DART+ South West

Option Selection Report

Volume 1: Preferred Option Report

November 2021

NTA
Údarás Náisiúnta Iompair
National Transport Authority

Rialtas na hÉireann
Government of Ireland

Tionscadal Éireann
Project Ireland
2040

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Glossary of Terms

Reference	Description
ABP	An Bord Pleanála
ACA	Architectural Conservation Area
AOD	Above Ordnance Datum
APIS	Authorisation for Placing in Service
ASA	Application for Safety Approval
AsBo	Assessment Body
ASPSC	Application Specific Project Safety Case
ATP	Automatic Train Protection
CAF	Common Appraisal Framework
Cantilever	OHLE structure comprising horizontal or near horizontal members supporting the catenary projecting from a single mast on one side of the track.
Catenary	The longitudinal wire that supports the contact wire.
CAWS	Continuous Automatic Warning System
CBI	Computer-Based Interlocking
CCE	Chief Civils Engineers Department of IE
CCRP	City Centre Re-signalling Project
CCTV	Closed Circuit Television
CDP	County Development Plan
CIE	Córas Iompair Éireann
CSS	Construction Support Sites also interchangeable with Construction Compounds
Contact wire	Carriers the electricity which is supplied to the train by its pantograph.
CPO	Compulsory Purchase Order
Cross overs	A set of railway parts at the crossing of several tracks which helps trains change tracks to other directions.
CRR	Commission for Rail Regulation (formerly RSC – Railway Safety Commission)

Reference	Description
CSM RA	Common Safety Method for Risk Evaluation and Assessment
CSS	Construction Support Site, interchangeable with Construction Compound
CTC	Central Traffic Control
Cutting	A railway in cutting means the rail level is below the surrounding ground level.
D&B	Design & Build (contractor)
DART	Dublin Area Rapid Transit (IÉ's Electrified Network)
DART+	DART Expansion Programme
DeBo	Designated Body
DC	Direct Current. Electrical current that flows in one direction, like that from a battery.
DCC	Dublin City Council
DRR	Design Review Report
DSR	Design Statement Report
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EIS	Environmental Impact Statement
Electrification	Electrification is the term used in supplying electric power to the train fleet without the use of an on-board prime mover or local fuel supply.
EMC	Electromagnetic Compatibility
EMU	Electric Multiple Unit (DART train)
EN	European Engineering Standard
EPA	Environmental Protection Agency
EPO	Emerging Preferred Option
ERTMS	European Rail Traffic Management System
ESB	Electricity Supply Board
Four-tracking	Four-tracking is a railway line consisting of four parallel tracks with two tracks used in each direction. Four-track railways can handle large amounts of traffic and are often used on busy routes.
FRS	Functional Requirements Specification

Reference	Description
FSP	Final Supply Points
GDA	Greater Dublin Area
GI	Ground Investigation
HAZID	Hazard Identification
Horizontal Clearance	The horizontal distance between a bridge support and the nearest railway track is referred to as horizontal clearance. Bridge supports include abutments (at the ends of the bridge) and piers (at intermediate locations).
HV	High Voltage
IA	Independent Assessor
IÉ	Iarnród Éireann
IM	Infrastructure Manager (IÉ)
IMSAP	Infrastructure Manager Safety Approval Panel
Insulators	Components that separate electricity live parts of the OHLE from other structural elements and the earth. Traditionally ceramic, today they are often synthetic materials.
KCC	Kildare County Council
Lateral Clearance	Clearances between trains and structures.
LCA	Landscape Character Area
Mast	Trackside column, normally steel that supports the OHLE.
MCA	Multi-criteria Analysis
MDC	Multi-disciplinary Consultant
MEP	Mechanical electrical and plumbing
MFD	Major Feeding Diagram
MMDC	Maynooth Multi-disciplinary Consultant
MV	Medium Voltage
NDC	National Biodiversity Data Centre
NIAH	National Inventory of Architectural Heritage
NoBo	Notified Body
NTA	National Transport Authority

Reference	Description
OHLE	Overhead Line Equipment
Overbridge (OB)	A bridge that allows traffic to pass over a road, river, railway etc.
P&C	Points and Crossings. Arrangements provided in a railway track to divert a train between lines.
Pantograph	The device on top of the train that collects electric current from the contact wire to power the train.
PC	Public Consultation
Permanent Way	A term used to describe the track or railway corridor and includes all ancillary installations such as rails, sleepers, ballast as well as lineside retaining walls, fencing and signage.
POAP	Plan-On-A-Page, high-level emerging programme
PPT	Phoenix Park Tunnel
PRS	Project Requirement Specification
PSCS	Project Supervisor Construction Stage
PSDP	Project Supervisor Design Process
PSP	Primary Supply Points
QA/QC	Quality Assurance/Quality Control
RAM	Reliability, Availability, Maintainability
RC	Reinforced Concrete
Re-signalling	Re-signalling of train lines will regulate the sage movement of trains and increase the capacity of train services along the route.
RMP	Record of Monuments and Places
RO	Railway Order
RPS	Record of Protected Structures
RSC-G	Railway Safety Commission Guideline
RU	Railway Undertaking (IÉ)
SAM	Safety Assurance Manager
SAP	Safety Approval Panel
SDCC	South Dublin County Council
SDZ	Strategic Development Zone

Reference	Description
SET	Signalling, Electrical and Telecommunications
Sidings	A siding is a short stretch of railway track used to store rolling stock or enable trains on the same line to pass
SMR	Sites and Monuments Records
SMS	IÉ Safety Management System
STC	Single Track Cantilever
TII	Transport Infrastructure Ireland
TMS	Train Management System
TPH	Trains per Hour
TPHPD	Trains per Hour per Direction
TPS	Train Protection System
Track Alignment	Refers to the direction and position given to the centre line of the railway track on the ground in the horizontal and vertical planes. Horizontal alignment means the direction of the railway track in the plan including the straight path and the curves it follows.
TSI	Technical Specifications for Interoperability
TSS	Train Service Specification
TTAJV	TYPSA, TUC RAIL and ATKINS Design Joint Venture (also referred to as TTA)
TTC	Two Track Cantilever
Underbridge (UB)	A bridge that allows traffic to pass under a road, river, railway etc. The underneath of a bridge.
VDC	Direct Current Voltage
Vertical Clearance	For overbridges, an adequate vertical distance between railway tracks and the underside of the bridge deck (soffit) must be provided in order to safely accommodate the rail vehicles and the OHLE. This distance is known as vertical clearance and it is measured from the highest rail level.
WFD	Water Framework Directive

Executive Summary

This document is Volume 1 of four volumes of the Option Selection Report (OSR) for the DART+ South West Project prepared to support the second stage of non-statutory public consultation. Volume 1 of the OSR presents the following:

- Introductory description of the DART+ Programme and the DART+ South West Project;
- High level description of the public consultation process and the outcome of non-statutory Public Consultation No.1;
- Description of the options selection process; and
- Description of the Preferred Option for the DART+ South West Project.

The DART+ Programme is a transformative railway investment programme that will modernise and improve the existing rail services in the Greater Dublin Area. It will provide a sustainable, electrified, reliable and more frequent rail service, improving capacity on rail corridors serving Dublin.

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

The DART+ South West Project will increase passenger capacity from the current peak capacity of approximately 5,000 passengers per hour per direction to approximately 20,000 passengers per hour per direction and increase train frequency.

The key elements of the DART+ South West Project include:

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

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

This report forms part of the documentation published for the second stage of non-statutory public consultation. On completion of the non-statutory public consultation, the submissions from the public will be considered in the further development of the design of the Preferred Option.

1. Introduction to DART+ Programme

The current electrified DART network is 50km long, extending from Malahide / Howth to Bray / Greystones. The DART+ Programme will increase the length of the DART network to 150km of railway corridor through the electrification and upgrade of existing lines transforming commuter train travel in the Greater Dublin Area. This modernisation includes the electrification, re-signalling, and certain interventions to remove constraints across the four main rail corridors, as per below:

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

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

The Programme has also been prioritised as part of Project Ireland 2040 and the National Development Plan 2021-2030 as it is integral to the provision of an integrated, high-quality public transport system.

The DART+ Programme will seek to maximise use of the existing railway corridors and implement a modernisation programme to achieve the capacity increase necessary to meet current and future demands.

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

1.1. DART+ Programme Objectives

The DART+ Programme's primary objective is to support urban compact growth and contribute to reducing transport congestion and emissions in the Dublin region by enhancing the heavy rail network between Dublin City Centre and the areas of Drogheda, Maynooth, Dunboyne, Celbridge and Greystones, providing a sustainable, safe, efficient, integrated, and accessible public transport service along these corridors.

Sub-objectives of the DART+ Programme include the following:

- Cater for existing heavy rail travel demand and support long-term patronage growth along established rail corridors in the Greater Dublin Area 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 Greater Dublin Area, for present and future generations, through the provision of a higher capacity heavy rail network.
- 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 Greater Dublin Area and which supports the advancement of Ireland's transition to a low emissions transport system and delivery of Ireland's emission reduction targets.
- Provide a higher standard of customer experience including provision of clean, safe, modern vehicles and a reliable and punctual service with regulated and integrated fares.

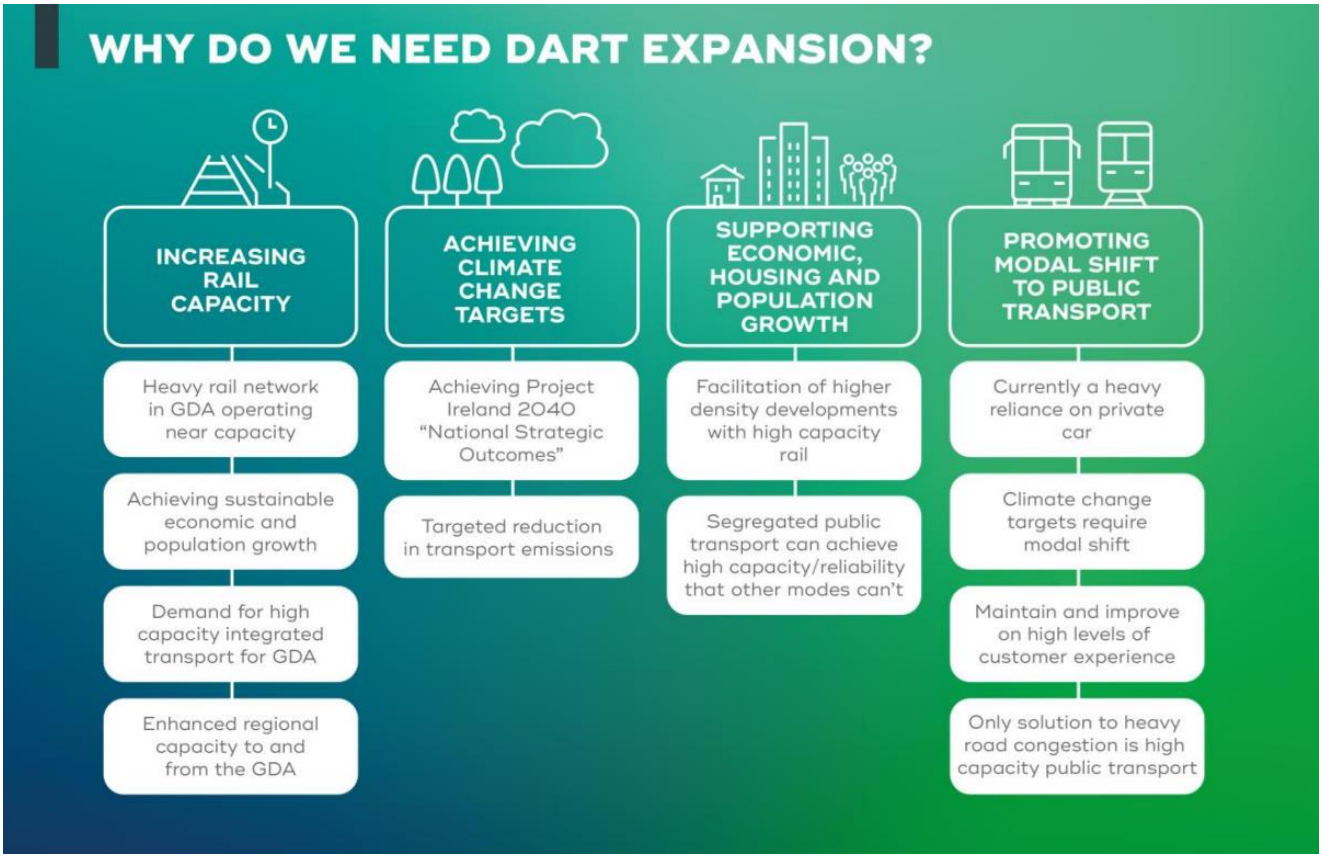

Figure 1-1 Why the DART+ Programme is Needed

1.2. DART+ South West Overview

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

DART+ South West will complete four-tracking between Park West & Cherry Orchard Station and Heuston Station, in addition to re-signalling and electrification of the entire route. The completion of the four-tracking will remove a significant existing constraint on the line (i.e. where the rail corridor reduces to two tracks), which is

currently limiting the number of train services that can operate on this route. DART+ South West will also deliver track improvements along the Phoenix Park Tunnel Branch Line, which will allow a greater number of trains to access the city centre.

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

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

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

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

Alleviate road congestion.

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

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

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

Improve journey time reliability.

The key elements of the DART+ South West Project include:

- Completion of four-tracking from Park West & Cherry Orchard Station to Heuston Station, extending the works completed on the route in 2009.
- Electrification of the line from Hazelhatch & Celbridge Station to Heuston Station and also from Heuston Station to Glasnevin Junction, via the Phoenix Park Tunnel Branch Line, where it will link with proposed DART+ West.
- Undertaking improvements / reconstructions of bridges to achieve vertical and horizontal clearances.
- Remove rail constraints along the Phoenix Park Tunnel Branch Line.

