
Chapter 3

Alternatives Considered

Contents

3.	Alternatives Considered	3-1
3.1.	Introduction	3-1
3.2.	EIA Requirements	3-3
3.3.	Approach to Alternatives	3-3
3.4.	Consultation	3-12
3.5.	Scope of Options Selection	3-18
3.6.	Hazelhatch & Celbridge Station to Park West & Cherry Orchard Station	3-22
3.7.	Park West & Cherry Orchard Station to Heuston Station	3-28
3.8.	Heuston Station to Glasnevin Junction	3-47
3.9.	References	3-56

3. Alternatives Considered

3.1. Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) describes how the DART+ South West Project was planned and designed through a staged process as applied to all major transport projects. This chapter presents an overview of the reasonable alternatives studied during the development of the project which have been informed by relevant policy/ plans, previous studies and developed and refined as part of the ongoing design development and Environmental Impact Assessment (EIA) process. This chapter of the EIAR builds on the initial considerations in Chapter 2 Policy Context & Need for the Project. The Transport (Railway Infrastructure) Act 2001 (as amended) provides for the making of a Railway Order application by Córas Iompair Éireann (CIÉ) to An Bord Pleanála ('the Board'). The European Union (Railway Orders) (Environmental Impact Assessment) (Amendment) Regulations 2021 (S.I. No. 743 of 2021) gives further effect to the transposition of the EIA Directive (EU Directive 2011/92/EU as amended by Directive 2014/52/EU) on the assessment of the effects of certain public and private projects on the environment by amending the Transport (Railway Infrastructure) Act 2001 ('the 2001 Act').

An examination, analysis and evaluation is carried out by An Bord Pleanála in order to identify, describe and assess, in the light of each individual case, the direct and indirect significant effects of the proposed railway works, including significant effects derived from the vulnerability of the activity to risks of major accidents and disasters relevant to it, on: population and human health; biodiversity, with particular attention to species and habitats protected under the Habitats and Birds Directives; land, soil, water, air and climate; material assets, cultural heritage and the landscape, and the interaction between the above factors.

In carrying out an EIA in respect of an application made under section 37 of the 2001 Act, An Bord Pleanála is required, where appropriate, to co-ordinate the assessment with any assessment under the Habitats Directive or the Birds Directive.

The 2001 Act as amended (including by S.I. No. 743 of 2021) at section 37 requires, inter alia, that the application be made in writing and be accompanied by:

- A draft of the proposed Railway Order;
- A plan of the proposed railway works;
- A book of reference to a plan describing the works which indicates the identity of the owners and of the occupiers of the lands described in the Plan; and
- A report on the likely effects on the environment of the proposed railway works.

A report of the likely effects on the environment of the proposed railway works is addressed by the preparation of this EIAR (previously referred to as an Environmental Impact Statement in section 39 of the 2001 Act prior to the amendments effected by S.I. No. 743 of 2021). As mentioned, this EIAR is based on a coordinated approach in order to facilitate An Bord Pleanála carrying out a coordinated assessment with any assessment under the Habitats Directive (Council Directive 92/43/EEC of 21

May 1992) or the Birds Directive (Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009).

In accordance inter alia with section 39 of the 2001 Act and the provisions of the EIA Directive, CIÉ, as the applicant for this Railway Order, has ensured that this EIAR is prepared by competent experts; contains a description of the proposed railway works comprising information on the site, design, size and other relevant features of the proposed works; contains a description of the likely significant effects of the proposed railway works on the environment; contains the data required to identify and assess the main effects which the proposed railway works are likely to have on the environment; contains a description of any features of the proposed railway works, and of any measures envisaged, to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment; contains a description of the reasonable alternatives studied by the applicant – here CIÉ – which are relevant to the proposed railway works and their specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the railway works on the environment; contains a summary in non-technical language of the above information; takes into account the available results of other relevant assessments under European Union or national legislation with a view to avoiding duplication of assessments; in addition to and by way of explanation or amplification of the specified information referred above, the EIAR contains such additional information specified in Annex IV to the EIA Directive relevant to the specific characteristics of the particular railway works, or type of railway works, proposed and to the environmental features likely to be affected and in this regard Annex IV sets out the information which is referred to in Article 5(1) of the EIA Directive. Further this EIAR includes the information that may reasonably be required for reaching a reasoned conclusion in accordance with section 42B of the 2001 Act on the significant effects of the proposed railway works on the environment, taking into account current knowledge and methods of assessment.

This assessment has been undertaken in accordance with the above legislative and regulatory regime.

The chapter includes a summary of the option selection process used in the selection of the development of the ‘Emerging Preferred Option’ stage and the ‘Preferred Option’ stage for the proposed Project and how environmental considerations were taken into account. Other issues identified during the preliminary design and EIAR development and are also included in this chapter where relevant. The detailed and extensive documentation supporting Public Consultation 1 and Public Consultation 2 (and Public Consultation 2 follow up with potentially impacted property owners) which includes the detailed reporting on options selection can be found in Appendix 1.3, Appendix 1.4 and Appendix 1.5 in Volume 4 of this EIAR.

A full description of the proposed Project is provided in Chapter 4 Project Description. A description of the environment in the event that the proposed Project does not proceed is described in Chapters 6 to 24 of the EIAR.

3.2. EIA Requirements

The consideration of alternatives is a mandatory part of the EIA process and as mentioned above is provided for in section 39 of the 2001 and the EIA Directive. Article 5(1)(d) of the Directive, for example, provides that the information to be provided by the developer shall include:

“A description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment;”

Specifically, in terms of railway works, this requirement has been transposed through section 39(1) of the Transport (Railway Infrastructure) as inserted by section 49(b) of the Planning and Development (Strategic Infrastructure) Act 2006 and as amended and substituted by the European Union (Railway Orders) (Environmental Impact Assessment) (Amendment) Regulations 2021 (S.I. No. 743 of 2021), which requires *inter alia* that the EIAR contain the following:

“(v) a description of the reasonable alternatives studied by the applicant which are relevant to the proposed railway works and their specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the railway works on the environment.”

The Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA, 2022) states the following in respect of alternatives:

“The objective is for the developer to present a representative range of the practicable alternatives considered. The alternatives should be described with ‘an indication of the main reasons for selecting the chosen option’. It is generally sufficient to provide a broad description of each main alternative and the key issues associated with each, showing how environmental considerations were taken into account in deciding on the selected option. A detailed assessment (or ‘mini-EIA’) of each alternative is not required”.

Alternatives may be considered at several stages in the EIA process, reflective of initial stages where location and form are most relevant and at later stages where alternative designs may be required to address emerging environmental issues.

