |
| NIFTI | National Investment Framework for Transport in Ireland |

| Abbreviation | Definition |
|---|---|
| NPF | National Planning Framework |
| NSO | National Statistics Outcomes |
| NTA | National Transport Authority |
| OCLZ | Overhead Contact Line Zones |
| OHLE | Overhead Line Equipment |
| Overbridge | A bridge which spans over the railway |
| P&C | Points and Crossings |
| PC1 | Public Consultation No. 1 |
| PC2 | Public Consultation No. 2 |
| pNHA | Proposed Natural Heritage Area |
| PPP | Public Private Partnership |
| REB | Relocatable Equipment Buildings |
| RO | Railway Order |
| RS | Rolling Stock |
| RRV | Road / Rail Vehicle |
| RSES | Regional Spatial and Economic Strategy |
| SAC | Special Area of Conservation |
| SEB | Signalling Equipment Building |
| SET | Signalling, Electrical and Telecom |
| SDZ | Strategic Development Zone |
| SP | Security Purpose |
| SPA | Special Protected Area |
| TEN-T | Trans-European Network for Transport |
| TII | Transport Infrastructure Ireland |
| TOD | Transport-Oriented Development |
| TPHPD | Trains Per Hour Per Direction |
| TSS | Train Service Specification |
| TSS | Traction Substation |
| UN | United Nations |
| Underbridge | a bridge or viaduct that carries the railway |



Underbridge

Overbridge

# 1. INTRODUCTION

## 1.1 Purpose of the Option Selection Report

The preliminary option selection and early concept level design work undertaken for DART+ Coastal North was presented at the first round of public consultation (PC1) held in Spring 2022. The feedback and submissions received as part of this have been reviewed and have informed the subsequent design development which has taken place in the intervening period.

The overall Option Selection Report (OSR) presents the "Preferred Option", incorporating further design development, studies, assessments and consultations with stakeholders, along with public feedback. The Preferred Option contained within this report is now presented to the public for observations and comments as part of Public Consultation No. 2 (PC2). The structure of the OSR is described in the Preferred Option Report (volume 1 of the OSR).

This document is the Option Selection Report: Technical Report (volume 2 of the OSR). This Technical Report supersedes the Preliminary Option Selection Report (POSR) presented at Public Consultation No. 1 (PC1) and now reflects the Preferred Option for the DART+ Coastal North project, incorporating feedback received, information from surveys and investigations, further design development and re-evaluation of the design options, where appropriate.

Following PC2 all information gathered by the project team will be used to inform further design development of the Project and the Environmental Impact Assessment Report (EIAR) and Appropriate Assessment (AA) documentation, and ultimately the Railway Order (RO) application to be submitted to An Bord Pleanála in Autumn / Winter 2023.

## 1.2 Structure of this Report

The OSR Volume 2 Technical Report is structured as follows:

- Chapter 1 introduces the DART+ Programme, DART+ Coastal North project and the public consultation process.
- Chapter 2 sets out the need for the project and its strategic fit with European, national, regional and local policy.
- Chapter 3 sets out the transportation analysis undertaken for the DART+ Programme and DART+ Coastal North project.
- Chapter 4 details the Option Selection Process, including a summary of the findings from PC1.
- Chapter 5 provides details of the Preferred Option for General Linear Works, including line-wide construction compounds.
- Chapters 6 to 11 provide details of the Preferred Option at discrete locations along the railway corridor for the DART+ Coastal North project.
- Chapter 12 provides a summary for the next steps in the DART+ Coastal North project.

## 1.3 Status of Design Presented in this Report

The information presented in this report is for the purpose of ongoing technical and environmental analyses, as well as consultation and engagement with the public and affected property owners. The designs have been refined since PC1 to incorporate surveys and assessments, consultation with stakeholders and engagement with the public.

Preliminary designs for the project will continue to be developed into the detailed designs which will be incorporated into the formal planning submission and Railway Order documents, along with undertaking the Environmental Impact Assessment and Appropriate Assessment (if required). Accordingly, not all design detail or construction requirements are known at this time; these will become available as the project moves forward into the detailed design phase.

The purpose of presenting the Option Selection Report at this stage of the project is to show the public the current status of the option selection process, the methodology that has been followed to identify the Preferred Option and to assist in eliciting feedback. As part of the public consultation process, the public will be invited to make observations on the current design proposals for consideration by the project team.

## 1.4 DART+ Programme

The DART+ Programme is a transformative railway investment programme that will deliver a high quality and integrated public transport system within the Greater Dublin Area (GDA). The DART+ Programme will both modernise and improve existing rail services in the GDA, providing a range of benefits for both the residents of the GDA itself, as well as those living in surrounding regions.

The DART+ Programme will play a significant role in contributing to Ireland's transition to a low carbon and climate resilient society by providing a sustainable, electrified, reliable and more frequent rail service with improved capacity to meet current and future demands. This will be achieved through the modernisation of existing railway corridors and by utilising electric powered trains in place of diesel trains.

The existing, electrified DART network extends from Malahide to Greystones (including the Howth Branch) over a length of approximately 50km. The DART+ Programme will seek to increase the length of high capacity and electrified network to 150km across the four main rail corridors within the GDA.

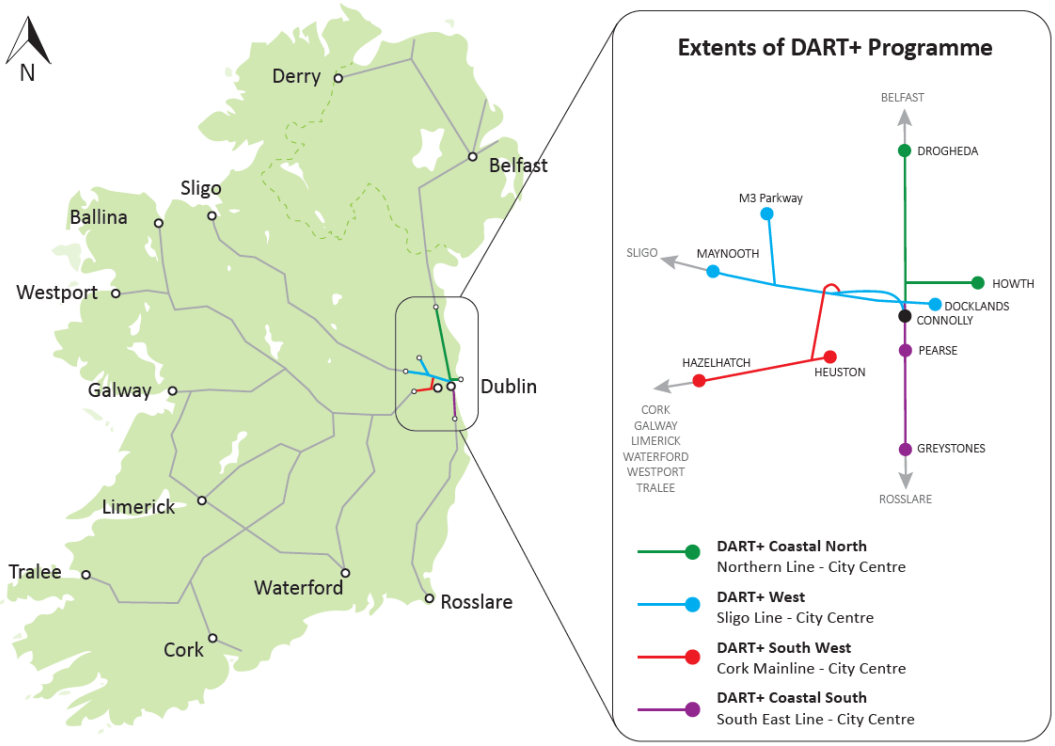



**Figure 1-1: Schematic of Overall DART+ Programme**

This modernisation includes the electrification, re-signalling and infrastructure interventions to remove constraints across the four main rail corridors within the GDA, as follows:

- **DART+ Coastal North (this project**) – circa 50km, extending from Drogheda to Dublin City Centre (north of Connolly Station).
- DART+ Coastal South – circa 30km, extending from Greystones to Dublin City Centre.
- DART+ West – circa 40km, extending from Maynooth and M3 Parkway stations to Dublin City Centre.
- DART+ South West – circa 16km, extending between Hazelhatch & Celbridge Station and Heuston Station and also circa 4km between Heuston Station and Glasnevin, via the Phoenix Park Tunnel Branch Line.

As part of the DART+ Programme, Iarnród Éireann is purchasing a new fleet of trains to enhance the capacity on the DART network. This procurement will allow Iarnród Éireann to choose a fleet made up of Electric Multiple Units (EMUs) and Battery Electric Multiple Units (BEMUs). The provision of BEMUs will allow for an enhanced service on the network in advance of full electrification to take place. These BEMU works will be delivered under a separate project.

The DART+ Programme is a key component in the national public transportation network. It will provide a high-capacity transit system for the GDA, improved connectivity to outer regional towns, and a greater level of integration with other public transport systems and active travel infrastructure, benefiting all current and future users of public transport. The delivery of the DART+ Programme will encourage a modal shift away from private car usage towards public transport. This transition will be achieved through the provision of a more reliable, frequent and accessible rail service.

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

generations. The expected reduction in road traffic congestion resulting from the DART+ Programme, especially during peak traffic periods, will contribute to a more sustainable transport system within the GDA and surrounding regions.


**Figure 1-2: Reduced congestion leading to reduction in CO2 emissions**

## 1.5 DART+ Coastal North

### 1.5.1 Overview

The DART+ Coastal North project is the third infrastructure project to launch as part of the DART+ Programme. The extents of the DART+ Coastal North project are presented in Figure 1-3.

The DART+ Coastal North project, as part of the DART+ Programme, will deliver an improved and extended electrified rail network and will enable increased passenger capacity and an enhanced train service between Dublin City Centre and Drogheda, including the Howth Branch railway line. This increased rail capacity will be achieved by implementing an extended electrified railway network with high-capacity DART trains and an increased frequency of rail services. In addition, the DART+ Coastal North project requires that some track modifications are implemented, including the provision of turnback facilities at Malahide, Clongriffin and Howth Junction & Donaghmede Stations. These modifications are essential to facilitate the increase in train services by improving operational flexibility, allowing trains to be turned back clear of continuing services and allow for a higher frequency and a more reliable service.

To achieve the peak capacity increases proposed by the DART+ Programme, the DART+ Coastal North project will seek a reconfiguration of Howth Junction and Donaghmede Station to increase capacity and frequency of services on the Northern and Howth Branch Lines. The project is seeking to deliver the infrastructure at Howth Junction and Donaghmede Station that will enable the operation of both a DART shuttle service on the Howth Branch Line as required, and/or a direct through service to/from Dublin City Centre, allowing for the capacity and frequency of DART+ services on both the Northern and Howth Branch lines to be maximised and to help future-proof the network.

In direct response to feedback received during the first Public Consultation, significant upgrade works, and enhancements are now being proposed for Howth Junction & Donaghmede Station to deliver accessibility improvements and provide for a better overall customer experience. The works will involve modifications to the station entrances to provide a more accessible, user friendly and

customer focused station for all rail users, as well as enhancing the connection to the surrounding communities of Donaghmede and Kilbarrack. Upgrades are proposed to the existing station footbridge and connections to the centre platforms, as well as to the lighting, signage, and finishes throughout.

Proposed changes to the Howth Branch will see both the service frequency and capacity increase, along with improvements to the reliability of timetabling. The reliability of the Howth Branch will increase as the proposed shuttle service would mean that trains operating on this branch would no longer be susceptible to delays occurring along the Northern Line. Further assessments on the four Howth Branch level crossings have indicated that, even with the proposed DART service uplift, the existing level crossings can continue to operate and provide an appropriate level of cross connectivity and accessibility to surrounding communities and thus will remain open.

Delivery of the DART+ Coastal North project will support existing communities along the railway and support future sustainable development. The project will serve all existing stations along the railway corridor between Dublin City Centre and Drogheda MacBride Station, including those located on the Howth Branch, with electric powered trains that have a lower carbon footprint than the existing diesel trains. The frequency and quality of service will provide a viable transport alternative to communities along the route and help encourage people to migrate from private car use. This will assist Ireland in reducing greenhouse gas emissions from transport and help combat climate change.

The majority of proposed works and interventions are expected to be carried out within the existing railway corridor boundary. Some works and interventions, however, will be required outside of Iarnród Éireann land such as:

- Bridge modifications/improvements to facilitate extended electrification;
- Construction of substations (to facilitate the provision of power to the line); and
- Use of land for temporary construction/storage compounds.

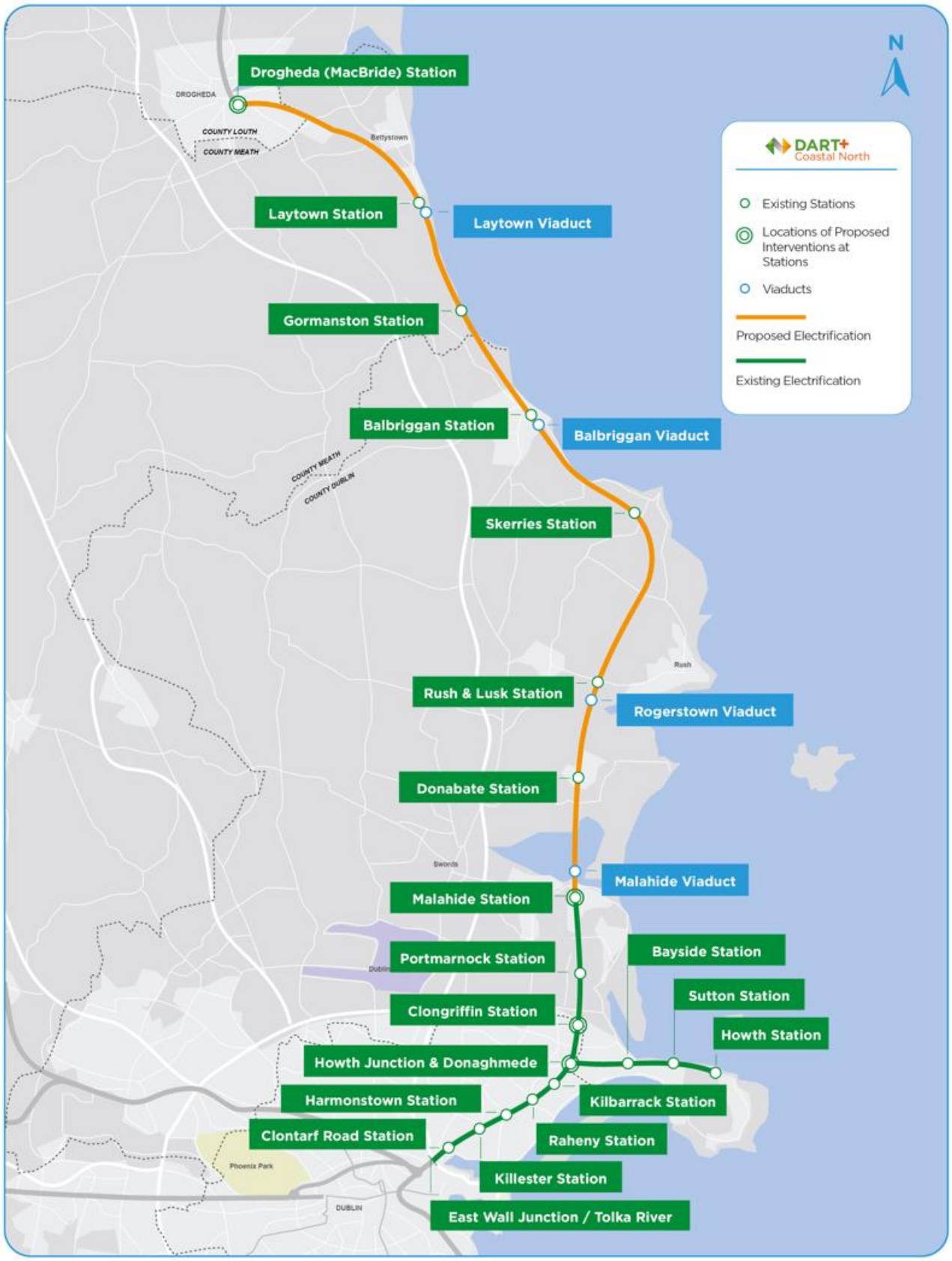



**Figure 1-3: DART+ Coastal North project extents**

### 1.5.2 Capacity increases associated with DART+ Coastal North

The DART+ Coastal North project will improve performance and increase train frequencies along the full length of the Northern Line, providing enhanced capacity from the city centre to as far north as Drogheda. Customers will experience enhanced levels of service in both AM and PM peaks, and in both southbound and northbound directions (Figure 1-4).

Additionally, in DART+ Coastal North the current AM and PM peak hours will become peak periods, with DART extending the proportion of the day it provides its maximum number of trains from 1 hour to 3 hours. This extension of enhanced peak service frequencies will take advantage of infrastructure enhancements and new rolling stock, providing more flexibility, comfort, and capacity to DART customers.

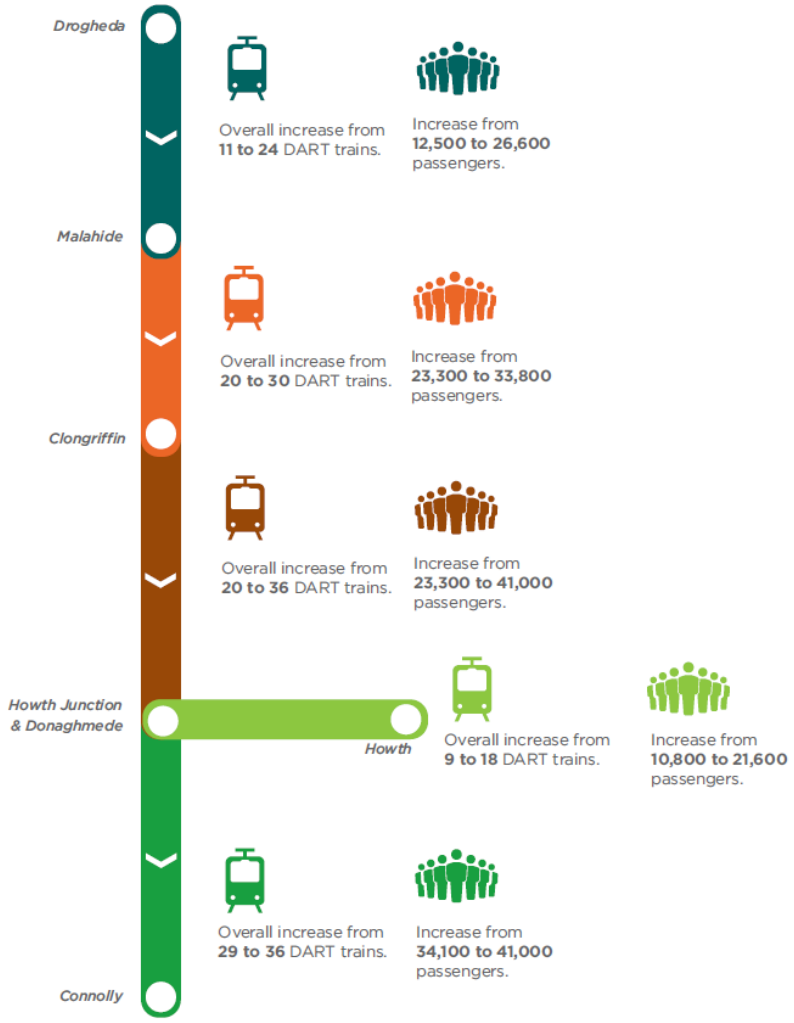



**Figure 1-4: Services Capacity Increases during AM peak period**

During a typical morning commute, a DART customer travelling can look forward to these enhanced frequencies starting an hour earlier and ending an hour later and similarly in the typical evening commute, a customer will benefit from the enhanced frequencies, starting an hour earlier and ending an hour later.

In addition to the improvements in the AM and PM peaks, DART+ Coastal North customers will also benefit from increases in the number of services operating throughout the day, outside the peak periods. During both peak and non-peak times, customers will benefit from enhanced reliability, with DART able to provide a service designed to incur fewer delays, and robust enough to recover from delays when they do occur.

Note that between the current timetable and the implementation of the DART+ Coastal North project, Iarnród Éireann plans to purchase Battery Electric Multiple Unit trains (BEMUs). The provision of these BEMUs will allow for the possibility of running enhanced services on the network in advance of full electrification. Iarnród Éireann identified the Northern Line as the most suitable route for BEMU deployment and Drogheda MacBride Station and depot area as the preferred charging location. These BEMU works will be delivered under a separate project and the increase in service levels provided will be in advance of the electrification under the DART+ Coastal North project. Accordingly, the increase in service level referred to in Figure 1-4 compares DART+ Coastal North to service levels post implementation of the BEMU fleet.

### 1.5.3 Key infrastructural elements of DART+ Coastal North

The key infrastructural elements of DART+ Coastal North include:

- Linear Works along the Northern Line to introduce electrification, as follows:
    - Extension of existing 1500V DC electrification, which currently terminates at Malahide, as far as Drogheda MacBride Station (approximately 37km). This entails the installation of foundations, masts and overhead wires, as well as the installation of new traction power substations to supply the required power, modified railway boundary fences to protect the public from coming into contact with the overhead line, and modifications to station canopies at Drogheda MacBride Station. These works take place alongside the existing railway corridor, predominantly in Iarnród Éireann-owned land with the exception of the substations;
    - Whilst the section of the Northern Line between Dublin City Centre and Malahide, inclusive of the Howth Branch, is already electrified, changes and upgrades to signalling equipment and associated power supply installations will be required in these areas to accommodate the proposed infrastructure works;
    - Undertaking modifications to bridges spanning the railway as a result of capacity enhancements, track reconfigurations and / or works to achieve necessary electrical clearances;
    - Undertaking localised bridge modifications to enable OHLE to be fixed to bridges carrying the railway;
    - Undertaking modifications to existing depots at Drogheda and Fairview to support the new train fleet, including the provision of additional train stabling at Drogheda;
    - Ancillary civil, drainage and landscaping works in areas of intervention.
    - Infrastructure works to facilitate the increase in service frequency and capacity, as follows:
    - These works will take place in specific areas of intervention as outlined below (from south to north).
        - Works around Drogheda MacBride Station;
        - Works to the existing user worked level crossing south of Donabate;
        - Works around Malahide Station;
        - Works around Clongriffin Station;
        - Works around Howth Junction & Donaghmede Station;

- The works at existing stations entail modifications to existing tracks and platforms, as well as the addition of new tracks, where required, to stable and facilitate the turn back and through running of trains. These works are primarily located within existing railway land.

### 1.5.4 DART + Coastal North timeline

A high-level timeline for the statutory approval process for the DART+ Coastal North project is set out in Figure 1-5. In addition to this, the construction relating to all proposed works is potentially expected to commence in 2025.

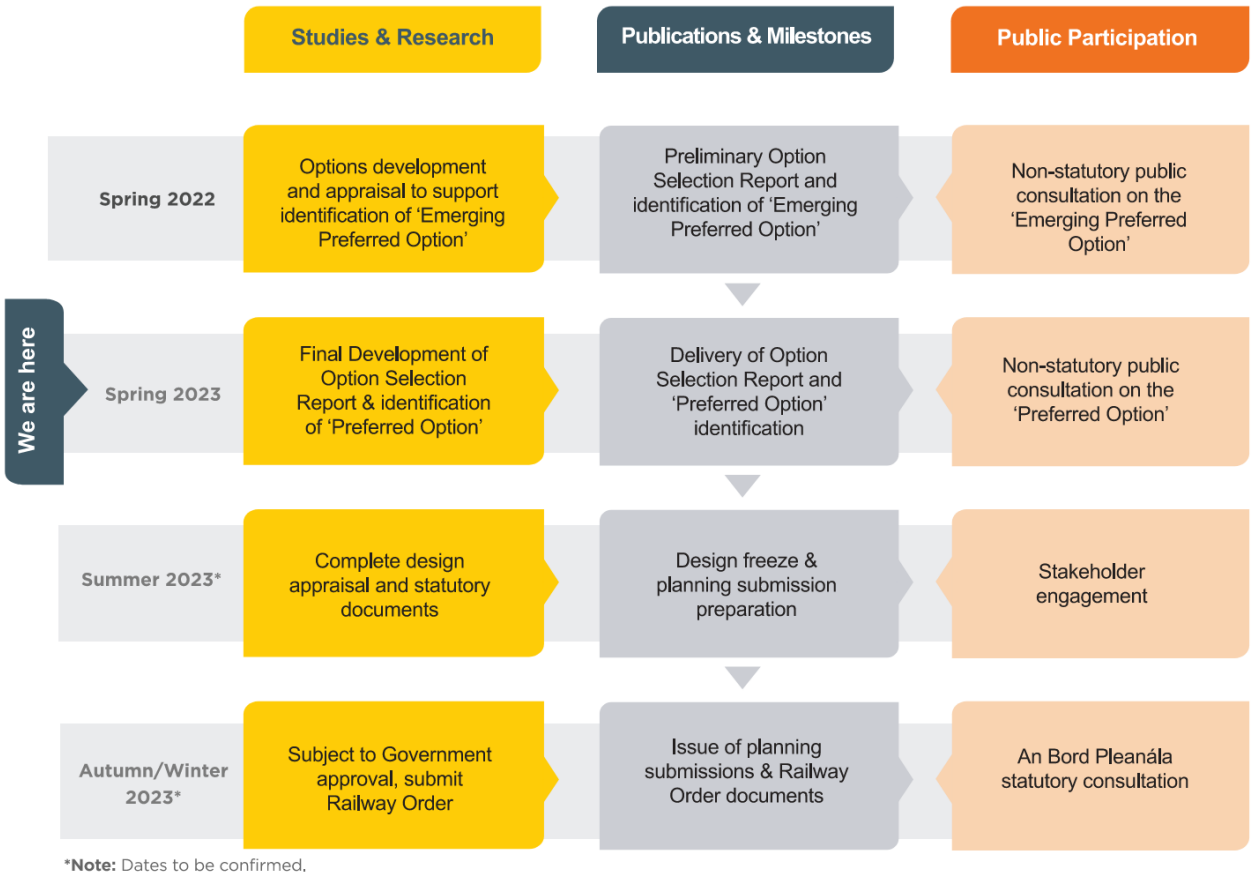



**Figure 1-5: DART+ Coastal North Timeline for Approval Process and public consultation process**

# 2. PROJECT NEED AND STRATEGIC FIT

## 2.1 DART+ Programme Objectives

The primary objective of the DART+ Programme is to support urban compact growth and contribute to the reduction of transport congestion and emissions in Dublin by enabling modernised high-quality commuter rail services between Dublin City Centre and the areas of Drogheda, Maynooth, Dunboyne, Celbridge and Greystones. This is aimed to provide a safe, sustainable, efficient, integrated, and accessible public transport service along these corridors.

Sub-objectives of the DART+ Programme include:

- Cater for existing heavy rail travel demand and improve customer services along established rail corridors in the GDA through the provision of a higher frequency, higher capacity, electrified heavy rail service which supports sustainable economic development and population growth.
- Improve accessibility to jobs, education, and other social and economic opportunities through the provision of improved inter-rail and inter-modal connectivity and integration with other public transport services.
- Enable further urban compact growth along existing rail corridors, unlock regeneration opportunities and more effective use of land in the GDA, for present and future generations.
- Deliver an efficient, sustainable, low carbon and climate resilient heavy rail network, which contributes to a reduction in congestion on the road network in the GDA and which supports the advancement of Ireland's transition to a lower emissions transport system and the delivery of Ireland's emission reduction targets.
- Provide a higher standard of customer experience, including the provision of clean, safe, quiet, modern vehicles and a reliable and punctual service with regulated and integrated fares.

## 2.2 DART+ Coastal North Objectives & Requirements

Below are the objectives for the DART+ Coastal North project:

- To deliver a higher frequency, higher capacity, reliable, electrified route to enable an increased DART service frequency between Drogheda and Dublin City Centre.
- To deliver solutions which improve the passenger experience where passenger infrastructure interventions are required to meet the Train Service Specification.
- To deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works.
- To identify cost-effective solutions from a capital, operations, and maintenance perspective.
- To minimise adverse impacts on the natural and built environment associated with the construction, operation and maintenance of the project.
- To minimise adverse impacts on existing rail services, road users and landowners associated with the construction, operation and maintenance of the project.
- To provide efficient and cost-effective integration of systems with the other DART+ Programme projects.

The delivery of the DART+ Coastal North project will clearly assist in meeting the DART+ Programme objectives to deliver a higher frequency, higher capacity electrified rail service between Dublin City Centre and Drogheda.

The requirements for the DART+ Coastal North project comprise technical and functional attributes derived from the objectives for the project. These requirements are:

**General**

- To design in accordance with IÉ Standards and relevant national and EU standards and guidelines.
- Designs shall comply with the Minimum Employer's Functional Requirements and meet the Train Service Specification

**Electrification**

- Electrification of the line from the end of the current electrified section at Malahide to Drogheda with 1500V DC overhead.
- Provision of an appropriate number of substations to support electrification.
- Undertake necessary infrastructure change to achieve the clearances required for electrification at bridges and structures.
- Undertake safety improvements resulting from the introduction of 1500V DC Overhead.

**Howth Junction & Donaghmede**

- Provision of new turnback infrastructure at Howth Junction & Donaghmede Station which will meet the Train Service Specification.
- Maintain provision for through running from Connolly to the Howth Branch Line.

**Howth Branch**

- To provide an appropriate level of accessibility across the Howth Branch level crossings whilst providing a safe, reliable solution which allows the Train Service Specification to be met.

**Turnback at Clongriffin**

- Provision of appropriate new turnback infrastructure at Clongriffin which will meet the Train Service Specification.

**Turnback at Malahide**

- Provision of new turnback infrastructure at Malahide which will meet the Train Service Specification.
- To take cognisance of the planned Broadmeadow Way Greenway and not to do anything which would preclude the construction of the Greenway.

**Turnback at Drogheda**

- Provision of new turnback infrastructure at Drogheda MacBride Station which will meet the Train Service Specification.
- To allow for continued movements of freight traffic to and from the Drogheda freight sidings.
- Provide DART rolling stock stabling within the Drogheda area as per the DART+ stabling strategy.

**Modifications at Fairview depot**

- To determine and provide the infrastructure, maintenance, and servicing facilities necessary for the new DART+ Fleet.

**Modifications at Drogheda depot**

- To determine and provide the infrastructure, maintenance, and servicing facilities necessary for the new DART+ Fleet.

**Northern Line Level Crossings**

- To close the user worked level crossing (XB001) in order to deliver the Train Service Specification and replace with appropriate relief infrastructure if necessary.

**Signalling and Telecoms**

- To provide signalling and telecoms systems to support the Train Service Specification.

## 2.3 Policy Context

The DART+ Coastal North project has been assessed for its strategic fit in relation to international, European, national, regional and local policy. A list of the policy documents which have been reviewed can be found below in Table 2-1.

**Table 2-1 List of policy documents**

| **International Policy** |
|---|
| United Nations 2030 Agenda (United Nations, 2015) |
| **European Policy** |
| Trans-European Network for Transport (TEN-T) |
| Sustainable and Smart Mobility Strategy |
| European Union (EU) Green Deal 2019 |
| **National Policy** |
| Project Ireland 2040: National Planning Framework (NPF) |
| National Development Plan 2021-2030 (NDP) |
| National Sustainable Mobility Policy |
| National Investment Framework for Transport in Ireland (December 2021) |
| Department of Transport: Statement of Strategy 2021-2023 |
| Building on Recovery: Infrastructure and Capital Investment 2016-2021 |
| Climate Action and Low Carbon Development (Amendment) Act 2021 |
| Climate Action Plan 2023 |
| **Regional Policy** |
| Eastern & Midland Regional Assembly, Regional Spatial and Economic Strategy (RSES) 2019-2031 |
| Transport Strategy for the Greater Dublin Area 2022-2042 |
| Integrated Implementation Plan 2019-2024 |

| Local Policy |
|---|
| Dublin City Development Plan 2022-2028 |
| Clongriffin-Belmayne Local Area Plan |
| Fingal County Development Plan 2023-2029 |
| Baldoyle-Stapolin Local Area Plan 2013 |
| Portmarnock South Local Area Plan 2013 |
| Donabate Local Area Plan 2016 |
| Meath County Development Plan 2021-2027 |
| East Meath LAP 2014-2020 |
| Louth County Development Plan 2021-2027 |

Through careful analysis of the aforementioned documents, it has been identified that the project is both compliant and complementary to all relevant policy. In providing a more efficient mode of public transportation, the DART+ Coastal North project is consistent with policy objectives relating to environmental, economic and social improvements. The project aims to cut carbon emissions, reduce reliance on private cars, improve accessibility for all, alleviate pressures on existing systems, promote regeneration and create opportunities for underutilised lands, and enable the growth of more sustainable urban centres.

The full policy analysis can be found in ***Annex 2.1***.

# 3. TRANSPORT ANALYSIS

## 3.1 Train Service Specification (TSS)

In 2018, the *DART-Expansion-Programme-Options-Assessment* (Oct 2018) by Jacobs and Systra recommended that the DART Expansion Programme (now the DART+ Programme) be delivered by enhancing the existing rail network in the short to medium term (Scheme Bundle 6). This recommendation followed modelling of the bundle options using the National Transport Authority's (NTA) Eastern Regional Model (ERM), which allowed for the performance and attractiveness of the bundles to be analysed by considering how transport demand is served by the rail system within a multi-modal network (i.e., including the public transport modes of rail, bus, Luas, Metro, as well as that of car, walking and cycling). Refer to *Annex 2.2* for a hyperlink to *DART-Expansion-Programme-Options-Assessment* (August 2018).

In 2018, the *DART-Expansion-Programme-Options-Assessment-Addendum* (August 2010) was published (also by Jacobs and Systra). It details the strategic modelling outputs of a revised Train Service Specification (TSS) Option 1 – Balanced City Centre Distribution of the Preferred Option (i.e., Scheme Bundle 6). Refer to *Annex 2.2* for a hyperlink to DART-Expansion-Programme-Options-Assessment-Addendum (June 2019).

Building on the work undertaken by Jacobs and Systra, the DART+ West Multi-disciplinary Consultant (MDC) undertook feasibility and robustness analysis to demonstrate whether the desired level of service is feasible / achievable, and the effects of each key element of the infrastructure on performance. The analysis provided a set of recommendations for further enhancements and considerations to improve the capacity of the network and obtain a more robust and predictable service pattern. The main outcome of the assessment is the definition of the TSS, which is the 'desired' number of train services to have on each branch of the DART network (i.e., trains per hour per direction (TPHPD)). The specific recommendation for the Northern Line is shown in Figure 3-1.