- Delivery of a new Heuston West Station.

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

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

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

Figure 1-2 DART+ South West Route Map

2. Purpose of Report

The preliminary options selection and early design development for the DART+ South West Project (the 'Project') was presented during the first round of public consultations (Public Consultation No. 1 (PC1)) held between 12th May 2021 and 23rd June 2021. During this time, a Preliminary Option Selection Report (POSR) was published which identified an 'Emerging Preferred Option'. This report presented the early Project design work undertaken at that stage of design development. It should be noted that this document was preliminary and has now been superseded by this current Option Selection Report (OSR). The OSR reflects consideration of the feedback received at PC1, information received from surveys and investigations, and further design development.

The OSR identifies the key constraints relevant to the various components of the Project within the respective study areas, to develop feasible options for each aspect and documents the optioneering process leading to the selection of the 'Preferred Option' for the DART+ South West Project.

2.1. Structure of Report

This OSR and related material is presented in four volumes, in a manner consistent with how it is presented on the DART+ Programme website:

- **Option Selection Report – Volume 1: Preferred Option Report** (this Report) presents a summary of the Preferred Option 'end-to-end' following the optioneering process and the public consultation process. The Preferred Option is also presented in a series of General Schematic Layouts (refer to **Table 2-1** for details).
- **Option Selection Report – Volume 2: Technical Report** contains the technical detail, supporting information, assessments and recommendations identifying the Preferred Option for the Project.
- **Option Selection Report – Volume 3: Option Selection Reports by Area and Drawings** contains additional technical information focusing of sections of the railway infrastructure moving consecutively from west to east. It builds on the information presented in Annex 3: Technical Reports presented at PC1. Refer to **Table 2-2**.
- **Option Selection Report – Volume 4:** contains several key background reports that provide the policy context, objectives, and requirements for the DART+ Programme and for the DART+ South West Project. Many are publicly available documents. Other documents include previous technical studies undertaken and base options considered which have helped to underpin the specific technical and infrastructural requirements of the project. Links to these documents are provided. Refer to **Table 2-3.**

Table 2-1 OSR Volume 1: Preferred Option General Arrangement Drawings

No	Title	Area Covered by the Map
1.1	Preferred Option – Schematic Layout (Sheet 1 of 17)	Hazelhatch (Limit of DART+ South West Project)
1.2	Preferred Option – Schematic Layout (Sheet 2 of 17)	Hazelhatch Station and surrounds
1.3	Preferred Option – Schematic Layout (Sheet 3 of 17)	West of Tubber Lane Road / Stacumny Bridge

No	Title	Area Covered by the Map
1.4	Preferred Option – Schematic Layout (Sheet 4 of 17)	Stacumny Lane and surrounds
1.5	Preferred Option – Schematic Layout (Sheet 5 of 17)	Adamstown Station and surrounds
1.6	Preferred Option – Schematic Layout (Sheet 6 of 17)	Adamstown to Griffeen Valley Park and surrounds
1.7	Preferred Option – Schematic Layout (Sheet 7 of 17)	Tullyhall and Kishoge Station
1.8	Preferred Option – Schematic Layout (Sheet 8 of 17)	Clondalkin / Fonthill Station and surrounds
1.9	Preferred Option – Schematic Layout (Sheet 9 of 17)	Ninth Lock Road, Cloverhill Road and Station Road
1.10	Preferred Option – Schematic Layout (Sheet 10 of 17)	M50 and Park West
1.11	Preferred Option – Schematic Layout (Sheet 11 of 17)	Cherry Orchard to Kylemore Road Bridge
1.12	Preferred Option – Schematic Layout (Sheet 12 of 17)	Kylemore to Inchicore Works
1.13	Preferred Option – Schematic Layout (Sheet 13 of 17)	Sarsfield Road to South Circular Road
1.14	Preferred Option – Schematic Layout (Sheet 14 of 17)	St Johns Road (Islandbridge) to Phoenix Park Tunnel (including Heuston Station)
1.15	Preferred Option – Schematic Layout (Sheet 15 of 17)	Phoenix Park to McKee Barracks Bridge
1.16	Preferred Option – Schematic Layout (Sheet 16 of 17)	McKee Barracks Bridge to Cabra Road Bridge
1.17	Preferred Option – Schematic Layout (Sheet 17 of 17)	North of Cabra Road Bridge to Glasnevin Junction

Table 2-2 OSR Volume 3: Option Selection Reports by Area

Volume Ref.	Option Selection – Report, Drawings and Appendices
Volume 3A	Option Selection – Hazelhatch to Park West - Report, Drawings and Appendices
Volume 3B	Option Selection – Park West to Le Fanu Bridge – Report, Drawings and Appendices
Volume 3C	Option Selection – Le Fanu to Kylemore Bridge - Report, Drawings and Appendices
Volume 3D	Option Selection – Kylemore to Sarsfield Road (including Inchicore Works and Khyber Pass Footbridge) – Report, Drawings and Appendices
Volume 3E	Option Selection – Sarsfield Road Bridge to Memorial Road - Report, Drawings and Appendices
Volume 3F	Option Selection – Memorial Road - Report, Drawings and Appendices
Volume 3G	Option Selection – Memorial Road to South Circular Road Junction – Report, Drawings and Appendices
Volume 3H	Option Selection – Heuston Station and Yard - Report, Drawings and Appendices
Volume 3I	Option Selection – Heuston West Station – Report, Drawings and Appendices

Volume Ref.	Option Selection – Report, Drawings and Appendices
Volume 3J	Option Selection – East of St. John's Road Bridge (Islandbridge) to East of the Phoenix Park Tunnel – Report, Drawings and Appendices
Volume 3K	Option Selection – East of the Phoenix Park to Glasnevin Junction – Report, Drawings and Appendices

Table 2-3 OSR Volume 4: Annexes

Volume Ref	Title	Detail
Volume 4.1	Public Consultation No. 1 - Consultation Findings Report	
Volume 4.2	Policy Context	This presents a detailed up-to-date review of the European, National, Regional, and Local policy context for the DART+ Programme and the DART+ South West Project.
Volume 4.3	Strategic Need Report	Background Studies of relevance to the Project.
Volume 4.4	Constraints Report and Drawings	Appendix A: Planning Application Monitor Appendix B: Heritage Memo Appendix C: Constraints Mapping - Population Constraints Appendix D: Constraints Mapping - My Plan Zones Appendix E: Constraints Mapping - Round 3 Rail Noise Lden Appendix F: Constraints Mapping - Biodiversity Constraints Appendix G: Constraints Mapping - Landscape Constraints Appendix H: Constraints Mapping - Cultural Heritage Constraints Appendix I: Constraints Mapping - Soils and Geology Constraints Appendix J: Constraints Mapping - Hydrogeology Constraints Appendix K: Constraints Mapping - Key Utilities and Licensed Facilities
Volume 4.5	Useful Links	A list of links to publicly available documents referred to in this Report.

The principal Project components are set out in volume 2 of the Option Selection Report and are as follows:

- Re-signalling, electrification and telecommunications;
- Overhead line equipment;
- Replacement bridges and structural alterations to existing bridges;
- Linear permanent way works;
- A new station at Heuston West;
- Substations and technical buildings; and

- Construction phase compounds.

The Project can be characterised as one which provides for enhancement of existing railway infrastructure over the 20km length of the scheme with the installation of electrical and signalling technology. A number of discrete elements extend beyond the boundary of the existing railway. Alternatives in respect of many of the linear works vary little from an environmental perspective, and consequently the options assessment for the likes of signalling systems, for example, is largely a technical matter rather than an issue of environmental impact.

While presenting a description of the end-to-end Preferred Option, the OSR has been drafted to focus on those elements for which alternative options manifest, options which are markedly different from one another, and which have varied impact on the local environment. Examples of such include four-tracking, bridge replacements, and options for the location of substations and compounds. It summarises the outcome of the options selection process for the principal elements of the Project.

For the purpose of describing the Preferred Option in this report, general linear works are described first, followed by sections (from west to east) with similar Project requirements and resulting levels of works or interventions, as follows:

- General Linear Works (Chapter 3).
- Hazelhatch & Celbridge Station to Park West & Cherry Orchard Station (Chapter 4).
- Park West & Cherry Orchard Station to Heuston Station (Chapter 5).
- East of St John's Road Bridge (Islandbridge) to Glasnevin Junction (Chapter 6).

The end-to-end preferred route is illustrated in the schematic layouts included in this volume and will assist the reader in understanding the final Preferred Option for the project.

This OSR Volume1 Report provides a statement of the Preferred Option, the selection of which is addressed in detail in the chapters of the OSR Volume 2.

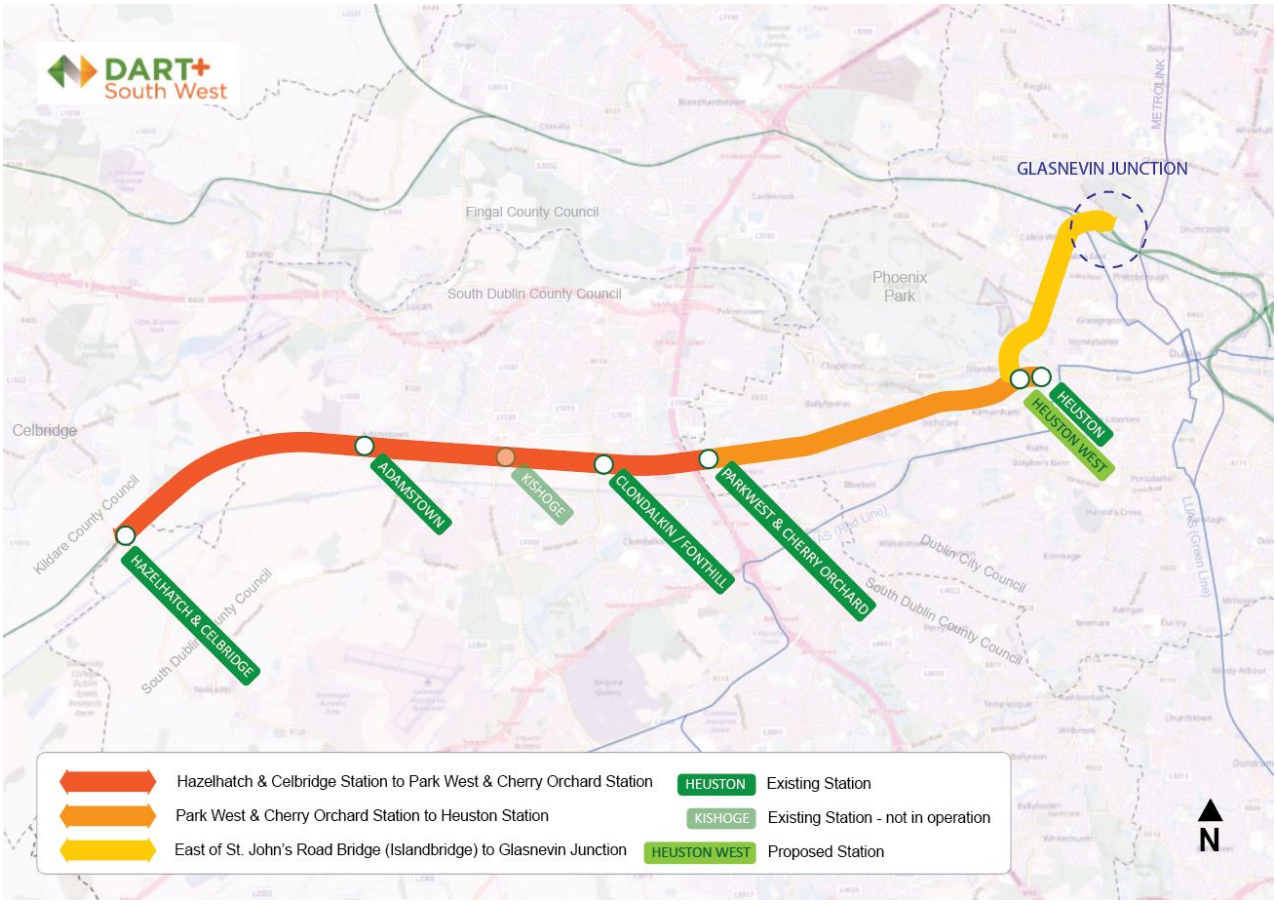

Figure 2-1 Route Section Breakdown

2.2. DART+ South West Public Consultation Process

Stakeholder engagement and consultation during the design process is a key element of the delivery of major infrastructure projects such as the DART+ South West Project. The purpose of public consultation is to:

- Engage the public in the scheme delivery process;
- Inform the public of the statutory process and the likely timescales;
- Seek the public's cooperation and understanding of the project; and
- Capture local knowledge to inform the Environmental Impact Assessment and Railway Order (RO) process.

Public participation is welcomed and encouraged throughout the design development process. However, there will be three main project consultation stages which will provide the opportunity to learn about the design development and provide feedback to inform the next stage as appropriate.

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

- Non-Statutory Public Consultation No. 1 of the Emerging Preferred Option (May 2021).
- Non-Statutory Public Consultation No. 2 of the Preferred Option (current stage).
- Statutory Consultation Period as part of the Railway Order application process (Summer/Autumn 2022).

2.3. Status of Design Presented in this Report

2.3.1. Public Consultation No. 1 – Emerging Preferred Option

Non-Statutory Public Consultation No. 1 (PC1) commenced on 12th May 2021 and ran for 6 weeks until its formal closure on 23rd June 2021. The public were given an additional week up to 30th June 2021 where they could still engage and submit feedback on the 'Emerging Preferred Option' as part of PC1. The purpose of PC1 was to inform the public of the developing design at the 'Emerging Preferred Option' stage for the DART+ South West Project and to request their views.

All submissions received either via post, telephone communication, online form feedback or email were analysed, with issues, comments and suggestions logged and considered by the design teams as appropriate.