3.3. Approach to Alternatives

The approach to consideration and assessment of alternatives for the DART+ South West Project commenced with a review of relevant policy influence and project history which have included key decisions leading to the development of the DART+ Programme and have influenced the design envelope of the proposed DART+ South West Project.

3.3.1. Policy Influence

For a description of the policy influence at a European, national, regional and local level for the DART+ South West Project, refer to Chapter 2 Policy Context & Need for the Project. A summary of

the key decisions and influences the policies have had for the DART+ South West Project are as follows:

- National Development Plan (2021-2030): The National Development Plan (NDP) promotes the DART+ Programme and although it does not provide provisions for detailed infrastructural parameters, it acknowledges public transport as a strategic investment priority and notes that *“the DART+ Programme will be a cornerstone of rail investment within the lifetime of Project Ireland 2040 and represents the single biggest investment in the Iarnród Éireann network”*.
- Eastern and Midland Regional Spatial & Economic Strategy (2019-2031): The Regional Spatial & Economic Strategy (RSES) supports a feasibility study for the provision of high-speed rail links between Dublin and Limerick Junction / Cork and enhanced rail services including the extension of the DART to Celbridge/ Hazelhatch in north Kildare.
- Transport Strategy for the Greater Dublin Area (GDA) (2016 – 2035): Documents the intention to implement the DART Expansion (now DART+ Programme) and identifies the heavy rail infrastructure required to be delivered. These include:
 - Reopening the Phoenix Park Tunnel Link for passenger services;
 - Develop a new train control centre to manage the operation of the rail network;
 - Construct additional train stations in developing areas with sufficient demand; and
 - Implement a programme of station upgrades and enhancement.

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

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

The NTA Draft Transport Strategy for the Greater Dublin Area 2022-2042 was published in November 2021 and once finalised and published will replace the previous 2016-2035 framework. The new draft Strategy commits fully to the existing transformative projects in development – BusConnects, DART+ and MetroLink, as well as other projects.

3.3.2. Design Origin and Project History

The origins of the development of the DART Expansion (now DART+ Programme) date back to the 1970's. The expansion of the heavy rail network has been a key objective of CIÉ, Iarnród Éireann and statutory transport planners for a long period.

The modernisation and expansion of the rail network in Dublin was conceived through the publication of the Dublin Transportation Study (1971) and the Dublin Rapid Rail Transit Study (DRRTS) (1975). The Dublin Transportation Study focused on more than just roads and wanted to invest in railway

lines, while the DRRTS investigated such options with Phase 1 of the scheme sanctioned in 1979 involving the electrification of the coastal section of rail line in Dublin from Howth to Bray which later became known as the DART (Dublin Area Rapid Transit) when it officially opened in 1984. Further progressive expansion and electrification of the radial lines in Dublin continued into the 1980s, until halted by recession and decreasing investment.

However, in 2001 the publication of the Dublin Transportation Office (DTO) – “*A Platform for Change - Outline of an integrated transportation strategy for the Greater Dublin Area - 2000 to 2016*” reinvigorated investment focus in heavy rail, marking the genesis of the DART Expansion Programme. Since 2001, Iarnród Éireann has progressed railway improvement projects in accordance with the objectives of DART Expansion (now DART+ Programme) as funding permitted.

Iarnród Éireann’s previous priority was to deliver, as early as possible, the DART Underground tunnel link beneath the city centre. This was fundamental to increasing capacity on the radial routes. Design and planning for DART Underground was progressed and a Railway Order was made by An Bord Pleanála in December 2011 and perfected by the High Court in March 2014.

However, in September 2015 the Government deferred authorisation for construction of DART Underground and instructed Iarnród Éireann to examine the current design with an objective of delivering a lower cost technical solution, whilst retaining the required rail connectivity for the DART Expansion (now DART+ Programme). Between September 2015 and the publication of the NDP in February 2018, Iarnród Éireann and the National Transport Authority (NTA) worked collaboratively in the assessment of lower cost technical solutions thus defining the DART+ Programme.

3.3.3. Previous Studies

Several studies have been completed as part of the DART+ Programme Design Development. Further detail on these studies can be found under separate cover in the published DART+ South West Preliminary Options Selection Report (DART+ South West Project, 2022). These include:

- DART Expansion – Rail Four-tracking from West of Hazelhatch to Phoenix Park Tunnel (2018);
- DART Expansion Programme Options Assessment (2018);
- Western Tie-in Study (2017);
- Kildare Route Project Phase 2 (2010);
- Kildare Route Project (2006-2009); and
- DART Underground (2002 - 2011).

The NTA Eastern Regional Traffic Model has also been referenced in this project as has the Train Services Specification which was prepared by IDOM (as part of the Dart+ West Project) building on a 2018 study by Systra & Jacobs.

3.3.4. Context for Alternatives

Following on from Section 3.3.1 to 3.3.3, the starting point for consideration of reasonable alternatives for the proposed Project was upgrades and modifications to the existing rail line between Hazelhatch and Heuston and onward to Glasnevin Junction via the Phoenix Park Tunnel (PPT). Unlike greenfield development, the focus of the interventions required are, in their totality, to an operational rail line and primarily within or directly adjacent to the existing rail corridor. The scope of reasonable alternatives is therefore significantly constrained and is focussed on individual locations / features in situ.

3.3.4.1. Scenarios Considered

The reasonable alternatives considered at option selection stage were framed within the following scenarios for each significant intervention required:

- The Do Nothing scenario wherein the proposed interventions do not go ahead and therefore the capacity and potential of the public transport system remain restricted and the project objectives are not met.
- The Do Minimum scenario wherein the proposed interventions go ahead but only those which can generally be met within the existing rail corridor. The Do Minimum scenario in this context is not passive, as some level of works and intervention is necessary to meet the Project objectives and requirements, albeit the least burdensome in terms of lands outside the rail corridor.
- The Do Something scenario(s) wherein the proposed interventions go ahead but interventions are required beyond the existing railway corridor impacting on 3rd party / private lands at some locations.
- The Preferred Option is that option which best provides for the proposed development to go ahead and for the project objectives to be met while also minimising the impacts outside the rail corridor. The passenger capacity and frequency of trains is increased. The frequency and quality of service that will be provided will provide a viable transport alternative to communities along the route and help encourage people from private car use. Sustainable economic development and population growth is supported through the delivery of an efficient, sustainable, low carbon and climate resilient heavy rail network. Ireland's advancement towards a low emissions transport system and emission reduction targets are achieved.

The following sections of this chapter provide detail on the option selection process of which the preferred option was derived.