The TSS calls for increased service frequencies that are the same in both directions, as described in Section 1.5.2. Where there are existing DART services, nine DART services will operate in each direction to Clongriffin, with seven in each direction continuing on to Malahide. In peak hours, five DART services in each direction will extend north from the current terminus at Malahide to Drogheda MacBride Station. These will be accompanied by two DMU (Diesel Multiple Unit) commuter services an hour from Dublin Connolly to Dundalk in each direction, stopping at all stations. During the peak period the TSS accommodates a further one intercity Enterprise service in each direction per hour between Dublin Connolly and Belfast, stopping only at Drogheda MacBride and Dundalk stations between Dublin and the border. Proposed changes to the Howth Branch, as defined in the Train Service Specification TSS1C, will see both the service frequency and capacity increase, along with improvements in the reliability of timetabling. The reliability of the Howth Branch will increase as the proposed DART shuttle service would mean that trains would no longer be susceptible to delays that occur along the Northern Line.

DART+ Coastal North has reviewed the analysis and it has been addressed in the design. Analysis of a range of specific infrastructure intervention possibilities has been undertaken at Clongriffin, Malahide, Howth Junction & Donaghmede, and Drogheda MacBride stations.

Further confirmation of feasibility and robustness has taken place at preliminary design phase, after the confirmation of infrastructure enhancements.

Feasibility and robustness analysis of the proposed infrastructure included examining performance from both a site-specific (e.g., train turnback infrastructure) and linear (e.g., signalling improvements) perspective. This analysis has provided assurance as to the ability of DART+ Coastal North's works to facilitate the planned increase in train services. Further design refinements to increase performance may be identified as part of the future design refinement.

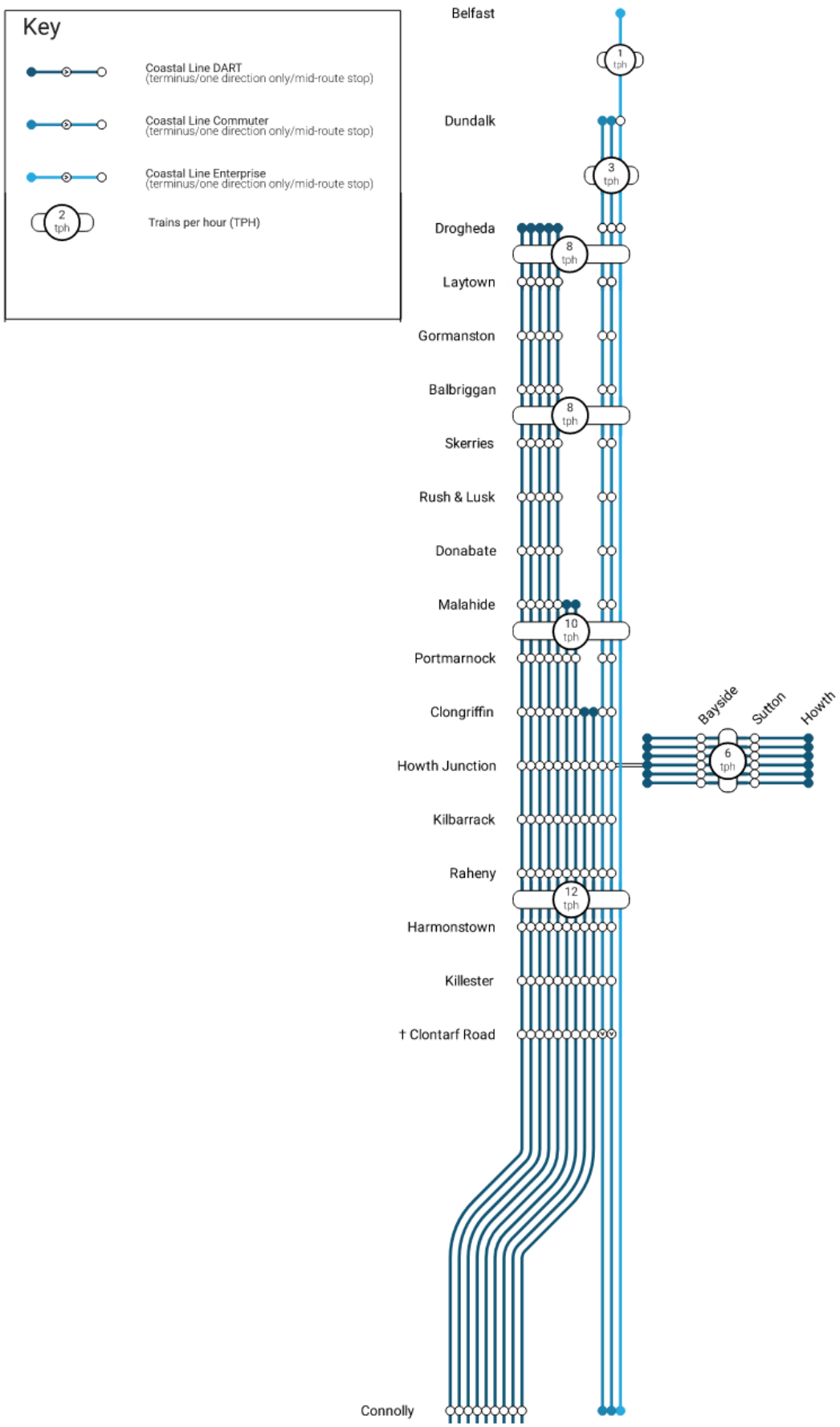



**Figure 3-1: Train Service Specification Diagram**

DART+ Coastal North will serve as part of a highly integrated network and will directly interface with DART trains from DART+ South West and DART+ West in the East Wall Junction / Tolka River area. The critical city centre route section, starting at this point and going south to Pearse Station, is part of the DART+ West project and is therefore outside of the scope of the DART+ Coastal North project. Achieving the service goals of the DART+ Coastal North project that are set out in the train service specification will only be possible with a sufficient level of performance in capacity and reliability around this city centre area.

## 3.2 NTA Eastern Regional Traffic Model

The Eastern Regional Model (ERM) is one of five models that comprise the NTA's Regional Modelling System. The ERM covers the whole of Ireland with a focus on the counties within Leinster and the GDA. These areas are represented by 1,907 geographic zones, with travel between these areas and the rest of Ireland represented by 39 road route zones and 7 rail route zones. The base year of the model is 2016 and it represents an average weekday with five separate peak periods modelled:

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

The model covers all surface access modes for personal travel and goods vehicles including private vehicles (taxis and cars), public transport (bus, rail, Luas, Bus Rapid Transit, Metro), active modes (walking and cycling) and goods vehicles (light goods vehicles and heavy goods vehicles).

The model is being used to carry out the demand modelling associated with the DART+ Programme. This work is currently being carried out by AECOM (on behalf of the NTA) and the output from the study will be used to update the transportation modelling for the DART+ Programme.

## 3.3 Updates since Public Consultation No.1

There is no current change to the TSS which impacts the DART+ Coastal North project.

The NTA's ERM model will be used to carry out demand modelling associated with the DART + Programme. The outputs from this study will be used to inform road design requirements which may be a requirement as a result of the redistribution of road-based traffic following the introduction of improved rail services and more frequent level crossing closures. The outputs from this study will also be used to inform the operational traffic assessment as part of the EIAR. The EIAR will also focus on the impact of the construction traffic management plan, which includes temporary bridge closures.

# 4. OPTION SELECTION PROCESS

## 4.1 Introduction

The primary purpose of this report is to present the option selection and decision-making process for the DART+ Coastal North project at the time of advancing the second round of public consultation.

A clearly defined appraisal methodology has been used in the selection of the Preferred Option for the project. Consistent with other Exchequer-funded projects, it is based on 'Guidelines on a Common Appraisal Framework for Transport Projects and Programmes' (CAF) published by the Department of Transport, Tourism, and Sport (DTTAS), March 2016 (updated 2020) and NTA /Iarnród Éireann's Project Approval Guidelines. The process comprises a two-stage approach (if / as appropriate):

- **Stage 1 –** Preliminary Assessment (Sifting); and
- **Stage 2 –** Multi-Criteria Analysis (MCA)

Not all design features require option selection but are instead subjected to technical assessment only. Consequently, the two-stage approach is not applicable to all general works or interventions that require option selection. The following criteria have been used to scope out elements from a CAF MCA assessment:

- If the type of system to be used is solely governed by IÉ standards and specified by technical requirements, then the CAF/MCA process will not be utilised;
  or
- If the type of design/systems to be used has no material effect on external parties, the public and/or environment, then the CAF/MCA process will not be utilised;
  or
- If there is no material geographic difference between the options, then the CAF/MCA process will not be utilised

This section of the report provides an overview of these two stages. In keeping with the principles of the CAF Preliminary Appraisal approach, the purpose of Stage 1: Preliminary Assessment (Sifting) is to subject a range of options to a preliminary appraisal, before subjecting a smaller number of options to a more detailed Stage 2: Multi-Criteria Analysis (MCA). General works are required to modernise and electrify the existing railway line between Malahide and Drogheda as part of DART+ Coastal North. The Preferred Options are interventions at specific locations and, when combined with the general works, form the end-to-end Preferred Option. Refer to Figure 4-1.

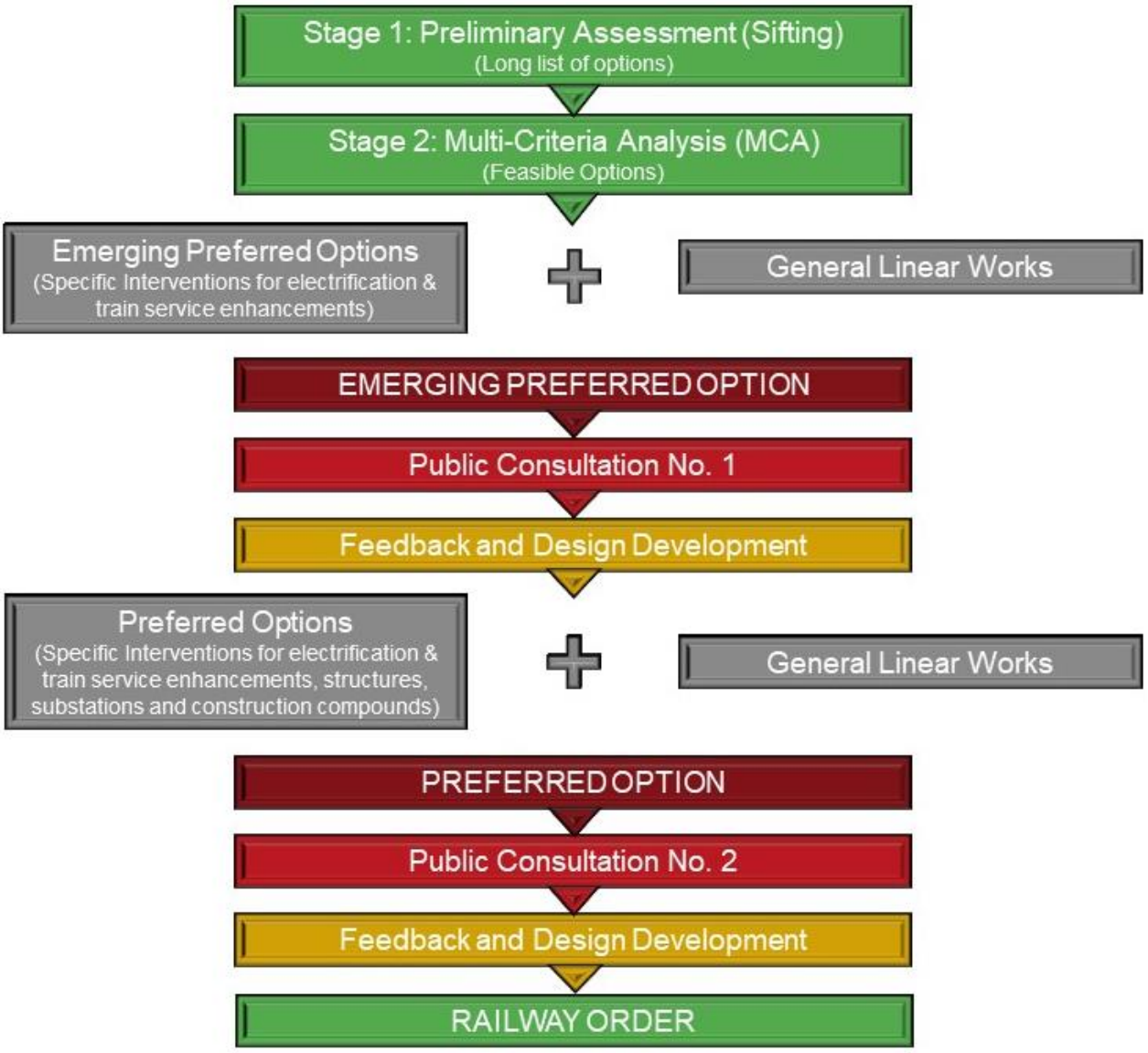



**Figure 4-1: Assessment Methodology**

## 4.2 Options to be Assessed

Many elements of the project require option assessment at a local level prior to incorporation into the end-to-end Preferred Option for the project. The options presented for assessment include:

- **Do-Nothing Option:** This option describes what is likely to occur in the absence of works and interventions needed to meet the project objectives and requirements.
- **Do-Minimum Option:** This represents the least burdensome option to maintain an intervention. In some cases (e.g., where legal commitments are in place) this can act as the Base Case.
- **Do-Something Option(s):** These options are available to address the objective of the intervention (i.e., the project objectives and requirements). The various options (Do-Something) are compared against a Base Case which can either be a Do-Nothing or Do-Minimum option as described above.

## 4.3 Longlisting of Possible Options

At each location, a list of options is developed to allow the CAF framework to commence. A longlist is developed based on carrying out the following:

- Identify a Study Area and scope of the assessment.
- Identify key constraints (at an appropriate level of detail) within the study area such that a reasonable number of feasible options can be included on the longlist and subsequent shortlisting can take place.
- Identify all reasonable and feasible alternatives and options.

Possible options must be significantly different from each other such that the likely impacts and benefits of the options would be materially different from each other.

## 4.4 Stage 1 – Preliminary Assessment (Sifting)

The CAF framework allows shortlisting of possible options as part of a preliminary appraisal, having sifted through a longlist of options:

- 'For some schemes, a large number of Do-Something options may present themselves. In order to keep the appraisal process manageable, it is appropriate to adopt an approach which subjects a large number of options to a preliminary appraisal, before subjecting a smaller number to a more complete appraisal'.

If only 1 possible option was identified at the sifting stage, Stage 2 – MCA methodology does not need proceed. Also, where the Do-Nothing or Do-Minimum options suffice, the optioneering process can be completed at this stage.

The sifting process considered the project objectives and project requirements. Each possible option was assessed on its ability to meet the project objectives and requirements documented in section 2.2.

A pass / fail approach was utilised. A failure against any of the project objectives and project requirements resulted in that option not being taken forward to the MCA stage.

## 4.5 Stage 2 – MCA Methodology

Where necessary, Stage 2 of the optioneering process comprised a detailed multi-disciplinary comparative analysis of those feasible options that passed through Stage 1: Preliminary Sifting. The options were assessed against the criteria of Economy, Safety, Environment, Accessibility and Social Inclusion, Integration and Physical Activity in line with the criteria required for multi-criteria analysis in the CAF guidelines. These parameters were split into several sub-criteria considered relevant to the DART+ Coastal North project.

## Table 4-1: CAF Criteria

| Criteria | Sub-Criteria | Example considerations | Assessment Type |
|---|---|---|---|
| Economy | Capital Expenditure (CAPEX): Construction, land acquisition, temporary works | Estimate high level cost of construction of option.<br>Extent and type of third party lands required permanently.<br>Extent and type of third party land required temporarily for temporary works during construction | Quantitative Assessment |
| | OPEX: Operational costs (IÉ or other entities), Technology advancements and future proofing / obsolescence | Cost to maintain the infrastructure over the whole life.<br>Effects of infrastructure maintenance to services.<br>Provision of ways of undertaking routine inspections and maintenance activities while minimising the effect on service to customers. | Qualitative Assessment<br>Quantitative Assessment on key differences between options |
| | Train Operations Functionality/Economic Benefit | Potential improvement or deterioration of the operation conditions of the line (reduction or increase of the risk of interruption of service).<br>Increased DART service improving connectivity and economy (leading to increased competition in economy, increased output of firms, increased tax revenue). | Qualitative Assessment |
| | Traffic functionality and associated economic activities and opportunities | Potential benefit to vehicular traffic flows in the vicinity of the works during construction and associated economic activities and opportunities in the vicinity.<br>Consideration of duration of traffic disruption and length of diversions.<br>To minimise the impacts on traffic and transportation during the construction and operational stages. | Qualitative Assessment |
| Safety | Employer's Safety | To reduce safety risks associated with construction maintenance and operations.<br>To reduce the potential for incidents or near misses for IÉ/construction staff. | Qualitative assessment |
| | Public safety | To reduce safety risks associated with passengers at platforms, public adjacent to the railway and road, pedestrian and cycle users at level crossings.<br>To reduce the potential for accidents for members of the public/passengers on railway infrastructure.<br>To reduce the potential for conflict between rail and road users. | Qualitative assessment |
| Environment | Landscape and Visual Quality | To avoid / minimise impact on designated amenities, landscapes, protected trees or views.<br>To avoid / minimise visual impact on properties & amenities.<br>To avoid / minimise removal of trees / hedgerows.<br>To avoid / minimise impact from light pollution.<br>To provide opportunities to enhance the local amenity and green infrastructure. | Qualitative assessment |

| Criteria | Sub-Criteria | Example considerations | Assessment Type |
|---|---|---|---|
| | Biodiversity | To consider effects on biodiversity of the area and/, such as impacts on specific flora or fauna, or on defined habitats.<br>To provide opportunities to enhance biodiversity.<br>To ensure that impacts on nature conservation resources are prevented and mitigated. These can occur through direct loss or damage to habitat or specific species, creation of barriers to population movement or indirect effects resulting from, for example, changes in water quality of levels, air quality or noise and light levels. | Qualitative assessment |
| | Noise and Vibration | To provide minimum levels of noise and vibration. | Qualitative assessment |
| | Water resources | To minimise impact or provide opportunities to enhance the quality of surface waters and associated floodplains, ground waters and coastal waters. | Qualitative assessment |
| | Archaeology, Architectural and Cultural Heritage | The construction, presence and operation of transport infrastructure can impact directly on such cultural heritage resources through physical impacts resulting from direct loss or damage, or indirectly through changes in setting, noise and vibration levels, air quality, and water levels.<br>To minimise the impact on cultural heritage such as on below ground archaeological remains, historic buildings (individual and areas), and historic landscapes and parks. | Qualitative assessment |
| | Geology and Soils | To consider the impacts on designated areas of geological interest, unstable natural ground and ground contamination<br>To consider the impacts on agricultural soil and sensitive or vulnerable soils and material resources, including the reuse of site won materials. | Qualitative assessment |
| | Agricultural and non-agricultural | Qualitative appraisal of impacts on valued resources either from a human or natural origin with value arising for economic or cultural reasons. These assets can be existing utilities or non-renewable resources. | Qualitative assessment |
| | Air Quality & Climate Change | Impacts of Construction Traffic.<br>Improvements in air quality through use of EMUs over DMUs.<br>Improvements in greenhouse gas emission through modal shift from road to rail.<br>Improvements in greenhouse gas emission through use of EMUs over DMUs.<br>Reduction in greenhouse gas emissions.<br>Preservation or enhancement the local air quality. | Qualitative assessment |

| Criteria | Sub-Criteria | Example considerations | Assessment Type |
|---|---|---|---|
| Accessibility and social Inclusion | Accessibility | Capacity of options to facilitate the movement of people (either within, on to or across the rail system).<br>Impact on the wellbeing of the passenger and public.<br>Positive impact on passenger and public experience.<br>Improve accessibility to key facilities, such as employment, education, transport and healthcare to satisfy transport demand for all trip types. | Qualitative assessment |
| | Social Inclusion | Positive impact towards vulnerable groups.<br>Positive impact to deprived geographic areas.<br>Improvement of accessibility to public transport facilities, in particular from deprived geographic areas. | Qualitative assessment |
| Integration | Adaptability in the future | Allowance for future internal transport links within Ireland. | Qualitative assessment |
| | Transport Integration | Similarity of systems with other DART+ Programmes.<br>The solution proposed should integrate with other transport systems such as DART+ West, Metrolink and light rail lines, local and national traffic road systems, walkways, and cycleways. | Qualitative assessment |
| | Land Use Integration | Integration with land use policies and objectives.<br>Integration with regional and local land use plans.<br>Adhesion to regional and local plans and policies. | Qualitative assessment |
| | Geographical Integration | Integration with land use policies and objectives<br>Integration with regional and local land use plans. | Qualitative assessment |
| | Government policy Integration | Integration with national and international plans and policies. | Qualitative assessment |
| Physical Activity | Walking / cycling opportunities | To enable walking and cycling opportunities in a safer environment in the communities along the route.<br>To create a healthy environment conducive to active travel. | Qualitative assessment |

The assessment compares the options, identifying and summarising the comparative advantages and disadvantages of each alternative under all applicable criteria and sub-criteria leading to a Preferred Option for the intervention required.

Each specialist included a commentary of their analysis for each option. They then compared the options relative to each other based on whether an option had ‘some’ or a ‘significant’ advantage or disadvantage over other options or whether all options were ‘comparable / neutral’. Ultimately, each optioneering exercise concluded with the determination of a site-specific Preferred Option.

**Table 4-2: Legend for MCA Summary Table**

| |
|---|
| Significant comparative advantage over other options |
| Some comparative advantage over other options |
| Comparable to other options / neutral |
| Some comparative disadvantage over other options |
| Significant comparative disadvantage over other options |

## 4.6 Feedback and Design Development Overview

The non-statutory public consultation on DART+ Coastal North is intended to show the current status of the optioneering process, provide information on ongoing technical and environmental analyses and to engage with the public and potentially affected property owners. Feedback from the public consultation is then fed through into the ongoing design process.

The Preliminary Option Selection Report was presented to the public as part of PC1, giving an early-stage characterisation of the design and decision-making process for the project at that moment in time. The Emerging Preferred Option presented in that report has since been re-evaluated to incorporate feedback from PC1 which has then informed the Preferred Option presented in this Option Selection Report as part of PC2.

In addition to the re-evaluation of the Emerging Preferred Option following stakeholder engagement, the report also presents separate optioneering for electrical substations and construction compounds along with further design development of the general linear works required to upgrade the railway.

## 4.7 Public Consultation No. 1 and Stakeholder Engagement

### 4.7.1 Introduction

Public participation is a key element in the delivery of all major infrastructure projects, such as the DART+ Coastal North project. The purpose of the consultation is to engage both the public and key stakeholders in the delivery process and inform them of the likely statutory timescales required to deliver the project; to seek their cooperation and to record their local knowledge presented by them to inform the Railway Order (RO) process as well as the Environmental Impact Assessment Report (EIAR) and Appropriate Assessment (AA) documentation.

The main public participation stages as part of the project development are shown below:

- Non-Statutory Public Consultation No.1 – The Emerging Preferred Option – completed in Spring 2022
- Non-Statutory Public Consultation No. 2 – Preferred Option – current stage
- Statutory Consultation Period as part of the Railway Order application process – Autumn/Winter 2023*

*Dates to be confirmed.

The first public consultation period, 'The Emerging Preferred Option', commenced on 24th February 2022 and ran for 6 weeks until its formal closure on 08th April 2022.

The remainder of this chapter details the process and records and analyses the feedback from the first of the public consultation events.

### 4.7.2 Methodology

DART+ Coastal North ensured the public consultation process was easily accessible to all stakeholders and the public. Due to COVID-19 restrictions in place at the time of PC1 and in order to comply with the public health restrictions and guidelines, no physical public events were held; instead, all consultation including meetings with potentially affected landowners / residents / stakeholders were conducted online (website / email / telephone). In addition, five evening webinars were held focusing on specific sections of the project route.

The following engagement methods used throughout PC1 are summarised below:

- Iarnród Éireann Chairman Frank Allen and Chief Executive Jim Meade were joined by the Mayor of Drogheda Cllr James Byrne, Cathaoirleach of Meath County Council, Cllr Sean Drew and Mayor of Fingal, Cllr Seána Ó Rodaigh, on the 24th of February 2022 to launch DART+ Coastal North Public Consultation No.1 at Drogheda Station. The launch was covered widely on the launch day by national media including Irish Independent, Irish Times, The Journal, Evening Echo, Breakingnews.ie, Northside News, Fingal Independent, Swords/Fingal Independent, LMFM, and East Coast FM.
- A project webpage was established, which presented all the project information, including the Preliminary Options Selection Report (POSR). Information regarding the project was also shared on Iarnród Éireann's social media channels.
- A dedicated Community Liaison Representative was engaged to answer calls and emails from residents, landowners, etc. Queries seeking further information or clarity regarding the Emerging Preferred Option were responded to.
- A 76-page non-technical public consultation brochure was published in both Irish and English languages. The brochure was made available on the dedicated project webpage and hard copies were to the elected representatives following the ministerial launch.
- The affected properties were sent an information leaflet in both English and Irish highlighting the key elements of the DART+ Coastal North project and providing information on the public consultation process.
- Letters were sent to all registered landowners who were likely to affected by the Emerging Preferred Option via registered post notifying them in advance of the commencement of PC1 and welcomed them to the event to provide their feedback on the Emerging Preferred Option.
- A project email address, project postal address and project helpline was established for stakeholders to provide support and resolve any queries. An online feedback form was also provided on the website.
- The project team held five online public webinars for residents local to the DART+ Coastal North affected areas, including: City Centre to Donaghmede, Bayside to Howth Area, Clongriffin to Malahide Area Donabate to Balbriggan Area, and Gormanston to Drogheda Area.
- An online virtual consultation room was created, allowing the public and other stakeholders to view maps, project information and other relevant information in a safe and accessible environment.

A total of 2,115 submissions were received by Iarnród Éireann via the communication channels provided. Submissions received after the close of the Public Consultation period (8th of April 2022) continued to be accepted and are taken into consideration as part of an overall body of feedback on the content of Public Consultation No.1. The feedback received ranges from personal submissions from affected residents and commuters to detailed proposals from public bodies and various associations. All submissions were received either via email, post, telephone, or through the online feedback form. All of the feedback was analysed and recorded by the project team on a dedicated consultation database. Before analysing the submissions, all feedback was anonymised and then categorised into identifiable themes, a summary of these themes is set out in Section 4.8.4.

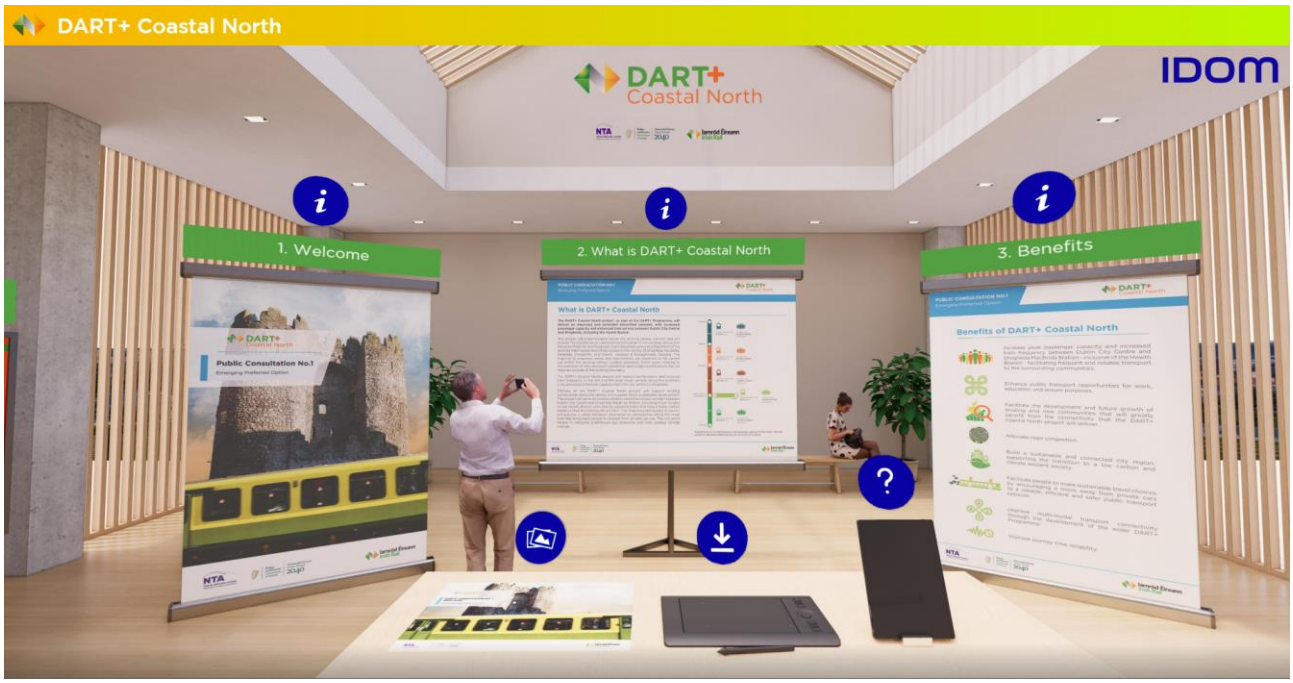



**Figure 4-2 DART+ Coastal North Virtual Consultation Room**

### 4.7.3 Prescribed Bodies & Key Stakeholders

A list of prescribed bodies and key stakeholders has been identified for the project. Each of them was written to as part of the non-statutory public consultation process to inform them of the DART+ Coastal North project and to allow them the opportunity to contribute to the development of the scheme. The identified prescribed bodies and key stakeholders are noted below:

- An Bord Pleanála
- An Taisce
- Angling Council of Ireland
- "Arts Council of Ireland
- An Chomhairle Ealaion"
- Astronomy Ireland
- Balbriggan Garda Station
- Ballymun Garda Station
- Bat Conservation Ireland
- BIM/Sea Fisheries Protection Authority (SFPA)
- Birdwatch Ireland
- Bord Gáis Energy
- Boyne Valley Tourism
- Bus Éireann
- CIE
- Coillte
- Commission for Energy Regulation
- Commission for Railway Regulation
- Commission for Regulation of Utilities
- Construction Industry Federation
- Coolock Garda Station

- Department of Arts, Heritage and the Gaeltacht - Built Heritage & Architectural Policy Unit
- Department of Defence
- Department of Foreign Affairs
- Department of Housing, Local Government and Heritage
- Department of Justice
- Department of the Environment, Climate and Communications
- Department of Transport
- Development Applications Unit
- Directorate-General for Mobility and Transport
- Drogheda & District Chamber of Commerce
- Dublin Bus Office
- Dublin Chamber of Commerce
- Dublin City Council
- Dublin City Council Planning Dept
- Dublin City Council Tourism
- Dublin Fire Brigade
- Dublin Port Company
- Dundalk Chamber of Commerce
- Eastern and Midland Regional Assembly
- EIR Building
- EirGrid
- Environmental Protection Agency (EPA)
- ESB
- ESB International
- ESB Networks
- Fáilte Ireland
- Fingal Chamber of Commerce
- Fingal Council Planning Dept
- Fingal Council Tourism
- Fingal County Council
- Garda Siochána
- Gas Networks Ireland Headquarters
- Geological Survey Ireland
- Geological Survey of Ireland
- Health & Safety Authority
- Health Service Executive (HSE)
- IBEC
- Irish Cattle & Sheep Farmers Association
- Inland Fisheries Ireland
- Inland Waterways Association of Ireland
- Irish Aviation Authority
- Irish Farmers Association
- Irish Landscape Institute
- Irish Water
- Irish Wildlife Trust
- Louth County Council
- Louth County Council Fire
- Louth County Council Planning Dept
- Louth County Council Tourism
- Luas Customer Service
- M50 Concession Ltd.
- Marine Institute Headquarters
- Meath Chamber of Commerce
- Meath County Council Fire Service
- Meath County Council
- Meath County Council Planning Dept
- Met Eireann
- Minister for Agriculture, Food and Marine (Department of Agriculture)
- Minister for Children, Equality, Disability, Integration and Youth (Department for Children and Youth Affairs)
- Minister for Education (Department of Education)
- Minister for Finance
- Minister for Further and Higher Education, Research, Innovation and Science
- Minister for Housing Local Government and Heritage
- Minister for Public Expenditure and Reform
- Minister for Rural and Community Development (Department of Rural and Community Affairs)
- Minister for the Environment, Climate and Communications
- Minister for Tourism, Culture, Arts, Gaeltacht, Sport and Media (Department of Arts, Heritage and the Gaeltacht)
- Minister of State with responsibility for International and Road Transport and Logistics
- National Ambulance Service
- National Transport Authority
- NIAH - National Inventory of Architectural Heritage

- Office of the Planning Regulator (OPR)
- Raheny Garda Station
- Railway Safety Commission
- Tánaiste and Minister for Enterprise, Trade and Employment
- Teagasc
- The Arts Council
- The Commissioner of Public Works in Ireland
- The Heritage Council
- The Office of Public Works
- Three Ireland (Hutchison) limited
- Transport Infrastructure Ireland
- Údarás na Gaeltachta
- Vodafone Ireland plc.
- Waterways Ireland

### 4.7.4 Summary of Key Issues of Concerns Raised

While a wide variety of issues were raised in the submissions received during Public Consultation No.1, a summary of the principal issues or main concerns across the entire project is included below:

- Howth Branch Line Infrastructure Proposals
    - Operation of a DART Shuttle Service at Peak Times
    - Station infrastructure at Howth Junction & Donaghmede Station
- Journey Times
- Safety
- Level Crossings & Traffic Impacts
- Train Frequency, Capacity & Reliability
- Howth Tourism & Business Impacts
- Station Facilities – Carparking, Bicycle Parking, Park & Ride, Toilets
- Development / Planning Implications
- Access & Mobility Issues
- Public Consultation Process
- Extension of DART to Drogheda & Change to Electric Power
- Limited Scope of Project
- Noise, Health & Impact on Landowners & Residents
- Environmental & Heritage Impacts

Issues outside of the scope such as future fares, extending the project to areas such as Dundalk, Navan or the Airport, or the addition of stations at Drogheda North, Bettystown, Laytown, or elsewhere are not included in this section and have been commented upon in Section 4.9.3.

Further detail on the key issues and concerns raised throughout PC1 can be found in the Public Consultation No.1: Findings Report in *Annex 2.3.*

## 4.8 Key Issues Arising from Public Consultation No. 1 findings

The key issues arising from public and stakeholder feedback from PC1 are dealt with under the following headings:

- Matters which require Further Assessment for the Preferred Option.
- Matters to be Addressed by Ongoing Design Development and the RO Application and EIAR.
- Matters outside of the Scope of the Project.