In summary, the most prevailing request was for new stations at Naas / Sallins, Ballyfermot, Kylemore, Kilmainham, Heuston West, Cabra and Glasnevin. The lack of connectivity or opportunities for greater connectivity between existing DART+ South West stations, including links between BusConnects and DART, was also raised. Improved pedestrian, cyclist and disabled access approaching and within all stations was also requested.

Other concerns raised throughout PC1 had regard to the project need; Environmental Impact Assessment; Project Benefit; Impact on Cultural and Architectural Heritage, Consultations & Engagement; Design; Policy & Planning; Construction; Electrification; Landownership; Operation Phase / Post Construction; Four-Tracking; and Survey & Site Investigations. Key issues or concerns raised during PC1 are discussed further in the Public Consultation No.1 Findings Report, Volume 4.

A number of issues raised within the submissions are outside the scope of the DART+ South West Project, including new stations at Kylemore and Cabra. All concerns have been noted and passed to the relevant teams within the DART+ Programme who will assess each issue in greater detail. The Project Team has also analysed the submissions and considered all relevant information in re-evaluation and further development of design options leading to the selection of the Preferred Option. Refer to Volume 2 for details.

2.3.2. Development of Preferred Option following Public Consultation No. 1

Having completed Public Consultation No.1, contributions from the public led to a number of design changes which are evident in the preferred option to be presented as part of Public Consultation No.2. The principal changes include the following:

- The inclusion of the new Heuston West Station in the scope of the project to be brought forward for Railway Order (RO).
- Design changes at Inchicore Works to avoid impacting on the structures of architectural/ heritage significance.

In addition, design development has brought forward further locations through the optioneering process relating to the required electrical substations along the route and necessary construction support sites to support the construction phases of the Project. The intervention on the bridges and the alignment for compatibility with future provision for stations have also been further developed

Cognisant of the level of feedback relating to construction and operational environmental impacts, the Project Team have sought to provide additional information relating to the construction methodology so that the public may understand the approach being considered.

2.3.3. Public Consultation No. 2 – The Preferred Option

A period of public and stakeholder consultation and engagement is currently being undertaken on the Preferred Option (presented in this report). As part of the consultation process, the public are being invited to make submissions and observations on the Preferred Option. All submissions will be reviewed, and the initial design of the preferred option will be advanced and further refined and developed in preparation for statutory processes.

The design development of the Preferred Option will inform the preparation of the Environmental Impact Assessment (EIA) and an Appropriate Assessment (AA). This process will culminate with the publication of an Environmental Impact Assessment Report (EIAR) and an Appropriate Assessment Screening Report (and Natura Impact Statement if screened in) that will be submitted as part of documentation required for the Railway Order approvals process.

2.3.4. Statutory Consultations – Railway Order

The Railway Order application process is set out in the Transport (Railway Infrastructure) Act 2001 (as amended and substituted) for a Railway Order. On finalisation of the project design and preparation of the necessary documentation, a Railway Order application will be submitted to An Bord Pleanála for statutory approval. An Environmental Impact Assessment Report (EIAR) will accompany the Railway Order application, and 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.

At the time of the submission of the Railway Order application, an advertisement will be placed in at least one national newspaper to notify the public of the Railway Order application. There will be a period of 6 weeks for submissions to be made to An Bord Pleanála. An Bord Pleanála may decide to hold an Oral Hearing.

2.4. Options Selection Process

This report presents the outcome of the optioneering process which has followed a structured and systematic approach to determine the Preferred Option for the Project in an objective manner. It comprises a two-step process – Stage 1: Preliminary Assessment (Sifting) (long list of options), followed by Stage 2: Multi-Criteria Analysis (feasible options), where appropriate.

The Multi-Criteria Analysis technique is recommended by the *Common Appraisal Framework for Transport Projects and Programmes*, published by the Department of Transport (2020) and provides a coherent mechanism for choosing between options on a comparative basis. Each option is characterised under six principal categories as defined within the *Common Appraisal Framework* and compared on a qualitative basis. The principles of the process apply to all options assessment for the Project. The mechanism allows for an objective approach to be taken in relation to the selection of the most suitable option for the project.

The optioneering process is presented in chapter 4 of Volume 2 of the Option Selection Report, as has the application of the comparative assessment methodology when appraised against the Project Objectives and Requirements. Aspects of the process which are particular to individual elements of the Project are detailed in

each individual chapter of Volume 2 and should be referred to when reviewing the respective options assessment results. More detailed information is presented in Volume 3.

3. General Linear Works End-to-End

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

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

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

There are a number of discrete Project elements, which are required along the full length of the Project, that are addressed in more detail in Chapters 4 to 6, and which include the following

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

3.1. Overhead Electrification Equipment (OHLE)

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

The DART+ Programme will adopt a 1,500V Direct Current (DC) system which provides synergy with the existing DART network with traction power provided to the train by Overhead Line Equipment (OHLE).

Figure 3-1 Sample Existing DART Overhead Line Equipment (OHLE)

3.2. Electrical Substations

The OHLE system will be supplied with electrical power from the ESB distribution network at regular intervals, at locations known as substations. These substations will receive power from the local power distribution network at voltages up to 110 kV AC and transform this into the required 1,500V DC for distribution along the OHLE system. The specific voltage to be adopted will be determined at a later date in discussions with the ESB. The footprint of the substation compound will generally be 50m (length) x 20m (wide). The substation building dimensions will generally be 35 m (length) x 10 m (width) and 6 m (height).

A 'DART System-Wide Power Study' identified that six substations will be required at various locations along the length of the DART+ South West Project to provide power to the network. The location for each of the substations was identified by following a two-step optioneering process: Preliminary Assessment and a Multi-Criteria Analysis (feasible options), where appropriate. This led to the identification of the Preferred Options in respect of each of the required substation locations. Further details in relation to the site selection process are included in the Option Selection Report, Volume 2.

The proposed substation locations along the line are:

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

Figure 3-2 Examples of Substations

3.3. Signalling

In order to achieve the necessary capacity enhancements and performance required for the introduction of DART+ Fleet, it will be necessary to upgrade the existing signalling system. This will include the provision of Signalling Equipment Rooms (SER), Low Voltage Rooms (LVRs) and Relocatable Equipment Buildings (REB)

where required along the route in order to accommodate signalling equipment and associated power supplies and backup.

Figure 3-3 Typical Signalling Infrastructure

3.4. Ancillary Equipment Cabins

Additional infrastructure will be required, including a number of equipment cabins which are required to support the signaling, electrical and telecommunication infrastructure. These will be located within existing Iarnród Éireann land where possible and will be typically in stations where similar cabins are currently evident.

The various cabins required along the works are:

- Signaling Equipment Rooms (SER).
- Principal Supply Points (PSP).
- Telecommunication Equipment Rooms (TER).

The cabins are typically fenced off as they need to be secure.

Figure 3-4 Typical Equipment Cabin

3.5. Permanent Way Requirements

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

- Widening of the railway corridor and completion of four-tracking between Park West & Cherry Orchard Station and Heuston Station.
- Track lowering arising from electrical clearance requirements.
- Improvements, including realignment works, to the Phoenix Park Tunnel Branch Line to support the increased capacity.

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

Specific locations of bridge reconstructions, track lowering and other improvement works are described in Option Selection Report Volume 2.

3.6. Construction Compounds

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

The compounds are required at specific construction sub-sites; they are distributed along the scheme by location specific features. For example, compounds will be required at each of the bridge reconstruction locations, they

will also be required for material processing and storage of construction components. The compounds will be used to support earthworks, enabling works, site clearance, utility diversions work, civil works, the demolition of bridges, OHLE, track installation, signalling and telecoms equipment and all ancillary works.

Further detail in relation to Construction Compounds is set out in Option Selection Report Volume 2.

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

4.1. General Description

This section of the railway extends between Hazelhatch & Celbridge Station and Park West & Cherry Orchard Station. The works carried out under the original Kildare Route Project between 2006 and 2009 provided the main groundwork for the DART+ South West Project, including the installation of the four-track section which commences to the west of Hazelhatch & Celbridge Station where the two running lines diverge into four lines, which continue on through Park West & Cherry Orchard Station. As part of the works, the two northern existing railway lines will be electrified with the installation of overhead electrical equipment.

The line passes through a number of stations including Hazelhatch & Celbridge Station, Adamstown Station, Kishoge Station (not currently in use), Clondalkin / Fonthill and Park West & Cherry Orchard Station. No works are envisaged to these stations as part the Project.

There are also a number of structures on this section of the route, including ten road overbridges and footbridges. A number of these structures were upgraded or replaced as part of the original Kildare Route Project, and the electrification works can therefore be run under the existing bridges with no / minimal intervention to the bridge structures. Only minor localised track lowering works are necessary to achieve the required clearance.

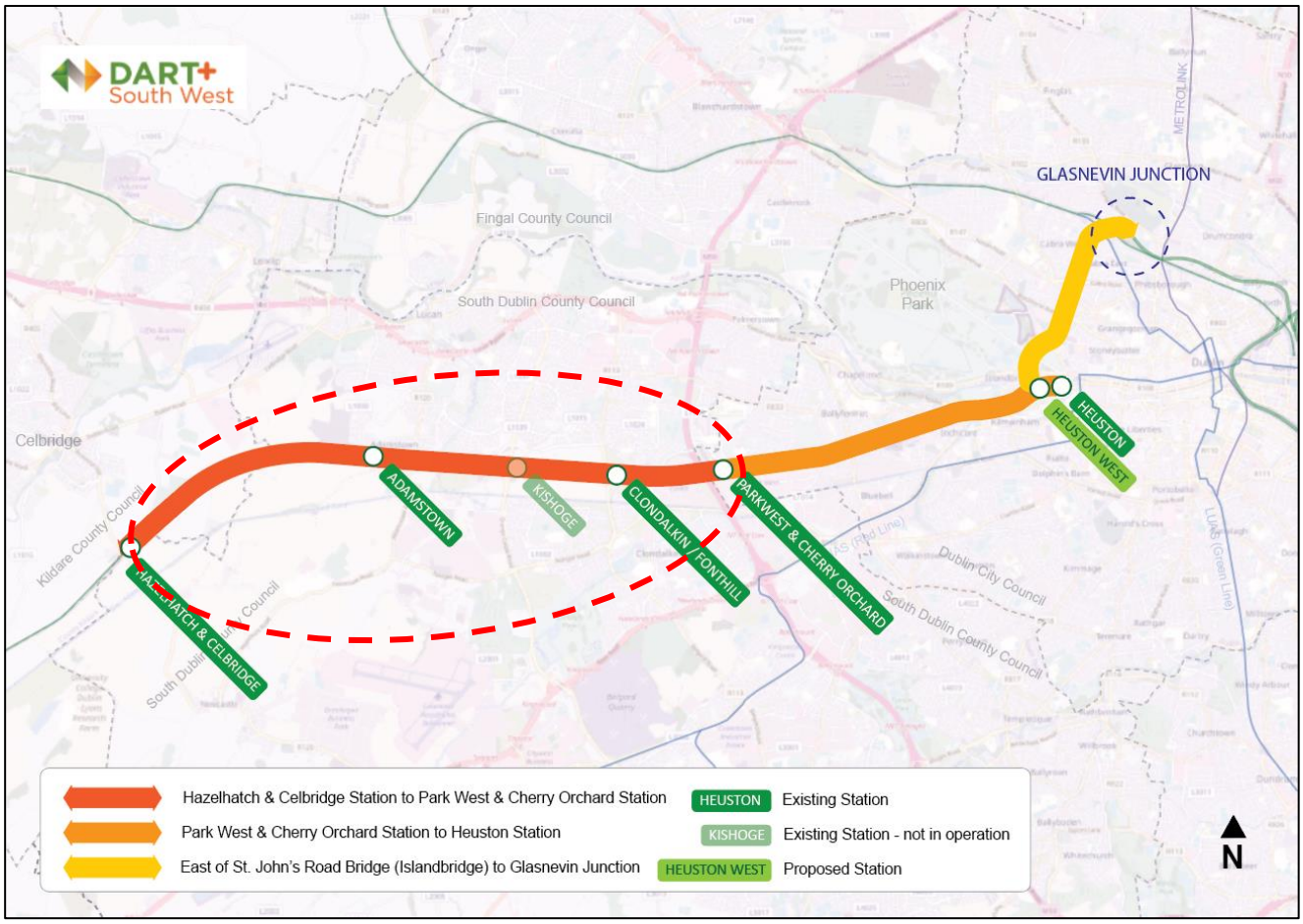

Figure 4-1 Hazelhatch & Celbridge Station to Park West & Cherry Orchard Station

4.2. Permanent Way Requirements

To facilitate the proposed increase in train frequency it is proposed as part of the DART+ South West Project to modify the trackwork with additional crossovers and adjustments to track alignment.

Localised track modifications works are required at Hazelhatch & Celbridge Station to facilitate the proposed DART services. To the west of the station, track modifications include the installation of a new turnback siding (approx. 350m in length, to accommodate 2 no. full length train units). A new crossover on the slow lines will provide access into the siding from both Up and Down directions.

At Adamstown Station the track layout requires modification to meet future operational requirements

The proposed works include the removal of an existing connection into the turnback on the central platform.

The lines continue on from Adamstown and converge with the new four-tracking section to the west of Le Fanu.

4.3. Substations

The Power Study identified the requirement for four new substations on this section of the scheme, at the following locations:

- Hazelhatch.
- Adamstown.
- Kishoge.
- Park West.

Hazelhatch Substation - The Preferred Option for the location of the Hazelhatch Substation is a brownfield site, which includes a disused residential dwelling in the ownership of CIÉ. The site is located adjacent to the Hazelhatch & Celbridge Station carpark and other disused dwellings also owned by CIÉ. It is situated to the east of Hazelhatch & Celbridge Station with direct access to the local road network. As the proposed location is within existing CIÉ land boundaries, no land acquisition is envisaged. Refer to OSR Volume 2 and Volume 3 for detailed consideration of the Hazelhatch Substation.