3.3.5. Options Selection Process

A clearly defined appraisal methodology has been used in the selection of the Preferred Option for the proposed Project. Consistent with other NTA projects, the appraisal methodology applied is based on 'Guidelines on a Common Appraisal Framework for Transport Projects and Programmes' (CAF) published by the Department of Transport, Tourism, and Sport (DTTAS), March 2016 (updated

2020), TII's *Project Management Guidelines* (TII PMG 2019) and NTA *Project Approval Guidelines 2020*. The process comprises of a two-stage approach, as appropriate:

- Stage 1 – Preliminary Appraisal (sifting) of a long list of options; and
- Stage 2 – Multi-Criteria Analysis (MCA) of a shorter list of feasible options.

In keeping with principles of the CAF Stage 1 Preliminary Appraisal approach, the purpose of the sifting is to subject a range of options to a preliminary appraisal, before subjecting a smaller number of options to a more detailed MCA. The option selection methodology is summarised in Figure 3-1.

While applying the broad principles of the CAF, when it came to exploring different options to achieve the identified Project objectives and requirements, the methodology has had regard to the fact that DART+ South West Project involves an existing operational rail line running in a pre-defined corridor. Unlike other transport projects there are no or limited route options and spatial variables for the improvement works and interventions required to meet the Project objectives and requirements. In this regard, 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 and isolated widening of tracks to accommodate four rail lines from Hazelhatch Station to Heuston Station.

A number of discrete elements extend beyond the boundary of the existing railway. Given this, the alternatives 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. Alternatives in respect of many of the linear works (e.g., signalling) and some of the bridge works vary little from an environmental perspective. Alternatives in respect of many of these elements are largely a technical matter and optioneering, where relevant, is presented for information.

3.3.5.1. Stage 1: Preliminary Appraisal (Sifting)

Stage 1: Preliminary Appraisal (Sifting) commenced with the Project Design Team identifying a long list of high-level options for the key elements of the scheme. This list included: a Do-Nothing Option (as described previously); a Do Minimum Option (depending on the specific requirements for the particular element); and Do Something Option(s) where interventions and related works may be required beyond the existing railway corridor in order to meet the Project objectives and requirements. A number of sub-options were possible in this category.

Consistent with CAF, the headline criteria which the options were assessed against were the criteria of Engineering, Environment and Economy. Of these, the key 'pass' or 'fail' criterion was Engineering in terms of whether an option was considered feasible and met the Project objectives and requirements or not. A pass/fail approach was not applied for Environment at the Preliminary Appraisal stage given that all interventions were geographically constrained with limited variability. Similarly it was also considered unsuitable to apply a pass/fail approach to Economy at the sifting stage. In both cases, key issues were identified and acknowledged at Preliminary Appraisal stage but did not lead to discounting any option outright. The sifting of options was completed during a series of multi-disciplinary workshops attended by the design, planning and environment teams.

Where a Do Minimum option was not identified as the Preferred Option at Preliminary Appraisal stage, feasible options were brought forward to Stage 2 Multi-Criteria Analysis (MCA) for further detailed analysis.

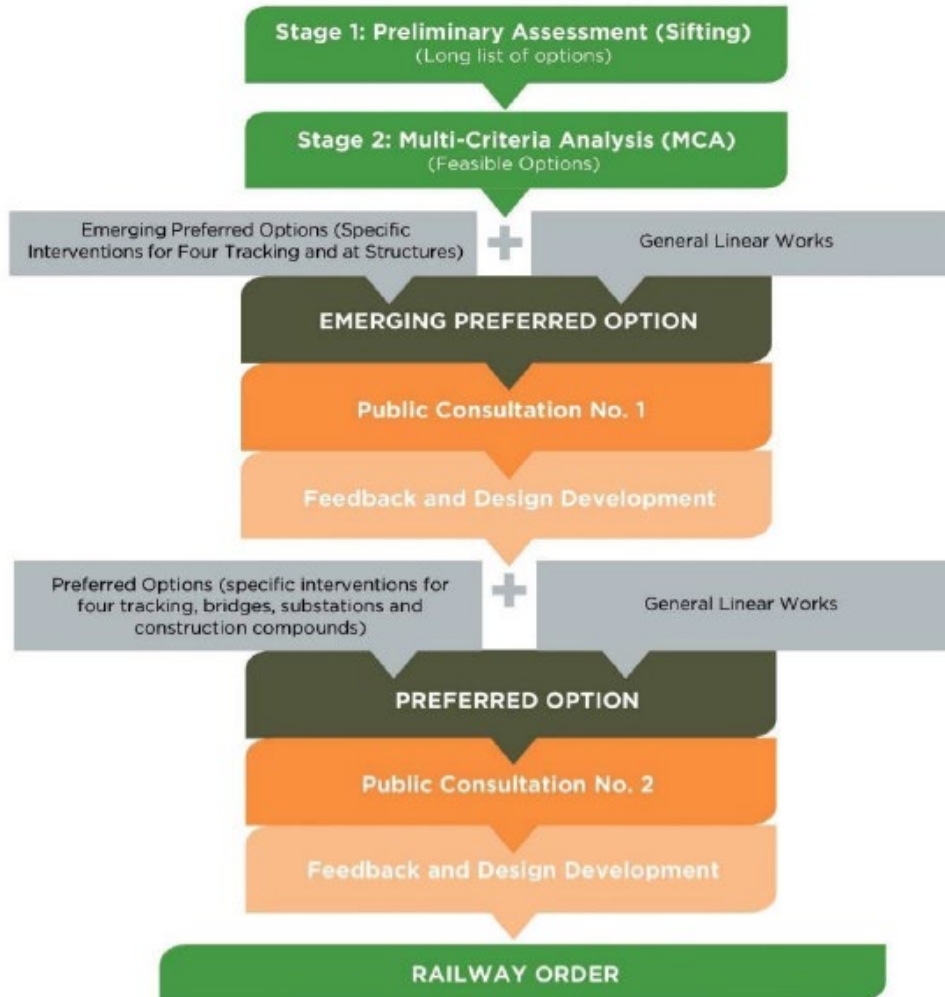


Figure 3-1 Option Selection Process (Emerging Preferred Option and Preferred Option Stages)

3.3.5.2. Stage 2: MCA Methodology

During Stage 2, the optioneering process comprised a detailed multi-disciplinary comparative analysis of those feasible options that passed through Stage 1. The options were assessed against a common set of six CAF criteria, as described in Table 3.1 below and included qualitative and/ or quantitative assessment of the options developed. These common set of six CAF parameters were split into a number of sub-criteria considered relevant to the DART+ South West Project as shown in Table 3.2. The criteria and sub-criteria were the measures of performance by which the options were assessed. The CAF Guidelines were used as a basis to inform the development of the respective sub-criteria which were adapted based on the individual infrastructural components under examination e.g. bridge or track. This approach allowed for consistency but also appropriate flexibility in the approach to the options assessment process. In some cases, some criteria were scoped out if they are not deemed relevant to the option assessment under examination (Table 3.2).