### 4.8.1 Matters which required further assessment for the Preferred Option

The purpose of PC1 was to present the Emerging Preferred Option for the proposed DART+ Coastal North project and to request the views of the public and other stakeholders. All submissions received as part of the first round of consultations have fed into the design process, an updated option selection process and the identification of the Preferred Option. The project team has analysed the submissions and considered all relevant information of potential relevance for the re-evaluation of the optioneering to date. As part of this analysis the following items or options were identified as requiring further consideration and have been considered in the options re-evaluation process:

- **The inclusion of, within the project scope, significant upgrades to Howth Junction & Donaghmede Station now proposed to provide a more accessible, user friendly and customer focused station for all rail users.**
  Feedback raised significant concerns in relation to the level of comfort and security experienced by passengers at Howth Junction & Donaghmede Station, as well as concerns over the station being fit to serve as an interchange service to enable the operation of a DART Shuttle Service on the Howth Branch Line. The design development has therefore now proposed a variety of significant modification works at the station to both improve the passenger experience generally, and to develop the station to better serve as an interchange station. The works are further described in Section 7.3.
- **Further surveys and assessments undertaken in relation to transport modelling for the level crossings on the Howth Branch line.**
  The proposed changes to the Howth Branch will facilitate an increase in both the service frequency and capacity, along with improvements to the reliability of timetabling and service operation. The current level crossing barrier opening and closing timings have been used to inform a traffic model assessing the effects on vehicles, cyclists and pedestrians.
  The current level crossing barrier opening and closing timings have been used to inform a traffic model assessing the effects on vehicles, cyclists, and pedestrians. Detailed assessment of the four existing level crossings along the Howth Branch Line has concluded that these level crossings can continue to operate and provide an appropriate level of cross connectivity and accessibility whilst still meeting the increased DART service frequency requirement. The increased frequency of level crossing closures will result in a greater likelihood of vehicles, pedestrians and cyclists being required to queue at the crossings, however, the traffic modelling and sensitivity analysis has shown that queue lengths are likely to remain within the available queueing road space in all cases. Based on the assessments carried out to date, additional infrastructural interventions at the four level crossings are not considered necessary.
  The traffic data used in the level crossing assessments was based on surveys carried out in May 2022. These included classified vehicle junction turning count surveys over a 14-hour time period between 0600 and 2000 at the junctions within the study area and also at the level crossings within the study area. The data also included queue length surveys and pedestrian count surveys. The AM Peak Hour was determined to occur between 0800 and 0900 and the PM Peak Hour between 1730 and 1830 (refer to Annex A).

  These are the busiest periods on the road network and the impact of the proposed level crossing closures was therefore assessed for these time periods. Historical traffic data (2018/2019) was available at some of the junctions adjacent to the Kilbarrack and Sutton level crossings and a comparison of the most recent traffic data (2022) and the historic traffic

data (2018/2019) has shown that traffic levels observed in the recent surveys have, to a large extent, returned to pre-Covid levels in the study area. The most recent 2022 traffic count data were therefore considered a suitable data source for the assessment.
The effects of any changes to traffic patterns will be fully assessed as part of the EIAR and it should also be noted that the EIAR accompanying the Railway Order application will include a comprehensive assessment of potential air quality and climate impacts resulting from the proposed DART+ Coastal North development.
This is discussed further in Section 8.

- **Design development since Public Consultation No. 1 has identified the locations of compounds, both temporary and permanent, relating to the project.**
  Compounds are required at specific construction locations and also distributed along the scheme by geographical features. For example, compounds will be required at each of the bridge reconstruction locations, and/or at viaducts requiring fitting with OHLE. They will also be required for material processing and storage of construction components. The construction compounds will be used to support earthworks, enabling works, site clearance, utility diversions work, civil works, the demolition of bridges, OHLE, track installation, signalling and telecoms equipment and all ancillary works.
  The compound locations are identified within the schematic layouts accompanying this report. Many of the compound locations would need to be temporarily acquired for the duration of the works where they are outside the railway corridor.
- **Structural assessments have identified bridges/structures requiring intervention to allow for the installation of OHLE as part of the overall extension of electrification to Drogheda MacBride Station.**
  Along the project route corridor, only six structures have been identified where the required clearances are not achieved.
  Following consideration of options, and completion of detailed analysis, two of the bridges were identified as requiring reconstruction, including Overbridge OBB81 (Drogheda station footbridge) and Overbridge OBB80/80A/80B (carrying Railway Terrace).
  Four additional bridges along the project extents were identified as having insufficient clearance for the installation of OHLE. Following detailed assessment. It was deemed that electrical solutions and localised track lowering interventions provide a sufficient solution at each location and more significant bridge reconstruction can be avoided. These bridges include Overbridge OBB39 (carrying Station Road / R128), Overbridge OBB44 (carrying local road in Tyrrelstown Big), Overbridge OBB55 (carrying Lawless Terrace / R127), and Overbridge OBB78 (carrying Colpe Road).
  This is discussed further in Section 5.5.

### 4.8.2 Matters to be Addressed as part of Ongoing Design Development, the RO Application and EIAR

All feedback relating to environmental matters has been fed back to the project team, including environmental specialists inputting into the Environmental Impact Assessment Report (EIAR) and Appropriate Assessment (AA) documentation, which will be submitted with the Railway Order. All feedback will be considered as appropriate in the detailed assessments which will inform these statutory documents. Issues raised specific to relevant environmental topics includes inter alia:

- Traffic & Transportation – the potential impact of temporary bridge closures on the surrounding community, the potential impact of works for pedestrians and cyclists; and appropriate mitigation (traffic management measures). Impacts on the surrounding road network resulting from increased level crossing barrier closure times.
- Air Quality – the potential benefit arising from the introduction of electric trains and potential impact at a local level in terms of dust and air pollution affecting nearby residents. Particular concerns were noted in relation to increased Howth Branch level crossing closure times and the negative effects of increased vehicle queuing resulting from the proposed increase in DART frequency on the Howth Branch Line.
- Archaeology and Cultural Heritage – potential impact on heritage and cultural sites.
- Architectural Heritage – potential impact on various buildings and bridges of significant architectural heritage importance including structures surrounding Drogheda MacBride Station and the four viaducts that will be fitted with OHLE infrastructure; also, appropriate mitigation required in respect of any buildings of architectural heritage which must be impacted by the works.
- Biodiversity – potential impact on local biodiversity (including uncultivated areas along railway cuttings and embankment); potential for protected flora and fauna including badgers, bats and otters; also, appropriate mitigation in terms of reinstatement and replacing / enhanced planting where tree removal is necessary. Particular concerns relevant to construction compounds were raised.
- Climate – the potential impact and contribution the electrification of the line will have in assisting the achievement of EU greenhouse gas emission targets and facilitating modal shift away from the private car.
- Human Health – it will consider with reference to and interactions with other environmental receptors contained in corresponding chapters such as air & climate, noise & vibration, traffic, water resources, electromagnetic effects, as appropriate.
- Land and Soils – the potential impact of the proposed works on the stability of embankments affecting roads or buildings surrounding them.
- Landscape and Visual – the potential impact of the proposed works on buildings and bridges of architectural heritage importance; also, appropriate mitigation in terms of reinstatement and replacing / enhanced planting where tree removal is necessary and careful design of replacement bridges and the siting of portal structures.
- Noise and Vibration – the potential noise and vibration impact of both daytime and night-time construction works along the track and operational noise resulting from the increase in the frequency of passing trains.
- Population – it will consider land use and social considerations, including effects on community severance, amenity uses of the site or of other areas in the vicinity; and economic activity, including tourism e.g. employment and population including associated land use.

It is an objective of the project to minimise adverse impacts on the natural and built environment associated with the construction, operation and maintenance of the project and to minimise adverse impacts on existing rail services, road users and landowners associated with the construction, operation and maintenance of the project. To that end, every effort will be made in the assessment of effects, to avoid, minimise and where necessary, mitigate any significant effects.

The key starting principle for the Project, is to upgrade the existing railway and to undertake all works within the existing railway corridor wherever feasible to do so. This can be achieved over the majority of the route. However, public and private land will be impacted by the Project, and the acquisition of

land and/or property and other interests (including new rights), whether whole or in part, will be necessary. However, detailed design and technical and construction related solutions will continue to seek to minimise this up to the submission of the Railway Order.

### 4.8.3 Matters Outside of the Scope of The Project

While reviewing the feedback received it was clear that there were several issues raised in the submissions that are outside of the scope of this project or which were not directly related to the proposals. These are detailed below and include the following topics:

- Effects of Covid-19 on Public Engagement;
- Inclusion of additional stations at Drogheda North, Skerries, Balbriggan, Bettystown;
- Extending DART services to Navan / Dundalk South / Dublin Airport / Swords Area;
- Fares & Future Inclusion of Drogheda in LEAP Card zone;
- Provision of Toilets on New DART Fleet;
- Condition of existing stations and upgrades to existing facilities;
- Provision of 4-tracking or underground to improve rail network;
- Night-time Services.

**Effects of Covid-19 on Public Engagement**

A number of submissions received indicated that individuals were unhappy with the decision to host Public Consultation No.1 as a predominantly virtual event. Respondents were concerned that the lack of a public forum, or in-person event, did not allow for all potentially affected members of the public to view the project material and voice their opinions.

The decision not to hold ‘in-person’ events was taken on the back of government advice at the time of planning Public Consultation No.1, the general uncertainty surrounding Covid-19 at the time, and in keeping with the approach to Public Consultation taken by other DART+ projects. The public were advised of public webinars and invited to attend these events for further information on the DART+ Coastal North project. Public Consultation No.2 will be held in a hybrid manner, offering both online and in-person events.

**Inclusion of additional stations, or platforms, as part of DART+ Coastal North**

A number of submissions called for the DART+ Coastal North project to include for additional stations at a variety of locations along the Northern Railway Line. These locations include:

- Dundalk;
- Dundalk South;
- Drogheda North;
- Dunleer;
- Castlebellingham;
- Southgate;
- North Skerries;
- Balbriggan;
- Bettystown;
- Laytown; and
- Reopening the station at Mosney.

In addition to calls for additional stations to be included, a number of respondents suggested either extending existing platforms, or construction of new platforms at the following stations:

- Drogheda;
- Clongriffin; and
- Howth Junction.

The delivery of new stations is not included as part of the DART+ Coastal North project but will however be considered by Iarnród Éireann as required, under separately funded projects. The 'Preferred Option' will not preclude the future development of any potential new stations, such as that proposed at Bettystown in the East Meath Local Area Plan.

**Extending DART services to Navan / Dundalk South / Dublin Airport / Swords Area**

A number of submissions called for the DART+ Coastal North project to include for an extension of DART services to locations including Navan, Dundalk, Dublin Airport and/or Swords.

No such extensions are included as part of the DART+ Coastal North project, however, the 'Preferred Option' will be compatible with any future extensions and/or additional links/branches that may be added to the Northern Line as part of any future Iarnród Éireann projects.

**Fares & Future Inclusion of Drogheda in LEAP Card zone**

Numerous queries related to future fares that will be applicable to the DART extension to Drogheda and if the potential exists for the LEAP travel zones to be extended to Drogheda as part of the DART+ Coastal North project.

The potential extension of the leap card zones to include Drogheda is not included in the DART+ Coastal North project remit. The regulation of fares and fare structures is the responsibility of the NTA for all rail services and indeed all Public Service Obligation (PSO) public transport services.

**Provision of Toilets on New DART Fleet**

Concerns were raised in relation to the lack of toilet facilities being provided on the new DART+ Fleet carriages. Respondents raised a need for toilet facilities to be provided largely due to the expected journey time from areas such as Drogheda to Dublin City Centre and some passenger requirements for such facilities to allow them to use public transport as a means of travel.

The DART+ Coastal North project, as noted previously, is responsible for the delivery of rail infrastructure to enable an increased frequency and capacity of rail services between Drogheda and Howth and Dublin City Centre. The initial order of carriages for the new DART+ Fleet was made at the end of 2021 and does not have toilet facilities on board. The feedback received during consultation has been shared with the DART+ Fleet team and consideration will be given to onboard toilet facilities in advance of any future fleet orders.

**Condition of existing stations and upgrades to existing facilities**

Some concerns have been raised in relation to the condition of facilities at existing stations including lifts, toilets, parking, and bicycle facilities.

Station facilities are continuously monitored, and improvements are proposed and made as appropriate through Iarnród Éireann's Network Enhancement Division and NTA's Park & Ride Development Office. Any works associated with existing station facilities would be progressed in parallel to the DART+ Coastal North project and not as a direct component of the project. Any concerns raised as part of this public consultation will be noted and given appropriate consideration by Iarnród Éireann. Iarnród Éireann's lift improvement programme has seen significant improvement in lift availability since 2020 and investments continue to be made in station lifts. This is the third year of a five-year programme which will see lifts replaced or upgraded in more than 50 stations.

A variety of significant modification works are proposed to Howth Junction and Donaghmede Station to both improve the passenger experience generally, and to develop the station to better serve as an interchange station into the future. The proposed works will involve modifying the entrances to provide a more accessible, user friendly and customer focused station for all rail users, as well as improving the connection to the surrounding areas of Donaghmede and Kilbarrack. Upgrades to the existing footbridge and connections to the centre platforms will also be carried out, as well as upgrades to lighting, signage, and finishes throughout.

**Provision of 4-tracking or underground to improve rail network**

Submissions have questioned the potential for the inclusion of 4-tracking, or underground rail construction, as a potential upgrade to the existing Northern Line.

The provision of additional track installations, or the inclusion of any underground construction, is not currently proposed as part of the Preferred Option for DART+ Coastal North. The main objectives of the DART+ Coastal North project include delivering a higher frequency, higher capacity, reliable, electrified route to enable an increased DART service frequency between Drogheda and Dublin City Centre and it is currently considered possible to deliver these objectives without the introduction of track installations. Upgrades to telecommunication and signalling infrastructure along the Northern Line will also contribute to meeting the project objectives.

**Night-time Services**

A limited number of submissions referred to the need for extended and more frequent night-time services.

Any amendments to the current timetables will be a matter for Iarnród Éireann operations and will be considered separately to the DART+ Coastal North project at the appropriate time.

# 5. GENERAL LINEAR WORKS

This section introduces the range of general linear works required to modernise and electrify the existing railway line between Malahide and Drogheda as part of DART+ Coastal North. This section of the report also provides an overview of the optioneering undertaken for works of a linear nature. For further detail on the information presented in this section refer to Annex 3.2.

The following works are required:

- Installation of Overhead Line Equipment (OHLE), e.g., masts and wires between Malahide and Drogheda
- Installation of OHLE foundations
- Installation of OHLE structures onto underbridges (bridge crossings carrying the rail)
- Modifications to parapets on overbridges, to ensure suitable protection from electrical wiring
- Modification to overbridges to achieve acceptable clearance of OHLE, including lowering of tracks to accommodate the passage of electrical wiring beneath overbridges and modification of bridges to accommodate proposed works (e.g. deck replacement & bridge reconstruction)
- Installation of power supply substations and electrical feeding infrastructure between Malahide and Drogheda
- Closure of the existing user worked level crossing south of Donabate
- Modifications to existing railway fencing and installation of new fencing to prevent the public coming into contact with the OHLE
- Modifications to surrounding station structures, such as canopies at Drogheda MacBride Station, to achieve required clearances to OHLE
- Enhancement of signalling and telecommunications infrastructure
- Creation of line-wide construction compounds to support works associated with the project. Note construction compounds which are associated with particular construction activities (for example modifications to overbridges) are discussed in their relevant section and have been chosen due to their proximity to the particular works.

Where construction compounds, new substations, and/or any necessary access routes, cannot be located within the extents of IÉ property, the required lands, local authority or third party owned, will be subject to temporary or permanent acquisition as required.

These works are described in detail in the following sub-sections.

## 5.1 Installation of Overhead Line Equipment between Malahide and Drogheda

OHLE generally refers to the mechanical and electrical items used to carry and deliver electrical power to the trains. Electrical energy is supplied to the train through contact between the equipment mounted on the top of the train (pantograph) and an electrically live overhead cable. This cable is suspended from a system of steel masts. The live overhead cable is fed electricity from individual substations which are located along the route.

**Figure 5-1: An example of OHLE on an existing line**

**Figure 5-2: A typical OHLE in a densely configured track area**

The DART+ Coastal North will adopt a 1500V Direct Current (DC) system which aligns with the existing DART network for traction power supply.

The existing railway corridor between Malahide and Drogheda is not currently electrified, therefore OHLE will be required. Options for the types of OHLE masts, their positioning and attachment to existing bridge structures have been considered and are explained in Section 5.3. In general the OHLE design for the DART+ Coastal North project will comprise a pre-sagged simple (2-wire) auto-tensioned system, supported on galvanised steel support structures, which will be adapted in specific locations where needed. While functionally similar to the OHLE on the existing DART network, modern-day design standards will be applied to optimise reliability and safety on the route. Due consideration will also be given to the impact of the live overhead cables on bird migration, with mitigation measures considered and identified in the Environmental Impact Assessment Report (EIAR) and Appropriate Assessment (AA) documentation.

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

For further details, refer to ***Section A of Annex 3.2***.

### 5.1.1 OHLE Mechanical Compensation Equipment

The OHLE wires are divided into sections which are individually held in tension by springs to maintain a constant height above the track irrespective of changes in ambient temperature.

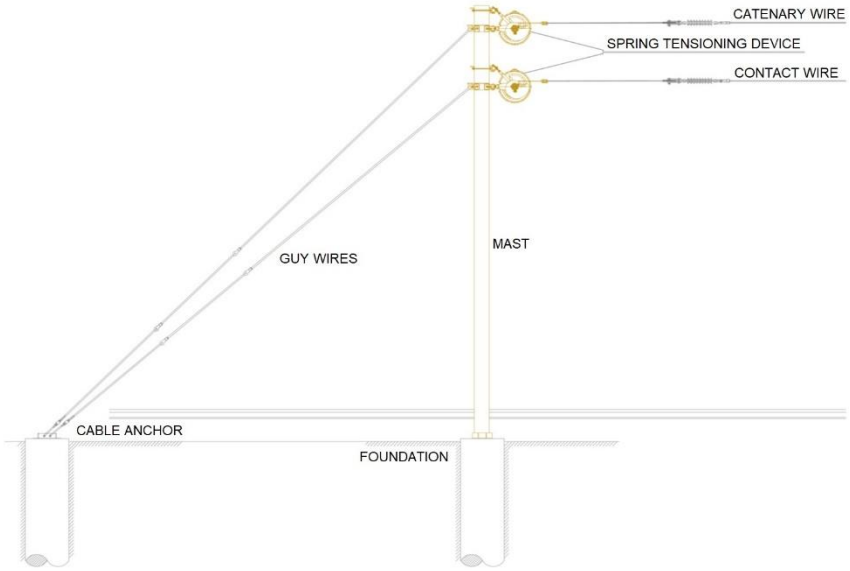



**Figure 5-3: Tensioning Device**

### 5.1.2 OHLE Support Structures

The new OHLE masts to be used for supporting OHLE wires will typically be H-section steel structures. The height of the masts and their profile depends on the stress they are subjected to and their type, function and location. Typically, OHLE mast heights will be between 6.5m and 8.5m, with a typical mast spacing of between 50m and 60m. The masts will be predominantly located in IÉ land along the existing rail corridor.

The OHLE arrangement will generally utilise the simplest suspension method compatible with the technical requirements for supplying power to the trains. The design will also, however, mitigate the environmental and ecological impacts by utilising the most appropriate solution for sensitive locations, e.g. at Malahide Viaduct.

### 5.1.3 OHLE in Stations

The type of mast and cantilever is influenced by the various different constraints at each location. For stations without impeding structures on the platform, single track cantilever masts can be used with insulators at the top to avoid live elements over the platforms, such as those currently used in stations such as Malahide or Portmarnock, as shown in Figure 5-4.

Where there are existing constraints at a station, such as canopies, preventing placement of a mast with a single-track cantilever, alternative solutions can be used. These include the use of two track cantilevers, portals or headspans. Refer to Figure 5-5, Figure 5-6 and Figure 5-7 for examples. Refer to Section 5.9 for further information where modifications have been applied at stations.


**Figure 5-4: Existing single-track cantilevers at Malahide Station**

**Figure 5-5: Current two track cantilever at Kilbarrack Station**

**Figure 5-6: Existing head span at Howth Station**

**Figure 5-7: Existing portal at Clongriffin Station**

## 5.2 Installation of OHLE foundations between Malahide and Drogheda

Foundations are required at each mast location and will be designed to resist the applied loads from the OHLE system. The various foundation solutions will be selected based on the specific ground conditions which tend to vary along the route. To cater for the different ground conditions expected, three foundation options have been identified (driven piles, concrete bored piles and concrete pads). The type of foundation selected at each location will be determined at a later stage of the design process when further ground investigation information is available.

Since PC1, A site specific Ground Investigation (GI) has been undertaken which will be used to inform further design development.

For further details, refer to **Section B of *Annex 3.2.***

## 5.3 Installation of OHLE structures onto underbridges

Bespoke fixing arrangements for OHLE will be required at some locations where the railway is supported on underbridges. It is envisaged that typical OHLE foundations can be placed either side of underbridges with spans of less than 60m, removing the need to fix OHLE to the bridge. Underbridges with spans around, or in excess of, this length have been subject to further assessment and optioneering. The resulting list of impacted underbridges is as follows:

- UBB30 – Malahide Viaduct;
- UBB36 – Rogerstown Viaduct;
- UBB56 – Balbriggan Viaduct;
- UBB72 – Laytown Viaduct;

A typical list of the possible OHLE support arrangements considered for each bridge is as follows (in addition to a 'Do-nothing' scenario):

- Option A – Supported on superstructure;
    - Option A1 – In-board of parapets;
    - Option A2 – Aligned with parapets;
    - Option A3 – Outside of parapets.
- Option B – Supported on substructure
    - Option B1 – Supported off pier;
    - Option B2 – Supported off abutment;
- Option C – Independent supports.

It should be noted that not all options are feasible for each bridge since they depend upon the clearance available between tracks and bridge parapets, as well as the technical feasibility of the construction methodology.

The Preferred Option selected for each bridge has been selected based on the outcome of the optioneering process, which included initial sifting and MCA.

Additionally, the positioning of OHLE masts along the length of the bridges has been considered, seeking to provide a visually preferable, symmetrical solution.

The Preferred Option for each structure is as follows:

- UBB30 – Malahide Viaduct – installation of masts supported on concrete pad foundations placed within the ballast layer under the tracks;
- UBB36 – Rogerstown Viaduct – installation of masts supported on the wingwalls of the existing abutments;
- UBB56 – Balbriggan Viaduct – installation of masts supported on the walkway, which will be modified locally to suit;
- UBB72 – Laytown Viaduct – installation of masts supported on additional steelwork attached to the bridge at the outer pier locations.

Further detail can be found in **Section C of *Annex 3.2***.

### 5.3.1 Construction Compounds

Small, temporary. isolated works compounds will be required for each of the viaducts. Their locations are identified on the figures below, with traffic access summarised in Table 5-1.

**Table 5-1: Summary of viaduct works construction compounds traffic access**

| Location | Traffic access to M1 |
|---|---|
| UBB30 – Malahide Viaduct | Joins M1 to west via R106, R132 and R125 |
| UBB36 – Rogerstown Viaduct | Joins M1 to south-west via the R127 Dublin Road and R132 |
| UBB56 – Balbriggan Viaduct | Joins M1 to west via R132 and R122 |
| UBB72 – Laytown Viaduct | Joins M1 to south-west via R150 and R132 (south pier compound via local road onto R132) |


**Figure 5-8: Malahide Viaduct compound site (Source: OSi aerial imagery)**


**Figure 5-9: Rogerstown Viaduct compound site (Source: OSi aerial imagery)**

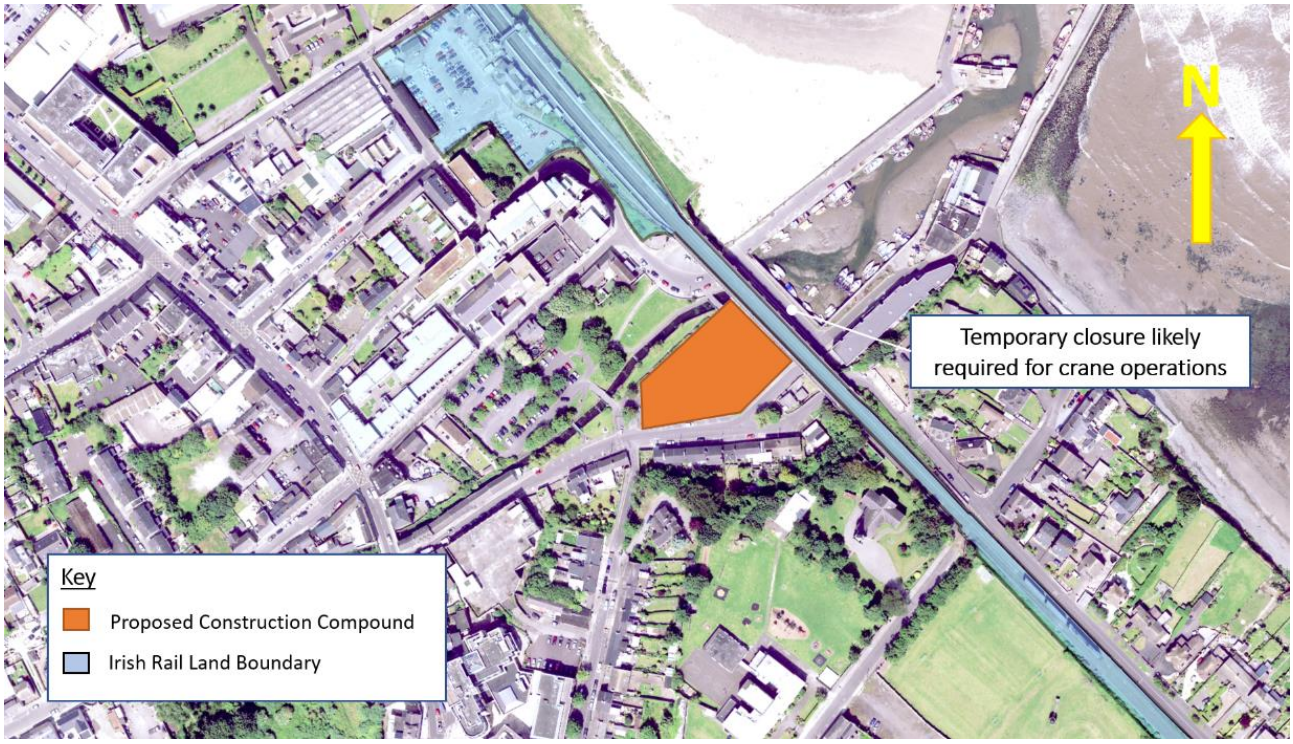



**Figure 5-10: Balbriggan Viaduct compound site (Source: OSi aerial imagery)**

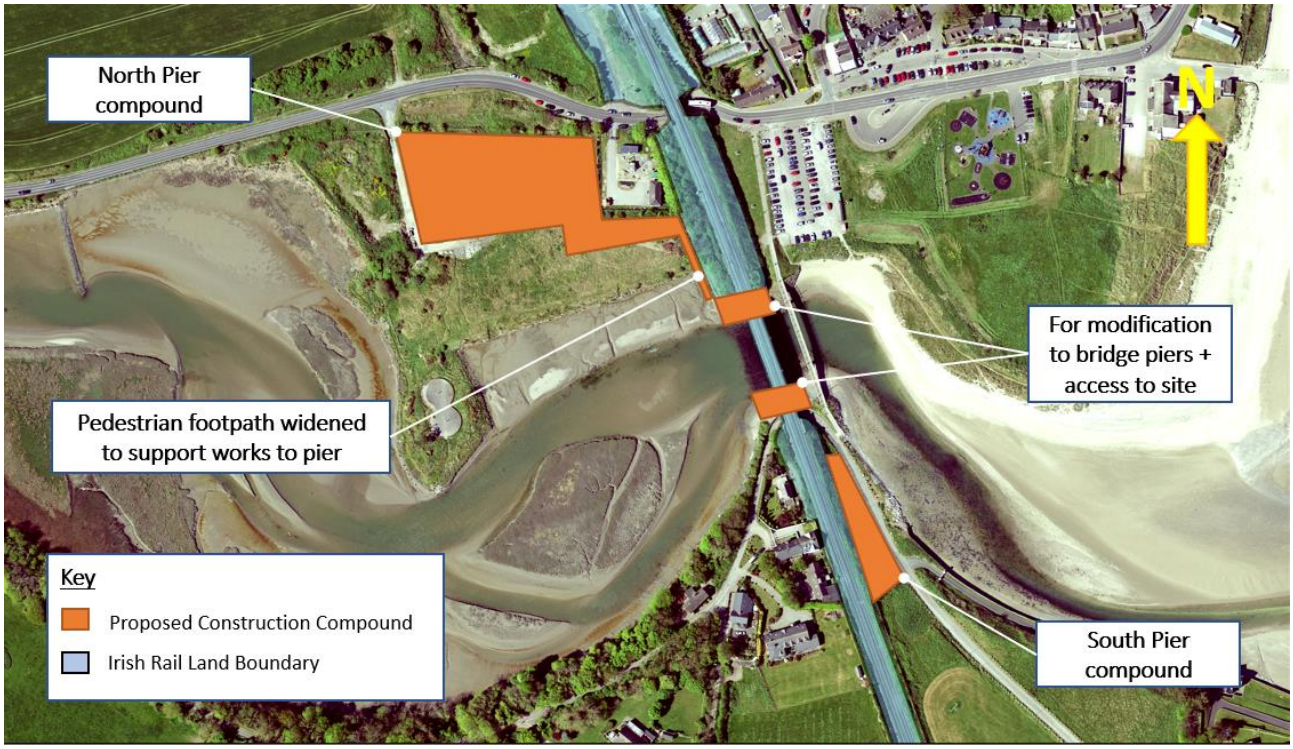



**Figure 5-11: Laytown Viaduct compound sites (Source: OSi aerial imagery)**

## 5.4 Overbridge Parapet Modifications

A number of existing overbridges between Malahide and Drogheda need to be modified to meet safety requirements for an electrified railway, i.e. to protect the public from direct contact with the live OHLE. As a result, reasonable steps to prevent people from accidentally or otherwise falling onto or touching the OHLE are required.

This will be achieved by modifying the composition and height of existing bridge parapets to achieve the required 1.8m height. A variety of options for modifying parapets are being considered on a case-by-case basis for each bridge. These are listed below:

- Demolish and reconstruct parapet to correct height;
- Extend parapet height using similar materials (stone, brick, concrete, etc.);
- Extend parapet height using a lightweight panel (e.g. mesh, steel plate).

Further detail can be found in **Section D of *Annex 3.2*.**

## 5.5 Overbridge Clearance Works

### 5.5.1 General

Wherever a bridge spans over the railway it is necessary to ensure that the OHLE passes safely below the bridge. This can often mean that the height of the wires needs to be reduced to pass under the bridge. In this case, the wire height will be reduced gradually on approach to the bridge so that the performance of the system is maintained. There is, however, an absolute minimum wire height from top of rail that needs to be achieved.

At some bridges, the OHLE will pass beneath without connection to the bridge. At other lower bridges, it will be necessary to connect the OHLE safely to the bridge, using insulators. Occasionally, it may be necessary to place an OHLE mast directly next to the bridge to support the OHLE.

Where existing bridges do not provide the necessary clearance for OHLE, a range of options to reduce impacts have been considered on a case-by-case basis. The options include modifications to the track layout and structural solutions to gain the necessary vertical and horizontal clearance. The options considered include the following (either standalone or in combination):

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

Along the project route corridor, there are a relatively low number of bridges that have insufficient clearance for installation of OHLE. The works for these bridges are summarised in the following sections with further detail provided in **Section E of *Annex 3.2*** with the following subsections:

- ***E1: Option Selection - OBB39 Report***
- ***E2: Option Selection – OBB44 Report***
- ***E3: Option Selection – OBB55 Report***
- ***E4: Option Selection – OBB78 Report***
- ***E5: Option Selection – OBB08/80A/80B Report***
- ***E6: Option Selection – OBB81 Report***

### 5.5.2 Overbridge OBB39 (carrying Station Road / R128)

#### *5.5.2.1 Context*

This vehicular bridge (IÉ reference OBB 39) is located north of Rush & Lusk Station and carries the R128 Road over the Northern Line. This is an important access route between the towns of Lusk and Rush.


**Figure 5-12: Bridge location (Map data © OpenStreetMap contributors, Map layer by Esri)**

The existing structure is a single span (9.16m skew span) reinforced concrete bridge with precast concrete parapets and precast concrete beams on masonry abutments with a reinforced concrete extension. The existing carriageway width in this location is approximately 6.73m wide, with a 2.4m shared footway/cycleway to one side.

**Figure 5-13: Existing Bridge Elevation**

#### *5.5.2.2 Preferred Option*

To achieve the required vertical clearance for electrification, from the top of rail to the existing soffit of OBB39, it is proposed to lower the Down Main tracks over an approximate length of 100m through a skim dig. The maximum proposed lowering will be 88mm on the Down Main, located approx. 5m north of OBB39.

Note OBB39 was not subject to the MCA process in line with the option selection process (Section 4.1) as the type of system to be used was solely governed by IÉ standards and specified by technical requirements.

Refer to ***Annex 3.2 E1*** for further information.

#### *5.5.2.3 Construction Compound*

The localised track works required are likely be supported from the temporary compound to be set up for the Rush and Lusk substation construction works. Only minor track adjustments are required here, which would be undertaken during non-disruptive night-time possessions though efficiencies may be gained by using longer possessions at weekends if available. No alterations to nearby station platforms are envisaged; minor alterations to cable troughing are planned.


**Figure 5-14: Rush and Lusk Traction Substation compound site – to be used for OBB39 (Source: OSI Aerial Imagery)**

### 5.5.3 Overbridge OBB44 (carrying local road in Tyrrelstown Big)

#### *5.5.3.1 Context*

This vehicular bridge (IÉ reference OBB 44) is located in Tyrrelstown, East of Lusk and carries the Horestown Road over the Northern Line. This is a minor access to local properties and businesses connecting to the L1285.


**Figure 5-15: Bridge location (Map data © OpenStreetMap contributors, Map layer by Esri)**

The existing structure is a single span (9.169m span) reinforced concrete bridge with precast beams on masonry abutments with concrete extensions. The existing carriageway width in this location is approximately 4.3m wide, which only facilitates passage of one vehicle, and although it is noted that a passing bay is provided along the local access road, there are signs of vehicular overrun present to all verges from agricultural vehicles along the route.

S

**Figure 5-16: Bridge elevation (source: Iarnród Éireann)**

#### *5.5.3.2 Preferred Option*

To achieve the required vertical clearance for electrification, from the top of rail to the existing soffit of OBB44, it is proposed to lower both the Up and Down Main tracks over an approximate length of 440m through a combination of skim dig and full depth track bed renewal.

The maximum proposed lowering will be 380mm and 238mm, on the Up and Down Main respectively, located approx. 80m north of OBB44.

Note OBB44 was not subject to the MCA process in line with the option selection process (Section 4.1) as the type of system to be used was solely governed by IÉ standards and specified by technical requirements.

Refer to ***Annex 3.2 E2*** for further information

#### *5.5.3.3 Construction Compound*

The temporary construction compound is proposed to be located adjacent to the bridge, outside of the current IÉ land ownership boundary as shown in Figure 5-17. A number of different fields surrounding the bridge are noted as suitable however the option shown is deemed to minimise impacts to nearby sensitive receptors. Only minor track adjustments are required here, which would be undertaken during non-disruptive night-time possessions though efficiencies may be gained by using longer possessions at weekends if available. In addition to trackwork, some localised alterations to cable troughing will be required.