Figure 4-2 Proposed Location for Hazelhatch Substation

Adamstown Substation - The Preferred Option for the location of the Adamstown Substation is a green field site located to the south of the railway. There is an existing access track that runs adjacent / parallel to the railway providing an established access route between the proposed site and the public road network to the west. The proposed location is within existing CIÉ land boundaries, therefore no land acquisition is envisaged. Refer to OSR Volume 2 and Volume 3 for detailed consideration of the Adamstown Substation.

Figure 4-3 Proposed Location for Adamstown Substation

Kishoge Substation - The Preferred Option for the Kishoge Substation location is to the east of the R136 regional road, on the southern side of Kishoge Station. It is located within the existing station carpark. Access to the road network would be via the carpark entrance. The proposed location is within existing CIÉ land boundaries, therefore no land acquisition is envisaged. Refer to OSR Volume 2 and Volume 3 for detailed consideration of the Kishoge Substation.

Figure 4-4 Proposed Location for Kishoge Substation

Park West Substation - The Preferred Option for the location of the Park West Substation is to the north of the railway and immediately east of the M50 motorway. This is a brownfield site with road access via Park West Avenue to the east. The existing Park West & Cherry Orchard Station is located to the east and existing housing developments in the Cherry Orchard area are located further east of Park West Avenue. The existing ESB 38kV network is located immediately east of Park West Avenue. The proposed location is not within existing CIÉ land boundaries, therefore land acquisition is required. It is noted that the Preferred Option for Park West Substation is coincident with a construction compound (see **Section 4.4**). Refer to OSR volume 2 and volume 3 for detailed consideration of the Park West Substation.

Figure 4-5 Proposed Location for Park West Substation

Detailed consideration of all substations is set out in OSR Volume 2, with locations identified in the drawings that accompany Volume 1 (Annex 1.0 – Preferred Option General Arrangement Drawings).

4.4. Construction Compounds

Two construction compounds are required along this section of the railway corridor, with one required at Hazelhatch and the other at Park West.

A construction compound is required in Hazelhatch for undertaking electrification works along the corridor, in addition to localised works including the installation of new trackwork to facilitate the turnback of trains at the station. The preferred location for the site is on the north side of the corridor on CIÉ property within the existing station car park – a portion of the car park would be utilised for the construction compound, leaving the remainder of the parking for regular users of the station.

Figure 4-6 Proposed Construction Compound Location at Hazelhatch

Another construction compound is required at Park West to facilitate the electrification works and the construction of a new electrical substation. The preferred location is on a brownfield site in third party ownership. Direct road access is via Park West Avenue to the east. The existing Park West & Cherry Orchard Station is located to the east and existing housing developments in the Cherry Orchard area are located further east of Park West Avenue. This area is also the preferred location for a new electrical substation (see **Section 4.3**), it is envisaged that the construction compound will also be used to facilitate the construction of the new electrical substation.

Figure 4-7 Proposed Construction Compound Location at Park West

5. Park West & Cherry Orchard Station to Heuston Station

5.1. General Description

The section from Park West & Cherry Orchard Station to Heuston Station requires electrification and the provision of four tracks. Extending to four tracks in this area requires an increase in the width of the existing rail corridor, potentially interfering with the property rights (on a permanent and / or temporary basis) of third parties bordering the rail corridor. The line runs through a relatively dense urban environment with a mix of residential and commercial properties bordering the rail corridor.

An option selection process has included developing and evaluating a number of options at each key intervention, leading to the Preferred Option being established.

Due to the complexity of the works and number of interventions on this section of the scheme, this section of the line is broken down into the following areas:

- Park West to Le Fanu Road Bridge.
- Le Fanu Road Bridge to Kylemore Road Bridge.
- Kylemore Road Bridge to Sarsfield Road Underbridge (including Inchicore Works).
- Sarsfield Road Underbridge to Memorial Road Bridge.
- Memorial Road Bridge to South Circular Road Junction.
- Heuston Station and Environs.

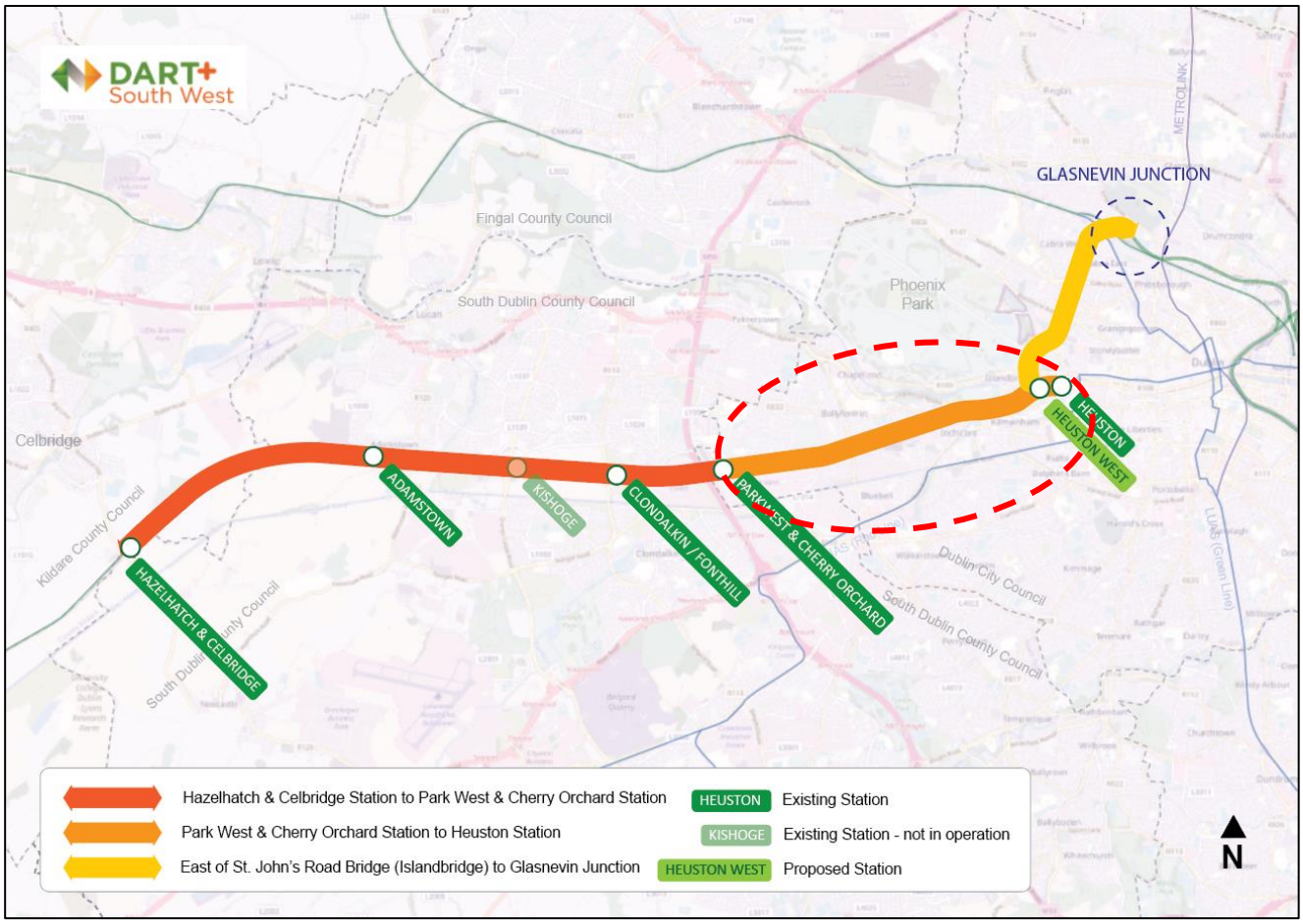

Figure 5-1 Park West & Cherry Orchard Station to Heuston Station

5.2. Park West to Le Fanu Road Bridge

5.2.1. General Description

The rail corridor on the Cork Mainline between Cherry Orchard Footbridge and Le Fanu Road Bridge initially comprises of three existing tracks, which narrow to two existing tracks at Le Fanu Road Bridge. The rail corridor is primarily in cutting (i.e. the rail level is below the surrounding ground level).

There are two overbridges in the area, Cherry Orchard Footbridge, which is a single-span pedestrian overbridge and Le Fanu Road Bridge, which is a single-carriageway road bridge carrying road traffic over the rail corridor in a north-south direction.

Increasing to four tracks requires the realignment of the existing tracks and an increase in the overall railway corridor width. Cherry Orchard Footbridge has sufficient span length and height for both the four tracks and electrification infrastructure. However, Le Fanu Road Bridge is a narrow arch structure and is inadequate in both span length and height for the four tracks and electrification infrastructure.

5.2.2. Permanent Way

The proposed layout realigns the existing two track layout on the south side of the rail corridor to become the fast lines (to facilitate the operation of InterCity services), with two new tracks provided to the north and serving as the electrified slow lines (to facilitate the operation of new DART services). Retaining walls are required to both the north and south sides of the rail corridor as the four-track corridor enters the cutting.

5.2.3. Le Fanu Road Bridge Replacement

The Preferred Option replaces the bridge with a longer span or spans to facilitate the additional width required for the additional tracks. To overcome the lack of height available for the electrification infrastructure, the road level will be raised in combination with lowering the rail track. Retaining walls are required to the north and south of the corridor adjacent to the new bridge to allow the widening of the corridor while minimising the impact on the adjacent properties. The raising of the road level will also mean that retaining walls will be required along the road to the north of the railway.

The proposed replacement bridge will be a modern structure that will provide segregation for pedestrians, cyclists and improved sightlines, and will be a significant improvement on the existing situation for all road users.

The proposed new bridge is presented below in sectional elevation looking east.

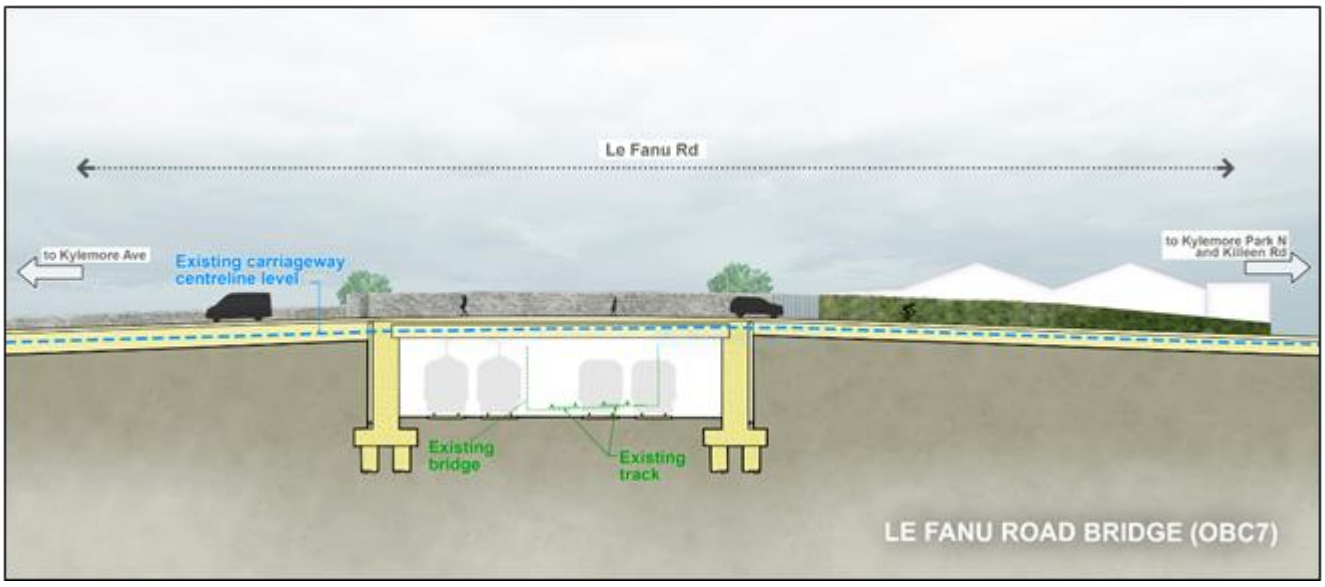

Figure 5-2 Proposal for Le Fanu Road Bridge

5.2.4. Construction Compounds

Three construction compounds are required along this section of the railway corridor.

A small construction compound is proposed at Friel Avenue on the south side of the rail corridor to facilitate access and transfer of materials and plant for the construction of the new retaining wall on the north side of the corridor, west of Le Fanu Road Bridge. The proposed site is currently a green area with direct access to the rail corridor and vehicular access via Friel Avenue. The site is privately owned and would need to be temporarily acquired for the duration of the works.

Figure 5-3 - Proposed Construction Compound Location at Friel Avenue

Another construction compound is proposed for Cherry Orchard Avenue, with works in this area to include the excavation and widening of the rail corridor. To facilitate this work, a suitable construction compound is required for materials processing and to provide the necessary support infrastructure. The preferred construction compound site is located on green space, adjacent to the rail line and Cherry Orchard Avenue. The site would need to be temporarily acquired for the duration of the works.

Figure 5-4 Proposed Construction Compound Location at Cherry Orchard Ave

Construction compounds are required in the vicinity of Le Fanu Road Bridge. One compound is required at this location to facilitate the reconstruction of the bridge, widening of the rail corridor and the construction of new retaining structures. It will comprise four separate elements on each corner of the bridge to provide access to the different work areas and to act as transfer / laydown areas for plant and materials.

Figure 5-5 Proposed Construction Compounds Locations at Le Fanu Road Bridge

This area has also been identified as suitable for the main contractor office and storage area for the Project. The Preferred Option for the construction compound is located on private land within a hardstanding area to the south of the railway corridor. The site is accessed via Friel Avenue. There is also an old access point from Killeen Road which is currently blocked off. The site would need to be temporarily acquired for the duration of the works.