Table 3.1: CAF Project Appraisal Criteria for MCA

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

Table 3.2: CAF Project Appraisal Criteria and Sub-criteria for MCA

CAF Criteria	Sub-Criteria	Four Tracking*	Bridge Replacements*	Substation Tech Buildings	Construction Compounds
1. Economy	Capital Expenditure (CAPEX): construction, land acquisition, temporary works.	√	√	√	√
	OPEX: operational costs (IE or other entities), Technology advancement and future proofing / obsolescence	√	√	√	√
	Train Operations Functionality/Economic Benefit	√	√		
	Traffic functionality and associated economic activities and opportunities.		√		
	Urban regeneration	√	√		
2. Integration	Transport Integration		√		√
	Land use integration	√	√	√	
	Geographical Integration		√	√	√
	Other government policy	√	√		√
	Adaptability in the future (robustness in the solution)	√	√	√	√
	Equipment integration			√	
	IE land use integration			√	
	Road access Integration			√	
3. Environment	Noise and Vibration	√	√	√	√

CAF Criteria	Sub-Criteria	Four Tracking*	Bridge Replacements*	Substation Tech Buildings	Construction Compounds
	Air quality and Climate	√	√	√	√
	Landscape and Visual	√	√	√	√
	Biodiversity (flora and fauna)	√	√	√	√
	Cultural Heritage, archaeological and architectural heritage	√	√	√	√
	Water resources	√	√	√	√
	Agricultural and non-agricultural	√	√	√	√
	Geology and soils (including waste)	√	√	√	√
4. Accessibility & Social Inclusion	Impact on Vulnerable Groups / Residents / Neighbours		√	√	
	Accessibility (station) – where relevant		√		
	Accessibility (bridge)		√		
	Social inclusion		√		√
5. Safety	Rail Safety	√	√	√	
	Vehicular Traffic Safety		√		
	Pedestrians, cyclists, road users, neighbour's and/or staff safety		√	√	
	Reliability, Availability and Maintainability			√	
	User / Operator and Public Safety			√	
	RAM			√	
6. Physical Activity	Connectivity to adjoining cycling and walking facilities		√		√
	Permeability and local connectivity		√		

* This was the focus of optioneering presented during PC1

The assessment undertaken was of a comparative nature (i.e. options compared against each other), comparing the options, identifying and summarising the comparative advantages and disadvantages of each alternative under all applicable criteria and sub-criteria leading to an Emerging Preferred Option for the intervention required. This was based on professional judgement in respect of the items to be qualitatively evaluated and comprehensively assessed against the key relevant criteria in accordance with CAF Guidelines and good industry practice.

All disciplines came together at a workshop to compare the options relative to each other. Each specialist included a commentary of his or her analysis for each option presented in a matrix format. 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'. This basis of comparison is consistent with the CAF Guidelines which use the following five-

point ranking scale when comparing options against each other for comparative analysis. Figure 3-2 provides an overview of the comparative colour coded scale for assessing the criteria and sub-criterion. For illustrative purposes, this scale is colour coded with advantageous options graded to ‘dark green’ and disadvantaged options graded to ‘orange’.

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

Figure 3-2 Option Comparison Criteria Legend

Criteria were then considered and aggregated to give a summary finding for each CAF criterion. The summary findings for all six CAF parameters were then considered and aggregated to determine the Preferred Option.

The assessment was informed by environmental constraints analysis and general arrangement drawings, as appropriate. The key environmental data / constraints were compiled into an Environmental Constraints Report (refer to Volume 4 (Constraints Report and Drawings) of the Options Selection Report (OSR). This baseline data informed the baseline characteristics of the environmental topic / CAF sub criteria under consideration. It, *inter alia*, identified areas or sites with specific statutory protection, which are recognised as important and / or sensitive from a planning and environmental perspective e.g. European and national designated sites, protected views, Record of Protected Structures etc.

Relevant considerations for the MCA analysis included:

- The assessment was a comparative analysis between options and not an impact assessment of each option.
- Not all sub-criteria were relevant in every case.
- For each option an indicative envelope was identified for the extent of permanent works required and the extent of temporary works was also considered.
- Changes in land use were considered under the planning policy consideration under the CAF Integration criteria (specifically Land Use Integration).
- The changes in traffic and associated impacts on the ‘economy’ were addressed under the CAF Economic criterion (specifically traffic functionality and associated economic activities and opportunities) and were not duplicated as part of the consideration of environmental matters.

3.4. Consultation

Stakeholder engagement and consultation during the design process and development of alternatives is a key element to the delivery of major infrastructure projects. The purpose of these consultations is to engage the public in the Project's delivery process, inform the public of the statutory process and likely timescales, seek the public's cooperation and understanding of the project and to capture local knowledge to inform the design, EIA and RO processes.

The public participation pre-planning centred around three key points:

- Non-statutory Public Consultation No. 1 on the Emerging Preferred Option (completed in Summer 2021);
- Non-statutory Public Consultation No. 2 on the Preferred Option (completed in Winter 2021); and
- Public Consultation 2 follow up with potentially impacted property owners (2022).

The public consultation phases were supported by consultation reporting and feedback was recorded in three separate Public Consultation Findings reports, which are included in Appendix 1.3, Appendix 1.4 and Appendix 1.5 in Volume 4 of this EIAR. A summary of the key findings is presented in the following sections.

3.4.1. Public Consultation 1 (PC 1)

The preliminary options selection and early design development for the proposed Project was presented during the first round of public consultations held between 12th May 2021 and 23rd June 2021 (PC1). The purpose of PC 1 was to show the public and stakeholders the status of the optioneering process (including the publication of the project Preliminary Option Selection Report (POSR)), and to identify the *Emerging Preferred Option* as it was at that point in time.

All feedback and submissions received were reviewed and assessed as part of the follow-on work after PC1 in order to inform the next stage of the design development. The feedback from PC1 is recorded in the PC1 Findings Report (see Volume 4, Appendix 1.3 of this EIAR).

The key issues arising from public and stakeholder feedback from PC1 were:

- Matters outside of the Scope of the Project particularly new stations at Kylemore, Cabra and Heuston West.
- Matters which require Further Assessment for the Preferred Option, notably inclusion of a station at Heuston West and avoidance of a heritage feature within Inchicore works, impacted by the four-tracking.
- Matters to be Addressed by Ongoing Design Development and the RO Application and EIAR including but not limited to benefits to air quality from electrification, impacts to the natural and built heritage along the route and community impacts.