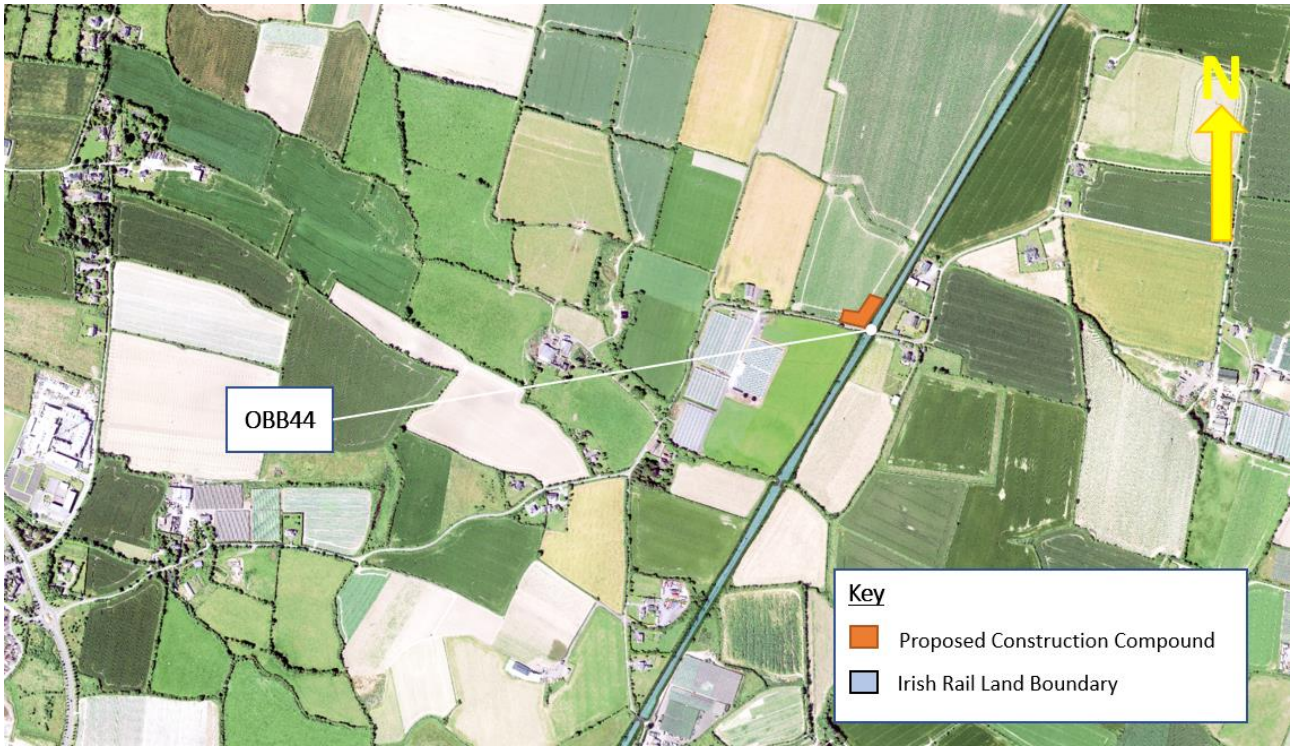



**Figure 5-17: OBB44 compound site (Source: OSI Aerial Imagery)**

The nearest road of strategic importance is the R127 which joins the M1 in the southwest via the R132. Horestown Road and the adjoining lanes to reach the R127 are narrow and may constrain construction vehicle access.

### 5.5.4 Overbridge OBB55 (carrying Lawless Terrace / R127)

#### *5.5.4.1 Context*

This vehicular bridge (IÉ reference OBB 55) is located in Balbriggan, south of Balbriggan Station and carries the R127 over the Northern Line. This is an important access road for a large residential area from the east of the town to the town on the west.


**Figure 5-18: Bridge location (Map data © OpenStreetMap contributors, Map layer by Esri)**

The existing structure is a single span (9.144m span) reinforced concrete bridge with precast concrete portal units on masonry abutments. The existing carriageway width in this location is approximately 7.41m wide, with footways provided to each side of the existing cross section of 1.71m and 1.67m, which is slightly below the recommended standard of 1.8m for adoptable purposes.

**Figure 5-19: Bridge Elevation**

#### *5.5.4.2 Preferred Option*

To achieve the required vertical clearance for electrification, from the top of rail to the existing soffit of OBB55, it is proposed to lower both the Up and Down Main tracks over an approximate length of 300m through a combination of skim dig and full depth track bed renewal. The maximum proposed lowering will be 256mm and 321mm, on the Up and Down Main respectively, located approx. 60m north of OBB55.

Note OBB55 was not subject to the MCA process in line with the option selection process (Section 4.1) as the type of system to be used was solely governed by IÉ standards and specified by technical requirements.

Refer to ***Annex 3.2 E3*** for further information.

#### *5.5.4.3 Construction Compound*

Due to the developed nature of the surrounding area and the site topography, there is no suitable area in which to establish a compound directly adjacent to the site. Instead, it is envisaged that the temporary construction compound next to Balbriggan Station will be utilised, Suitable mitigation of the construction impact will be required given the number of adjacent sensitive receptors. Only minor track adjustments are required here, which would be undertaken during non-disruptive night-time possessions though efficiencies may be gained by using longer possessions at weekends if available. In addition to trackwork, alterations to cable troughing will be required.

### 5.5.5 Overbridge OBB78 (carrying Colpe Road)

#### *5.5.5.1 Context*

This vehicular bridge (IÉ reference OBB 78) is located in Colpe to the east of Drogheda Station and carries Colpe Road over the Northern Line. This is an important access route with essential services located at both sides of the bridge, including schools, a crèche and shopping centre.

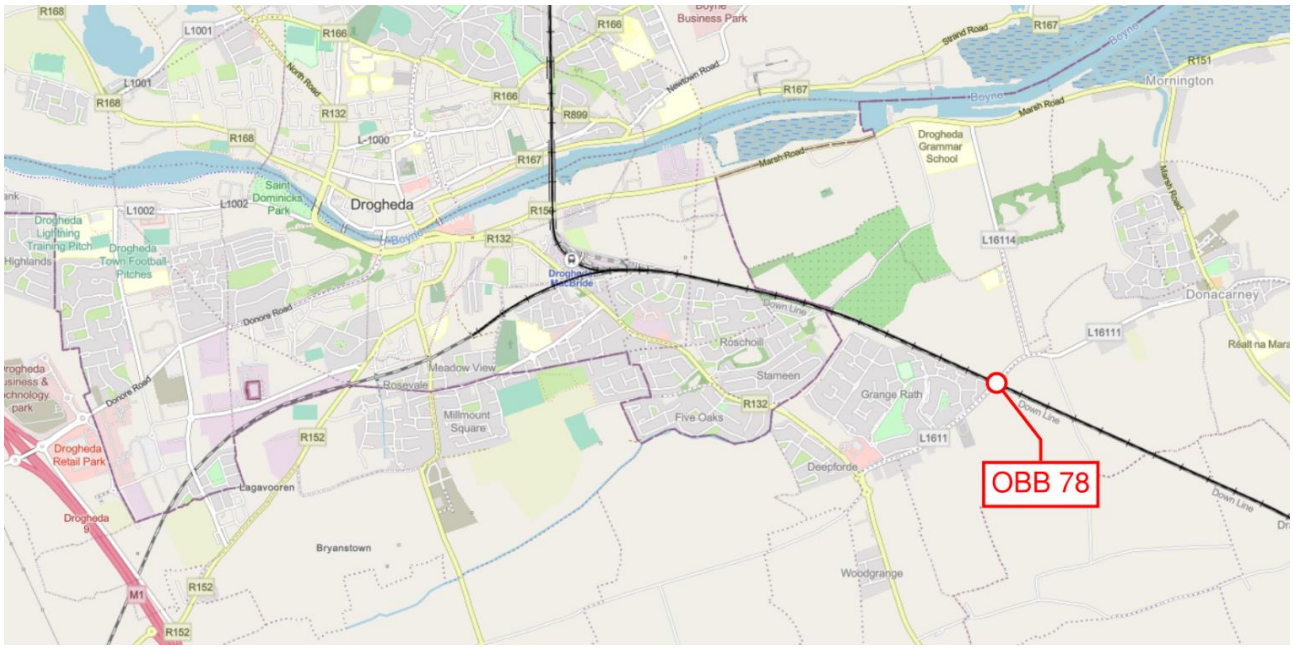



**Figure 5-20: Bridge location (Map data © OpenStreetMap contributors, Map layer by Esri)**

The existing structure is a single span (9.144m span) reinforced concrete bridge with precast concrete portal units on reinforced earth wall abutments. The existing carriageway width in this location is approximately 7.25m wide, with footways and verges provided to each side of the existing cross section.

**Figure 5-21: Existing Bridge Elevation**

#### *5.5.5.2 Preferred Option*

To achieve the required vertical clearance for electrification, from the top of rail to the existing soffit of OBB78, it is proposed to lower both the Up and Down Main tracks over an approximate length of 200m through a combination of skim dig and full depth trackbed renewal. The maximum proposed lowering on the Up Main will be 107mm, located approx. 10m north of OBB78. The maximum proposed lowering on the Down Main will be 132mm, located approx. 30m south of OBB78.

Note OBB78 was not subject to the MCA process in line with the option selection process (Section 4.1) as the type of system to be used was solely governed by IÉ standards and specified by technical requirements.

Refer to ***Annex 3.2 E4*** for further information.

#### *5.5.5.3 Construction Compound*

The proposed temporary construction compound is located to the south-west of OBB78 in agricultural land outside the IÉ land boundary. The bridge is surrounded by suitable fields but the option shown is deemed to minimise the impact to local residents to the north of the bridge. The nearest road of strategic importance is the R132 which joins the M1 to the south-west near Gormanston. The Colpe Road joins the R132 at the small roundabout to the East. Access into the existing field is good from Colpe Road.


**Figure 5-22: OBB78 compound site (Source: OSI Aerial Imagery)**

### 5.5.6 Overbridge OBB80/80A/80B (carrying Railway Terrace)

#### *5.5.6.1 Context*

The vehicular bridges East of Drogheda Station (IÉ reference OBB 80/80A/80B) are located on the edge of the station. The bridges provide vehicular access to McGrath's Lane which includes 2no. residential properties, a train depot, a farmer's field and maintenance access to tracks. Adjacent to these properties; planning permission has been granted for a proposed development (Louth County Council Planning Ref. No. 17387) consisting of 133 no. two storey residential dwellings and a vehicular access road connecting to Marsh Road (R150). This proposed development is independent of the existing bridges and McGrath's Lane.

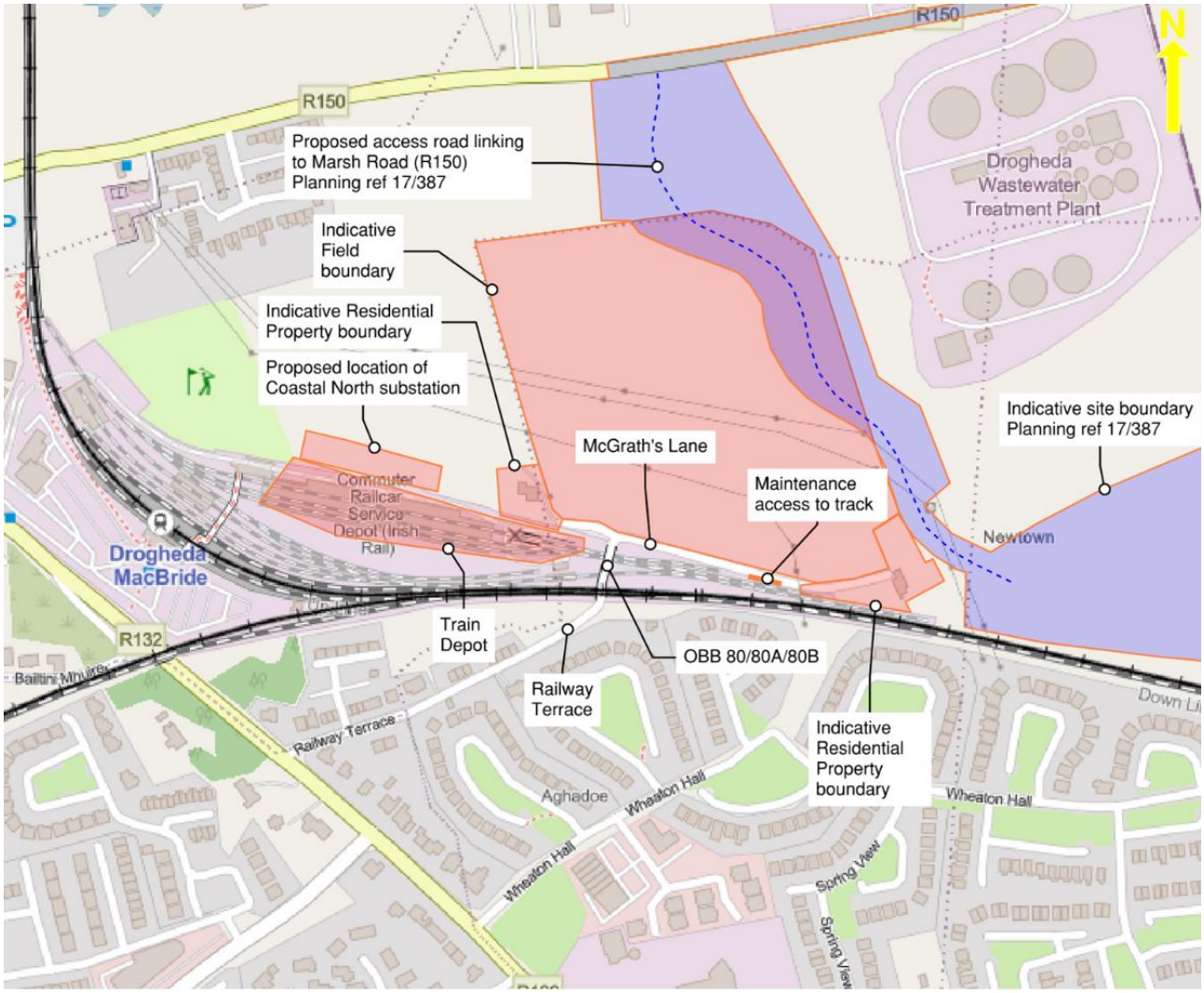



**Figure 5-23 Location of OBB80/80A/80B**

OBB80 and OBB80A are stone masonry arch structures with single 9.1 m spans, built in the 1800's as a pair with an earth embankment between. These structures are not protected structures however they are historic structures which contribute to the character and special interest of the station, and which are protected within the curtilage of the station complex. OBB80B was constructed in 2003 to facilitate access to a train wash with the embankment removed. The bridge is a reinforced concrete bridge of 8.2 m span on piled abutment walls built between OBB80 and OBB80A.

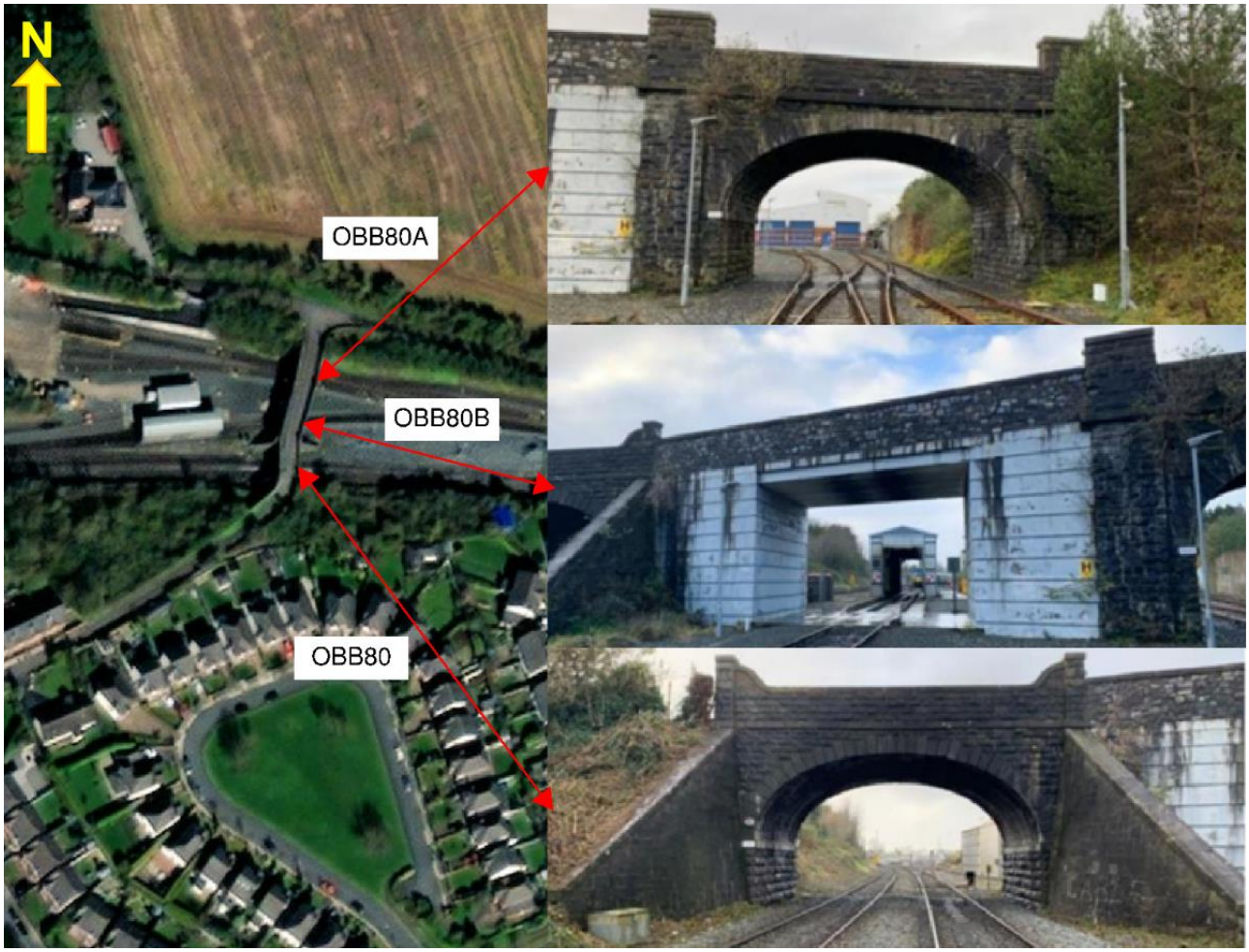



**Figure 5-24 Bridge elevations and locations**

The three bridges at this location create the physical dimensional constraints for the passage of a compliant electrical solution beneath these structures. An assessment of the bridge clearances found that the existing clearance from the rails to the underside of the bridge is insufficient to cater for a compliant electrical solution at OBB80 and OBB80A. A compliant electrical solution is possible at OBB80B, however modifications required to OBB80 and OBB80A may also necessitate modifications to OBB80B.

To determine the Preferred Option, OBB80/80A/80B went through the option selection process as described in Section 4 and is detailed in ***Annex 3.2 E5.***

#### *5.5.6.2 Preferred Option*

To attain the required clearances with respect to the contact wire height, it is proposed that the existing bridge is demolished and rebuilt on the same alignment.

The bridge comprises prestressed concrete beams with a cast in situ deck slab. The precast beams have a maximum depth of 750mm. The beams under the roadway rise slightly towards the centre to create slope for drainage so that the decks maintain a constant thickness throughout. The reinforced concrete deck has a thickness of 200mm and is topped by an asphalt layer of 125mm thickness minimum. The reinforced concrete parapets are integral with the deck.

The beams sit on top of a crosshead beam at each pier in the span, which acts as a temporary landing during the construction stage. The crosshead becomes an integral part of the diaphragm once the deck is poured. Each diaphragm is supported by reinforced concrete columns. The piers are supported on a single row of piles. The abutments comprise an RC walled abutment supported on piles. Wingwalls extend back and tie in with wingwalls on the approach embankments.

The new bridge will retain its previous road width being a shared carriageway for local traffic. Pedestrians and cyclists will be the frequent user of the crossing with vehicles less so.

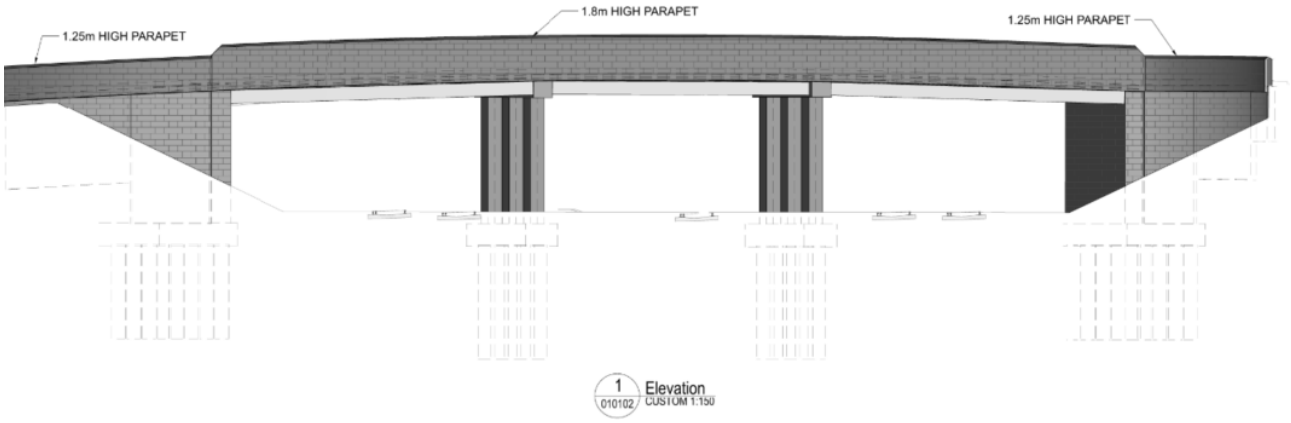



**Figure 5-25: Overbridge OBB80/80A/80B replacement Preferred Option**

For further information refer to ***Annex 3.2: E5.***

#### *5.5.6.3 Construction*

The construction required to replace OB80/80A/80B will inevitably disrupt both highway traffic and railway traffic. The intention will be to mitigate such disruption, whilst also keeping environmental impact to local residents as low as reasonably possible and targeting a cost-effective solution.

Access to the two residential properties on the north side of McGrath's Lane and to the rear station depot entrance will be maintained during the replacement of the bridge, ideally via the new access road to/from the R150.

The proposed construction methodology for the bridge is as follows:

- Phase 1: Demolition. The construction of the bridge first requires the demolition and removal of the three existing spans. This will take place from track level with a suitable protection layer over the tracks, the sequence being established once a closer understanding of the structure has been gained.
- Phase 2: Foundations, piers and abutments. Foundations will be piled from track level, with suitable protection of tracks in place, over a series of daytime track possessions. Once piles have been constructed, pile caps will proceed soon afterwards. Piers and abutments will follow suit, all during possessions due to their proximity to the tracks.
- Phase 3: Deck. The bridge deck will be formed with precast concrete beams, each weighing approximately 20 tonnes. A relatively large mobile crane is planned to be set up over the (protected) tracks, which then lifts each beam off a lorry and into place. The deck would then

have precast planks placed and an insitu concrete deck poured. Parapets would complete the structure.

#### *5.5.6.4 Construction Compound*

For OBB80/80A/80B, a temporary worksite compound is planned to be established alongside the northern verge of the adjacent McGrath's Lane, outside of the current IÉ land ownership boundary. A minor compound (primarily for material storage) may also be required by contractors adjacent to the southern abutment of the bridge, within IÉ lands, albeit on sloping ground and needing some vegetation removal. Construction will be planned with other station works in mind, using possessions as required to minimise disruption to the public.

The nearest road link of strategic importance is the R150 which connects with the M1 in the south via Colpe Road and the R132. Access to the compound for OBB80/80A/80B is envisaged to be via the new road serving a new development off the R150 to the north or a similar road running parallel. This road will be used as access for the two properties East of the railway in the temporary case. There is a clearance under the bridge adjacent to the station (Underbridge UBK1) is 4.78m and hence any traffic needing greater clearance would need to access the site from the M1 in the west via Donore Road and the R132.


**Figure 5-26: Construction compounds in vicinity of OBB80/80A/80B and OBB81 (Source: OSI Aerial Imagery)**

### 5.5.7 Overbridge OBB81 (Drogheda station footbridge)

#### *5.5.7.1 Context*

The pedestrian bridge at Drogheda Station (IÉ reference OBB81) is located within the confines of the station. The bridge provides pedestrian access between Platform 1 and Platforms 2/3 with stairs

and lift access at both ends. The stairs and lift at Platform 2/3 also provide maintenance access to the depot via OBB81C.

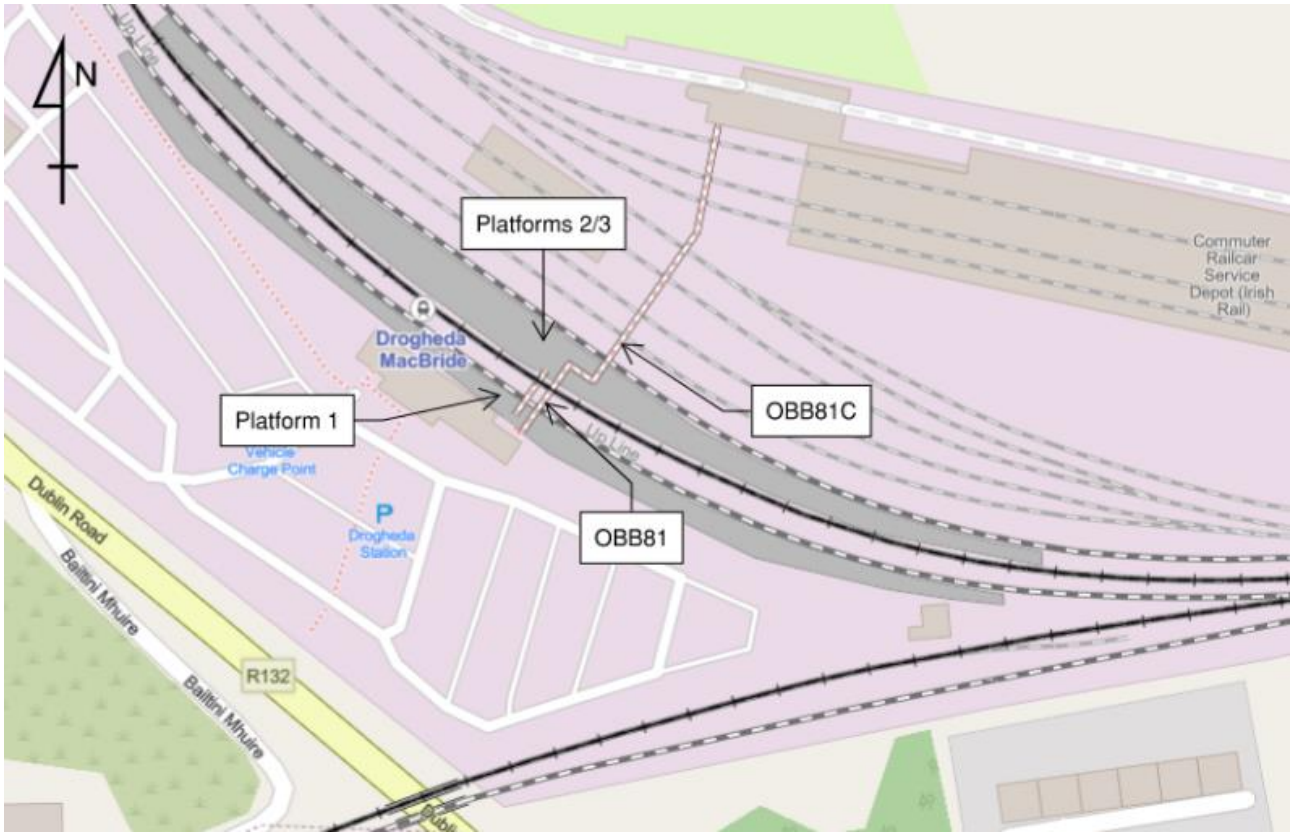



**Figure 5-27 Location of OBB81 at Drogheda MacBride Station**

OBB81 is a 17m single span footbridge crossing over the main line. The superstructure comprises two steel plated girders with a cast-in-situ deck slab between. The girders act as 1.0m high parapets to the walkway over the bridge, with a steel roof canopy supported off the girders. Three transverse bracing members, used to brace the compression flange, contain a horizontal member which projects below the soffit of the deck and encroaches on the rail clearance envelope below.

The bridge is framed either side by a flight of stairs and lift shaft. The steel superstructure is supported on a reinforced concrete and masonry frame at its ends, which also provide the landing for the top of the stairs the lift. The girders appear to be supported directly off the concrete/masonry frame, without the presence of any bearings.

The current bridge was constructed in 1953 replacing an older steel plated structure with a curved soffit (built circa 1855). No remnants of the original structure appear to remain. The existing structure has been modified in recent years, with the girder cut and additional supports provided at its north-eastern end to allow maintenance access to OBB81C.

Drogheda MacBride Station is a Protected Structure (LCC RPS DB-055). The listing notes this railway station retains a great deal of its original fabric and is a well composed architectural set piece.

**Figure 5-28 OBB81 bridge elevation and stairs access from Platform 1**

#### *5.5.7.2 Preferred Option*

From reviewing the options listed in Section 5.5.1 the Preferred Option is replacement of the bridge superstructure with a profiled soffit to provide sufficient clearance for OHLE installation, as it provides a cost-effective solution that minimises disruption to services during construction while also maintaining the visual character of the station. This option provides a minimum vertical clearance of approximately 4.78m allowing for an electrical solution which utilises a contenary solution with zero encumbrance and a contact wire height of 4.400m.

This option is of simple construction and allows the existing substructure to be retained, giving a cost-effective solution that does not require the construction of new bridge foundations. Only minor works are required to the existing stairs, landing and lifts, minimising the impact on the station and disruption to commuters. The heritage value of the station will be maintained, by retaining the existing stairs and providing a structure that is similar in form to the existing.

Refer to ***Annex 3.2 E6*** for further information.

**Figure 5-29: Indicative visualisation of Overbridge OBB81 replacement Preferred Option**

#### *5.5.7.3 Construction Compounds*

For OBB81, the works will likely require lifting operations from the station car park. Construction will be planned with other station works in mind, using possessions as required to minimise disruption to the public. Local, relatively small worksite compounds could be set up if required, within Irish Rail land, or most likely utilising one of the adjacent compounds as shown in the figure below.

The nearest road link of strategic importance is the R150 which connects with the M1 in the south via Colpe Road and the R132. Access to the station car park from the M1 would be from the south via the R132 which connects with the M1 in the south, avoiding routing construction traffic through the centre of Drogheda. The posted vertical clearance to the bridge adjacent to the station (Underbridge UBK1) is 4.87m and hence any traffic needing greater clearance would need to access the site from the M1 in the west via Donore Road and the R132.


**Figure 5-30: Construction compounds in vicinity of OBB80/80A/80B and OBB81 (Source: OSI Aerial Imagery)**

## 5.6 Installation of Traction Power Substations

The OHLE system will be supplied with electrical power from the ESB distribution network at regular intervals, as a result new electrical substations will be required at various locations between Malahide and Drogheda. These substations will receive power at voltages up to 38kV AC and transform this into the required 1500V DC for distribution along the OHLE system. The specific voltage to be adopted will be determined at a later date in consultation with the ESB.

Findings from a power study have indicated that eight new substations will be required between Malahide and Drogheda to provide power to the network. The general locations along the line are as follows:

- Donabate;
- Rush and Lusk;
- Skerries South;
- Skerries North;
- Balbriggan;
- Gormanston;
- Bettystown;
- Drogheda;

The optioneering process for determining the preferred locations at the areas listed above can be found in Sections 5.6.1 to 5.6.8.

The siting of each substation within any general area has considered the following:

- The land-use and development context of potential locations;

- The substations will be located adjacent to the railway line in the form of a fenced compound surrounding a single storey building which will house all the necessary electrical switching and feeding equipment;
- The substations will be connected to the local power distribution network and the OHLE system using insulated cables. These cables will be installed in buried routes for additional protection;
- The substations will need to be accessible from the local road network for construction and maintenance purposes;
- The footprint of each substation compound is estimated to be up to approximately 1,900 sqm and will include the building required to house the electrical equipment for both IÉ and ESB.

While every effort has been made to contain the necessary works, including the provision of eight additional substations, within existing IÉ owned lands, this has not always been possible. Where works are required outside of IÉ lands, engagement with impacted landowners has commenced and will continue through the remainder of the design and statutory processes. Lands required for construction compounds will typically be on a temporary basis while the lands required for the substations will be on a permanent acquisition basis.

Layouts of the substations will be developed as the design progresses, noting requirements from ESB.

Greater detail on this aspect of the project can be found within **Section F of *Annex 3.2***, which including supporting drawings.

Note that construction compounds for any of the substations are all expected to be directly adjacent to the final substation location. Due to their location, some of these compounds may be larger to support line-wide works, as described in Section 5.11.

### 5.6.1 Donabate Substation

From the outputs of the power study, the area under consideration for a substation at Donabate extends from directly south of the overbridge for the R126 to the northern boundary of Donabate station car park (see Figure 5-31).

#### *5.6.1.1 Stage 1: Preliminary Assessment*

Four options, excluding the 'Do-Nothing' option, have been identified for the area. Full details of the initial sifting assessment are included in Section F of *Annex 3.2*. A summary of the findings of the sifting assessment is provided in Table 5-2.