Figure 5-6 Proposed Main Construction Compound at Le Fanu Road Bridge / Killeen Road

5.3. Le Fanu Road Bridge to Kylemore Road Bridge

5.3.1. General Description

This section of the railway comprises two existing tracks and one bridge structure (Kylemore Road Bridge). The bridge does not have adequate span length to fit four tracks and is not high enough for the DART line electrification infrastructure to pass under. There are a number of constraints in this area including:

- The railway corridor is bounded on both sides by soil slopes.
- To the north and south of the bridge are road junctions and access points that significantly restrict the alterations that may be required to the road geometry.
- Kylemore Road is a potential route for a future Luas line. Therefore, the design must consider the potential for this new infrastructure.

- The west of Kylemore Road Bridge has been identified for a potential future railway station (not part of the DART+ South West Project scope). The bridge designs for this area must not prejudice its delivery in the future.

5.3.2. Permanent Way

The proposed layout realigns the existing two track layout on the south side of the rail corridor to become the fast lines, with two new tracks provided to the north, serving as the slow lines, and electrified as part of the DART+ South West Project.

The steep nature of the existing cutting slopes, proximity of the adjacent domestic and industrial properties, and height of the cutting slope to be retained necessitates a retaining wall solution along both the north and south sides of the rail corridor.

Additional minor retaining or earthwork structures may be required at road level surrounding Kylemore Road Bridge to facilitate the proposed road level raising. Further details in relation to these structures will be provided as part of the Railway Order application.

The west of Kylemore Road Bridge has been identified for a potential future railway station (not part of the DART+ South West Project scope). The permanent way designs for this area must not prejudice its delivery in the future.

5.3.3. Kylemore Bridge Replacement

The Preferred Option for Kylemore Road Bridge is for a bridge reconstruction that replaces the existing bridge with a longer span to facilitate the additional track width. To overcome the lack of height available for the electrification infrastructure, the road level will be raised in combination with lowering the rail track. The Preferred Option is designed to include passive provision for a potential future railway station at this location. However, the provision of a railway station at this location is not within the scope of the DART+ South West Project.

Retaining walls are required to the north and south of the corridor to allow the widening of the corridor while minimising the impact on the adjacent properties. The raising of the road level will also mean that retaining walls will be required along the road to the north and south of the railway.

The proposed new bridge is presented below in sectional elevation looking east.

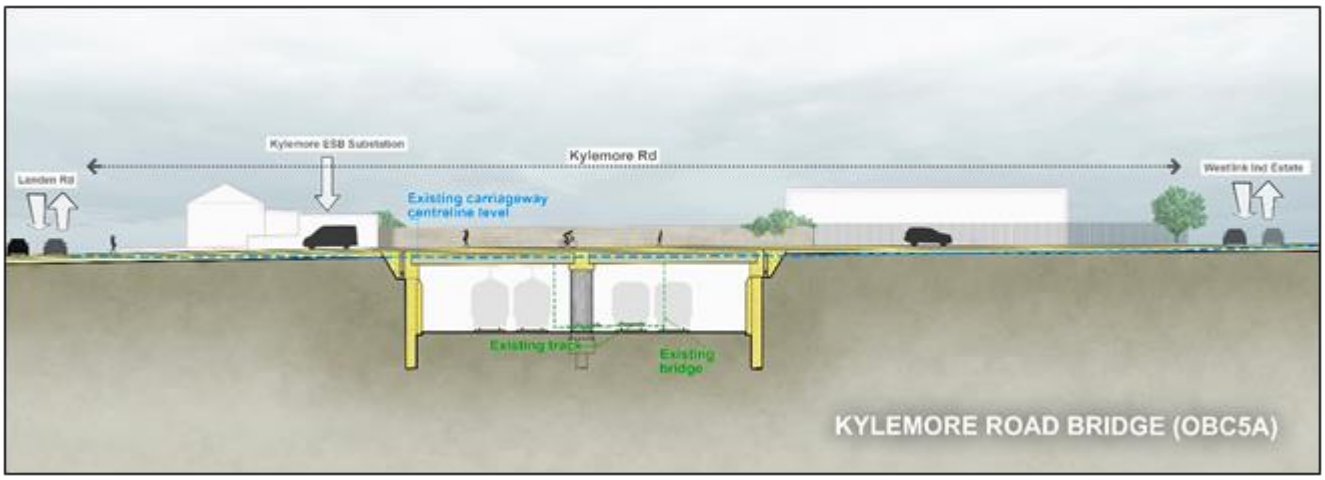

Figure 5-7 Preferred Option for the Kylemore Road Bridge

5.3.4. Substations

The Preferred Option for the location of the Kylemore substation is to the south east of Kylemore Bridge, adjacent to the rail corridor. The preferred location is in an industrial area on a brownfield site which is in the possession of private landowners, therefore land acquisition is envisaged. Refer to OSR Volume 2 and Volume 3 for detailed consideration of the Kylemore substation.

Figure 5-8 Proposed Location for Kylemore Substation

5.3.5. Construction Compounds

Construction compounds are required at Kylemore Road Bridge to facilitate bridge replacement, electrification, the widening of the track corridor and provision of retaining walls. While one compound is required at this location, it will comprise four separate elements on each corner of the bridge to provide access to the different work areas and to act as transfer / laydown areas for plant and materials.

Figure 5-9 Proposed Construction Compounds Locations at Kylemore Road Bridge (OBC5A)

5.4. Kylemore to Sarsfield Road (including Inchicore Works)

5.4.1. General Description

The railway in this area (between Kylemore Road Bridge and Sarsfield Road Bridge) comprises two mainline tracks which are joined by an additional short track (or siding) connected to the Inchicore depot. This section also includes the Khyber Pass footbridge which is located in the Inchicore depot. The existing tracks through the area would not provide the required four-tracking while maintaining the functionality of the depot. Therefore, the laying of additional tracks is required, which in turn requires the realignment of the existing tracks and an increase in the railway corridor width in this area.

The Preferred Option focuses this enhancement of the corridor to the south, requiring the demolition / modification of some Iarnród Éireann facilities within the Inchicore depot, minimising the impact to third party properties to the north of the rail corridor. There is potential interference to third party property rights north and south of the railway corridor, including either / both permanent and temporary land acquisition, but further design development and construction related solutions will seek to minimise this impact.

5.4.2. Permanent Way

The proposed layout realigns the existing two track layout on the south side of the rail corridor to become the fast lines, with two new tracks provided to the north which would serve as the electrified DART lines. Multiple crossovers will provide the necessary train pathways to access Inchicore Works.

Sections of the line are in a cutting, with steep slopes. The proximity of the adjacent domestic and industrial properties and the height of the cutting slope to be retained necessitates a retained wall solution along sections to the north and south sides of the rail corridor.

Design development has resulted in a permanent way solution which negates the requirement to remove a turret associated with a locomotive shed to the south of the line. This structure is listed in the National Inventory of Architectural Heritage (NIAH) (Reg. No. 50080418). It is not a Protected Structure. It will, however, still be necessary to remove a signal box on the north side of the line. This structure is listed in the NIAH (Reg No. 50080417). It is not a Protected Structure.

Figure 5-10 View of Locomotive Shed and Turret (right) and Signal Box (left)

The Preferred Option includes a new drainage system which will be put in place as part of the new track arrangement to collect and drain all surface water runoff. Additional retention structures will also be provided to attenuate the peak runoff flows and meet the necessary discharge requirements. An area to the south of the railway has been identified for proposed attenuation facilities. A potential additional attenuation tank at Inchicore Works, and outfall to an existing surface water drain that crosses the railway corridor, has also been identified.

5.4.3. Khyber Pass Footbridge

Khyber Pass Footbridge is an existing pedestrian overbridge linking Inchicore Works to Sarsfield Road to the north. The existing structure has three tracks beneath it and is not wide enough to safely accommodate an increase to four tracks.

The Preferred Option provides a new pedestrian bridge with sufficient height and width to meet the requirements of four-tracking and electrification. The extent of works may potentially interfere with property rights in the immediate area, but further design development and construction related solutions will seek to minimise this impact.

The proposed new pedestrian bridge is presented below in sectional elevation looking east towards Heuston Station.

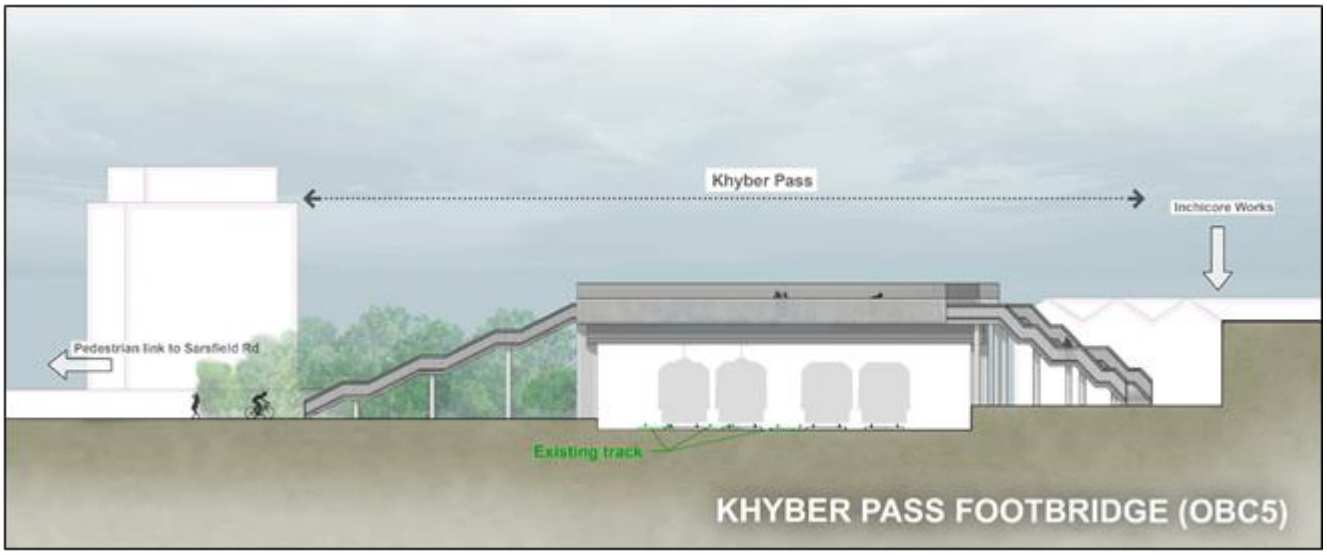

Figure 5-11 Proposal for Khyber Pass Footbridge

5.4.4. Construction Compounds

A construction compound is required at Inchicore Depot to facilitate the construction works in this area, including the widening of the rail corridor, construction of retaining walls and installation of new trackwork. The construction compound will be used as the main materials storage, processing and recycling area. It will also be used to provide site offices, welfare facilities and contractor parking and equipment storage. The preferred location of this compound is within Iarnród Éireann's Inchicore Depot, due to the proximity to the excavation and widening work between Kylemore and Sarsfield Road. As the site is within the Inchicore Depot, no additional land will need to be acquired.

Another construction compound is required to facilitate the construction of the new Khyber Pass Footbridge. It will comprise two separate elements to provide access to the different work areas and to act as transfer / laydown areas for plant and materials; one immediately to the north of the footbridge, linked by an existing pedestrian footpath to Sarsfield Road. The site is bordered by the Seven Oaks apartments to the east and Landen Road residential properties to the west. The other is located on a green space in Inchicore Depot, south of the railway close to the location of the footbridge.

Figure 5-12 Proposed Construction Compound Location at Inchicore Depot

Figure 5-13 Proposed Construction Compound Locations at Khyber Pass Footbridge

5.5. Sarsfield Road Underbridge to Memorial Road Bridge

5.5.1. General Description

This section of the railway between Sarsfield Road Underbridge and Memorial Road Bridge consists of three tracks. It is proposed to increase the number of tracks at this location to four tracks and to electrify two tracks on the northern side of the corridor. This will require the replacement of the existing bridges in this area.

5.5.2. Permanent Way

The railway corridor transitions from being at grade at the east side of Sarsfield Road Bridge to a cutting (tracks at a lower level than the surroundings). The rail corridor will need to be widened to accommodate the increase from three tracks to four tracks. The track will also need to be lowered to provide sufficient clearance under the new Memorial Road Bridge. The modifications to railway corridor will necessitate the construction of retaining structures along sections to the north and south of the corridor.

It is proposed that a new track drainage system would be installed and connected to a proposed attenuation facility located near Heuston Station, before discharging to the River Liffey.

5.5.3. Sarsfield Road Deck Replacement

Sarsfield Road Underbridge carries the railway over Sarsfield Road. Both the bridge and the railway corridor in this area comprise three mainline tracks which are not wide enough to carry the fourth track that is required.

The Preferred Option involves the replacement of the existing bridge deck with two parallel bridge decks, one for the InterCity service and one for the DART service. The existing abutments and supporting structures below deck level will be retained. This Preferred Option also avoids works to the road alignment by increasing the track and deck levels to achieve required clearance underneath.

Heading east of the bridge the corridor will predominantly be widened to the north to add a fourth track (into the embankment between the railway and Con Colbert Road). There is potential interference to third party property rights but further design development and construction related solutions will seek to minimise this impact.

The proposed bridge is presented below in sectional elevation looking east towards Heuston Station.