3.4.1.1. Matters Outside the Scope of the Project

New Railway Stations: A significant number of submissions during PC1 called for new railway stations along the railway line, including at Kylemore, Cabra and Heuston West.

The scope of the DART+ South West Project considers the necessary railway infrastructure to enable increased rail capacity and transition to electrical power. While the provision of new stations does not form part of this scope, consideration has been given to potential future stations during design development, including track alignments and other infrastructure which would not preclude the delivery of new stations in the future.

The National Transport Authority published the draft Transport Strategy for the Greater Dublin Area 2022-2042 in November 2021. A number of new stations have been identified in the draft Strategy, including at Kylemore, Cabra and Heuston West. Following the electrification and upgrade of the commuter lines, NTA has committed to developing these stations in conjunction with Iarnród Éireann to provide higher levels of public transport accessibility at locations which currently accrue little gains from the presence of a rail corridor.

In the case of Heuston West, the scope of the DART+ South West Project included a Feasibility Report and Concept Design for a potential new station at this location. Having regard to public feedback, the progress made on the Feasibility Report and Concept Design and having regard to the location of the potential station within Iarnród Éireann lands at Heuston (and more specifically at the location of the existing platform 10), Iarnród Éireann has made the decision to include the new Heuston West Station in the scope of the Project to be brought forward for Railway Order (RO). The inclusion of an intermediate station between Park West & Cherry Orchard Station and Glasnevin Station at Heuston will address the concerns and opportunities identified by the public relating to servicing the local community and multi-modal interconnectivity.

Extending the DART+ South West Project: Some submissions requested the extension of the Project to Sallins / Naas. The National Transport Authority published the draft Transport Strategy for the Greater Dublin Area 2022-2042 in November 2021. The draft Strategy identifies that forecast demand for travel, when considered in tandem with the need to reduce transport emissions, has shown that, over the lifetime of the Transport Strategy, there will be a requirement to further extend DART services to key locations in the GDA. An extension of the DART service on the Kildare Line to Naas / Sallins will provide additional capacity to this area, including to a planned regional Park & Ride site in this vicinity.

Facilities at Existing Railway Stations: A significant number of submissions raised concerns regarding existing facilities at stations. All concerns have been noted and passed to the relevant teams within the DART+ Programme who will assess each issue in greater detail, including:

- Pedestrian and cycling facilities associated with many of the existing stations were provided as part of the original Kildare Route Project; the facilities are constantly under review and are the remit of the Iarnród Éireann Station Enhancement Programme.
- The provision of strategic Park & Ride facilities and car parking at or near existing train stations is not part of the DART+ Programme. However, the NTA's Park and Ride Development Office is currently working with Iarnród Éireann to identify strategic locations to develop park and ride schemes that will connect with the rail system. Proposals will be brought forward independently of the DART+ Programme.

3.4.1.2. Matters Requiring Further Assessment for the Preferred Option

The purpose of PC1 was to present the Emerging Preferred Option for the proposed DART+ South West Project and to request the views of the public and stakeholders. All submissions received as part of the first round of consultations fed into the design process, an updated option selection process and the identification of the Preferred Option. The Project Team analysed the submissions and considered all relevant information 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 the new Heuston West Station in the scope of the Project to be brought forward for Railway Order (RO). As this station is located wholly in Iarnród Éireann's Heuston Station boundary and having regard to the requirements for the station the options for assessment are not materially different and are therefore largely a technical matter (relating to design and access) which was subject to MCA.
- Following feedback and more detailed design of the four tracking requirements between Kylemore Bridge and Khyber Pass Footbridge, it was possible to avoid removing 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) located within the Railway Works at Inchicore (see Section 3.4.2 for further information).

In the initial MCA, Option 4 was determined to have 'Some Comparative Advantage' over Option 3 in respect of the CAF criteria of Economy, Integration and Environment, however the option did require the removal of both a Signal Box and Turret within Inchicore Works while Option 3 only involved removal of the Signal Box. At the detailed sub-criteria level, Option 3 was found to have 'Some Comparative Advantage' in respect of Cultural Heritage and Architectural Heritage and Biodiversity (potential for bat roosts).

Given the sensitivity of the heritage features, the design options for Inchicore Works were revisited and further variations explored to avoid the Turret (all feasible options identified will require removal of the Signal Box). The Stage 2: MCA was re-run in respect of the options for Inchicore Works following identification of an option to avoid impacting the Turret. The new variation was found to be 'comparable to the other option / neutral' in respect of both the Cultural Heritage and Architectural Heritage and Biodiversity criteria. This did not change the overall assessment findings of Option 4 as the Preferred Option and it was subject to more detailed design leading to the identification of the Preferred Option which is presented in this report.

3.4.1.3. Matters to be Addressed by Ongoing Design Development and the RO Application

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) which will be submitted with the Railway Order. This includes:

- 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).

- 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.
- Archaeology and Cultural Heritage: potential impact on heritage and cultural sites including the area surrounding Glasnevin.
- Architectural Heritage: potential impact on various buildings and bridges of significant architectural heritage importance including those in Iarnród Éireann Inchicore Works Estate (including the Signal Box and Turret and around Memorial Park; also appropriate mitigation required in respect of any buildings of architectural heritage which must be impacted by the works. Consideration of the social heritage impact arising was also flagged.
- 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. Some stakeholders expressed concerns about the proposed line and its possible impact on the Phoenix Park.
- 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: the potential noise impact of both daytime and night-time works along the track and operational noise resulting from the increase in the frequency of passing trains and the potential impact of exposure to electromagnetic radiation.
- 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 and the loss of green spaces and planting; 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: the potential impact on communities, including on community facilities (e.g., a community orchard, and communal gardens)

Key feedback came from potential impacted residents and local businesses and related to concerns in respect of the extent of temporary or permanent land take required. Some requested clarification that the Iarnród Éireann land will be used first before any private land is taken for the tracks; others noted that agreements should be made to appropriately redress the situation faced by landowners, including compensation, and remedial/landscaping works.

The key starting principle for the Project, is to upgrade the existing railway and to undertake all works within the existing railway corridor. 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.

3.4.2. Public Consultation 2 (PC 2)

The *Emerging Preferred Option* presented in the POSR at PC1 was subsequently analysed and re-evaluated based on public consultation feedback from PC1 and this informed the *Preferred Option* which was presented during the second round of public consultations held between 10th November 2021 and 17th of December 2021 (PC2). To support PC2, a second report was published - the DART+ South West Options Selection Report. The *Preferred Option* presented in that report superseded the earlier *Emerging Preferred Option* which had been presented in the POSR.