**Table 5-2: Summary of Longlist Sifting for Donabate Substation**

| Option | Screening Result | Summary |
|---|---|---|
| "Do-nothing" | **FAIL** | Fails to provide electrical railway between Malahide and Drogheda<br>Fails to provide adequate number and location of substations |
| Option 1 | **PASS** | Meets project objectives and requirements |
| Option 2 | **PASS** | Meets project objectives and requirements |
| Option 3 | **PASS** | Meets project objectives and requirements |
| Option 4 | **PASS** | Meets project objectives and requirements |

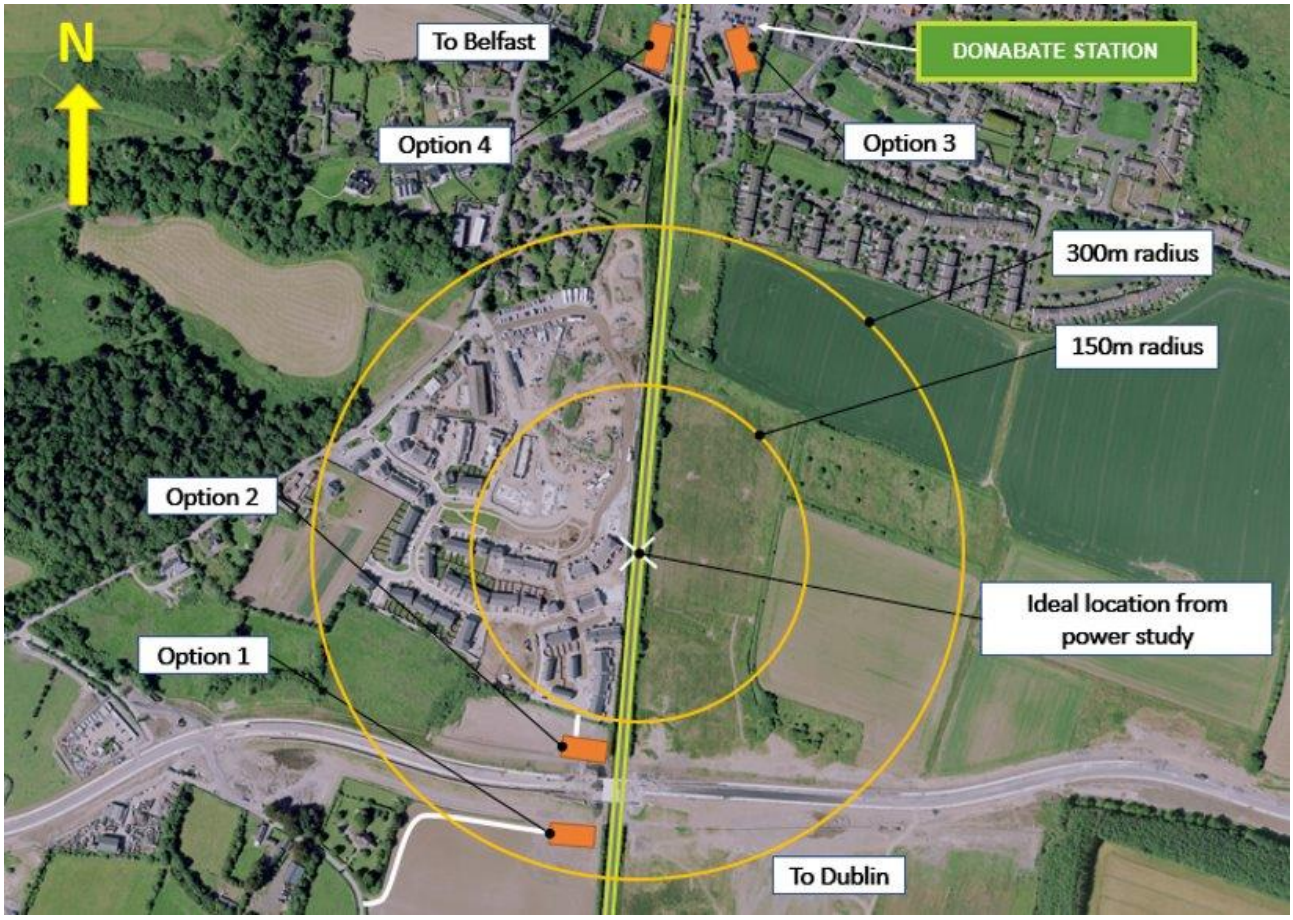



**Figure 5-31: Options considered for Donabate Substation (Source: OSI Aerial Mapping)**

#### *5.6.1.2 Stage 2: MCA*

All four options passed preliminary sifting and were taken forward to MCA. The options are described briefly below:

Option 1 – located on agricultural land south of the R126, west of the railway line. An access road would be required from the lane south-west of the proposed location.

Option 2 – located on agricultural land north of the R126, west of the railway line. An access road would be required from the housing development direction north of the site.

Option 3 – located on a grassed area at the entrance to the station car park, east of the railway line, located on IÉ owned land.

Option 4 – located on undeveloped land west of the station. It is envisaged access would be provided through the station west car park.

The summary findings of the MCA are contained in Table 5-3 below.

**Table 5-3: Overall criteria MCA summary table for Donabate Substation**

| Criteria Summary | Option 1 | Option 2 | Option 3 | Option 4 |
|---|---|---|---|---|
| Economy | | | | |
| Safety | | | | |
| Environment | | | | |
| Accessibility & Social Inclusion | | | | |
| Integration | | | | |
| Physical Activity | | | | |

**Table 5-4: Legend for MCA Summary Table**

| |
|---|
| Significant comparative advantage over other options |
| Some comparative advantage over other options |
| Comparable to other options / neutral |
| Some comparative disadvantage over other options |
| Significant comparative disadvantage over other options |

Option 1 has been identified as the Preferred Option. The basis for the selection of option 1 is as follows:

In terms of Economy, Safety, Accessibility & Social Inclusion, and Physical Activity, all options are comparable.

In terms of Environment, options were comparable with regard to Water Resources and Air Quality & Climate Change. Option 1 had significant advantages in respect of Landscape and Visual Impact, Noise and Vibration and Archaeology, Architectural and Cultural Heritage. Option 4 had significant advantage in respect of Agricultural and Biodiversity.

For Integration Option 2 had significant comparative advantage as it is zoned for Residential as opposed to High Amenity (option 1) and Town Centre (options 3 and 4). Options 1 and 2 had advantage over Options 3 and 4 for transport integration since Options 3 and 4 impacted existing parking was well as pedestrians and cyclists at the station.

#### *5.6.1.3 Preferred Option*

The Preferred Option for Donabate Substation is to locate it within agricultural land south of the R126, west of the railway line. An access road will be required from the lane south-west of the proposed location. The area is currently outside of the IÉ land ownership boundary and hence property rights will be affected by the permanent works and permanent land acquisition will be required.

### 5.6.2 Rush and Lusk Substation

From the outputs of the power study, the area under consideration for a substation at Rush and Lusk extends from the southern boundary of Rush and Lusk station car park to agricultural land directly adjacent to R128 Station Rd.

#### *5.6.2.1 Stage 1: Preliminary Assessment*

Three options, excluding the 'Do-Nothing' option, have been identified for the area. Full details of the initial sifting assessment are included in Section F of Annex 3.2. A summary of the findings of the sifting assessment is provided in Table 5-5.

**Table 5-5: Summary of Longlist Sifting for Rush and Lusk Substation**

| Option | Screening Result | Summary |
|---|---|---|
| "Do-Nothing" | **FAIL** | Fails to provide electrified railway between Malahide and Drogheda<br>Fails to provide adequate number and location of substations |
| Option 1 | **PASS** | Meets project objectives and requirements |
| Option 2 | **PASS** | Meets project objectives and requirements |
| Option 3 | **PASS** | Meets project objectives and requirements |

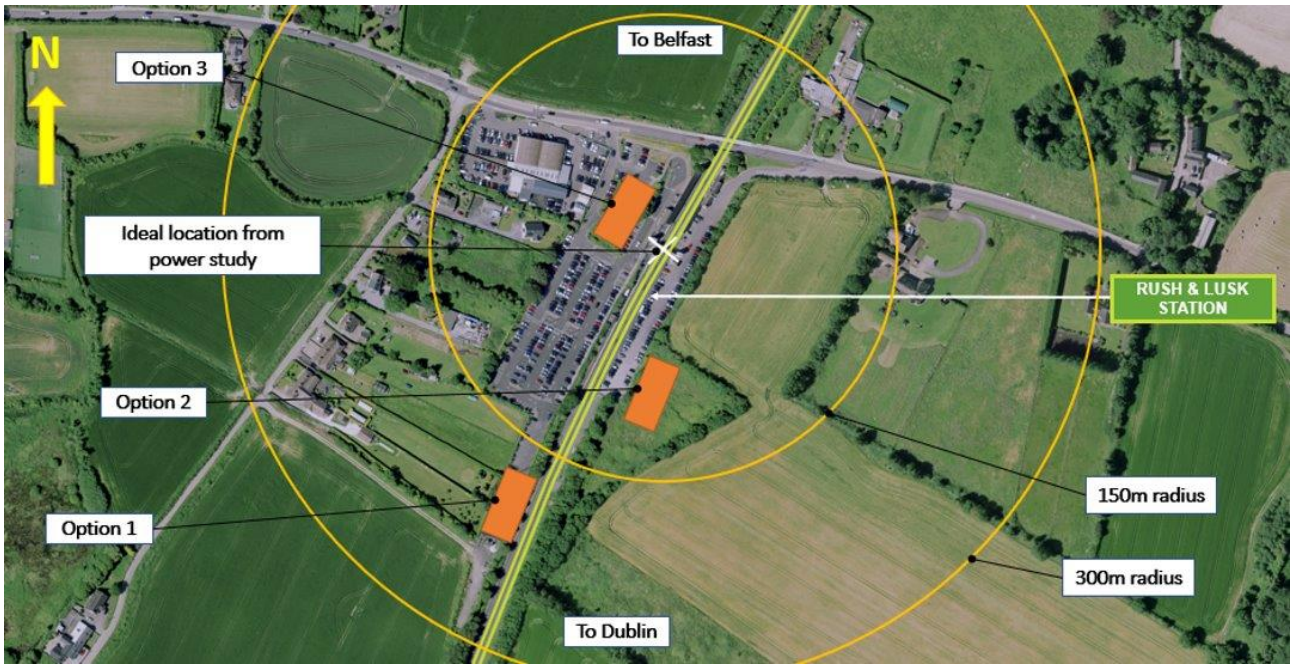



**Figure 5-32: Options considered for Rush and Lusk Substation (Source: OSI Aerial Mapping)**

#### *5.6.2.2 Stage 2: MCA*

All three options passed preliminary sifting and were taken forward to MCA. The options are described briefly below:

- Option 1 – located within the southern boundary of the station car park, west of the railway line, on IÉ owned land
- Option 2 – located adjacent to the station car park, east of the railway line, on IÉ owned land
- Option 3 – located within the station car park, which is closest to Station Road, west of the railway line. It is envisaged that access would be provided through the station car park

The summary findings of the MCA are contained in Table 5-6 below.

**Table 5-6: Overall criteria MCA summary table for Rush and Lusk Substation**

| Criteria Summary | Option 1 | Option 2 | Option 3 |
|---|---|---|---|
| Economy | | | |
| Safety | | | |
| Environment | | | |
| Accessibility & Social Inclusion | | | |
| Integration | | | |
| Physical Activity | | | |

**Table 5-7: Legend for MCA Summary Table**

| |
|---|
| Significant comparative advantage over other options |
| Some comparative advantage over other options |
| Comparable to other options / neutral |
| Some comparative disadvantage over other options |
| Significant comparative disadvantage over other options |

Option 2 has been identified as the Preferred Option. The basis for the selection of option 2 is as follows:

In terms of Safety, Accessibility & Social Inclusion and Physical Activity, all options are comparable.

In terms of Economy, Option 2 has advantage over the other options as it does not impact on the car park in the same way as other options, which impacts traffic functionality and associated economic activities and opportunities.

In terms of Environment, Option 2 has some disadvantage as it has greater biodiversity impact due to vegetation removal.

In terms of Integration, Option 2 has advantage over the other options as it does not impact the long-term parking provision at the station in a similar manner to the other options.

#### *5.6.2.3 Preferred Option*

The Preferred Option for Rush and Lusk Substation is to locate it adjacent to the station car park, east of the railway line, on IÉ owned land. No property rights are expected to be affected by the permanent works.

### 5.6.3 Skerries South Substation

From the outputs of the power study, the area under consideration for a substation at Skerries South extends from agricultural land east of the southern boundary of Skerries Golf Club to agricultural land directly north of the overbridge for Golf Links Rd.

#### *5.6.3.1 Stage 1: Preliminary Assessment*

Three options, excluding the 'Do-Nothing' option, have been identified for the area. Full details of the initial sifting assessment are included in Section F of *Annex 3.2*. A summary of the findings of the sifting assessment is provided in Table 5-8.

**Table 5-8: Summary of Longlist Sifting for Skerries South Substation**

| Option | Screening Result | Summary |
|---|---|---|
| "Do-Nothing" | FAIL | Fails to provide electrified railway between Malahide and Drogheda<br>Fails to provide adequate number and location of substations |
| Option 1 | PASS | Meets project objectives and requirements |
| Option 2 | PASS | Meets project objectives and requirements |
| Option 3 | PASS | Meets project objectives and requirements |

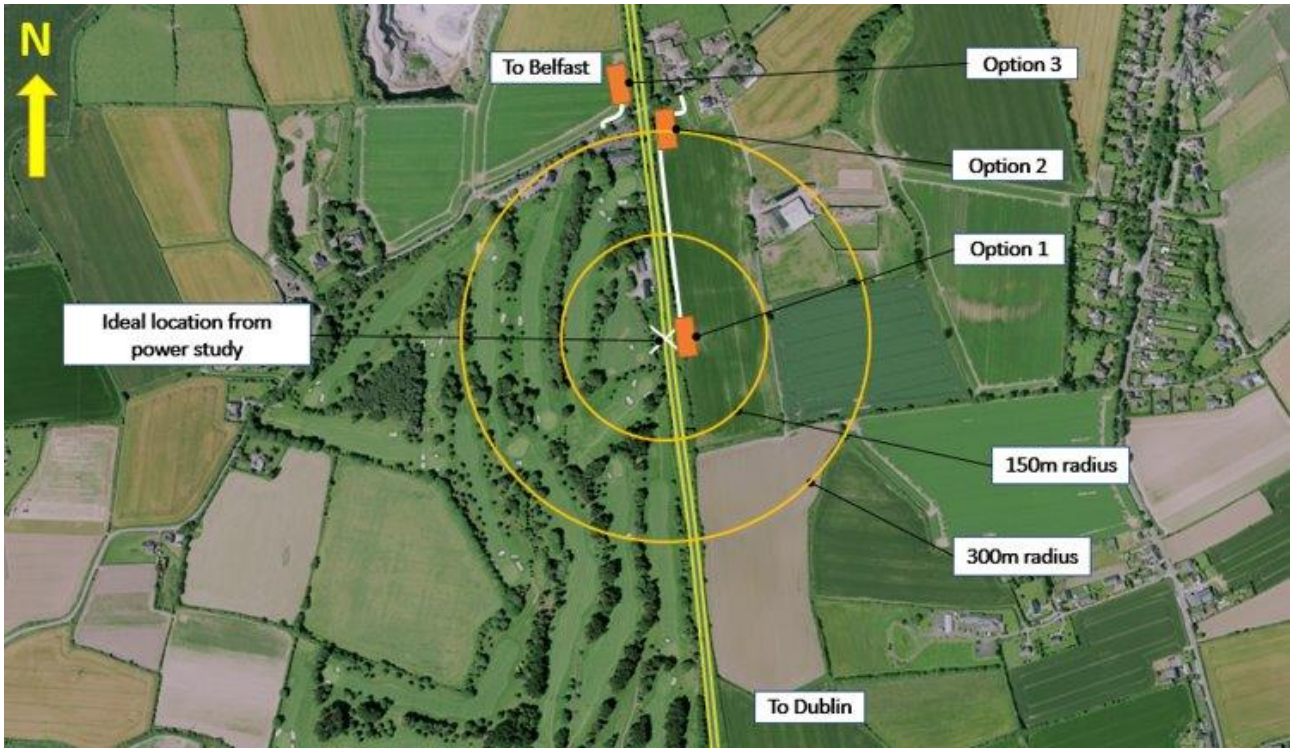



**Figure 5-33: Options considered for Skerries South Substation (Source: OSI Aerial Mapping)**

#### *5.6.3.2 Stage 2: MCA*

All three options passed preliminary sifting and were taken forward to MCA. The options are described briefly below:

Option 1 – located on agricultural land, east of the railway and approx. 325m south of Golf Links Rd. An access road would be required from Golf Links Rd, parallel to the railway corridor along the boundary of the field.

Option 2 – located on agricultural land, east of the railway and directly south of Golf Links Rd. It is envisaged that access would be provided directly from Golf Links Rd.

Option 3 – located on agricultural land, west of the railway and directly north of Golf Links Rd. It is envisaged that access would be provided directly from Golf Links Rd.

The summary findings of the MCA are contained in Table 5-9 below.

**Table 5-9: Overall criteria MCA summary table for Skerries South Substation**

| Criteria Summary | Option 1 | Option 2 | Option 3 |
|---|---|---|---|
| Economy | | | |
| Safety | | | |
| Environment | | | |
| Accessibility & Social Inclusion | | | |
| Integration | | | |
| Physical Activity | | | |

**Table 5-10: Legend for MCA Summary Table**

| |
|---|
| Significant comparative advantage over other options |
| Some comparative advantage over other options |
| Comparable to other options / neutral |
| Some comparative disadvantage over other options |
| Significant comparative disadvantage over other options |

Option 2 has been identified as the Preferred Option. The basis for the selection of option 2 is as follows:

In terms of Safety, Accessibility & Social Inclusion, Integration, and Physical Activity, all options are comparable.

In terms of Economy, Options 1 and 2 have comparative advantage as Option 3 would require large excavations along with the construction of retaining walls.

In terms of Environment, Options 2 and 3 have comparative advantage primarily as Option 1 requires a longer access road which has an associated increased environmental impact.

#### *5.6.3.3 Preferred Option*

The Preferred Option for Skerries South Substation is to locate it on agricultural land, east of the railway and directly south of Golf Links Rd. It is envisaged that access would be provided directly from Golf Links Rd. The area is currently outside of the IÉ land ownership boundary and hence property rights will be affected by the permanent works and permanent land acquisition will be required.

### 5.6.4 Skerries North Substation

From the outputs of the power study, the area under consideration for a substation at Skerries North extends from agricultural land 250m southeast of Barnageeragh Bay Steps to woodland on the south-eastern tip of Argillan Castle land.

#### *5.6.4.1 Stage 1: Preliminary Assessment*

Four options, excluding the 'Do-Nothing' option, have been identified for the area. Full details of the initial sifting assessment are included in Section F of *Annex 3.2.* A summary of the findings of the sifting assessment is provided in Table 5-11.

**Table 5-11: Summary of Longlist Sifting for Skerries North Substation**

| Option | Screening Result | Summary |
|---|---|---|
| "Do-Nothing" | **FAIL** | Fails to provide electrified railway between Malahide and Drogheda<br>Fails to provide adequate number and location of substations |
| Option 1 | **PASS** | Meets project objectives and requirements |
| Option 2 | **FAIL** | Fails to consider built environment and landowners by requiring routing of substation power cables under road and private garden |
| Option 3 | **FAIL** | Fails to consider adverse impact on built environment and landowners by building within historic castle grounds |
| Option 4 | **PASS** | Meets project objectives and requirements |


**Figure 5-34: Options considered for Skerries North Substation (Source: OSI Aerial Mapping**

#### *5.6.4.2 Stage 2: MCA*

Two options passed preliminary sifting and were taken forward to MCA. They are described briefly below:

Option 1 – located on scrubland opposite the top of Barnageeragh Bay Steps, east of the railway. An access road would be required from the Hamilton Hill residential development as direct access to the R127 is precluded by the surrounding topography.

Option 4 – located on agricultural land 250m southeast of Barnageeragh Bay Steps, west of the railway. The substation is positioned close to the railway corridor, permanently blocking the current access road to the farmland directly south of the proposed substation. An access road would be required from Barnageeragh Rd to allow access to the farmland south to be maintained.

The summary findings of the MCA are contained in Table 5-12 below.

**Table 5-12: Overall criteria MCA summary table for Skerries North Substation**

| Criteria Summary | Option 1 | Option 4 |
|---|---|---|
| Economy | | |
| Safety | | |
| Environment | | |
| Accessibility & Social Inclusion | | |
| Integration | | |
| Physical Activity | | |

**Table 5-13: Legend for MCA Summary Table**

| |
|---|
| Significant comparative advantage over other options |
| Some comparative advantage over other options |
| Comparable to other options / neutral |
| Some comparative disadvantage over other options |
| Significant comparative disadvantage over other options |

Option 4 has been identified as the Preferred Option. The basis for the selection of Option 4 is as follows:

In terms of Safety, Environment, Accessibility & Social Inclusion, Integration, and Physical Activity, all options are comparable.

In terms of Economy, Option 4 has comparative advantage as it would be cheaper to construct and maintain due to the level land on which it is proposed to be constructed, compared to the changing levels at the side of Option 1 which would require earth retaining structures.

#### *5.6.4.3 Preferred Option*

The Preferred Option for Skerries North Substation is to locate it on agricultural land 250m southeast of Barnageeragh Bay Steps, west of the railway. The substation is positioned close to the railway corridor, blocking the current access road to the farmland directly south of the proposed substation. An access road will be required from Barnageeragh Rd to allow access to the farmland south to be maintained. The area is currently outside of the IÉ land ownership boundary and hence property rights will be affected by the permanent works and permanent land acquisition will be required.

### 5.6.5 Balbriggan Substation

From the outputs of the power study, the area under consideration for a substation at Balbriggan extends from grassland directly north of O'Dwyers GAA pitches to directly south of the overbridge (OBB62) serving agricultural land.

#### *5.6.5.1 Stage 1: Preliminary Assessment*

Three options, excluding the 'Do-Nothing' option, have been identified for the area. Full details of the initial sifting assessment are included in Section F of *Annex 3.2*. A summary of the findings of the sifting assessment is provided in Table 5-14.

**Table 5-14: Summary of Longlist Sifting for Balbriggan Substation**

| Option | Screening Result | Summary |
|---|---|---|
| "Do-Nothing" | **FAIL** | Fails to provide electrified railway between Malahide and Drogheda<br>Fails to provide adequate number and location of substations |
| Option 1 | **PASS** | Meets project objectives and requirements |
| Option 2 | **PASS** | Meets project objectives and requirements |
| Option 3 | **PASS** | Meets project objectives and requirements |

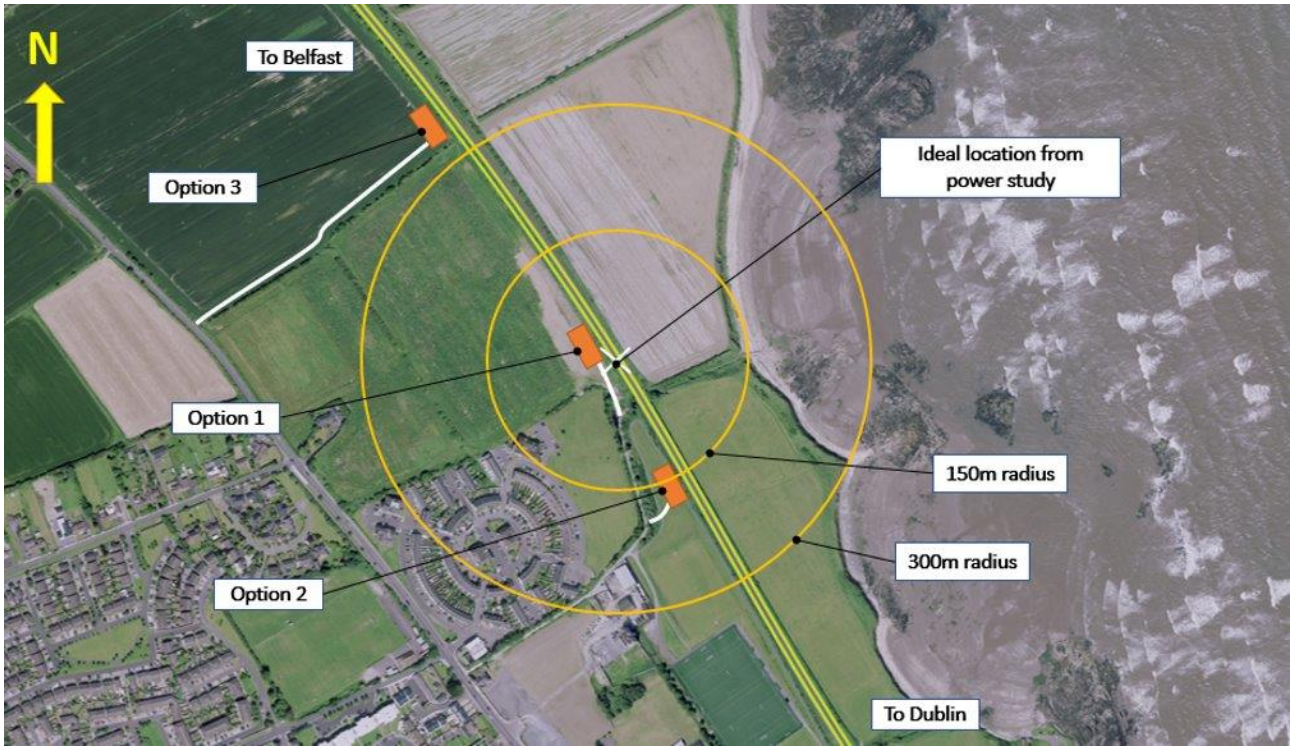



**Figure 5-35: Options considered for Balbriggan Substation (Source: OSI Aerial Mapping)**

#### *5.6.5.2 Stage 2: MCA*

All three options passed preliminary sifting and were taken forward to MCA. The options are described briefly below:

Option 1 – located on scrubland directly north of the underbridge serving Bremore Bay Beach, west of the railway, identified as part of the future Bremore Regional Park.

Option 2 – located on grassed parkland directly south of the underbridge serving Bremore Bay Beach, west of the railway, identified as part of the future Bremore Regional Park.

Option 3 – located on agricultural land 350m north of the aforementioned underbridge, west of the railway. An access road would be required from the R132, running along the boundary of the existing fields.

The summary findings of the MCA are contained in Table 5-15 below.

**Table 5-15: Overall criteria MCA summary table for Balbriggan Substation**

| Criteria Summary | Option 1 | Option 2 | Option 3 |
|---|---|---|---|
| Economy | | | |
| Safety | | | |
| Environment | | | |
| Accessibility & Social Inclusion | | | |
| Integration | | | |
| Physical Activity | | | |

**Table 5-16: Legend for MCA Summary Table**

| |
|---|
| Significant comparative advantage over other options |
| Some comparative advantage over other options |
| Comparable to other options / neutral |
| Some comparative disadvantage over other options |
| Significant comparative disadvantage over other options |

Option 3 has been identified as the Preferred Option. The basis for the selection of Option 3 is as follows:

In terms of Accessibility & Social Inclusion and Physical Activity, all options are comparable.

In terms of Economy, Options 1 and 2 have some comparative advantage as the length of access road and new highway connection in option 3 have greater associated capital cost.

For Safety, Option 3 has comparative advantage as maintenance is segregated from public areas associated with Bremore Regional Park.

For Environment, Options 2 and 3 have comparative advantage since Option 2 has significant comparative advantages from the perspective of Geology and Soils and Agricultural while Option 3 has significant comparative advantages from Landscape and Visual Quality, Noise and Vibration and Archaeology, Architectural and Cultural Heritage perspectives.

In terms of Integration, Option 3 has comparative advantage from a land use perspective as Options 1 and 2 are within an area which has statutory approval for development as a recreational park.

#### *5.6.5.3 Preferred Option*

The Preferred Option for Balbriggan Substation is to locate it on agricultural land 350m north of the underbridge serving Bremore Bay Beach, west of the railway. An access road will be required from the R132, running along the boundary of the existing fields. The area is currently outside of the IÉ land ownership boundary and hence property rights will be affected by the permanent works and permanent land acquisition will be required.

### 5.6.6 Gormanston Substation

From the outputs of the power study, the area under consideration for a substation at Gormanston extends from 150m north of the disused runway to the overbridge to the north.

#### *5.6.6.1 Stage 1: Preliminary Assessment*

Four options, excluding the 'Do-Nothing' option, have been identified for the area. Full details of the initial sifting assessment are included in Section F of *Annex 3.2*. A summary of the findings of the sifting assessment is provided in Table 5-17.

**Table 5-17: Summary of Longlist Sifting for Gormanston Substation**

| Option | Screening Result | Summary |
|---|---|---|
| "Do-Nothing" | **FAIL** | Fails to provide electrified railway between Malahide and Drogheda |

| | | |
|---|---|---|
| | | Fails to provide adequate number and location of substations |
| Option 1 | **PASS** | Meets project objectives and requirements |
| Option 2 | **PASS** | Meets project objectives and requirements |
| Option 3 | **PASS** | Meets project objectives and requirements |
| Option 4 | **PASS** | Meets project objectives and requirements |

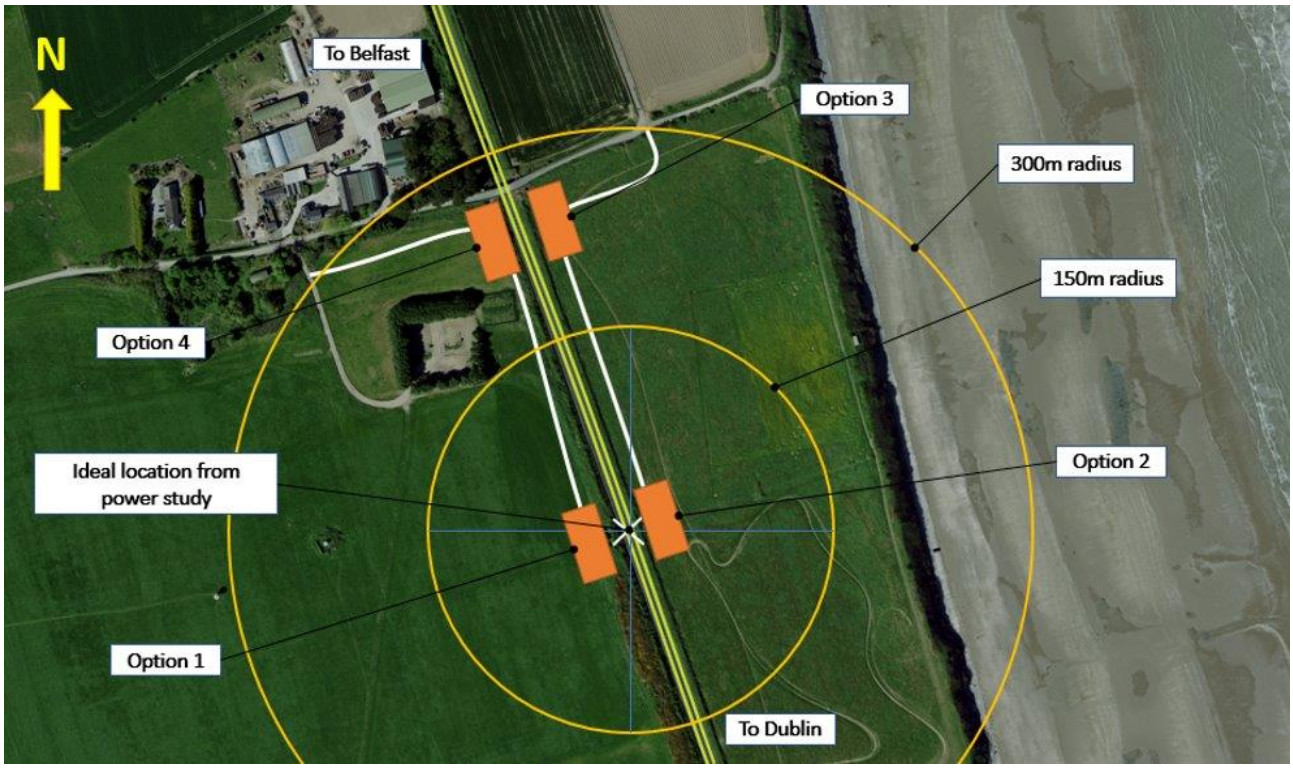



**Figure 5-36: Options considered for Gormanston Substation (Source: OSI Aerial Mapping)**

#### *5.6.6.2 Stage 2: MCA*

All four options passed preliminary sifting and were taken forward to MCA. The options are described briefly below:

Option 1 – located on grassland within Gormanston Camp, 150m north of the disused runway, west of the railway. An access road would be required around the perimeter of the camp to the adjacent lane.

Option 2 – located on grassland, 150m north of the disused runway, east of the railway. An access road would be required parallel to the railway boundary and up to the adjacent lane.

Option 3 – located on grassland directly south of the overbridge, east of the railway.

Option 4 – located on grassland directly south of the overbridge, west of the railway. A short access road would be required perpendicular to the tracks due to topological constraints for the overbridge access ramps.

The summary findings of the MCA are contained in Table 5-18 below.

**Table 5-18: Overall criteria MCA summary table for Gormanston Substation**

| Criteria Summary | Option 1 | Option 2 | Option 3 | Option 4 |
|---|---|---|---|---|
| Economy | | | | |
| Safety | | | | |
| Environment | | | | |
| Accessibility & Social Inclusion | | | | |
| Integration | | | | |
| Physical Activity | | | | |

**Table 5-19: Legend for MCA Summary Table**

| |
|---|
| Significant comparative advantage over other options |
| Some comparative advantage over other options |
| Comparable to other options / neutral |
| Some comparative disadvantage over other options |
| Significant comparative disadvantage over other options |

Option 4 has been identified as the Preferred Option. The basis for the selection of option 4 is as follows:

In terms of Economy, Environment, Accessibility & Social Inclusion and Physical Activity, all options are comparable.

In terms of Safety, Options 1 and 4 have significant comparative advantage as Options 2 and 3 have associated risk due to nearby firing ranges.

In terms of Integration, Option 4 has significant comparative advantage regarding land use integration as it is understood to have the least impact on military operations and assets following discussions with the Defence forces.

#### *5.6.6.3 Preferred Option*

The Preferred Option for Gormanston Substation is to locate it on grassland directly south of the overbridge, west of the railway. A short access road would be required perpendicular to the tracks due to topological constraints for the overbridge access ramps. The area is currently outside of the IÉ land ownership boundary and hence property rights will be affected by the permanent works and permanent land acquisition will be required.

### 5.6.7 Bettystown Substation

From the outputs of the power study, the area under consideration for a substation at Bettystown extends from agricultural land south of Ardmore Ave to woodland west of Ardmore Lane.

#### *5.6.7.1 Stage 1: Preliminary Assessment*

Five options, excluding the 'Do-Nothing' option, have been identified for the area. Full details of the initial sifting assessment are included in Section F *Traction Power Study* of *Annex 3.2 Electrification of the Northern Line between Malahide and Drogheda*. A summary of the findings of the sifting assessment is provided in Table 5-20.

**Table 5-20: Summary of Longlist Sifting for Bettystown Substation**

| Option | Screening Result | Summary |
|---|---|---|
| "Do-Nothing" | **FAIL** | Fails to provide electrified railway between Malahide and Drogheda<br>Fails to provide adequate number and location of substations |
| Option 1 | **PASS** | Meets project objectives and requirements |
| Option 2 | **PASS** | Meets project objectives and requirements |
| Option 3 | **PASS** | Meets project objectives and requirements |
| Option 4 | **PASS** | Meets project objectives and requirements |
| Option 5 | **PASS** | Meets project objectives and requirements |


**Figure 5-37: Options considered for Bettystown Substation (Source: OSI Aerial Mapping)**

#### *5.6.7.2 Stage 2: MCA*

All five options passed preliminary sifting and were taken forward to MCA. The options are described briefly below:

Option 1 – located on agricultural land south of Ardmore Avenue, east of the railway. An access road would be required from the corner of Ardmore Avenue and around the perimeter of the field. The access road crosses a drainage ditch/stream.

Option 2 – located on agricultural land southwest of Ardmore Avenue, west of the railway. An access road would be required from Minnistown Road, running along the perimeter of two fields, over approximately 600m.

Option 3 – located on scrubland adjacent to Ardmore Avenue. It is envisaged that it could be directly accessed from the existing road with a small section of new access road required.

Option 4 – located on agricultural land south of Ardmore Avenue, west of the railway. An access road would be required from Minnistown Road, running along the perimeter of two fields, over approximately 600m. The access road crosses a drainage ditch/stream.