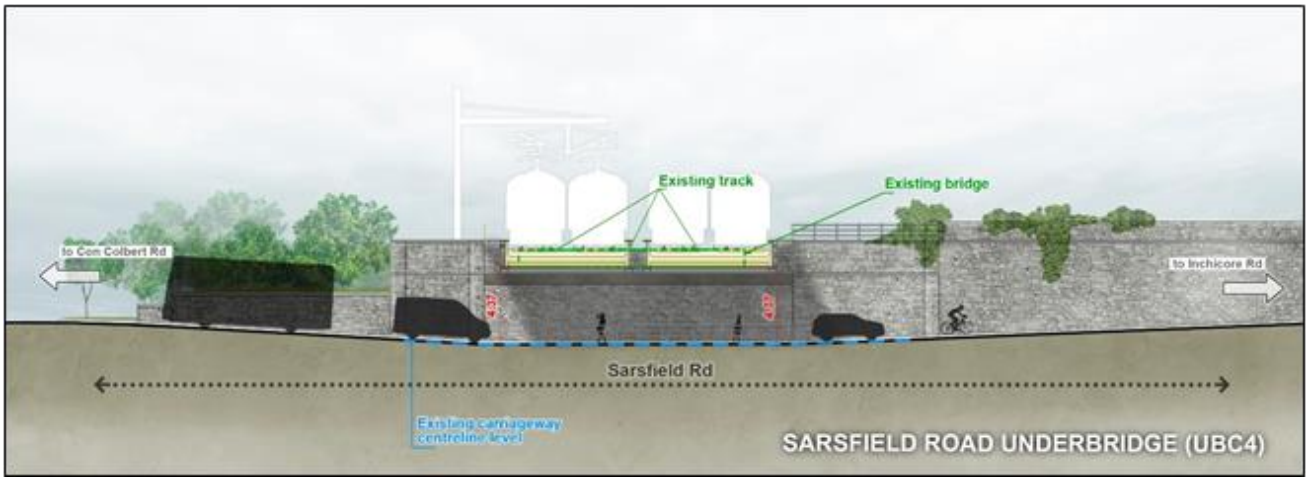

Figure 5-14 Proposal for Sarsfield Road Underbridge

5.5.4. Memorial Road Bridge Replacement

The existing Memorial Road Bridge is too short in span length to accommodate the additional fourth track, so a longer span bridge is required. The existing bridge also does not have the height required to accommodate the electrification infrastructure beneath the bridge. The bridge is very close to the Con Colbert dual carriageway so any increases in the height of the road would have an impact on the dual carriageway.

The Preferred Option is based on the emerging preferred option presented at PC1 following an optioneering process. The Preferred Option replaces the bridge with a longer span bridge. In addition, the rail tracks will be lowered to facilitate the electrification infrastructure beneath the new bridge. The masonry retaining walls on the southern side would need to be strengthened due to the lowering of the track and new retaining walls would be required along the northern side.

The permanent way boundary wall along Con Colbert Road will need to be reconstructed to a higher containment standard and height, as it will be removed to provide retaining wall construction access. The proposed bridge is presented below in sectional elevation looking east towards Heuston Station.

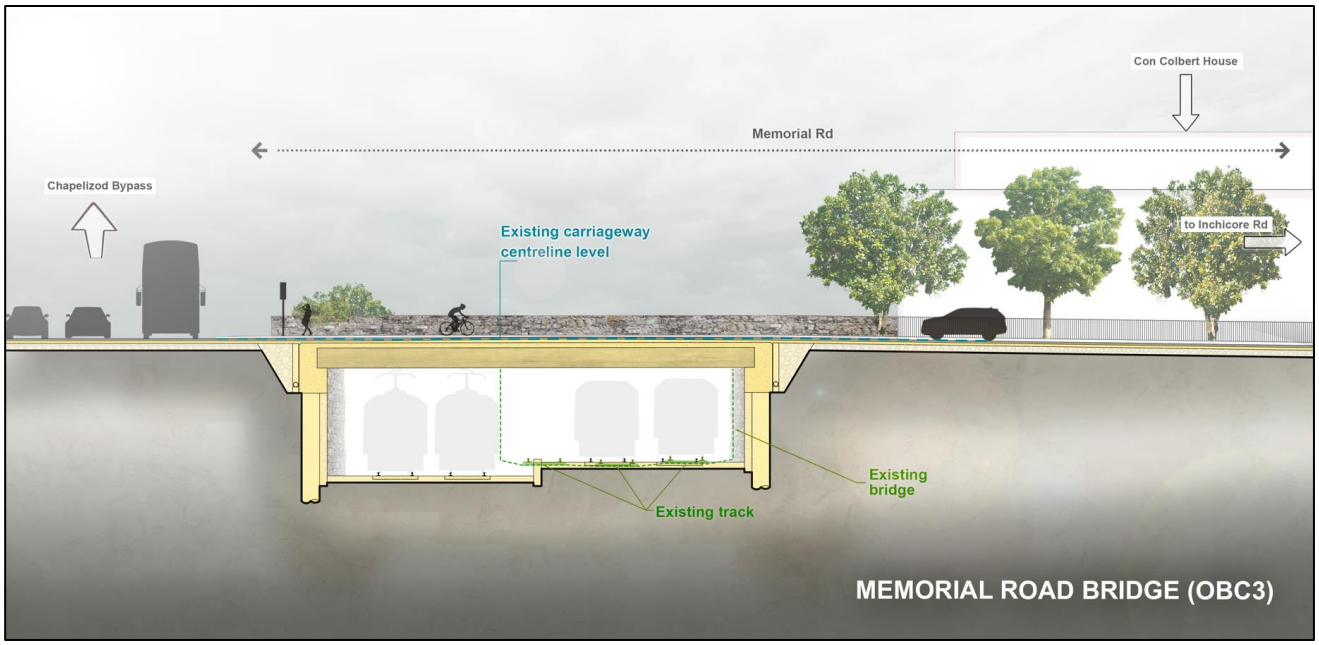

Figure 5-15 Proposal for Memorial Road Bridge

5.5.5. Construction Compounds

The underbridge located at Sarsfield Road needs to be reconstructed to accommodate the widened track corridor. A new underground attenuation tank is also required in this area. A construction compound is required in this location to facilitate these works. As access is required for these localised works, in particular the bridge reconstruction, three discrete elements are required, located at the north east, south west and south east corners of the bridge.

Not all the locations are on CIÉ property, and as such temporary land acquisition is required.

Figure 5-16 Proposed Construction Compounds Locations at Sarsfield Road Underbridge

A construction compound is required for the reconstruction of Memorial Road Bridge. The preferred location for the site will be on Memorial Road, which will be closed to facilitate the reconstruction of the bridge. Additional facilities will be housed on part of the bus lane, which will also be partially closed to allow safe access and egress to the work site.

Figure 5-17 Proposed Construction Compound Location at Memorial Road Bridge

5.6. Memorial Road Bridge to South Circular Road Junction

5.6.1. General Description

This area extends from Memorial Road Bridge to the South Circular Road Junction. There are two major bridge structures in this area which are part of the junction, namely South Circular Road Bridge and St. John's Road Bridge. St. John's Road Bridge has an adequate span length to enable a layout with the minimum four tracks requirement and is high enough for the electrification infrastructure required for DART. South Circular Road Bridge does not have adequate span length to fit four tracks and is not high enough for the electrification infrastructure to pass under.

The Preferred Option leaves South Circular Road Bridge in place and includes the construction of a new structure to the north of the existing bridge. The new structure would be for the new DART tracks and the existing InterCity service would continue under the existing South Circular Road Bridge. The new structure requires retaining walls to be constructed on both sides beyond the junction area to the west.

The South Circular Road Junction is extremely busy and frequently has traffic queues, so any works in this area are likely to impact traffic. In order to minimise impact on traffic during the works, the construction will be carried out in phases, utilising all available road space to safely divert all road users around the affected area.

The new structure will accommodate DART trains. This means that the existing South Circular Road Bridge would not need to be electrified and the track levels can be left as they are currently.

The proposed intervention is presented below in sectional elevation looking east towards Heuston Station.

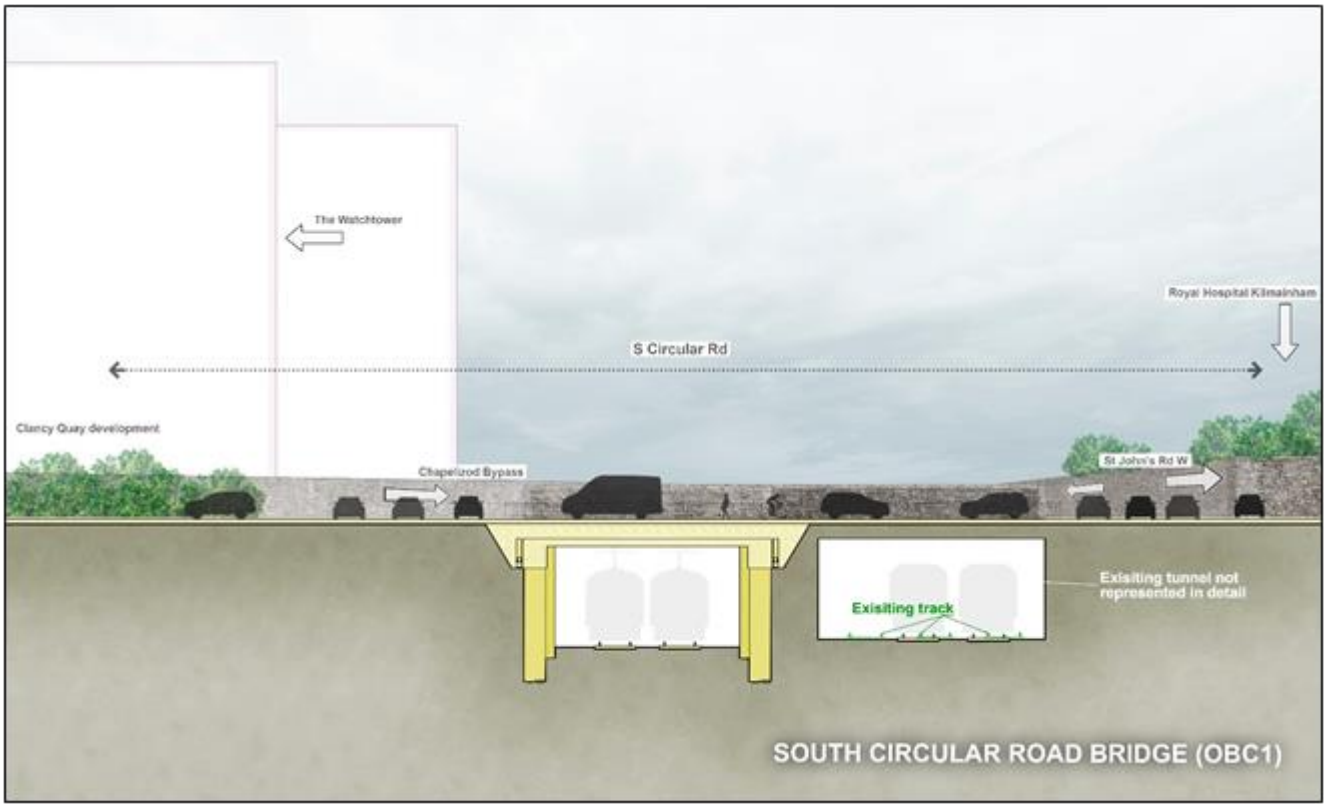

Figure 5-18 Proposal for South Circular Road Bridge

Figure 5-19 Aerial View of Proposal for South Circular Road Junction

5.6.2. Permanent Way

It is proposed to increase the number of tracks from three to four tracks and electrify the two tracks on the northern side of the corridor.

It is not practically feasible to add an additional track on the south side of the rail corridor due to the density and proximity of commercial and residential properties between Memorial Road Bridge and South Circular Road Bridge. As such, all options include widening the corridor to the north to avoid the impact of the reconstruction of the existing retaining wall on the southern properties. The existing tracks will also be realigned to meet design standards.

The additional track will be placed on the north side by installing a retaining structure along the cutting slope between South Circular Road Bridge and Memorial Road Bridge. The track will be placed between the existing rail line and the Chapelizod Bypass which runs parallel.

5.6.3. Construction Compounds

A construction compound is required in this area between Memorial road and South Circular Road and its primary purpose will be to serve the construction works trackside between South Circular Road and Memorial Road Bridge. The preferred location is on the north side of the rail corridor, on the embankment adjacent to Con Colbert Road. Its location and access to the main road will also serve the purpose for removing excess earthwork materials and track ballast – the site will also serve as offices and a welfare facility for works to the new structure under the South Circular Road.

Figure 5-20 Proposed Construction Compound Location at Memorial Road & South Circular Road

5.7. Heuston Station and Environs

5.7.1. General Description

This area encompasses Heuston Station, including the associated servicing sidings, and extends to the east side of St John's Road. The Permanent Way in this area consists of tracks serving platforms 1 to 8, valet sidings, carriage sidings, and a carriage wash siding in close proximity to adjacent running lines on either side. There is a subway, providing access for IE personnel to the valeting plant at Heuston Yard. The specific requirements for this area are:

- Provide access to platforms and sidings within the Heuston area, as required for the DART+ services;
- Modification of the connections to running lines due to four-tracking modifications;
- Provide electrification of platforms and sidings within the Heuston area, as required for the DART+ services (platform 6, 7 and 8, and sidings to the north);
- Maintain current functionality of the other platforms and station services;
- Track alignment and drainage requirements; and
- Delivery of a new station at Heuston West.

5.7.2. Permanent Way

Platforms 6, 7 and 8, as well as additional sidings to the north, are to be electrified to receive the DART+ Fleet, with one of the sidings requiring lengthening, whilst retaining the existing functionality of Heuston Station Yard. The track layout follows the existing station footprint as far as possible, remaining within the existing rail corridor and retaining the existing functionality of the station platforms and train servicing facilities.

The three tracks which run from St. John's Road Bridge to the Liffey Railway Bridge and then converge to two tracks which run through the Phoenix Park Tunnel are also to be electrified. These lines will pass through the proposed new Heuston West Station, which is located adjacent to the Clancy Quay Development and the existing platform 10.

The permanent way layout has not changed since PC1, except for the addition of a crossover between platforms 6 and 7 as part of the electrification requirements.

The proposed track drainage system will include filter drains to collect surface water runoff from the ballast and surrounding areas, and carrier pipes to convey collected runoffs to a proposed attenuation tank and discharge point. The attenuation tank will be located on CIÉ lands between the proposed Heuston West Station and the Islandbridge / Clancy Barracks development.