All feedback and submissions received were reviewed and assessed as part of the follow-on work after PC2 in order to inform the design development. The feedback from PC2 is recorded in the PC2 Findings Report (see Volume 4, Appendix 1.4 of this EIAR).

The key issues arising from public and stakeholder feedback from PC2 were categorised as:

- Matters within the Scope of the Project;
- Matters relating to the RO documentation and application; and
- Matters outside of the Scope of the Project.

3.4.2.1. Matters within the Scope of the Project

- **Property and land issues:** keeping works and impacts within the CIÉ property ownership as far as possible and minimising the extent of impact on third party lands and compulsory purchase required (see EIAR Chapter 17).
- **Noise:** shaping the construction stage so as to minimise disturbance by noise and vibration and operating the new rail service with the least possible operational noise (see EIAR Chapter 5 Construction Strategy and Chapter 14 Noise and Vibration).
- **Biodiversity:** seeking to protect existing 'biodiversity corridor' formed by the railway and replenishing vegetation where possible where construction requires its removal (see EIAR Chapter 8).
- **Traffic and Transport:** identifying likely problems when roads/ bridges are temporarily closed, and scheduling this so that the impacts are minimised (see EIAR Chapter 5 Construction Strategy and Chapter 6 Traffic and Transportation).
- **Sustainable Transport:** taking cycling and walking into account when replacing or upgrading infrastructure such as bridges, and in relation to the new station at Heuston West (see EIAR Chapter 6 Traffic and Transportation).
- **Universal Access:** making this a key aspect of new station design and taking the principle into account in other infrastructure works. (see EIAR Chapter 4 Project Description and Chapter 6 Traffic and Transportation).
- **Construction Management:** addressing concerns expressed in relation to aspects like disturbance, security/ safety, access, and measures to control dust and litter; these issues will

be addressed through mitigation within the EIAR and delivered through the Construction Environmental Management Plan (see Volume 4, Appendix 5.1). This will include a requirement for excellent communications and community liaison during construction, as part of the plan. Where possible, construction stage will seek to minimise duration of impacts and overall construction programme (see EIAR Chapter 5 Construction Strategy)

- **Infrastructure Co-ordination:** engaging with other bodies such as local authorities and utility companies to co-ordinate actions and avoid inefficiency or conflict. (see EIAR Chapter 4 Project Description and Chapter 5 Construction Strategy).
- **Development plans and co-ordination:** keeping abreast of emerging planning policy changes at city/county level and also at local area level and for Strategic Development Zone locations and new proposals such as the 'City Edge' project, by continuing to engage with the local authorities (see Planning Report).
- **Architectural Heritage:** taking a sensitive and appropriate design approach to features of built heritage and archaeology (see EIAR Chapter 20 Archaeology and Cultural Heritage and Chapter 21 Architectural Heritage).

There was also good feedback in relation to the preferred methods of communication and consultation during project development, including the desire for clear, simple and graphic communications where possible. This feedback will continue to be applied by the overall Iarnród Éireann project team.

3.4.2.2. Matters relating to the RO Documentation and Application

Procedural questions: during the preparation of the railway order application, and when submitting the formal application to An Bord Pleanála, using simple and clear language to communicate to stakeholders what the process entails, and how and where they can access information and make submissions.

Compensation in relation to compulsory purchase of land: a number of businesses and homeowners will be impacted by compulsory purchase as part of the Railway Order process. The Iarnród Éireann team will aim to keep relevant property owners abreast of developments that affect them and will explain the procedures involved when it comes to compensation for either permanent or temporary property impacts.

3.4.2.3. Matters outside of the Scope of the Project

In addition, a number of issues were raised that are outside of the scope of this Project:

Stations at Kylemore and Cabra: the preliminary design will take into account the potential for the NTA to approve further DART stations at Kylemore and Cabra in the future, by providing 'passive' measures in so far as possible to enable such facilities to be integrated. There is no current indication that DART services will extend further south (for example to Sallins or Newbridge) but there is a possibility that such a requirement could be considered in the future if transport planning requires it.

Existing Stations – access, upgrades etc. and Public Realm: this project has a specific scope, namely, to enable DART services. It is acknowledged that successful operational DART services may create changes in demand and operational profile for existing stations, and there may be a need

for improved facilities around sustainable travel or car-parking. There may also be opportunities to enhance the public realm in or around DART stations. This type of project will be addressed by a separate team within Iarnród Éireann under a Station Enhancement programme. It is likely that such improvements will be advanced following approval of the Railway Order.

DART frequency – this project will create the necessary tracks, electrification and signalling and safety systems to run DART services, but control on the operation frequency and rail timetables will become an operational matter for Iarnród Eireann in the future.

3.4.3. Consultation with Potentially Impacted Property Owners

In addition to two focused periods of non-statutory public consultation, throughout 2022 the project team has undertaken engagement with all potentially impacted property owners to generate awareness in advance of a Railway Order application being submitted and gather information to further inform project development. This engagement comprised letters to property owners inviting them to meet the project team; and meetings with the many property owners who availed of this opportunity. As well as informing property owners of how the project may impact them, they have also raised issues relating to construction and operational phases of the project and these have been considered by the wider project team. A summary of the issues is presented below.

- Noise and vibrations – operation and construction stage
- Additional operational train noise of additional trains at operational stage
- Noise and disturbance from night-time works
- Loss of vegetation – impact on wildlife and privacy
- Dust from construction
- Security from the railway
- Damage to property from construction works
- Pest control

All feedback received has been reviewed and considered in finalising the design and the EIAR. The feedback is recorded in the PC2 Addendum Report (see Volume 4, Appendix 1.5 of this EIAR).

3.5. Scope of Options Selection

3.5.1. Civil and OHLE Related Options (including Track and Bridges)

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 (Figure 3-3).