Option 5 – located on Irish Rail owned land adjacent to the junction between Ardmore Lane and Narroways Road, east of the railway. An access road would be required from the substation to the junction.

The summary findings of the MCA are contained in Table 5-21 below.

**Table 5-21: Overall criteria MCA summary table for Bettystown Substation**

| Criteria Summary | Option 1 | Option 2 | Option 3 | Option 4 | Option 5 |
|---|---|---|---|---|---|
| Economy | | | | | |
| Safety | | | | | |
| Environment | | | | | |
| Accessibility & Social Inclusion | | | | | |
| Integration | | | | | |
| Physical Activity | | | | | |

**Table 5-22: Legend for MCA Summary Table**

| |
|---|
| Significant comparative advantage over other options |
| Some comparative advantage over other options |
| Comparable to other options / neutral |
| Some comparative disadvantage over other options |
| Significant comparative disadvantage over other options |

Option 3 has been identified as the Preferred Option. The basis for the selection of option 3 is as follows:

In terms of Safety, Accessibility & Social Inclusion, Integration and Physical Activity, all options are comparable.

In terms of Economy, Options 1, 3 and 5 have some comparative advantage due to the significantly shorter access roads.

In terms of Environment, Option 3 has some comparative advantage due to being able to be screened from residential properties, having less impact on water resources, have no impact to agricultural land, and having a geology and soils advantage due to the shorter access road.

#### *5.6.7.3 Preferred Option*

The Preferred Option for Bettystown Substation is to locate it on scrubland adjacent to Ardmore Avenue. It is envisaged that it could be directly accessed from the existing road with a small section of access road. The area is currently outside of the IÉ land ownership boundary and hence property rights will be affected by the permanent works and permanent land acquisition will be required. The interface with long-term station proposals in this area will need to be considered (not part of DART+ Coastal North), along with interfacing with proposed adjacent development.

### 5.6.8 Drogheda Substation

From the outputs of the power study, the area under consideration for a substation at Drogheda extends from the end of McGrath's Lane to the Marsh Road Pay & Display car park.

#### *5.6.8.1 Stage 1: Preliminary Assessment*

Nine options, excluding the 'Do-Nothing' option, have been identified for the area. Full details of the initial sifting assessment are included in Section F of *Annex 3.2*. A summary of the findings of the sifting assessment is provided in Table 5-23.

**Table 5-23: Summary of Longlist Sifting for Drogheda Substation**

| Option | Screening Result | Summary |
|---|---|---|
| "Do-Nothing" | **FAIL** | Fails to provide adequate number and location of substations<br>Fails to provide electrified railway between Malahide and Drogheda |
| Option 1 | **PASS** | Meets project objectives and requirements |
| Option 2 | **FAIL** | Unsuitable impacts on maintenance operations. |
| Option 3 | **PASS** | Meets project objectives and requirements |
| Option 4 | **FAIL** | Unsuitable topography does not consider adverse impact on natural and built environment and disruption due to significant works required |
| Option 5 | **FAIL** | Unsuitable topography does not consider adverse impact on natural and built environment and disruption due to significant works required |
| Option 6 | **PASS** | Meets project objectives and requirements |
| Option 7 | **PASS** | Meets project objectives and requirements |
| Option 8 | **PASS** | Meets project objectives and requirements |
| Option 9 | **PASS** | Meets project objectives and requirements |

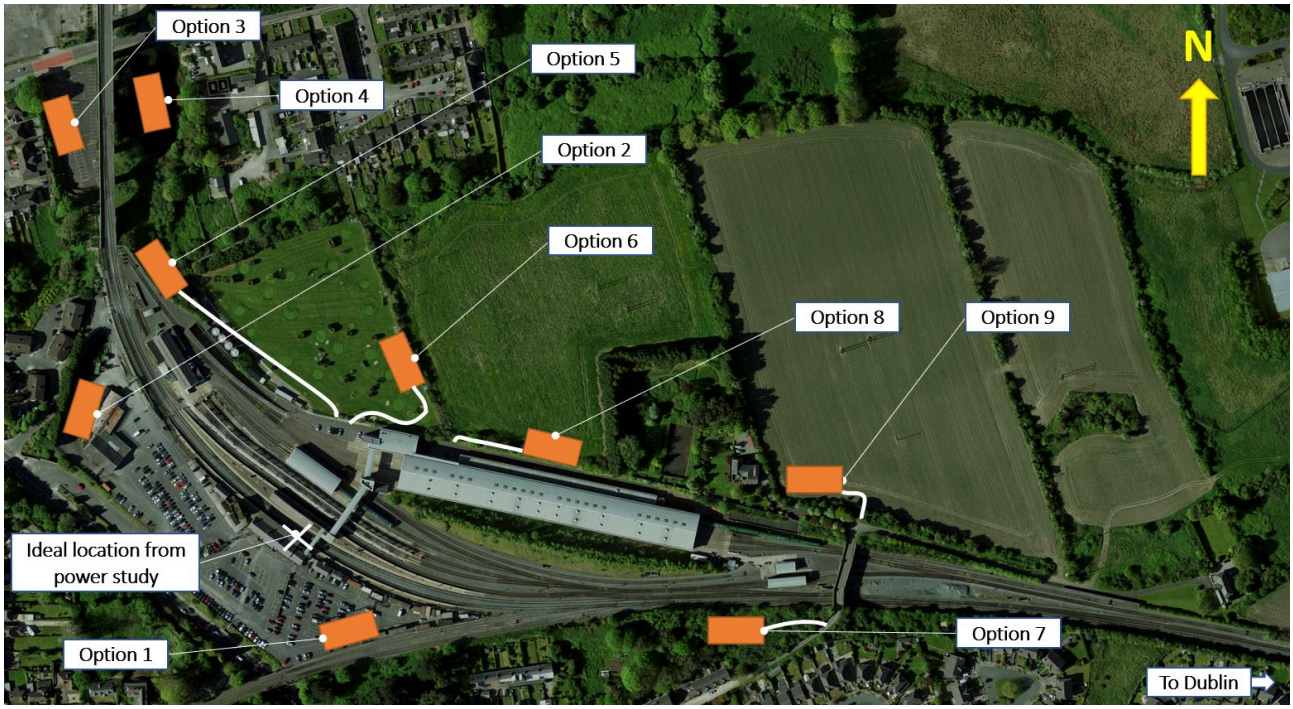



**Figure 5-38: Options considered for Drogheda Substation (Source: OSI Aerial Mapping)**

#### *5.6.8.2 Stage 2: MCA*

Six options passed preliminary sifting and were taken forward to MCA. The options are described briefly below:

Option 1 – located on the southern boundary of the station car park.

Option 3 – located on hardstanding for a current construction storage area and ancillary buildings within the station car park. This would require demolition of the existing corrugated steel building.

Option 6 – located on grassland currently used by the McBride Pitch and Putt Club, north of the depot confines. A short access road would be required from the current depot boundary.

Option 7 – located on vegetated land located between the railway corridor and McGrath's Lane, just south of the railway bridge. This area is heavily vegetated and likely on a sloping gradient.

Option 8 – located on agricultural land, north of the depot train shed. A short access road would be required from the current depot boundary. Access would be created through the existing reinforced concrete wall, rather than through the gabion wall, with additional sections of reinforced concrete wall constructed to the rear when in cutting.

Option 9 – located on agricultural land north of the end of McGrath's Lane, north of the railway. It is envisaged access would be provided from McGrath's Lane, directly opposite the railway bridge.

The summary findings of the MCA are contained in Table 5-24 below.

**Table 5-24: Overall criteria MCA summary table for Drogheda Substation**

| Criteria Summary | Option 1 | Option 3 | Option 6 | Option 7 | Option 8 | Option 9 |
|---|---|---|---|---|---|---|
| Economy | | | | | | |
| Safety | | | | | | |
| Environment | | | | | | |
| Accessibility & Social Inclusion | | | | | | |
| Integration | | | | | | |
| Physical Activity | | | | | | |

**Table 5-25: Legend for MCA Summary Table**

| |
|---|
| Significant comparative advantage over other options |
| Some comparative advantage over other options |
| Comparable to other options / neutral |
| Some comparative disadvantage over other options |
| Significant comparative disadvantage over other options |

Option 8 has been identified as the Preferred Option. The basis for the selection of Option 8 is as follows:

In terms of Safety, Accessibility & Social Inclusion and Physical Activity, all options are comparable.

In terms of Economy, Options 6, 8 and 9 have some comparative advantage since Option 7 would have cost associated with new ESB supplies needing to cross the line, and Options 1 and 3 impact the existing parking provision, pedestrians and cyclists (thus affecting traffic functionality and associated economic activities and opportunities).

In terms of Environment, Options 1 and 8 have significant comparative advantage. Option 1 has significant advantages from a biodiversity and water resources point of view and Option 8 has similar from a landscape and visual quality, noise and vibration and water resources perspective.

For integration, Options 6, 8 and 9 have some comparative advantage since Option 7 has the land use disadvantage as being the only option not zoned as Transportation Development Hub, while Options 1 and 3 result in the loss of station parking, having a transport integration disbenefit.

#### *5.6.8.3 Preferred Option*

The Preferred Option for Drogheda Substation is to locate it on agricultural land, north of the depot train shed. A short access road would be required from the current depot boundary. Access would be created through the existing reinforced concrete wall, rather than through the gabion wall, with additional sections of reinforced concrete wall constructed to the rear when in cutting. The area is currently outside of the IÉ land ownership boundary and hence property rights will be affected by the permanent works and permanent land acquisition will be required.

## 5.7 Works to the existing user worked level crossing south of Donabate

This section provides an outline of the assessment undertaken for the existing level crossing south of Donabate.

The existing user worked level crossing is located close to the Malahide Estuary south of Donabate (level crossing reference number XB001), connecting farmlands either side of the railway. Intervention at the current crossing is required due to an increase in risk from the electrification of the railway line as well as the increased frequency of trains.

Aerial views indicating the location of the level crossing and associated structures are provided in Figure 5-39 and Figure 5-40.

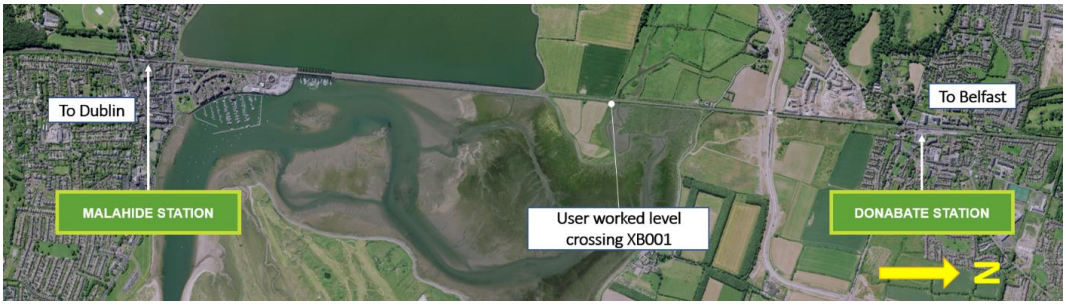



**Figure 5-39: Location of user worked level crossing in relation to Malahide and Donabate Station (Source: OSI aerial mapping)**


**Figure 5-40: Location of user worked level crossing (Source: OSI aerial mapping)**

The Preferred Option is to close the level crossing and purchase the land east of the railway such that third party access requirements are removed. Consideration would need to be given as to the access method for maintenance activities in the field/to the estuary shoreline. The option also

presents the opportunity to improve biodiversity/ecological value of the area of land in question, which is currently designated as farmland.

It is proposed to remove the existing gates at the level crossing and replace them with a permanent fence. The existing rubber mats across the tracks will be removed and replaced with ballast. Any level crossing signage, trackside for the benefit of the train drivers on the approach to the crossing will be removed. New signage will be installed on the field side, at the location of the former gates, informing that the level crossing is now permanently closed. Works will be either offline or during non-disruptive possessions.

Based on the level of information and design available at this time for Public Consultation No. 2, the extent of permanent works that may potentially interfere with property rights relate to:

- The circa 5 to 5.5ha area of severed farmland projecting into the estuary, east of the crossing

Refer to ***Section G of Annex 3.2*** for more detailed information.

## 5.8 Modifications to existing railway fencing and installation of new railway fencing

Necessary safety improvement works will be required to railway fencing where OHLE is to be introduced. Similar to bridge parapet works, reasonable steps will be taken to prevent people from accidentally or otherwise falling onto or making contact with the OHLE. This will comprise assessment of the level of trespass prevention provided along the route and subsequent proposal of new fencing/fencing improvements. The installation of fencing shall consider the urban or rural nature of the setting and mitigate adverse environmental, heritage and visual impacts in so far as is reasonably practicable.

For urban areas:

- For those areas with a perceived high risk of trespass, a security purpose (SP) steel palisade fence or paladin fence will be installed.
- Where risk of trespass is lower and the fencing is required only as either a boundary marker or to deter a casual intruder, an open mesh steel panel for general purposes shall be installed.

For rural areas:

- The type of fence has been determined following an environmental assessment and a safety risk assessment that considered the settings in which the fence will pass through.

Since PC1, assessments have been undertaken along the railway corridor of the existing fencing and the proposed OHLE infrastructure for compliance against standards. The fencing has also been assessed using a risk assessment methodology to identify where the risks imposed by the proposed OHLE require fencing interventions.

The results demonstrate that locations requiring intervention are few relative to the extent of the proposed OHLE works. Where interventions are required, they mostly require bonding of the existing fencing, as the fencing sits within the OCLZ zones. Bonding and fencing interventions will be required at stations and on bridges and viaducts, but these will be addressed in their respective packages.

Large sections of the proposed electrification of the line pass through a rural environment. Through much of these areas, there is currently no formal fencing, but the railway boundary is formed of thick vegetation, comprising impenetrable hedges and thickets. This natural boundary performs an effective barrier in preventing unauthorised access to the railway.

Further detail can be found in **Section H of *Annex 3.2.***

## 5.9 Modifications to surrounding station structures

Sufficient clearance must be achieved at platform canopies such that live parts, such as overhead wires, overhead equipment and the pantograph gauge can be placed at the minimum required electrical clearances from the canopies, along with provision of necessary allowances for tolerance, adjustment and electrical isolation.

A study has been undertaken to determine the impact of electrification on station canopies. The study has identified that only the station canopy at Drogheda MacBride Station on Platform 1 will be affected. It is important to note that Drogheda (MacBride) Station is a protected structure which includes its canopies on the platforms.


**Figure 5-41 Drogheda Platform 1 Canopy (Source: Arup)**

The Platform 1 Canopy at Drogheda Station will clash with the proposed overhead line equipment. It will therefore need to be modified as part of the DART+ Coastal North project. The station platform is curved and therefore the end profile of the canopy will have to follow, thus each modification will differ so as to miss the exclusion zone, or all the trusses will need to be modified (shortened) for the worst case to keep them uniform.

All trusses are made from steel (and/or possibly wrought or cast iron).

The following options were considered but deemed unsuitable:

- Track lowering: Lowering of the track in the vicinity of the existing platforms presents a significant undertaking with respect to the works required and maintaining the operational functionality of the station. Since this track lowering would need to occur in a confined area, the existing platforms will require partial or full demolition to achieve this, with remodelling of the public platform areas also required. There would also be a knock-on impact to the areas within the vicinity of Drogheda McBride Station, including the depot and the Drogheda freight siding functionality with changes to the existing switches needing to be removed and lowered.
- Raising of the canopy: Looking at the general arrangement of the canopy as it interfaces with the proposed development, the canopy needs to be raised by a significant distance to be clear of the exclusion zone. Whilst it is possible to move the canopy up, the amount of such movement is quite large and would require significant changes to the canopy supports. The top chord support will require the station wall, or parts of it, to extend up to provide the required support to the canopy trusses at their raised position. The pedestal support of the bottom chord needs to be extended up in a similar way. Furthermore, the columns need to move up by the same amount - possibly by adding new stone, cast iron, or reinforced concrete pedestals. While the canopy could be raised therefore, this would require significant changes to its supporting walls and columns and as such it has been ruled out as a possible option.

The preferred viable solution is to modify the existing canopy in a way that is sensitive to its heritage structure status and allows for passive provision for 25kV. Sections which overhang the exclusion zone will be cut back and an endplate will be bolted to join the top and bottom chords.

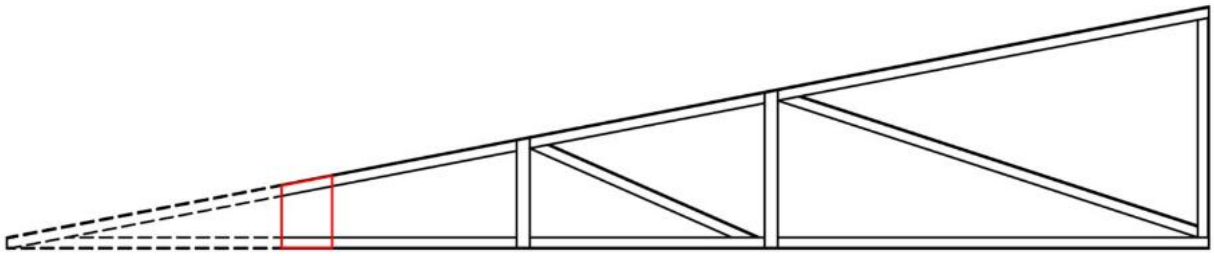


**Figure 5-42 Truss modifications (indicative)**

The modifications can be carried out by completely dismantling the canopy, then applying the modifications and other remediations such as straightening of members, corrosion repairs, corrosion protection, etc., before assembling again, or by modifying the canopy whilst it is kept in-place. This must be done in a way that is sensitive to its heritage structure status to allow the required clearances around the canopy for the electrification of the line to be achieved.

It is noted that the required canopy modifications will affect the glazing, guttering, and purlins which will require alteration to match the revised general arrangement. It should also be assessed during the modification process of the canopy structure whether the canopy structure originally included daggerboard fascia and if that is the case it should also then be assessed whether it could be reinstated as part of the modification works.

Further detail can be found in **Section I of *Annex 3.2.***

## 5.10 Signalling and telecommunication works

In order to support the delivery of the improved train service specification between Dublin City Centre and Drogheda, enhancements to the signalling system will be required. The extent of the enhancements relates to accommodating the changes to the track layout at Howth Junction & Donaghmede, Clongriffin, Malahide and Drogheda stations, as well as the delivery of additional services over the new and existing tracks. This upgrade is needed to exploit the efficient use of the trackwork. In addition, further changes may be made to the signalling system to enable the delivery of a robust Train Service Specification.

These enhancements will require the provision of new signalling and telecommunication equipment accommodation buildings along the line to house new equipment at strategic locations, located within IÉ land where possible. New signalling equipment buildings (SEB) will be constructed at Drogheda, Malahide, Clongriffin and Howth Junction & Donaghmede stations. These signalling equipment rooms will have an area of approximately 100 square metres and telecommunication equipment rooms (TER) will have an area of approximately 40 square meters. The equipment will operate signals and point machines as well as communicate the locations of trains to the National Train Control Centre located at Heuston. Where necessary, systems will be upgraded or modified to support the delivery of the TSS. All the equipment will be connected together by a new fibre cable network running the length of the upgraded area.

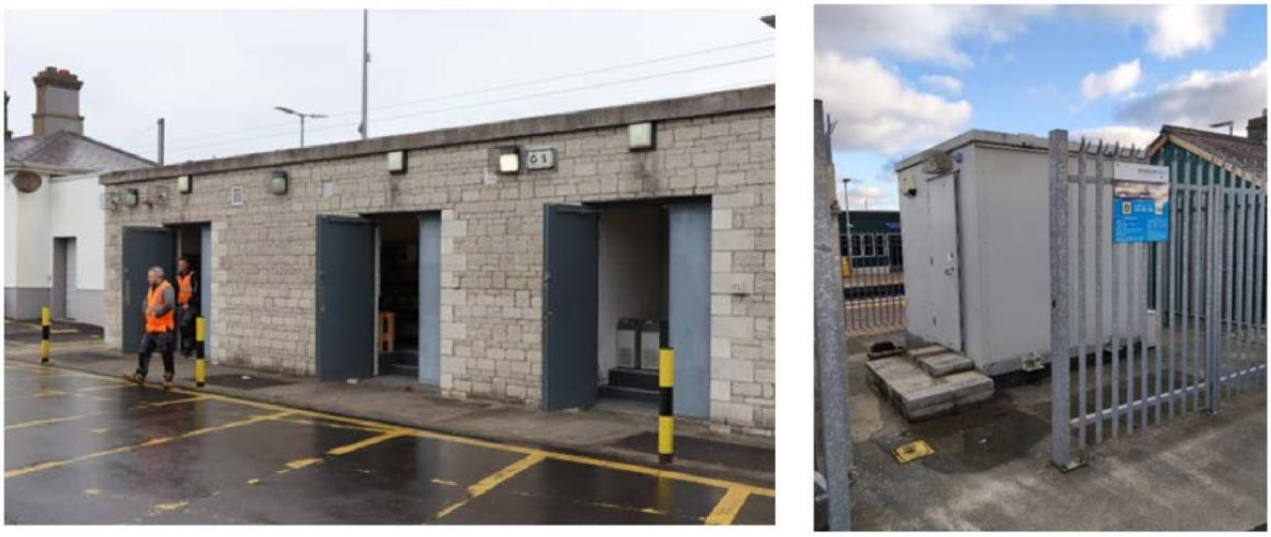


**Figure 5-43 Typical Equipment Cabins (SEB & TER)**

## 5.11 Line-Wide Construction Compounds

To support the construction activities required for DART+ Coastal North, a number of construction compounds will be required along the project extents. This will include both isolated work compounds relating to particular construction activities (e.g., construction of Bettystown Substation –Section 5.6.7, works around Clongriffin Station – Section 9) and larger line-wide compounds which support the general linear works of the project (e.g. site clearance, OHLE installation, signalling and telecoms upgrades, parking, and loading/offloading areas). Line-wide compounds will also be used to provide facilities for the contractor such as offices and staff facilities.

For a line-wide temporary construction compound, the space required for these activities is expected to be up to 10,000m$^2$ but typically closer to 5,000m$^2$.

The main factors considered in choosing optimum compound locations for any type of works are listed below:

- Size of plot
- Access arrangements off the public highway
- Access arrangements off the railway
- Time needed to travel between worksite compounds and work fronts
- Environmental impact
- Ownership of land
- Compensation to others, for loss of amenity during construction
- Ground conditions
- Access to local utilities, to support compound
- Security risk, from vandalism or theft

### 5.11.1 Line-wide works compounds strategy

The project area stretches over about 50km and therefore will need a number of line-wide compounds. Such compounds are expected to feed at least two work fronts at a time, one heading northwards and the other southwards. To help plan the strategy, the line has been considered as three work zones: Northern, Central and Southern, as shown in Figure 5-44. In selecting sites, the project has considered the suitability of each isolated works compound, along with other areas of Irish Rail owned land around existing track access points.

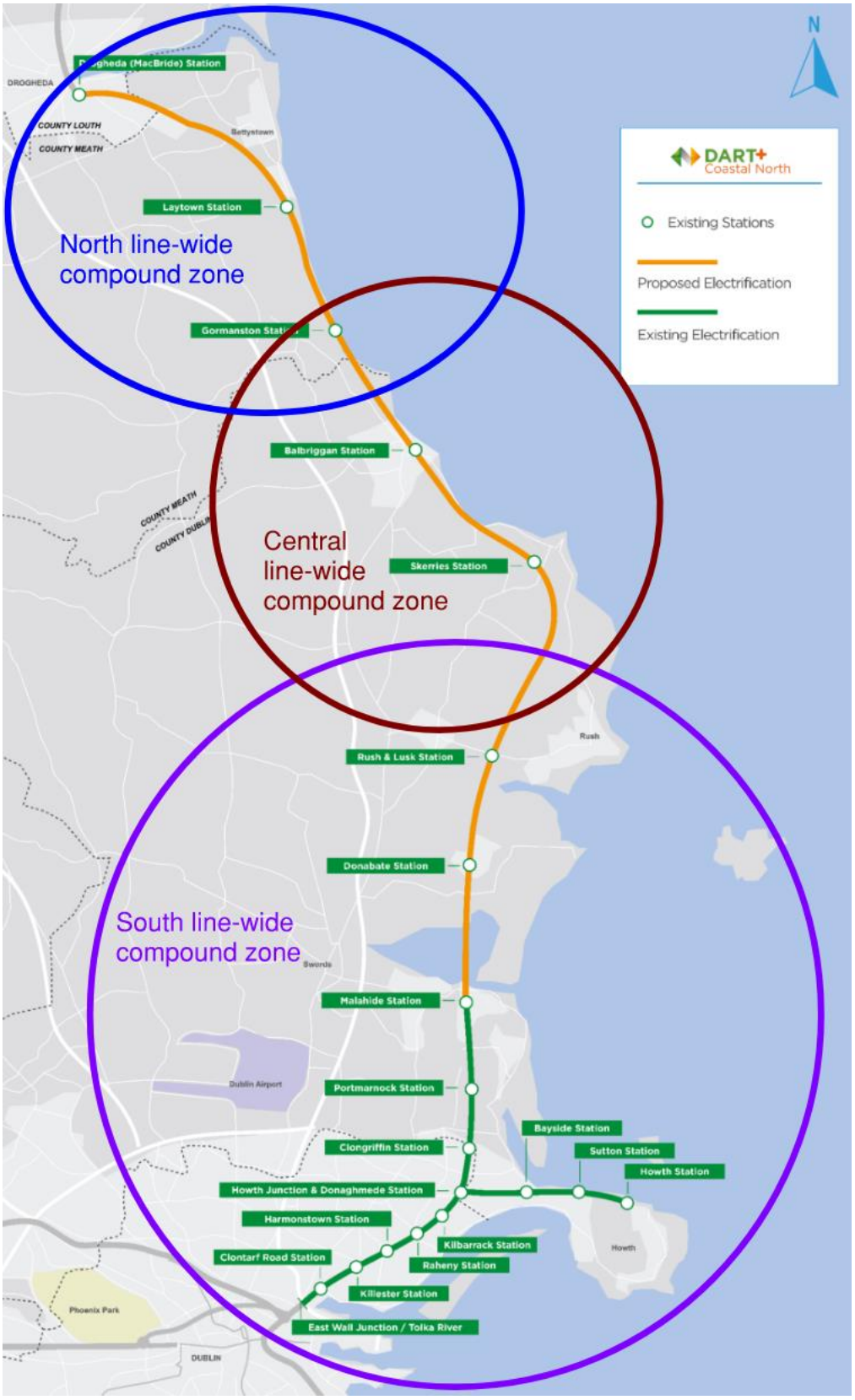



**Figure 5-44: Approximate extents of the DART+ Coastal North zones for line-wide compounds**

### 5.11.2 North Line-Wide Zone Compounds

This section contains the option selection process for a line-wide compound in the northern zone as indicated on Figure 5-44. Three locations have been chosen as line-wide temporary compound which are described below.

**Laytown Station**. A temporary line-wide compound is to be located both in the car park west of the railway and extending into an adjacent field. The site is accessible by a regional road (R150) which is approximately 6m wide and suitable for construction traffic. The road joins the M1 in the south-west via the R132 Dublin Road.


**Figure 5-45: Laytown Station compound site (Source: OSI Aerial Imagery)**

**Gormanston Station**. A temporary line-wide compound is to be located both in the car park west of the railway and extending into an adjacent field. The site would be accessed via the R132 which joins the M1 in the north-west.


**Figure 5-46: Gormanston Station compound site (Source: OSI Aerial Imagery)**

**Drogheda Station bridge works.** Expansion of the construction compound for OBB80/80A/80B (section 5.5.6) to support line-wide works. The site would be accessed via the R150 which connects with the M1 in the south via Colpe Road and the R132 (avoiding central Drogheda).


**Figure 5-47: Drogheda line-wide compound site (Source: OSI Aerial Imagery)**

### 5.11.3 Central Line-Wide Zone Compounds

This section contains the option selection process for a line-wide compound in the central zone as indicated on Figure 5-44. Two locations have been chosen as line-wide temporary compound which are described below.

**Skerries Station.** The temporary construction compound is located within the IÉ land ownership boundary, parallel to the tracks and directly north of the station car park. The site would be accessed via the R127 which joins the M1 in the north via the R122. Vehicles could avoid central Skerries by using Barnageeragh Road.


**Figure 5-48: Skerries Station compound site (Source: OSI Aerial Imagery)**

**Balbriggan TSS**. The expansion of the construction compound for Balbriggan Substation (section 5.6.5) to support line-wide works. The site would be accessed via the R132 which joins the M1 in the north.


**Figure 5-49: Balbriggan Substation compound site (Source: OSI Aerial Imagery)**

### 5.11.4 South Line-Wide Zone Compounds

This section contains the option selection process for a line-wide compound in the south zone as indicated on Figure 5-44. Three locations have been chosen as line-wide temporary compound which are described below.

**Rush and Lusk TSS.** The expansion of the construction compound for Rush and Lusk Substation to support line-wide works. The site would be accessed via the R128 which joins the M1 in the south-west via the R127 and R132.


**Figure 5-50: Rush and Lusk Substation compound site (Source: OSI Aerial Imagery)**

**Donabate Station**. This temporary construction compound could utilise an existing road-rail access point (RRAP). The construction compound would be located within the IÉ land ownership boundary. The site would be accessed via the L2170 which joins the M1 in the east either via the R132 (if leaving Donabate to the west) or via the R126 (if leaving by the east). It is acknowledged that the roads in the vicinity of this option become very congested at times.


**Figure 5-51: Donabate Station compound site (Source: OSI Aerial Imagery)**

**Donabate TSS**. The expansion of the construction compound for Donabate Substation (Section 5.6.5) to support line-wide works. The nearest road link of strategic importance is the R126 which joins the M1 in the west. The compound will be accessed off a new section of track from Corballis Cottages which will form the permanent access to the substation.


**Figure 5-52: Donabate Substation compound site (Source: OSI Aerial Imagery)**

# 6. DEPOT WORKS

Works are proposed to two existing depots as part of the DART+ Coastal North project: Fairview and Drogheda depots. Fairview depot is located directly adjacent to Clontarf Road Station and to the north of Dublin Connolly Station. Directly to the southwest of the depot is the East Wall Road and Tolka River Underbridge (UBB3). Drogheda depot is located within the extents of Drogheda MacBride Station, east of the existing platforms.

Modifications at Fairview and Drogheda depots are required to provide the infrastructure, maintenance, and servicing facilities necessary for the new DART+ Fleet with all proposed works being within the current depot facilities.

## 6.1 Drogheda Depot

To facilitate the maintenance of the new trains at Drogheda depot, an additional stabling road is required for the depot along with some track modifications to accommodate the works on the mainline and at Drogheda MacBride Station.

The works at Drogheda Depot are summarised below:

- Depot train door replacement to allow for the OHLE to pass through Roads 8 and 9
- Installation of OHLE for Roads 8 and 9, in addition to the external electrification
- Installation of Depot Protection System (DPS) – a safety system to protect workers from electrification risks and train movements.
- Installation of Under Frame Cleaning (UFC) screen – a vertical screen to prevent direct spraying of water onto adjacent OHLE.
- Installation of new stabling road adjacent to existing stabling Road 7 with associated localised access platforms for train drivers and cleaners, lighting and water and power supply points. The new stabling road will require reprofiling of the existing earth bund to provide sufficient space.
- Installation of localised access platforms for train drivers and cleaners, lighting and water and power supply points on the Northern Headshunt Road.

The construction compound for these works will be located in the Drogheda MacBride Station car park.

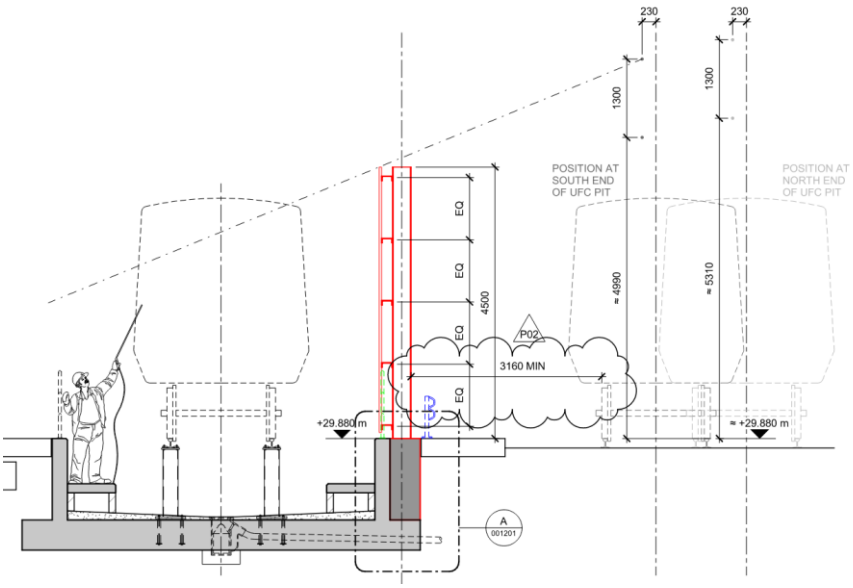



**Figure 6-1: UFC Screen Preliminary Design Extract**

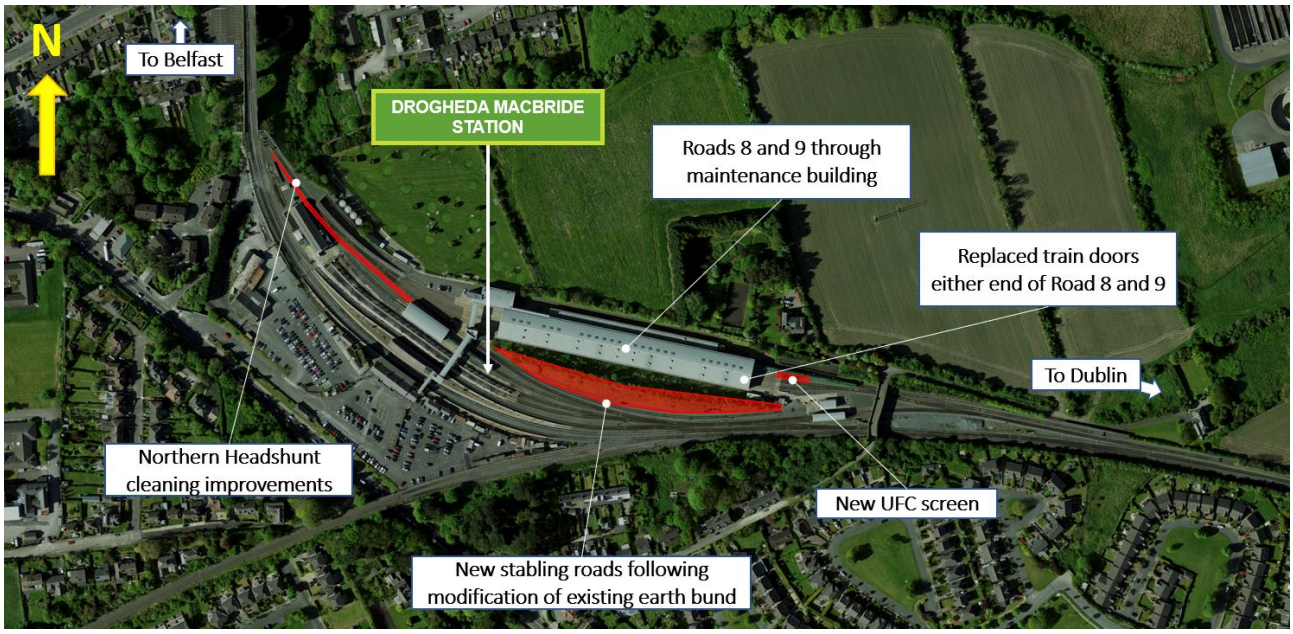



**Figure 6-2: Drogheda Depot works overview**

## 6.2 Fairview Depot

In order to provide a greater output of cleaning at Fairview depot for the new trains, several modifications are required at the depot. These will include the provision of new cleaning platforms on the sidings to the East side of the mainline, along with associated walkways and services. On the West side, modifications are proposed largely within the existing maintenance building to provide suitable access and services for cleaning staff. The construction compound for these works will be located in the vicinity of Fairview Depot, on IÉ owned land.