5.7.3. Islandbridge / Heuston Substation

The Preferred Option for the location of the Islandbridge / Heuston Substation is located within the Heuston Yard area along the R148 (St John's Road). It is a brown field site on the southern side of the railway yard. The proposed location is within existing CIÉ property boundaries, therefore no land acquisition is required. Refer to OSR Volume 2 for detailed consideration of the Islandbridge / Heuston Substation.

Figure 5-21 Proposed Location for Islandbridge Substation

5.7.4. Construction Compounds

A construction compound is required for the works to the Phoenix Park Tunnel, the construction of the new Heuston West Station, localised track works and track drainage works. The preferred location for this compound is located within the Heuston environs on lands within the ownership of CIÉ. The proposed location is to the west of Heuston Station, adjacent to the existing platform 10 and the Liffey Railway Bridge. The construction compound is also the location of the proposed Heuston West Station.

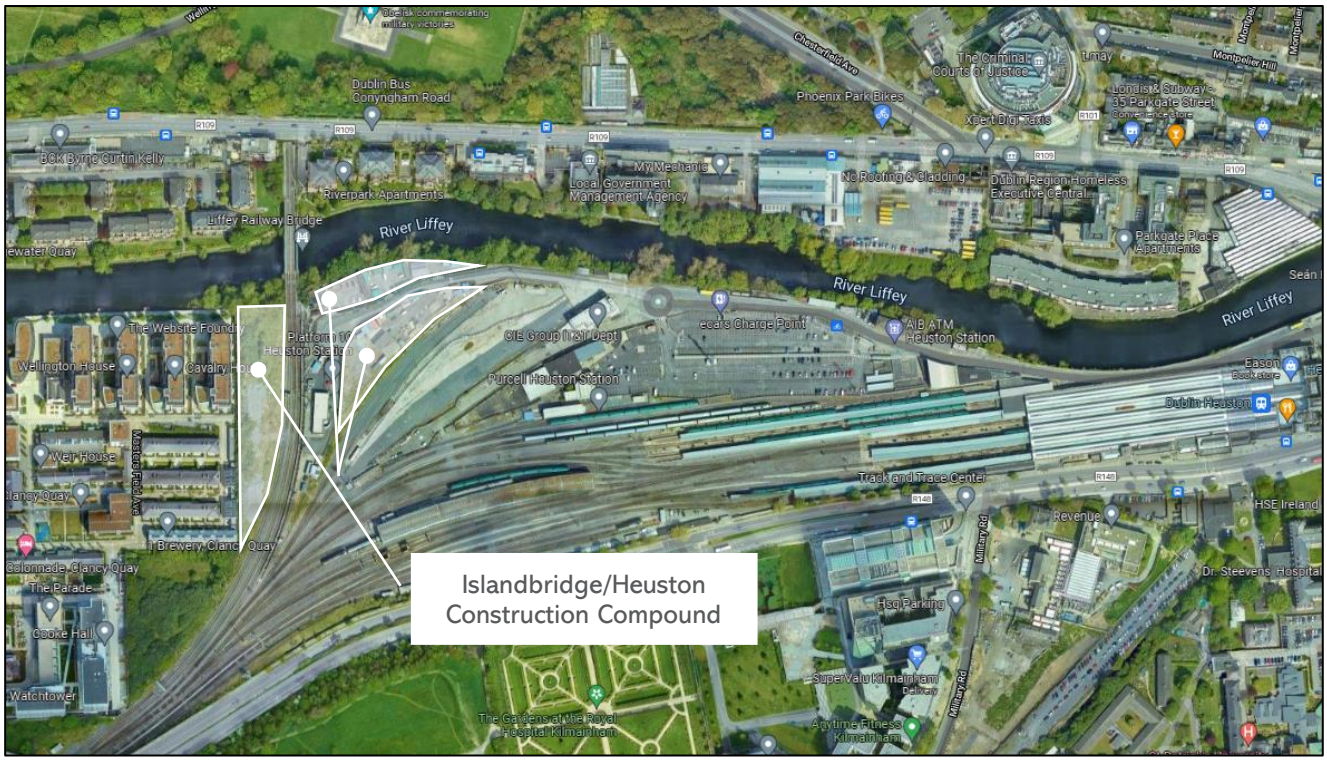

Figure 5-22 Proposed Construction Compound Locations at Islandbridge/Heuston

5.7.5. Heuston West Station

A new Heuston West Station is proposed as part of the DART+ South West Project. The proposed site for the new station is located to the north west of the greater Heuston Station complex adjacent to the Liffey Railway Bridge and the Clancy Quay Development.

The design for the station takes into consideration the current development strategy and masterplan for the wider Heuston Station site and surrounding environs. The Masterplan area stretches some 500m along the south bank of the River Liffey and includes the CIÉ owned site on the north bank at Conyngham Road. The urban design proposals are to facilitate development of a new city quarter on the western edge of the city centre, incorporating an integrated inter-modal transport hub centred on the existing station, a new retail and commercial core, and a residential neighbourhood, all with a high level of focus on open space provision and the public realm.

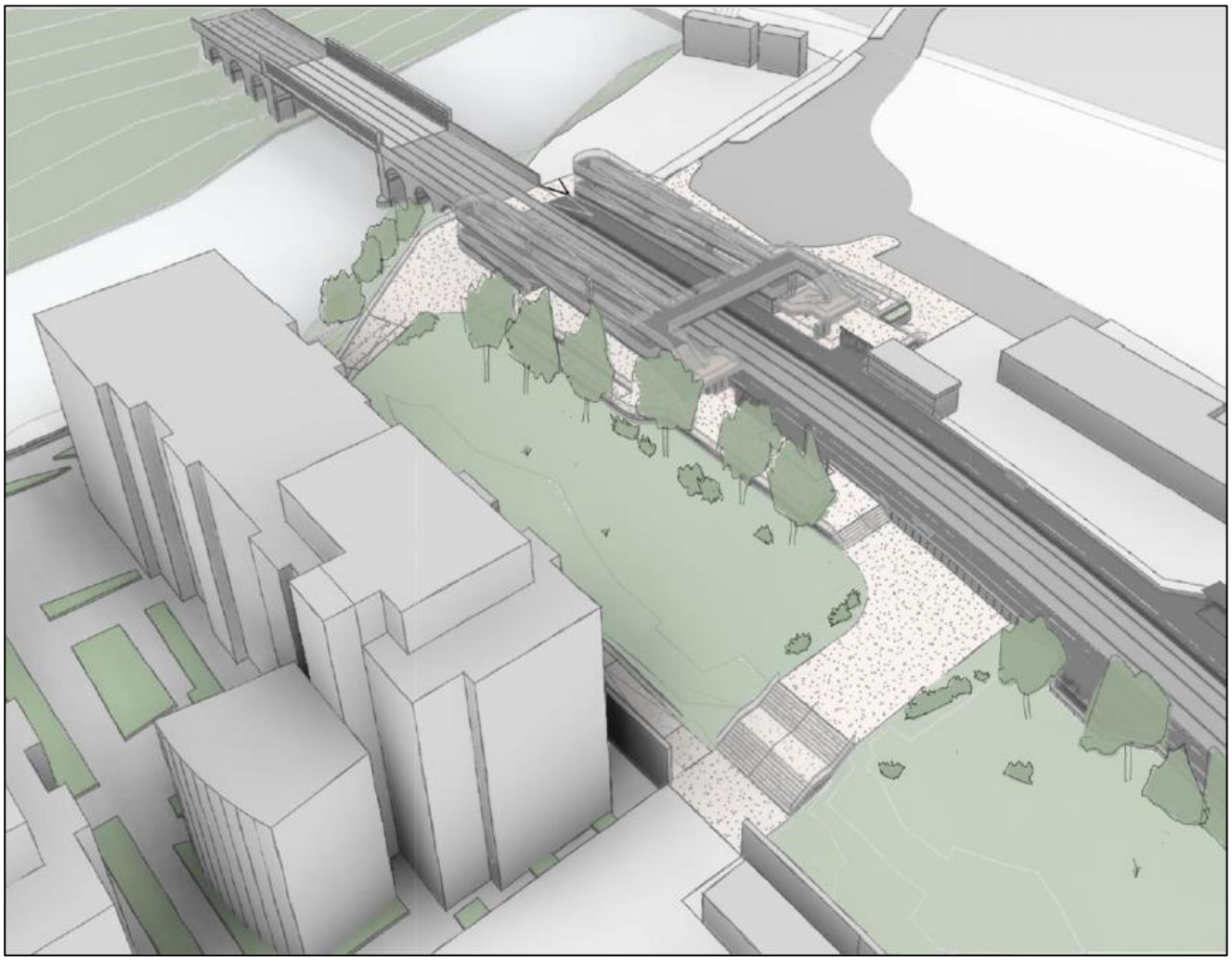

Figure 5-23 Image of Proposed Heuston West Station

The new Heuston West Station will be the first station on the branch line from Glasnevin, which extends the route of the DART+ South West on to Connolly Station. Glasnevin Junction and Glasnevin Station will connect the South Western and the Western line routes to both Connolly and the new Spencer Dock station in the Docklands area.

The preferred station design option incorporates two open platforms, each 174m long. The station will be accessible by road, including a set-down area for vehicles. Access will be provided for emergency services vehicles. Access for the public to cross the rail line will be facilitated by a footbridge; in accordance with accessibility requirements, access to the footbridge will also incorporate a ramp.

A new pedestrian access route to the Clancy Quay Development will also be provided on the western side of the station.

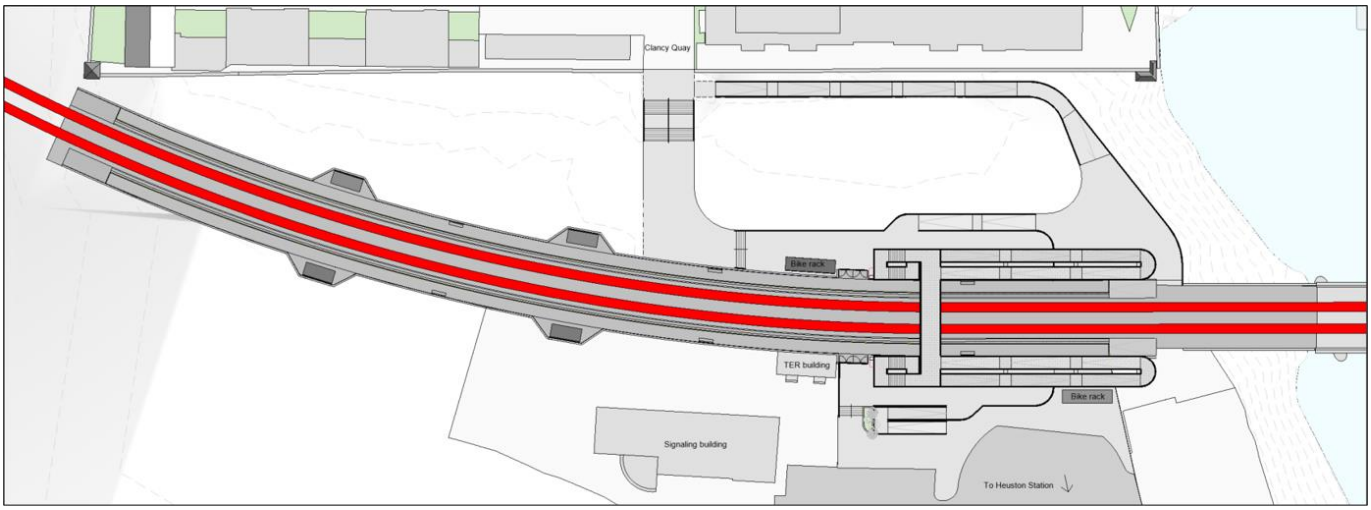

Figure 5-24 Proposed Heuston West Station Layout

6. East of St John's Road Bridge (Islandbridge) to Glasnevin Junction

6.1. General Description

This area extends from the east of St John's Road Bridge and northwards over the River Liffey via the Liffey Railway Bridge and under Conyngham Road Overbridge where it enters the Phoenix Park Tunnel.

Close to the junction of the Cabra Road and Navan Road the line exits the Phoenix Park Tunnel and continues north under several road bridges as follows:

- McKee Barracks Bridge;
- Blackhorse Avenue Road Bridge:
- Old Cabra Road Bridge;
- Cabra Road Bridge;
- Faussagh Avenue Bridge;
- Royal Canal and Luas Twin Arch;
- Maynooth Line Twin Arch; and
- Glasnevin Cemetery Road Bridge.

The line then continues east and connects with the proposed DART+ West at Glasnevin Junction.