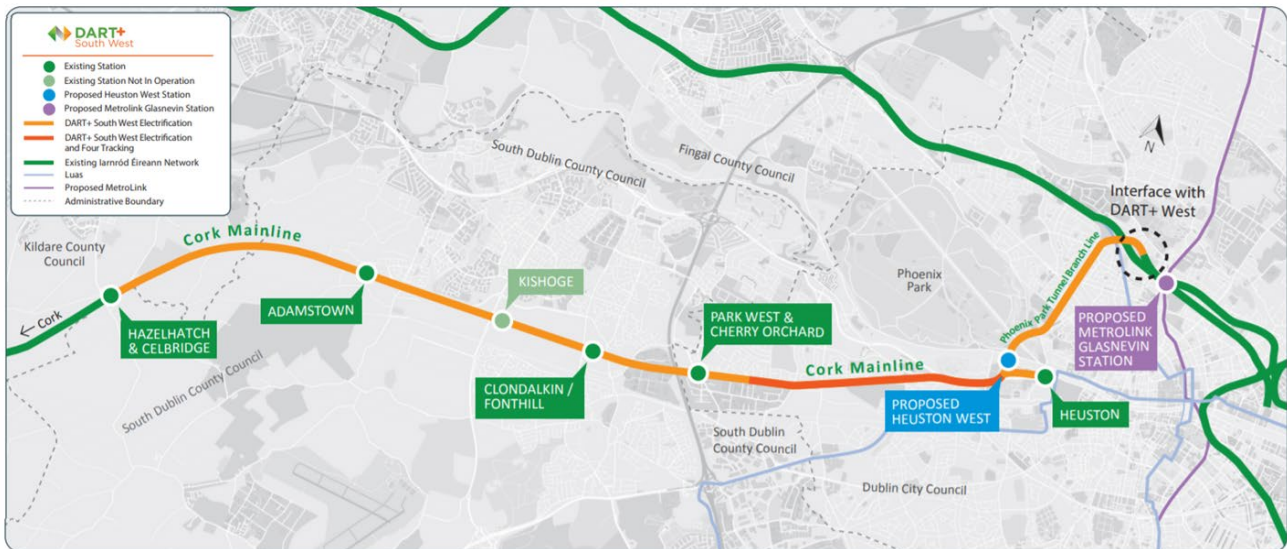


Figure 3-3 DART+ South West Route Map and Area for Four-tracking and Electrification

Expanding from two tracks to four tracks will require a horizontal width extension across the railway corridor between Park West & Cherry Orchard Station and Heuston Station affecting both track and bridge clearances. Electrification of the entire route will require vertical clearance through all bridges and through the PPT. The delivery of these key elements have been the focus of the main reasonable alternatives for the DART+ South West Project and this has influenced the scope of the alternatives considered for the project (Table 3.3).

3.5.2. Substations

A total of 6 traction electrical substations are necessary along the project extents. The substation locations are constrained geographically due to project objectives and requirements for substation to comply with the following:

- **Power Study Compliance** - The substation Option (including distance between it and other substation options) must comply with the requirements of the Power Study. Given that the tolerance of the power simulation is maximum +/- 300m approximately, to ensure compliance only those options located within 200m of the location identified in the Power Study are considered. Where no feasible options are identified within 200m, only then would sites greater than 200m but less than 300m be considered to meet the project requirements.
- **Proximity to the Railway Line** - Proposed substations would be located immediately adjacent to the proposed slow lines to allow for ease of connectivity of feeder cables to OHL equipment. Naturally, this aspect would favour existing vacant plots in the ownership of CIÉ. However, other privately owned options may also be considered.
- **Vehicular Access** - The proposed substations will require periodic access by maintenance staff from both Iarnród Éireann and ESB Networks. Hence, the feasibility of a proposed access route between the substation and the public road network is considered under this criterion.

3.5.3. Track Drainage

A new drainage system is required between Park West & Cherry Orchard Station and Heuston Station in order to meet the increased runoff volumes generated by the new four-tracking layout, as well as the attenuation requirements needed to comply with the allowable discharge rates. The new drainage system is based on three independent drainage networks (Network 1, Network 2 and Network 3) based on three outfall locations. As part of the design process different attenuation solutions were assessed.

3.5.4. Stations

One of the key infrastructural developments for the DART+ South West Project is the delivery of a new Heuston West Station. The location of the station is relatively defined by the available land in the vicinity of Heuston Station and yard therefore the focus of reasonable alternatives has been the station configuration and links to Heston Station.

3.5.5. Construction Compounds

Works on this linear scheme will require construction compounds at specific locations. Construction compounds did not require sifting or MCA as they must be located close to and ideally with direct access to the site, with some requiring very specific geographic locations, in close proximity to specific work elements. For example, construction compounds will be required at each of the bridge reconstruction locations. Therefore, limited alternatives were identified.

Table 3.3: Scope of Alternatives Considered

Section of Route	Alternatives Considerations
Hazelhatch to Park West	<p>Track widening - This section of the route was upgraded to four-tracks as part of the original Kildare Route Project. No additional lateral clearance is required at this location. All rack layout modifications can be accommodated with localised track works. As such <i>no alternatives</i> were generated for tracks or bridges in this location.</p> <p>Electrification - The majority of the existing overbridges and footbridges along this section of the route were upgraded or replaced as part of the original Kildare Route Project, and the electrification works can be run under the existing bridges with no / minimal intervention to the bridge structures. Only localised track lowering works are necessary to achieve the required clearance. As such <i>no alternatives</i> were generated for tracks or bridges in this location.</p> <p>Substations - Four sub-stations required in this section – <i>alternatives considered</i>.</p> <p>Track Drainage - No alternative track drainage proposals in this area as no track widening required – <i>no alternatives considered</i>.</p> <p>Stations - No stations are proposed in this section - <i>no alternatives</i></p>

Section of Route	Alternatives Considerations
	<p><i>considered.</i></p> <p>Construction compounds - As noted in Section 3.5.5, majority of compounds located proximate to the works and as such <i>no alternatives considered.</i></p>
<p>Park West & Cherry Orchard Station to Heuston Station</p>	<p>Track widening - Four tracking required along the length of this section. Lateral expansion required - <i>alternatives considered.</i></p> <p>Electrification - All bridges along the section require consideration to accommodate electrification - <i>alternatives considered.</i></p> <p>Substations – One sub-station required in this section – <i>alternatives considered.</i></p> <p>Track Drainage - New drainage is required in this section to accommodate the four-tracking – <i>alternatives considered.</i></p> <p>Stations – One new station proposed at Heuston West in this section - <i>alternatives considered.</i> The location is broadly set however configurations/ links options available.</p> <p>Construction compounds - As noted in Section 3.5.5, majority of compounds located proximate to the works and as such <i>no alternatives considered.</i></p>
<p>Heuston Station to Glasnevin Junction (including PPT)</p>	<p>Track widening -. This section will not include four-tracking. No lateral expansion required - <i>no alternatives considered.</i></p> <p>Electrification - All bridges along the section require consideration to accommodate electrification - <i>alternatives considered.</i></p> <p>Substations – One sub-station required in this section – <i>alternatives considered.</i></p> <p>Track Drainage – No new drainage is required in this section as no track widening required – <i>no alternatives considered.</i></p> <p>Stations – No new stations in this section therefore <i>no alternatives considered.</i></p> <p>Construction compounds - As noted in Section 3.5.5, majority of compounds located proximate to the works and as such <i>no alternatives considered.</i></p>

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

The area extends from the west side of Hazelhatch & Celbridge Station to Park West Station. This is an existing four-track section on the Cork Mainline, commencing on the south side of Hazelhatch & Celbridge Station where the two running lines diverge into four lines and continue on through Park West & Cherry Orchard Station. The project scope in this area involves the reconfiguration of the existing 4 running lines and electrification of the two tracks on the north side for the DART services.