**Figure 6-3 Fairview Depot works overview**

# 7. WORKS AROUND HOWTH JUNCTION & DONAGHMEDE STATION

This section provides an outline of the optioneering undertaken for works around Howth Junction & Donaghmede Station and the design development since PC1.

## 7.1 Context

Howth Junction & Donaghmede Station is located at the point where the Northern Line and the Howth Branch diverge from each other – see Figure 7-1.

Howth Junction & Donaghmede Station comprises four platforms: Platforms 1 and 2 are located on the Howth Branch, and Platforms 3 and 4 are located on the Up and Down Northern Line respectively. Access to Platforms 2 and 3 is provided by the existing station pedestrian footbridge (OBQ0). An aerial view of the site is shown in Figure 7-1, with a focus on station structures provided in Figure 7-2.

The study area is northeast of Dublin City, straddling the administrative areas of Dublin City Council (to the east and south) and Fingal County Council (most of the study area, to the north and west). The station and Howth Branch are wholly within the Fingal County Council administrative area.

The area around the railway line in the vicinity of the proposed works is well developed, with Howth Junction Business Park to the south of the railway, Baldoyle Industrial Estate to the north, and residential development to the northwest, south and east.

The R104 Tonglegee – Kilbarrack Road crosses the railway to the south (on the mainline) with Naomh Barrog GAA (Gaelic Athletic Association) club and Bayside National School located to the south/southeast of the Howth Branch.

There are no European sites in the immediate vicinity, with Baldoyle Bay Special Area of Conservation (SAC), Special Protection Area (SPA) and Proposed Natural Heritage Area (pNHA) sites located to the northeast and North Dublin Bay SAC and pNHA and North Bull Island SPA located to the southeast, respectively. Further to the east and south, there are a number of European sites, including Ireland's Eye SAC, SPA and pNHA, Rockabill to Dalkey Island SAC, Howth Head SAC and pNHA, as well as South Dublin Bay and River Tolka Estuary SPA and South Dublin Bay SAC and pNHA.


**Figure 7-1: Aerial view on Howth Junction & Donaghmede Station (Source: OSI Aerial Imagery)**

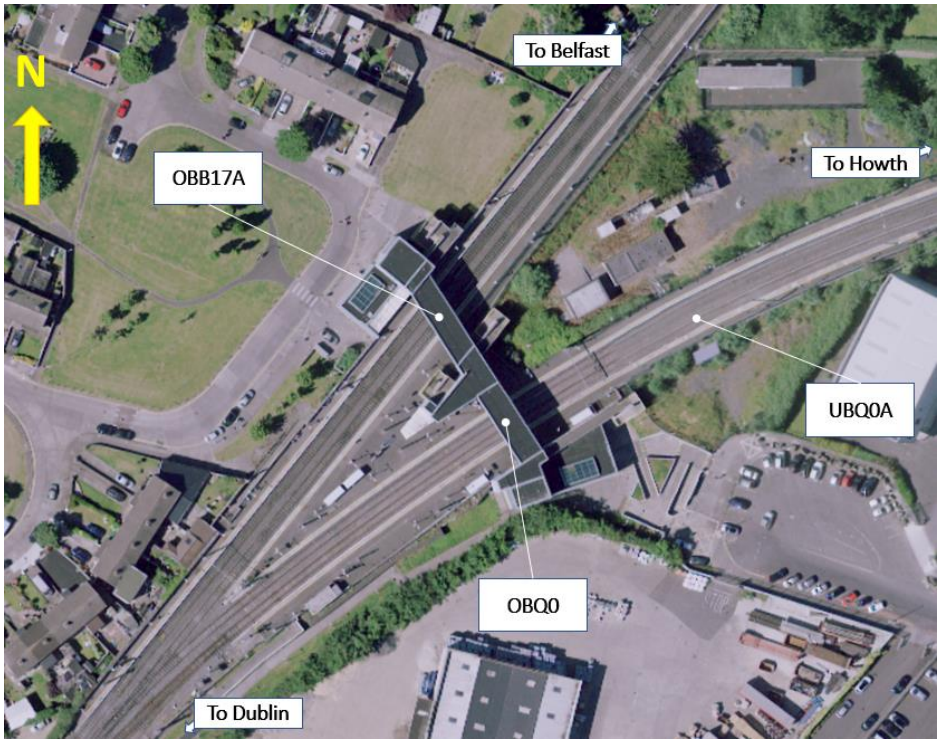



**Figure 7-2: Aerial view of existing structures located within the vicinity of Howth Junction & Donaghmede Station (Source: OSI Aerial Imagery)**

## 7.2 Review of Public Consultation No. 1 Feedback, Design Development and Preferred Option

The project team has analysed the submissions and considered all relevant information in the re-evaluation and further development of design options leading to the selection of the Preferred Option.

In direct response to feedback received during the first Public Consultation, significant upgrade works and enhancements are now being proposed for Howth Junction & Donaghmede Station to deliver accessibility improvements and provide for a better overall customer experience. These improvements are described further in Section 7.3.

The Preferred Option for turnback facilities at Howth Junction and Donaghmede Station is as presented at PC1 but has been further developed. It focuses construction north of the Howth Branch, extending the existing Platform 2 to allow the platform to be used by services from Howth without impacting on services running along the Northern Line. A new crossover will be installed from the Up to Down Branch line. Alterations to existing OHLE, signalling and telecoms will also be required.

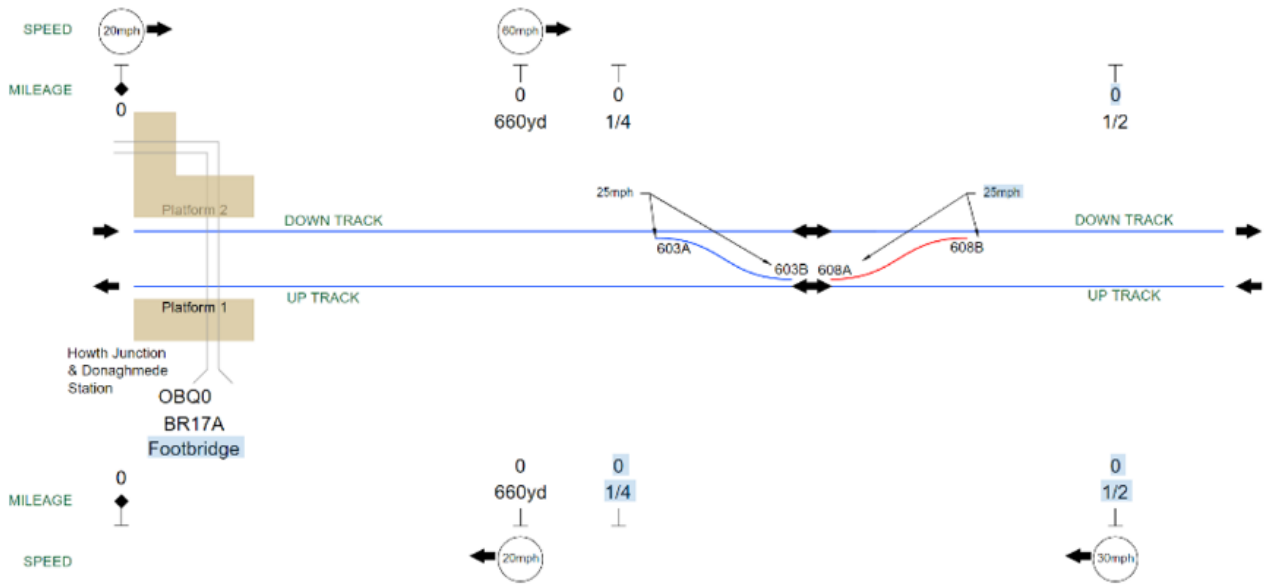



**Figure 7-3 Howth Junction & Donaghmede Station, Proposed Track Scheme**

Refer to ***Annex 3.6*** for further information, including supporting drawings.

## 7.3 Station Improvements Proposals

To achieve the peak capacity increases proposed by the DART+ Programme, the DART+ Coastal North project will seek a reconfiguration of Howth Junction and Donaghmede Station and the removal of train crossing conflicts at the station which currently limit both capacity and frequency of services on the Northern and Howth Branch Lines. The project is seeking to deliver the infrastructure at Howth Junction and Donaghmede Station that will enable the operation of both a DART Shuttle Service on the Howth Branch Line as required, and/or a direct through service to/from Dublin City Centre, allowing for the capacity and frequency of DART+ services on both the Northern and Howth Branch lines to be maximised and to help future-proof the network.

The works will involve modifications to the station entrances to provide a more accessible, user friendly and customer focused station for Donaghmede and Kilbarrack. Upgrades are proposed to the existing station footbridge and connections to the centre platforms, as well as to the lighting, signage, and finishes throughout.

### 7.3.1 Footbridge

The Preferred Option for the Footbridge will create an open, light and inviting space by proposing the following features:

- Central wall removed to brighten and open up the space.
- The flooring will be fully replaced with new slip-resistant finish.
- New green profiled vitreous enamel parapet and chamfered sill to discourage graffiti and littering.
- New architectural stainless steel external mesh finish to maximise natural light and views.

**Figure 7-4 Howth Junction & Donaghmede Station Footbridge Proposal Internal**

**Figure 7-5 Howth Junction & Donaghmede Station Footbridge Proposal External**

### 7.3.2 Central Connection

The Preferred Option for the Central Connection proposes the following:

- Two new through lifts connected to the northeast side of the Footbridge with an ample landing and clearance to provide space for waiting, turning and seating.
- A straight stair is located directly adjacent to the lifts. It is split into two flights with deep steps (to allow for resting) and a central landing.
- To enable the straight stair, new areas of platform will need to be built-up (taken from existing IÉ land) and the fence line adjusted.
- A canopy projects from the lift shaft to provide weather protection and lighting for passengers using the lift and stairs at Footbridge level. Handrail lighting will illuminate the stairs at landing and Platform level.
- New entrance 'portal' with accompanying seating signage, ticket vending machine, validator post and lighting where the access route to Baldoyle Industrial Estate meets the new fence line to Platforms 2 and 3.

**Figure 7-6 Howth Junction & Donaghmede Station Central Connection Proposal**

### 7.3.3 Station Entrances

#### *7.3.3.1 Ticket Hall Door*

The proposed Ticket Hall Door opens up both public facing sides of the ticket hall as far as possible. This creates maximum views into and out of the station, as well as more natural light to the interior during the day. The ticket machines, lifts and stairs beyond are immediately visible when entering to provide intuitive wayfinding for passengers.

**Figure 7-7 Howth Junction & Donaghmede Station Ticket Hall Door Proposal**

#### *7.3.3.2 Donaghmede Entrance*

The Preferred Option for the Donaghmede Entrance proposes to remove both sets of existing access stairs and replace them with a new single covered stair. The existing lift is to remain. The new stair provides a straight single flight from Ticket Hall level up to Platform level so that Platform 4 is visible when approaching the base of the stairs. The stair then continues from the Platform up one flight to a landing where the stair returns and continues with two more equal flights to Footbridge level. The option proposes:

- New entrance door
- Retain existing lift
- Add lift waiting area & wayfinding
- New straight and visible stairs
- New slip-resistant floor finish
- New secure bike store
- New external Ticket Vending Machine, validator & shelter

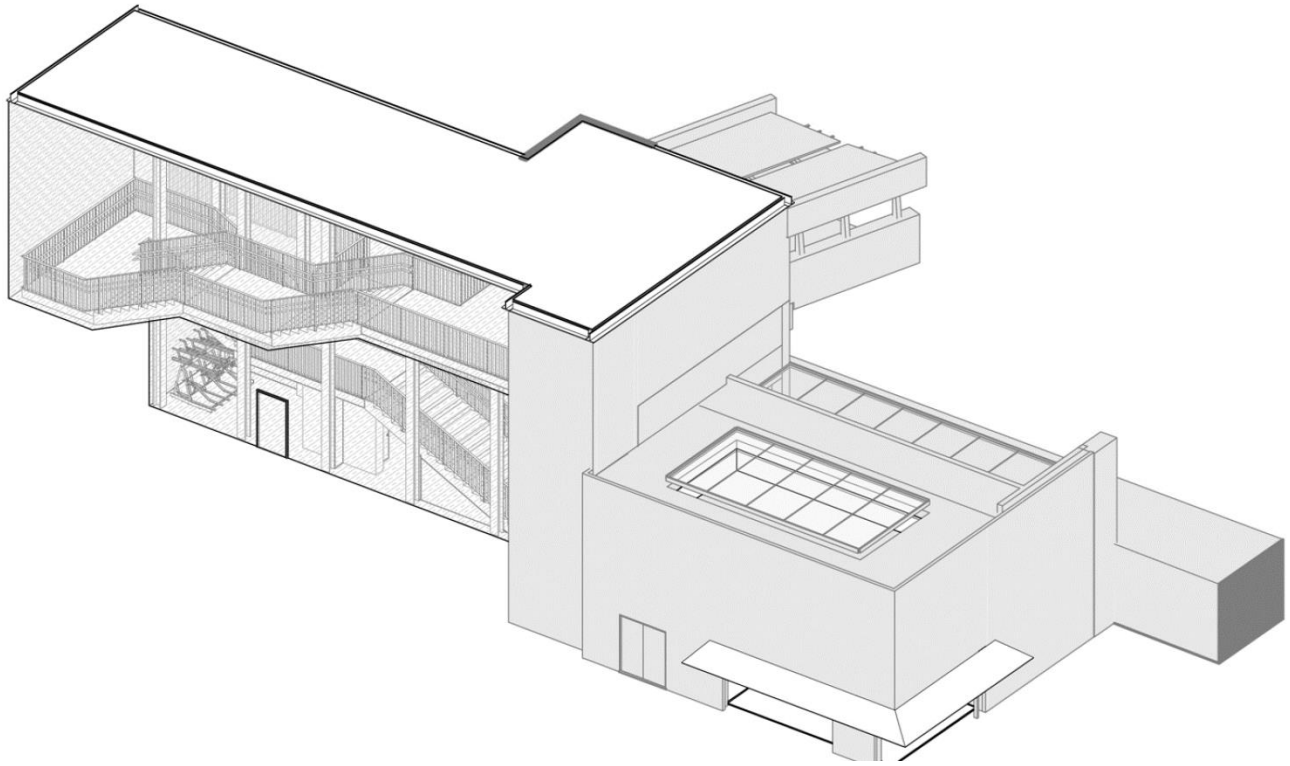


**Figure 7-8 Howth Junction & Donaghmede Station Donaghmede Entrance Proposal**


**Figure 7-9 Architectural visual of the proposed entrance hall internally at the Donaghmede entrance**

#### *7.3.3.3 Kilbarrack Entrance*

The Preferred Option for the Kilbarrack Entrance proposes to remove both sets of existing access stairs and replace them with a new single covered stair. The existing lift is to remain. The new stair provides a straight single flight from Ticket Hall level up to Platform level so that Platform 1 is visible when approaching the base of the stairs. The stair then continues from the Platform up one flight to a landing where the stair returns and continues with two more equal flights to Footbridge level. The option proposes:

- New entrance door
- Retain existing lift
- Make lift more visible
- New straight and visible stairs
- New slip-resistant floor finish
- New secure bike store
- New external Ticket Vending Machine, validator & shelter

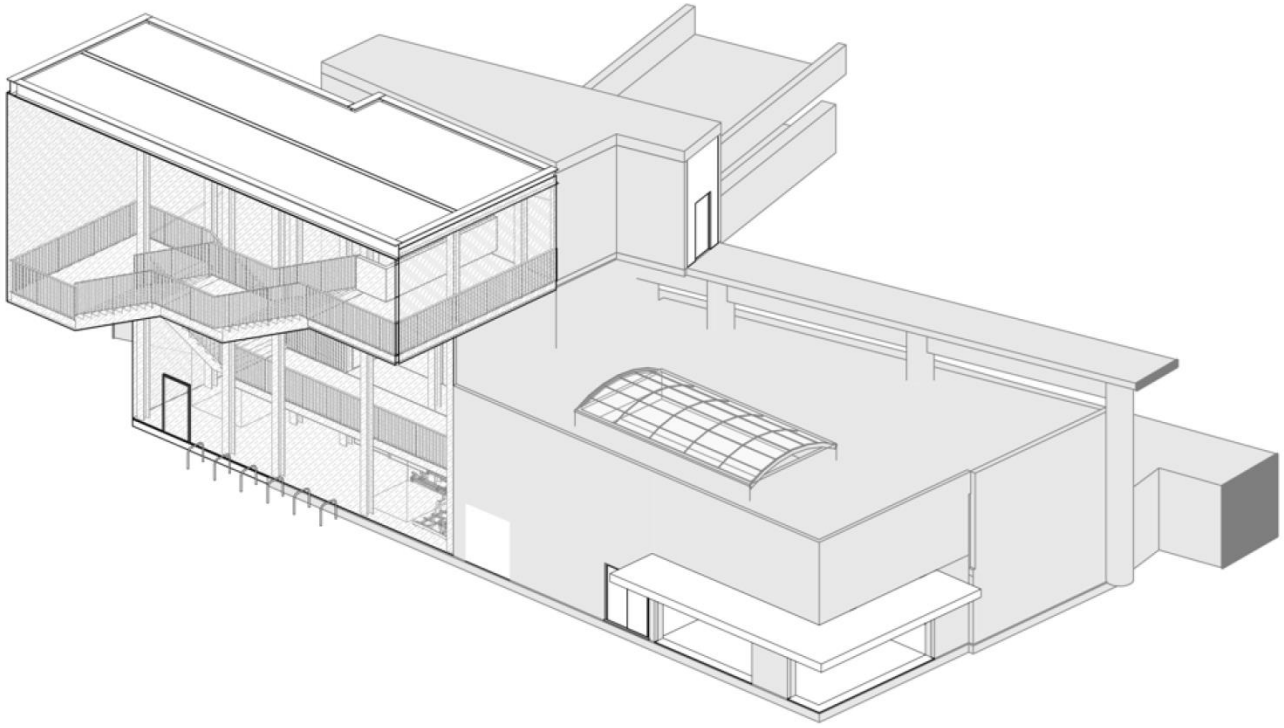


**Figure 7-10 Howth Junction & Donaghmede Station Kilbarrack Entrance Proposal**


**Figure 7-11 Architectural visual of the proposed entrance hall internally at the Kilbarrack entrance**

Refer to ***Annex 3.8B*** for further information.

## 7.4 Construction

### 7.4.1 Construction Methodology

#### *7.4.1.1 Platform extension and track works construction*

The superstructure of the Platform 2 extension will be formed from precast elements, these precast elements will sit on a cast in-situ reinforced concrete slab. The slab may be founded on piles depending on the results of the GI.

The proposed construction sequence is likely to be as follows:

- Enabling works
  - Site clearance
  - Worksite setup
  - Utility diversions
- Ground works
  - Piling (likely using micro piling rigs)
  - In-situ concreting
  - Drainage tank installation
- Civil works
  - Precast platform unit installation
  - Tie-in to existing platform
  - Cable ducts and drainage
- Finishing works

- Permanent fencing
- Platform shelter erection
- Benches and lighting
- Landscaping

The platform extension works are expected to take around 3 months, the majority of which should be possible offline from the railway, though some night-time and weekend possessions will be required for particular operations close to the existing railway, such as piling and lifting in the new precast concrete platform units.

#### *7.4.1.2 Modifications to station entrances and footbridge construction*

The works to the station entrances and footbridge will be phased to reduce disruption to passengers. Temporary accesses will be provided for each entrance during the period of demolition and reconstruction. The extent and sequence of works for the modification is still to be confirmed. It may be packaged such that the works are delivered over several phases.

### 7.4.2 Construction Compound

There is an existing vehicular access point (RRAP) at Howth Junction alongside an existing maintenance compound within Irish Rail land but the area is too small and congested to form a suitable DART+ construction compound there. Instead, a substantially better location for a worksite compound would be in part of a car park to the north-east of the site which is attached to a commercial/ industrial facility within Baldoyle Industrial Estate. It is well located to access the Howth Junction platform works and track works, along an existing road track, as well as having good access onto the main roads around Howth. There is also the benefit of there being no nearby residential properties. A further 2 smaller temporary compounds will be required, located either side of the station entrances. The compound sites are outside of the Irish Rail land ownership boundary.

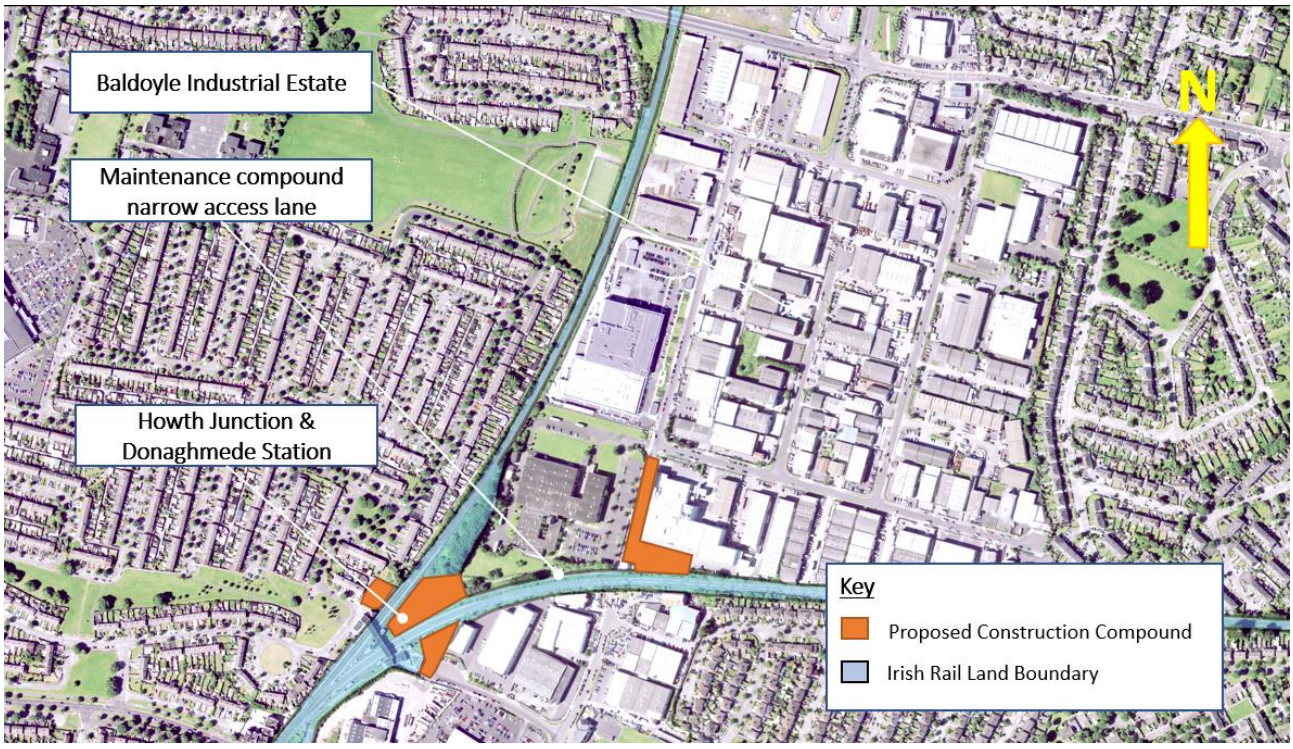



**Figure 7-12: Howth Junction and Donaghmede Station proposed compound sites (Source: OSI Aerial Imagery)**

## 7.5 Permanent and Temporary Land Requirements

The majority of permanent works at Howth Junction and Donaghmede Station are confined within the extents of IÉ owned lands. Some impact on local authority lands may result from works to the existing station entrances. Temporary land acquisition will be required in relation to the construction compound location to the North East of the station which is in third party ownership.

# 8. HOWTH BRANCH LEVEL CROSSINGS

This section provides an outline of the assessment undertaken for the existing level crossings on the Howth Branch.

There are four level crossings located on the Howth Branch, as listed below:

- Baldoyle Road Level Crossing
- Sutton Level Crossing
- Cosh Level Crossing
- Claremont Level Crossing

The location of these level crossings can be seen on Figure 8-1.


**Figure 8-1 Overview of level crossing locations on the Howth Branch (Source: OSI aerial imagery)**

The proposed changes to the Howth Branch will see both the service frequency and capacity increase, along with improvement to the reliability of timetabling. The Preferred Option will enable the operation of both a DART shuttle service on the Howth Branch line as required, and/or a direct through service to/ from Dublin City Centre, allowing for the capacity and frequency of DART+ services on both the Northern and Howth Branch lines to be maximised.

The level crossing barrier closures are highly sensitive to the exact meeting point of trains in any given scenario; having trains cross simultaneously at a level crossing is the best case, as it allows two trains to pass during one closure.

A baseline timetable scenario has been used for the assessment which is based on TSS1C and has a regular timetable structure.

The effect of different train meeting points and the impacts on the barrier opening times of level crossings has been assessed for a number of timetable scenarios, which serves as a sensitivity check to evaluate how differently the level crossings will behave depending on the level of synchronization of rail services; and how this may in turn impact on queues.

It should be noted that there is the ability to optimise the timetable around minimising barrier closures to one of the two major road crossings (Sutton or Kilbarrack but not both). The baseline timetable used minimises the closure times at Sutton.

The assessment indicates that the likelihood of vehicles incurring delay at the level crossings will increase due to the increased frequency of level crossing closures. Traffic queue lengths at level crossing closures were also assessed and, in some scenarios, queues were seen to reduce, while in other scenarios they were seen to increase. Taking account of the varying nature of timetable reliability, the assessment has established that in normal circumstances traffic queues will mostly not extend beyond the next junction. In normal circumstances, queues that build while the level crossings are down will typically clear at the next barrier opening. However, queues at Kilbarrack northbound may occasionally extend beyond the next junction especially during the PM peak hour. It should be noted that current Government Policy supports the prioritisation of public transport over the use of private cars to help reduce transport related greenhouse gas emissions and help combat climate change.

Similarly, the likelihood of pedestrians incurring delay at a level crossing will increase. In the proposed baseline timetable scenario, the average wait time for pedestrians is likely to increase at Cosh and Kilbarrack Crossings from a maximum of 3 - 4 minutes to a maximum of 5 minutes. Sutton and Claremont closure durations will be similar or less than the existing situation in the proposed baseline timetable scenario.

Initial assessments and modelling of the four existing level crossings along the Howth Branch line has indicated that these level crossings can continue to operate, and that the impacts of the increased frequency of closures have been assessed and are considered to be acceptable. The increased reliability of a DART shuttle operation, and an optimised timetable, will ensure that closure times are kept to a minimum, and in some cases reduced when compared with current closure times.

It is also important to note that final level crossing closure times and frequencies are based on the development of future timetables which are yet to be determined. All future timetable changes will be subject to a public consultation process organised by the National Transport Authority (NTA), known as the Timetable Customer Consultation Process. The public will be invited to give their feedback on any future proposals at the appropriate time.

Refer to ***Annex 3.7*** for further details on the assessment which took place to understand the impact the proposal has for vehicles on the road network and for pedestrian cyclists at the level crossings.

# 9. WORKS AROUND CLONGRIFFIN STATION

This section provides an outline of the assessment undertaken around Clongriffin Station and the design development since PC1.

## 9.1 Context

Clongriffin Station is located on the Northern Line which has three platforms: Platform 1 is located on the Up Line (trains travelling to Dublin), Platform 2 is on the Down Line (trains travelling from Dublin) and Platform 3 is located on a passing loop off the Down Line. All platforms are 190m long. Access to the platforms is provided by an existing pedestrian overbridge at the station. The station was designed and constructed with a fourth track in mind and has an unused platform face which is not currently served by track.

The OHLE was extensively reconfigured and renewed when the station was built in 2010 and consequently is still in good condition. The OHLE is supported by portal frames mounted on masts on the platforms. In the station surrounds, the OHLE is instead supported on single track cantilevers.

Clongriffin Station is within the administrative area of Fingal County Council, located to the north of Donaghmede, approximately 5km east of the M1/M50 interchange and to the west of the former Baldoyle racecourse.

Much of the land to the west of the existing station and rail line is well developed, with residential and commercial development in the vicinity. There is further development planned/underway to the east of the existing station, where lands are zoned for residential development in the current Fingal Development Plan 2017 – 2023. Refer to *Annex 3.1* for details of relevant existing planning applications. Areas to the north (east and west of the existing railway line), are currently zoned as high amenity areas.

The River Mayne crosses under the railway line approximately 1km north of the existing station before discharging to the Baldoyle Estuary to the east. The estuary forms part of the Baldoyle Bay Special Area of Conservation (SAC) and Special Protection Area (SPA). There are also a number of other European sites in the wider area, including both SPAs and SACs.

An aerial view of the site is shown in Figure 9-1.

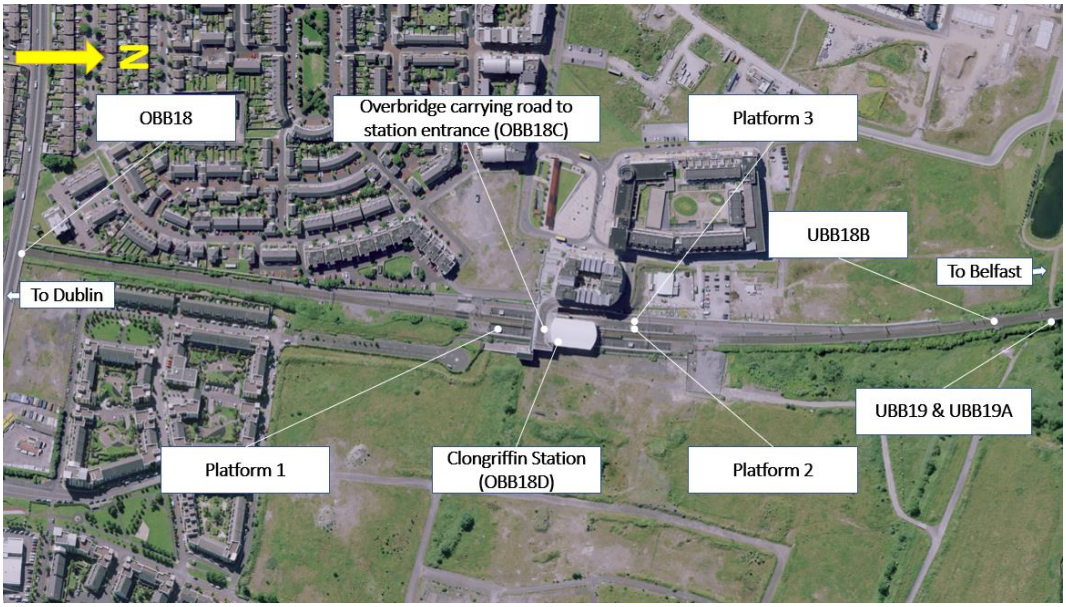



**Figure 9-1: Aerial view of Clongriffin Station (Source: OSI Aerial Imagery)**

## 9.2 Review of Public Consultation No. 1 Feedback, Design Development and Preferred Option

The project team has analysed the submissions and considered all relevant information in the re-evaluation and further development of design options leading to the selection of the Preferred Option.

The Preferred Option at Clongriffin Station is as presented at PC1 but has been further developed. The works are to construct new track on the east side of the station, named the “East Loop”. In turn, this will allow the reopening of Platform 0 to receive operational traffic. A new cross over will also be provided to the south of Clongriffin Station and new turnouts to connect the new track to the Up Main Line.

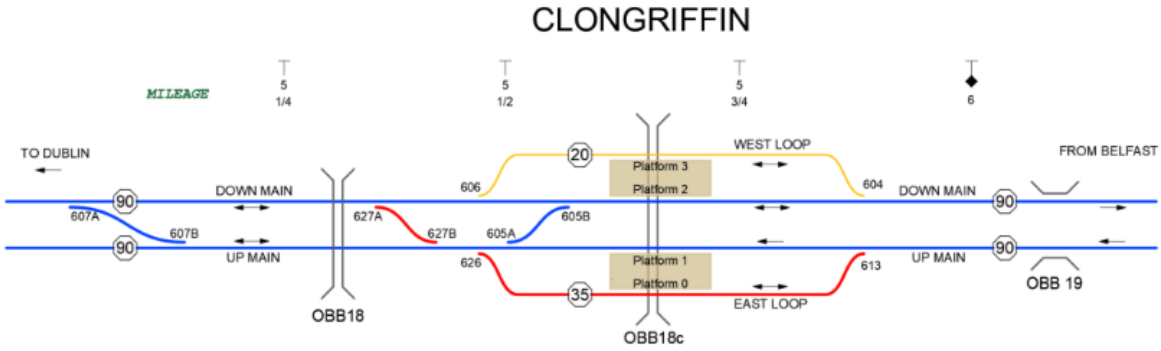



**Figure 9-2 Clongriffin Station, Proposed Track Scheme**

For the above to be feasible, a new retaining wall is to be constructed along the east side of the new track. It will be approximately 150m long and up to 2m high.