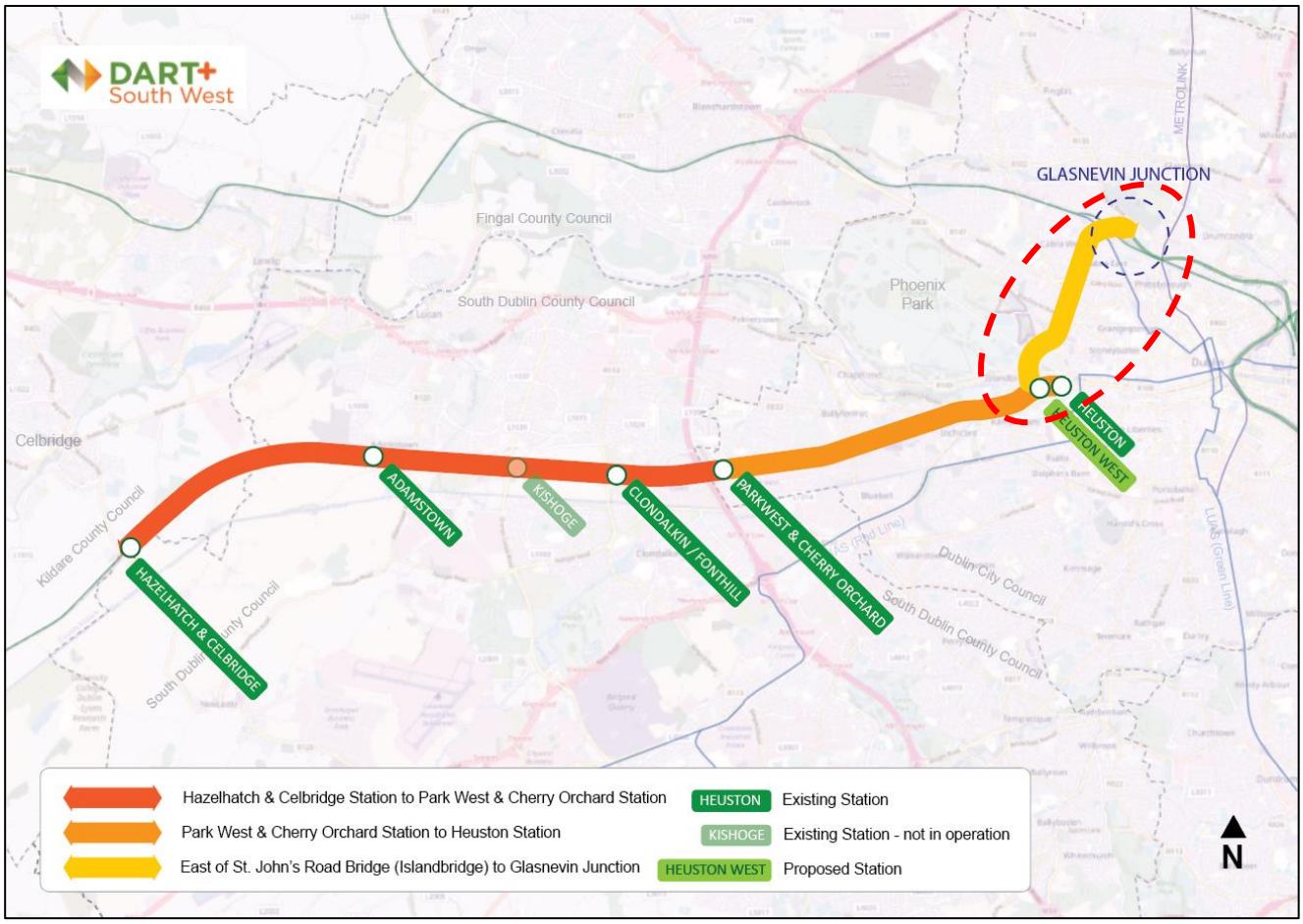

Figure 6-1 East of St. John's Road Bridge to Glasnevin Junction

6.2. Permanent Way

The Permanent Way for this section of the railway corridor consists of two tracks from St. John's Road Bridge to the Liffey Railway Bridge and then two tracks running through the Phoenix Park Tunnel and the remaining length of the scheme to connect with the DART+ West at Glasnevin junction.

The track alignment through Phoenix Park Tunnel will be realigned horizontally and vertically to ensure that structural and passing clearances are achieved, whilst providing the necessary headroom for the installation of new OHLE equipment required to electrify the lines. Due to the constrictive nature of the tunnel a careful balance has been struck to optimise the outcome of fitting the track with the new OHLE equipment.

The Preferred Option for the existing twin tracks along the remaining section of the Phoenix Park Tunnel Branch will follow the existing rail corridor and involves track lowering at certain locations to achieve the height requirements for electrification. Horizontally, the track corridor will need to be widened in some areas to ensure passing clearance for DART+ Fleet. Retaining structures are required at certain points to both the north and south sides of the rail corridor, which is in cutting to the east of Phoenix Park Tunnel.

Figure 6-2 Portals to the Phoenix Park Tunnel and View of Inside Tunnel

The provision of a new station at Cabra does not form part of the scope of the DART+ South West Project. However, passive provision for a potential station has been assessed. The proposed location for the future station is adjacent to the track between Carnlough Road and Cabra Road. The proposed site is located beside a new residential development which is currently under construction.

The future Cabra Station is sited on a length of horizontal straight track, which is ideal for constructing the platform to standard offsets to facilitate passenger stepping to the train. The track alignment has been designed to take into account the future provision of a station at this location.

6.3. Structures

The Preferred Option for the Liffey Railway Bridge features electrification and retention of the existing fixed track system.

Proposals regarding the diversion of the existing sewer pipe bridge located south of Blackhorse Ave Bridge are under development and subject to ongoing consultation with Irish Water. As the sewer serves McKee Barracks, the Department of Defence (DoD) have also been contacted. The likely diversion of this sewer comprises a pumping station on the west side of the rail corridor connected to a pipe crossing through Blackhorse Ave bridge from west to east, and a connection point east of the bridge to the sewer network. Proposals in relation to the diversion of combined sewers north and south of Cabra Road bridge are also under development.

There are four existing structures on this section of the line where the existing clearance beneath the bridges is insufficient to allow the installation of a standard OHLE solution. At these locations, track lowering, installation of a reduced height OHLE solution or a combination of both shall be employed to allow a suitable solution to be achieved. This work will have minimal effect on the existing bridges and the works will be undertaken predominantly within the existing rail corridor.

The bridges in question are:

- Cabra Road Bridge;
- Faussagh Avenue Bridge;
- Royal Canal and Luas Twin Arches;
- Maynooth Line Twin Arch.

The clearance beneath Glasnevin Cemetery Road Bridge is also insufficient to accommodate the new OHLE system. The preferred option for this bridge to meet the necessary OHLE requirements involves the partial

reconstruction of the bridge. This option proposes to replace the bridge deck at a higher soffit level. The existing abutments would be retained, and the abutment seats would be raised as required to accommodate the new deck. The bridge parapets would be upgraded for pedestrian protection.

Figure 6-3 View from the east, of Glasnevin Cemetery Road Bridge

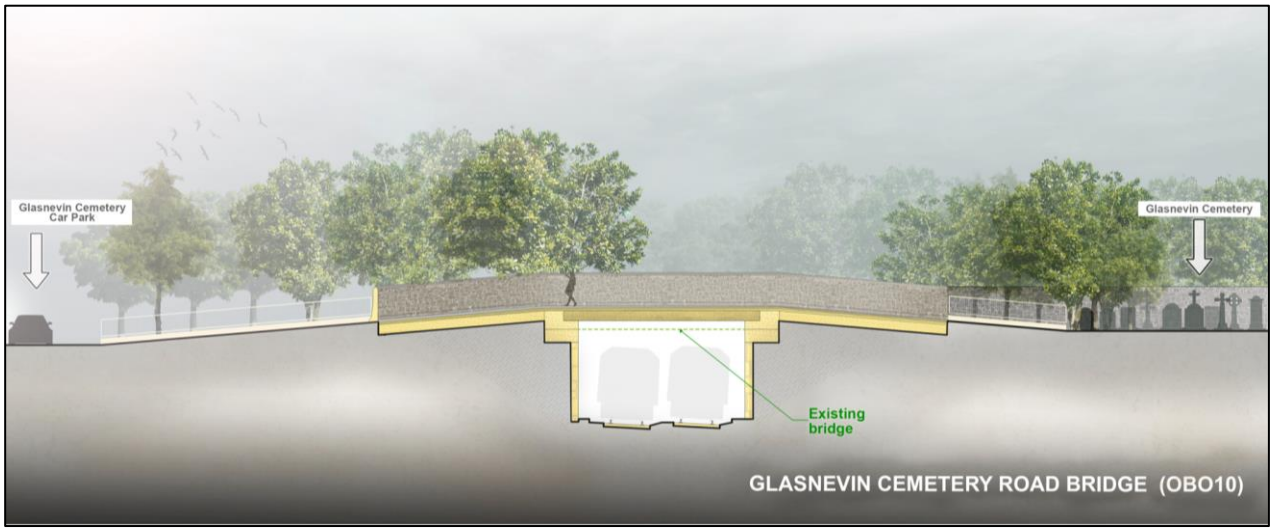

Figure 6-4 Proposal for Glasnevin Cemetery Road Bridge

As this bridge is the main entrance to this section of the cemetery, the timing and sequencing of this work will be carefully coordinated to minimise disruption. An option under consideration is to provide a temporary pedestrian footbridge for the duration of the works.

6.4. Construction Compounds

A construction compound is proposed on the branch line in an area adjacent to the Cabra Road / Carnlough Road Junction. The proposed compound is located on CIÉ property with direct access to the rail line. The DART+ West Project have also identified this as a potential location for a construction compound. A new residential development is currently under construction immediately adjacent to the site. Access to the site will be from Carnlough Road to Cabra Road, Navan Road to the M50.

A small construction compound is required in this area, primarily to facilitate works to Cemetery Road bridge. The site will need to facilitate continual access to the Cemetery by the public and Cemetery workers. As noted earlier, the provision of a temporary pedestrian bridge is under consideration, the bridge will need to be installed alongside the existing bridge.

A construction compound is proposed for Faussagh Avenue on the eastern side of the rail corridor to supplement the Cabra compound which is located approx. 500m to the south. The site is currently a disused public house and is in private ownership. Access to the site would be via Faussagh Avenue, Quarry Road, Cabra Road, Navan Road to the M50. Planning permission has been granted for this site which may impact on the availability and suitability of this site.

Two potential additional sites adjacent to the Royal Canal have been identified, but both sites are ‘land locked’, bordered by the rail line on one side and the Royal Canal on the other. Further assessment is required to determine if the site access issues can be addressed and if the sites are suitable as potential compounds.

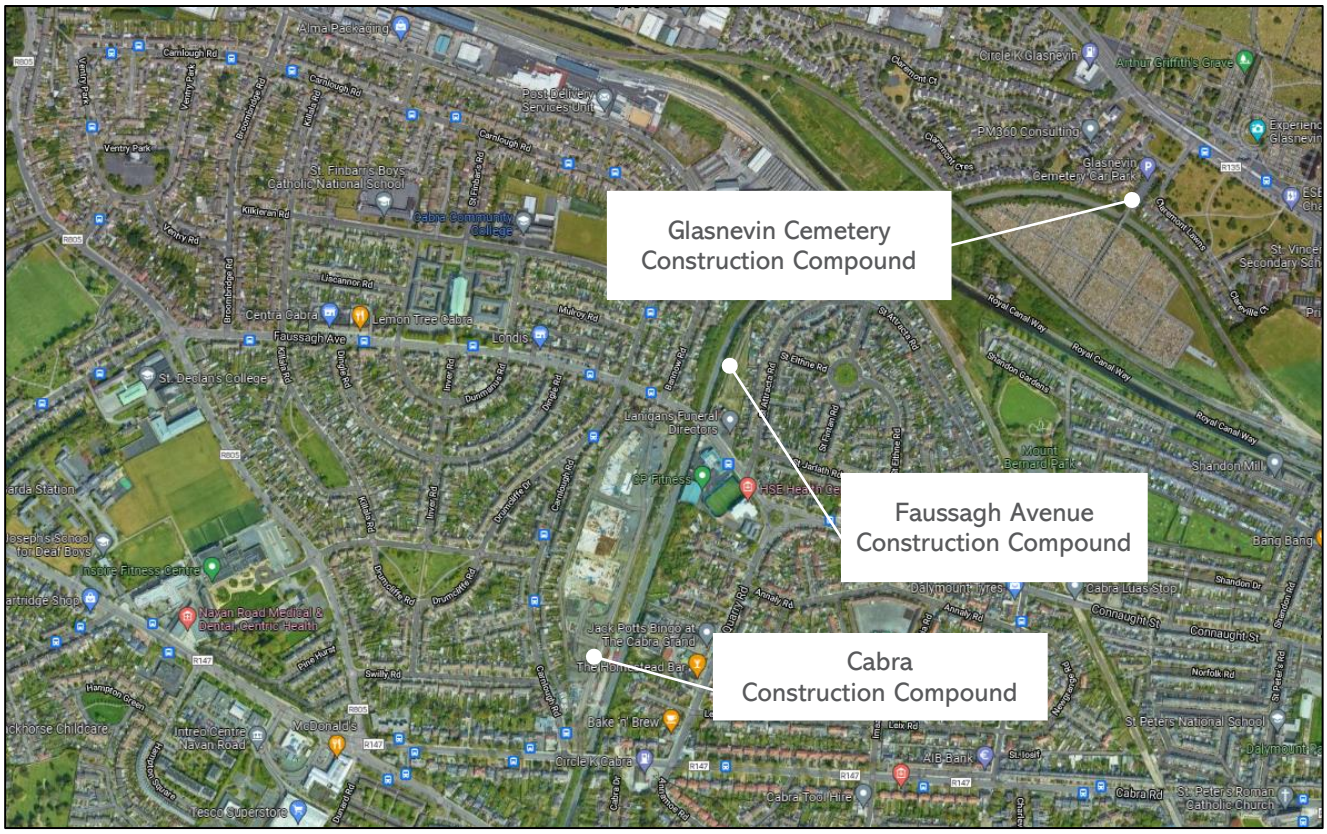

Figure 6-5 Proposed Construction Compounds on the Phoenix Park Tunnel Branch Line

Figure 6-6 Proposed Cabra Construction Compound

Figure 6-7 Faussagh Avenue Proposed Construction Compound

Figure 6-8 Glasnevin Cemetery Proposed Construction Compound

7. Conclusion

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

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

The Preferred Option for the DART+ South West Project is presented in this document, OSR Volume 1, with summary details of the public consultation process. OSR Volume 2 presents the detail of the option selection process which has led to the choice of the Preferred Option.

It is intended that this document will be published as part of the second stage of non-statutory public consultation. It is proposed that all supporting information will be made available with it.

On completion of the non-statutory public consultation, the public submissions received following the consultation period will be considered in further development of the design of the Preferred Option for publication as part of the statutory process for planning