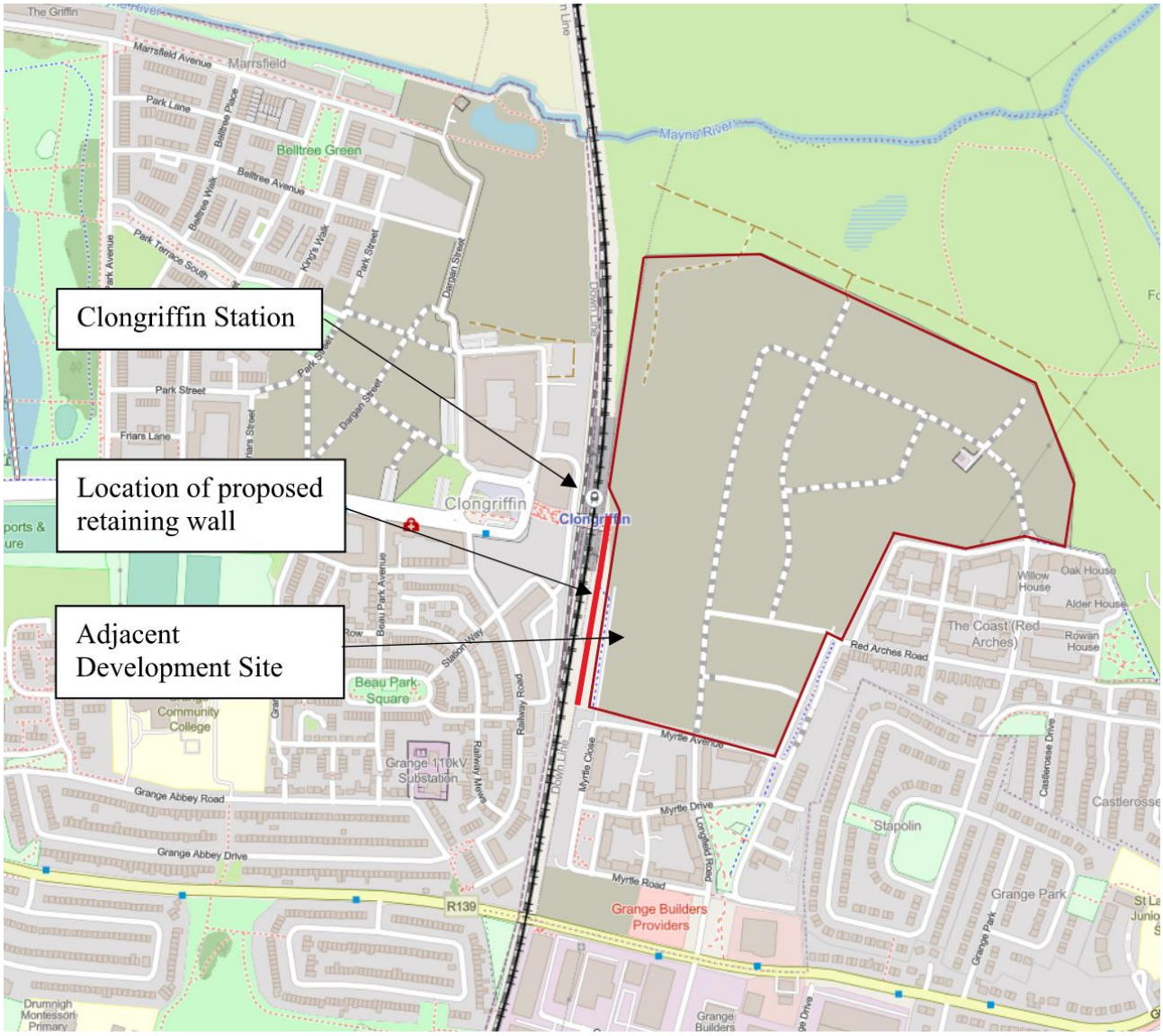



**Figure 9-3 Proposed location of retaining wall**

Refer to ***Annex 3.5*** for further information, including supporting drawings.

## 9.3 Construction

### 9.3.1 Construction Methodology

Generally, the construction sequence will involve, where necessary, appropriate excavation and temporary slope stabilisation works. Piles will then be installed, followed by the installation of the in-situ pile capping beam and then the in-situ wall stem. The area behind the wall will then be backfilled with appropriate fill material and compacted.

The retaining wall could be constructed off site using precast reinforced concrete elements or in-situ using traditional methods. A section of the wall needs to be piled to avoid undermining the existing railway abutments close to the existing platform. There is less than ~7.5m distance between the existing platform and proposed road bridge.

As such a piling platform will need to be constructed, which could form part of the permanent works. In addition, careful consideration of the sequencing of the piling will need to be adopted due to limitations in space.

There will need to be a limited number of track possessions associated with tying in the existing tracks with the new track. It is expected that the tie in work could be done over several weekend possessions depending on available resources.

### 9.3.2 Construction Compound

Irish Rail land ownership at Clongriffin Station is presently limited to a thin band bordering each side of the railway, this being insufficient to locate a worksite compound for the station works required.

On the east side of the station, where most DART+ Coastal North works are needed, extensive third-party development plans are being progressed, primarily involving new housing to the east and a strategic infrastructure development to the north. Discussions have been undertaken with the developers to establish which plots of land could be used by DART+ Coastal North project for construction compounds and during what periods.

The nearest road link of strategic importance is the R123 (“Moyne Road”) in the north which joins onto the M1 to the west via the R107 and R139. It currently provides access onto a new road leading to the ongoing housing construction adjacent to the station. Discussions would be needed with the housing developers to understand if use of this route could be shared with DART+ construction vehicles. In addition, it is recognised that the R123 becomes very busy at times.

Underbridge UBB20, where the R123 crosses under the railway, has a clearance of 3.85m. This will restrict larger construction vehicles, including possibly concrete wagons, in which case such vehicles would need to approach this area via the R106 Coast Road to the east. If access using the existing construction access from the north is not feasible, traffic would be required to find a route via the south or east, and ultimately maybe the R809 and/or R139, whilst endeavouring to mitigate disruption to the local community.

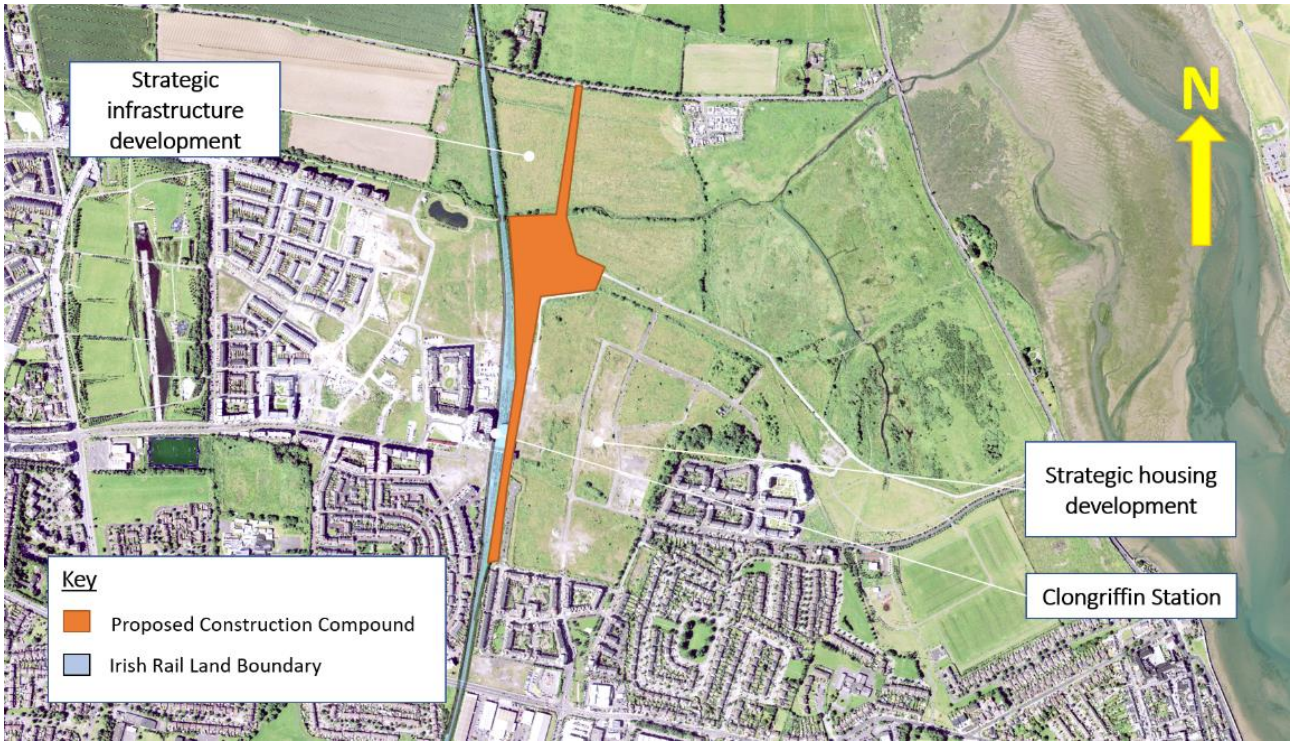



**Figure 9-4: Clongriffin Station proposed compound sites (Source: OSI Aerial Imagery)**

## 9.4 Permanent and Temporary Land Requirements

The construction of the passing loop at Clongriffin Station is expected to be located within the extents of IÉ lands in the permanent case. Lands to facilitate its construction and the construction compounds in this area are expected to require the temporary acquisition of 3rd party lands.

# 10. WORKS AROUND MALAHIDE STATION

This section provides an outline of the assessment undertaken around Malahide Station and the design development since PC1.

## 10.1 Context

Malahide Station is located on the Northern Line, off Malahide Road (R106). The station consists of two platforms: Platform 1 on the Up Main line (trains travelling to Dublin) and Platform 2 on the Down Main line (trains travelling from Dublin), linked by a pedestrian bridge over the railway line.

North of Malahide Station is the Malahide Estuary and the Irish Water wastewater treatment works. The railway crosses the estuary by way of a viaduct.

Aerial view of the site is shown is Figure 10-1 to Figure 10-3 The site under consideration is contained within the Schematics drawings in Annex 1.

There is residential, commercial and amenity development in the vicinity of the railway line in Malahide and to the north of the Malahide Estuary in Donabate (including new development south of Donabate, the Malahide Marina and Malahide Marina Village).

The railway line passes through the Malahide Estuary Special Protected Area (SPA), Malahide Estuary Special Area of Conservation (SAC) and Malahide Estuary proposed Natural Heritage Area (pNHA), all of which are European sites. Other European sites in the vicinity include the Rogerstown Estuary SAC and Rogerstown Estuary SPA, both to the north of Donabate.

The proposed Broadmeadow Way Greenway by Fingal County Council, a planning approved walkway and cycleway, will be located parallel to the railway line over the Malahide Estuary. There is also a new road over the railway line (the Donabate Distributor Road, R126) to the north of the estuary, south of Donabate.


**Figure 10-1: Aerial view of the Malahide area (Source: OSI Aerial Imagery)**

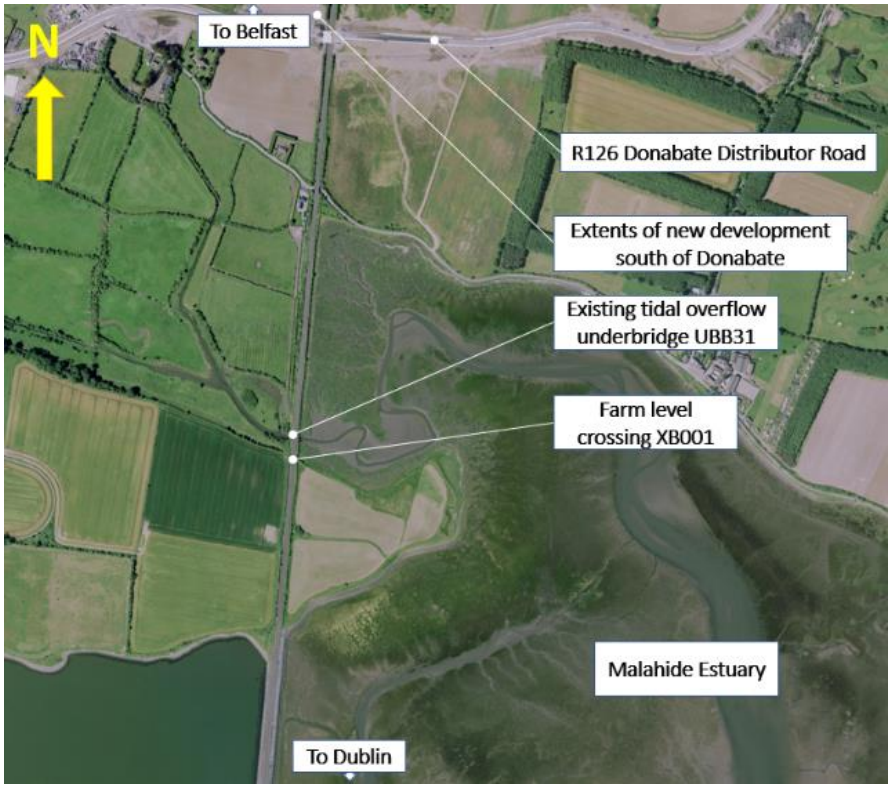



**Figure 10-2: Aerial view of the area South of Donabate (Source: OSI Aerial Imagery)**


**Figure 10-3: View of Malahide Station (Source: OSI Aerial Imagery)**

## 10.2 Review of Public Consultation No. 1 Feedback, Design Development and Preferred Option

The project team has analysed the submissions and considered all relevant information in the re-evaluation and further development of the design options for this section, leading to the selection of the Preferred Option. Consultation between the DART+ Coastal North project team, Fingal County Council and Irish Water in relation to potential impacts on the Malahide Wastewater Treatment Plant have informed the development of the Preferred Option.

The Preferred Option is as presented at PC1 but has been further developed. The works include to slew the Up Main to the East to facilitate a central turnback and a raised walkway north of underbridge UBB29. The works are located between Malahide Station and the Malahide Viaduct. A proposed new friction buffer stop shall be installed at the turnback end. The new raised walkway will be lit with raised driver access platforms to allow drivers to transfer from one train to another.

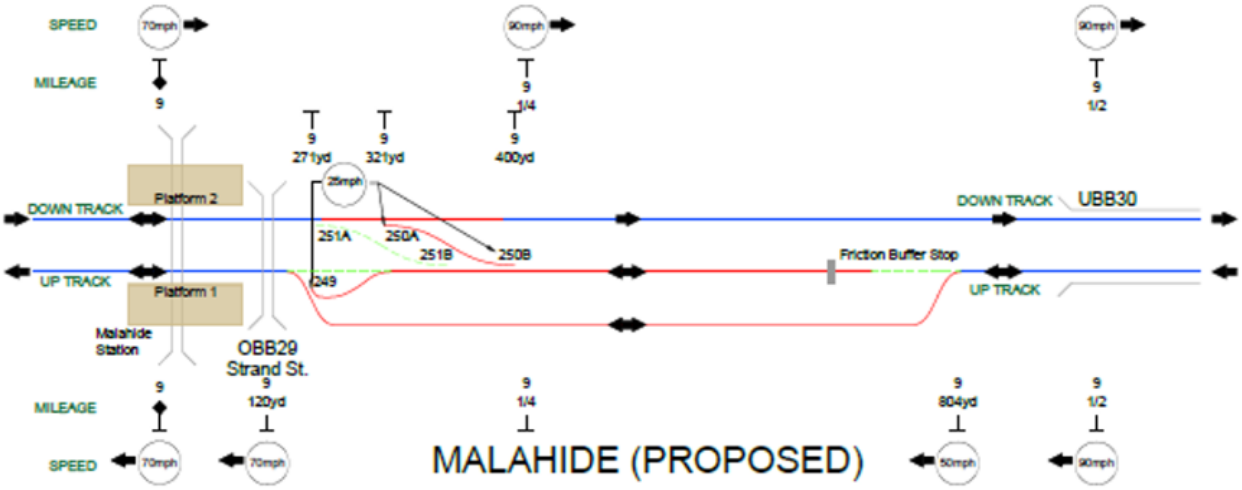



**Figure 10-4 Malahide Station, Proposed Track Scheme**

To facilitate the works described above, a new retaining wall is required running along the East side of the tracks. It will be approximately 400m long and up to 4m high.

Refer to ***Annex 3.4*** for further information, including supporting drawings.

## 10.3 Construction

### 10.3.1 Construction Methodology

Generally, the construction sequence will involve, where necessary, appropriate excavation and temporary slope stabilisation works. Piles will then be installed, followed by the installation of the in-situ pile capping beam and then the in-situ wall stem. The area behind the wall will then be backfilled with appropriate fill material and compacted.

In order to ease the management of track possessions it is proposed that the OHLE cabling is removed from the eastern-most track alongside the length of the new wall at the start of the new works, as it will need to be realigned in any case for the new turnback track alignment.

It is proposed to temporarily move any utility services or reposition them if assessed to be impacted by the proposed works (following confirmation of location).

The availability of track possessions will heavily influence the level of disruption to railway operations, particularly for the eastern track. There will be a need to install temporary works to create a wide enough platform for piling, particularly closer to Marina Village. If sheet piles are to be used for the temporary platform, the construction of the sheet pile wall will be carried out with weekend possession due to the potential noise impact of the activity.

### 10.3.2 Construction Compound

The figure below illustrates where a temporary compound is proposed to be located to support the works, within the car park immediately south of the wastewater treatment plant (though it may not need the whole of the car park). This has the benefit of having a wide frontage onto the railway, being relatively remote from residential properties and of suitable size.

It is noted that a plot within the Malahide Marina, just north of the wastewater treatment plant, has been proposed to support works on the Malahide Viaduct. There is potential for the same compound to also support the turnback works, to a minor degree, depending on timing and size of plot available. Similarly, there is potential to gain construction access onto the railway via a small existing compound off Strand Court but this is already a busy zone and would need to be carefully coordinated with various third parties.

The nearest road link of regional importance is the R106 Swords Road which joins the M1 to the west via the R132 and R125.


**Figure 10-5: Construction compound for works around Malahide Station (Source: OSI Aerial Imagery)**

## 10.4 Permanent and Temporary Land Requirements

The design development has sought to minimise the requirement for permanent land take in this area. Any permanent acquisition along the eastern boundary with the Malahide Wastewater Treatment Plant would require additional third party land take to mitigate replacement of key existing buildings within the site. Works to replace these buildings is also considered highly disruptive and therefore has been avoided.

The Preferred Options for the location of proposed construction compounds in the vicinity of the Malahide turnback works are on lands in third party ownership and temporary land acquisition from the Malahide Marina for the duration of the works will be required.

The Preferred Option will require construction of a new retaining wall along the eastern boundary with the Malahide Wastewater Treatment Plant access road, which will also require realignment over a short section. As a result the access road will be unavailable during these construction works and temporary access to the Wastewater Treatment Plant is proposed through the existing Marina Village Road. This may require the temporary acquisition of lands within Malahide Marina Village.

# 11. WORKS AROUND DROGHEDA MACBRIDE STATION

This section provides an outline of the assessment undertaken at Drogheda MacBride Station and the design development since PC1.

## 11.1 Context

Drogheda MacBride Station is located on the Northern Line, south-east of Drogheda town centre. The station is located to the east of Dublin Road (R132) and south of the River Boyne. The station consists of three platforms: Platform 1 on the Down Main line, Platform 2 on the Up Main line and Platform 3 on a spur. There is an existing earth bund next to the depot maintenance building.

Drogheda depot is located to the east of the station and directly to the north-west of the depot is Underbridge UBB82 (Boyne Viaduct). The Drogheda freight sidings connection to the mainline is in close proximity to the depot mainline connection.

The lands along the eastern and north-eastern boundaries of the station generally comprise of undeveloped lands which consist of a pitch and putt club, farmland and two dwellings. There have been recent proposals to develop the farmland for housing development.

Road access to the depot is through the road underpass at the northern end of the depot. A secondary restricted access to the depot is along Railway Terrace via overbridge OBB80/80A/80B. Pedestrian access is available to the depot building from the station via two pedestrian overbridges (OBB81 and OBB81C).

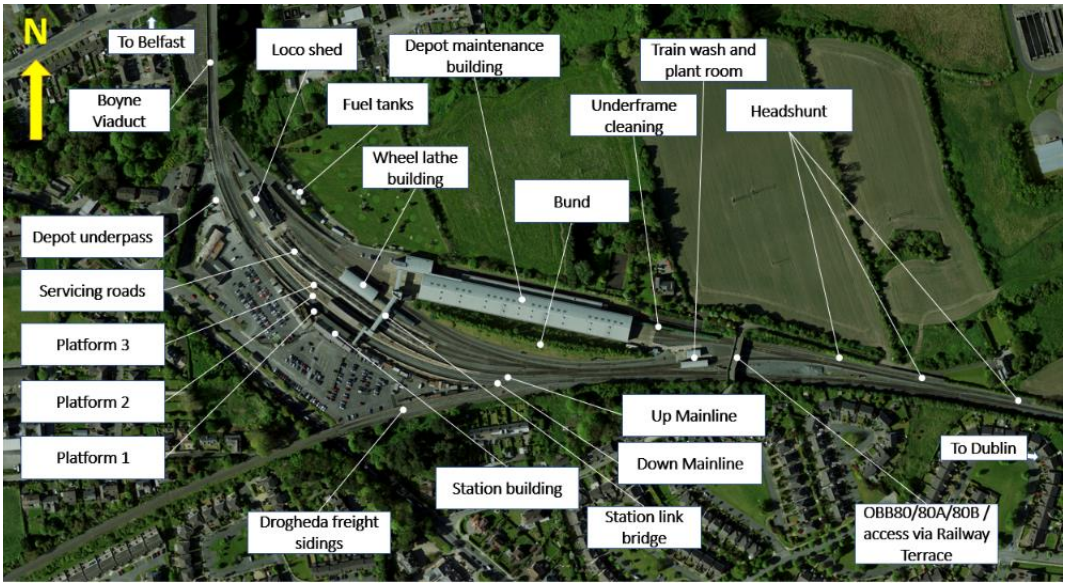



**Figure 11-1: Drogheda MacBride Station Existing Arrangement (Source: OSI aerial mapping)**

## 11.2 Review of Public Consultation No. 1 Feedback, Design Development and Preferred Option

The project team has analysed the submissions and considered all relevant information in the re-evaluation and further development of the design options for this section, leading to the selection of the Preferred Option.

The Preferred Option Station is as presented at PC1 but has been further developed, which involves providing a new single platform on the Drogheda freight sidings. This new platform will extend over the Dublin Road Underbridge (UKB1), necessitating widening of the bridge. The platform will be interconnected with the existing platform 1 which will be modified to allow for pedestrian movement to the new platform. In turn this option requires existing track realignment towards the south of the site which allows for a turnback facility. With the introduction of a new platform, the installation of ticketing gates, CCTV, protected waiting areas, fencing and rearranged parking areas will also take place.

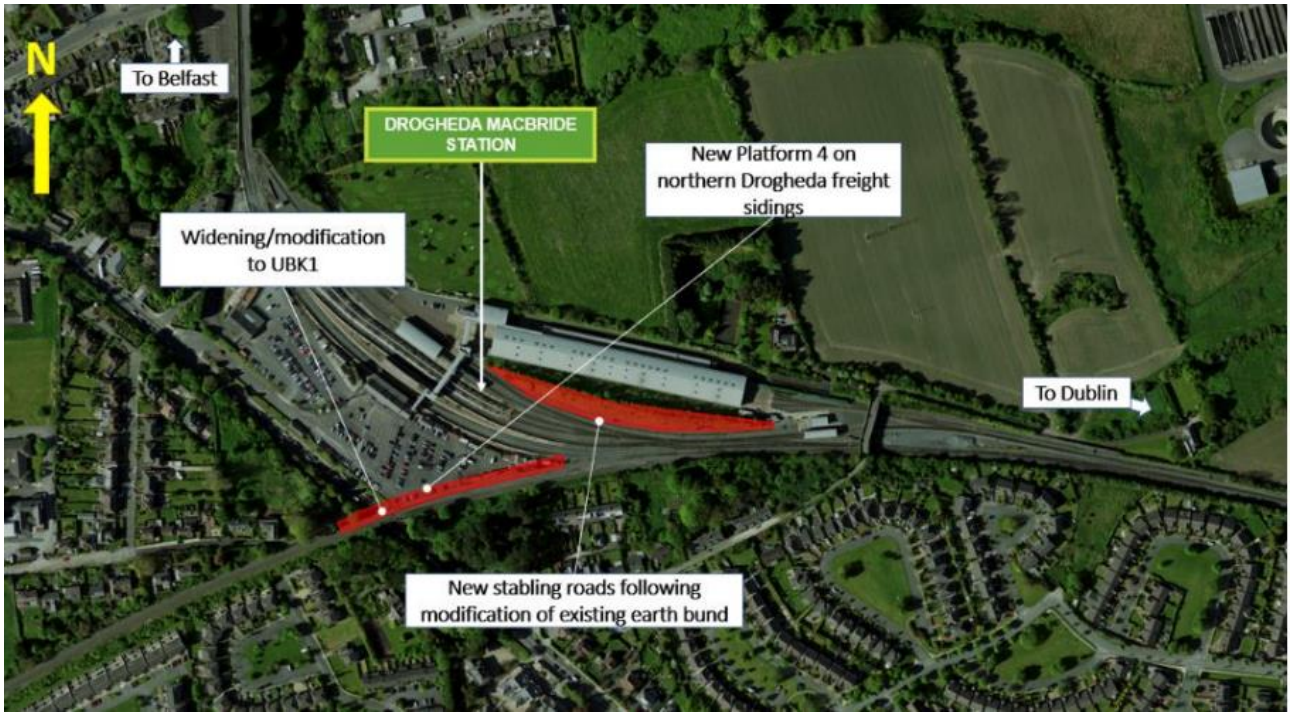



**Figure 11-2 Preferred Option (note new stabling road covered in Section 6 Depot Works)**

In terms of train stabling, the existing Drogheda freight siding and a new stabling track, located adjacent to the depot, will be utilised. The new stabling track will require works to the existing landscape bund. Refer to Section 6 for further details.

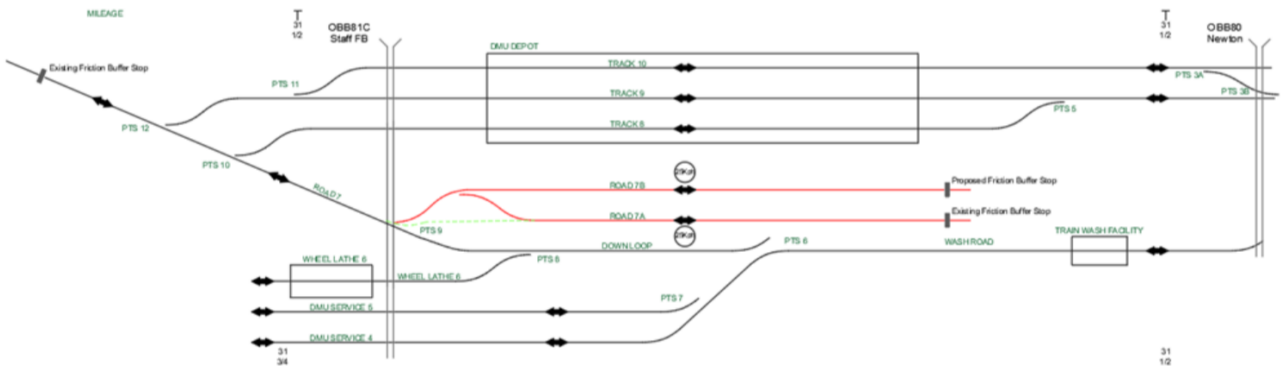



**Figure 11-3 Drogheda McBride Station, Proposed Stabling Track Scheme**

The Preferred Option at Drogheda MacBride Station requires the widening of the Dublin Road Bridge to facilitate a shift of the tracks to the south and inclusion of an extension of the existing platform on the northern side of the tracks above the Dublin Road Bridge.

The following options were considered:

- Support the new superstructure on the existing abutments and build an extension to the abutment to support the widened deck;
- Retain the existing abutment and support the new superstructure on a piled foundation set back from the existing abutment;
- Demolish and reconstruct the bridge.

It is proposed to retain the existing masonry abutments and construct an abutment extension to the south of the bridge parallel to the existing road (Option 1 listed above). The proposed structure will maintain the existing road cross section beneath the bridge with the existing vertical and horizontal clearances retained. This option limits the extent of foundation works to be carried out and minimises disruptions to rail services during construction.

**Figure 11-4 Elevation of Dublin Road Bridge (UBK01)**

The existing steel bridge superstructure will be replaced with a wider concrete bridge superstructure and rail platform supported on the existing and extended abutment. The structure will utilise concrete trough sections for the rail supporting structure. The rail platform will run parallel to the bridge supported on concrete beams with a concrete slab on top.

Refer to ***Annex 3.3*** for further information, including supporting drawings.

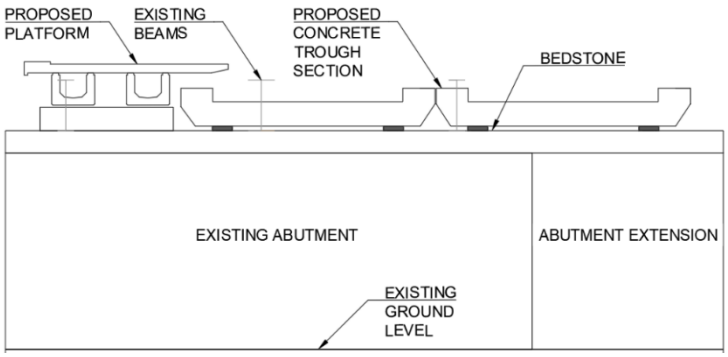



**Figure 11-5 Cross section of proposed abutment arrangement**

There are works on the Drogheda Station canopies, which exist on Platform 1, to ensure there are no clashes with the proposed OHLE. Further information can be found in Section 5.9.

## 11.3 Construction

### 11.3.1 Construction Methodology

The turnback works will be undertaken within the context of the overall new platform works planned for Drogheda Station, which entails not only trackwork and platform works but the installation of ticketing gates, CCTV, protected waiting areas, fencing and rearranged parking areas. The track works are most likely to be undertaken during weekend possessions, to be scheduled to suit other project works and railway maintenance activities. The southern-most track would be slewed first, the first part of this needing a new retaining wall built further into the slope which needs prior removal of the previously installed BEMU walkway, cable trough and retaining wall. Once the new wall is in place new ballast, sleepers and track can be laid along with cable trough and walkway.

Note that the Dublin Road Bridge works need to be coordinated with these track works, as the modified bridge needs to be able to receive the new track alignment. The new platform would then be built, and the second track slewed across. Ideally the raised concourse area alongside will have been completed and all systems commissioned by the time the second track has been passed ready to open to the public. The railway bridge over the R132 Dublin Road, as shown in Figure 11-6 is to be replaced in a two phased process. A new span with one track is to be added to the south first, the southern-most track slewed onto it and then the existing bridge will be demolished and a new deck built in its place with a new track.


**Figure 11-6 Dublin Road Bridge (UKB1)**

The proposed construction methodology for the bridge is as follows:

- Phase 1: New southern foundations. To construct the new southern piles, it will likely be most efficient to do so from road level; the alternative would be to temporarily form a piling platform at top of existing retaining wall level 1 to 2m above road level. If piling the southern piles from road level, some sheet piles will first need to be driven into the existing batter to retain the higher ground whilst the piles are constructed. The space required for piling will likely require a full closure of the Dublin Road, though this could be constrained to weekend working if need be. Likewise, the railway will likely need to be possessed during piling due to the proximity to the bridge which supports the railway. Once the southern piles have been constructed, either side of the road, one lane of the Dublin Road could be reopened whilst pile caps are formed first on one side and then the other. Abutment extension walls and new wing walls would then also be constructed, using construction plant predominantly based at road level. Trains will be able to run during most of this period.
- Phase 2: Relocate southern tracks. Once the abutments needed to support the new southern tracks have been constructed, a capping beam can be constructed on top of each, with couplers in the northern ends for their future extension. Bearings can then be placed followed by the precast concrete superstructure . Once suitably cured, and the railway track can be added along with guardrails, walkway and ductwork. In tandem with this, the southern track either side of the railway bridge will need to be realigned, starting with earthworks, so that the new southern alignment can be opened as soon as possible. Meantime all trains will have needed to pass along the northern track.

  Phase 3: Relocate northern tracks. Once the southern tracks have been opened, the northern tracks can be closed, removed and the remaining original bridge beams taken down. This latter operation will need full possession of the Dublin Road and the southern tracks too, anticipated to be over a weekend. The formation of the capping beam, using couplers to join with the earlier southern section of the beams, will need a suitably long blockade of the railway to allow the concrete to cure before trains can run again on the southern tracks (at least one week is envisaged, depending on concrete design). Once the abutment beams are suitably cured, bearings will be placed followed by the precast beams which will include additional ones to support the platform alongside. The northern side of the bridge will then be completed in a similar way to the southern side, with the added work of including the platform. Trackworks will also be happening either side of the bridge to align the full route. When suitably tested and commissioned, the new northern track can open to trains and the worksite areas will be demobilised.

### 11.3.2 Construction Compound

The temporary worksite compound needed to undertake the works described in this section is anticipated to be located within Drogheda Station car park, on CIÉ owned land. Note the construction will be carried out in phases and therefore the size of the construction compound will vary throughout the construction. An additional temporary area of land on the west side of the bridge will also be temporarily needed, to enable access to the bridge extension works.

The nearest road link of strategic importance in this area is the R132 which connects with the M1 in the south, avoiding routing construction traffic through the centre of Drogheda. Clearance under UBK1 is 4.78m and hence any traffic needing greater clearance would need to access the site from the M1 in the west via Donore Road and the R132. It is likely that the R132 Dublin Road will need to

have traffic lane restrictions, possibly under traffic light control, for some of the duration of the bridge works.


**Figure 11-7: Drogheda construction compounds (Source: OSI aerial imagery)**

## 11.4 Permanent and Temporary Land Requirements

The majority of works can be accommodated within the existing rail corridor. The location of the construction compound is also within the CIÉ land boundary. Construction compounds relevant to the Drogheda Depot works, bridge reconstruction works for OBB080, and McGraths Lane are on lands in third party ownership and temporary land acquisition for the duration of the works will be required.

# 12. NEXT STEPS

## 12.1 Further Design Development & Option Selection

The option selection and design development that has been undertaken has led to the development of the 'Preferred Option' which is the focus of this public consultation stage. Once the public consultation process is complete, all feedback and submissions received will be reviewed and assessed as part of the finalisation of the design. Following a full appraisal of the feedback, a public Consultation No. 2 Findings Report will be prepared and published.

Following PC2, all information gathered by the project team will be used to inform the design development of the project, as well as the Environmental Impact Assessment Report (EIAR) and Appropriate Assessment (AA) documentation and ultimately the Railway Order application which will be submitted to An Bord Pleanála.

Public feedback will be accepted during all stages of the design development and can be submitted through the project website, e-mail address, phone-line or by written correspondence.

## 12.2 The Railway Order Process

The Railway Order application process is set out in the Transport (Railway Infrastructure) Act 2001 (as amended) and the application will be submitted to An Bord Pleanála (ABP) for statutory approval. An Environmental Impact Assessment Report (EIAR) will accompany the Railway Order Application. This will detail the nature and extent of the proposed project and identify and describe the impacts on the environment. It will also detail measures that will be taken to avoid, reduce and/or monitor these impacts. Following the submission of the Railway Order application to An Bord Pleanála, the public are invited, through public notices, to make submissions which will be duly considered by An Bord Pleanála as part of the decision-making process.

An Bord Pleanála may conduct an oral hearing, to allow the public to provide further participation in the decision-making process for this Project. At an oral hearing, the Iarnród Éireann project team will provide responses to submissions and will be available for questioning. Any person or body may make a submission or observation in writing to the Board in relation to the Railway Order application, including the EIAR and the Compulsory Purchase land requirements.