3.6.1. Civil and OHLE Related Options (including Track and Bridges)

This section of the route was upgraded to four-tracks as part of the original Kildare Route Project. In addition the majority of the existing overbridges and footbridges along this section of the route were upgraded or replaced as part of the original Kildare Route Project. As such, no civil or OHLE alternatives were required in this section of the route.

3.6.2. Substations

Four substations are required within this section of the route. The alternatives considered for each substation are included in the following sections.

3.6.2.1. Hazelhatch

The power study determined the requirement for an electrical substation in Hazelhatch. The area is on the Kildare / Dublin County boundary and is predominantly surrounded by agricultural land with the exception of Hazelhatch and Celbridge train station and a number of private dwellings located on the L5063 Lord's Road to the northwest and Railway Cottages to the southeast of the station. There is a materials storage / handling area adjacent to the railway, with direct access from the L5063 Lord's Road. This has been highlighted as an environmentally sensitive area with known contamination issues.

The Do Nothing Option (Option 0) along with two additional design options (Option 1 and Option 2) were considered (Figure 3-4). The Do Nothing Option and Option 2 failed the engineering feasibility sifting process at Stage 1 as they did not meet the project objectives for electrification. Option 1 was the only option considered feasible.

- Option 1 – is located on a brown field site, a disused residential dwelling in the ownership of CIÉ. The site is located adjacent to the Hazelhatch Station carpark and other uninhabited dwellings also owned by CIÉ. It is situated to the east of Hazelhatch Station with direct access to the local road network. This is a large site and provides a number of options in terms of the proposed substation positioning and configuration. It is understood that existing drainage attenuation measures associated with the carpark are located to the north of this site potentially discharging to the existing watercourse located further north of the site.

Stage 2 MCA was not required as only one option (Option 1) was considered feasible. Option 1 was considered the preferred option.

The outcome from the sifting identified Option 1 as the preferred option.



Figure 3-4 Proposed Hazelhatch Substation Locations

3.6.2.2. Adamstown

The power study determined the requirement for an electrical substation in Adamstown. The area is predominantly rural in nature with the exception of the ongoing residential and mixed-use development at Adamstown to the north and east of the study area. The area is characterised by agricultural use of the surrounding countryside.

The Do Nothing Option (Option 0) along with two additional design options (Option 1 and 2) were considered (Figure 3-5). The Do Nothing Option failed the engineering feasibility sifting process at Stage 1. Options 1 and 2 were brought forward for detailed Stage 2 MCA as follows.

- Option 1: This is located in a greenfield site currently in private ownership to the north of the railway. There are currently no access roads to Option 1, potentially limiting access in and out.
- Option 2: This is located in a greenfield site currently in CIÉ's ownership. It is located to the south of the railway and adjacent to an existing pump station. 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. However, currently this track does not have any physical separation from the live railway.



Figure 3-5 Proposed Adamstown Substation Locations

Table 3.4 presents the summary assessment for each of the CAF parameters. In terms of Economy, Option 2 performed favourably due to ease of access and constructability. Option 2 can be accessed via a CIÉ-owned track which joins the public road network at Stacumny Bridge. It was assumed this track would require work to effectively separate it from the permanent way and thus permit access by ESB Networks personnel unaccompanied by CIÉ track safety coordinators. The site for Option 2 is also currently owned by CIÉ. In terms of Integration, Option 2 offered a significant comparative advantage due to the ease of access to the adjacent road network and preferred buildability due to the existing access track. Under Environmental criteria, Option 2 performed marginally better due to an expected lower noise impact as this option is located further away from existing and proposed residential developments. Option 2 performed favourably in terms of Accessibility and Social Inclusion as it would be located further away from nearby residential developments. Both options were comparable in terms of Safety criteria.

The outcome from the MCA identified Option 2 as the preferred option.

Table 3.4: Adamstown Substation MCA Summary

CAF Parameters	Option Assessment 1	Option Assessment 2
1. Economy	Significant comparative disadvantage over other options	Significant comparative advantage over other options
2. Integration	Significant comparative disadvantage over other options	Significant comparative advantage over other options
3. Environment	Some comparative disadvantage over other options	Some comparative advantage over other options
4. Accessibility & Social Inclusion	Significant comparative disadvantage over other options	Significant comparative advantage over other options
5. Safety	Comparable to other options / neutral	Comparable to other options / neutral
6. Physical Activity	Comparable to other options / neutral	Comparable to other options / neutral
CONCLUSION		Preferred Option

3.6.2.3. Kishoge

The power study determined the requirement for an electrical substation in Kishoge, in west Co. Dublin. There is an existing train station at this location which is currently not in use pending future / planned development in the area. A carpark has been constructed for the new station and is located on the southern side of the railway corridor. Located to the west of the station and on the southern side of the track is an existing halting site. To the north of the tracks and east of the station is an existing education facility. The study area is located within the Clonburris Strategic Development Zone (SDZ) - and specifically Development Area 6 – Kishoge Urban Centre which includes objectives to develop a high-quality mixed-use centre to support the community of Kishoge and to provide for significant commercial (non-retail) provision at areas of high accessibility to public transport. This indicated a need for a building in sympathy with the intended high profile uses intended in the area.

The Do Nothing Option (Option 0) along with three additional design options (Option 1-3) were considered (Figure 3-6). The Do Nothing Option failed the engineering feasibility sifting process at Stage 1 as it did not meet the project objectives for electrification. Options 1-3 were brought forward for detailed Stage 2 MCA as follows:

- Option 1: This site is located to the west of the R136 regional road and to the south of the railway corridor. It is in a greenfield site in private ownership in close proximity to the existing halting site. Access to the adjacent road network would be provided via a newly constructed access road.
- Option 2: This site is located to the east of the R136 regional road and on the southern side of Kishoge Station. It is located within the existing carpark. The proposed site is in the ownership of CIÉ. Access to the road network would be via the carpark entrance.
- Option 3: This site is located to the west of the R136 regional road and to the north of the railway corridor. It is in a brownfield site in private ownership. Access to the adjacent road network would be provided via a newly constructed access road.

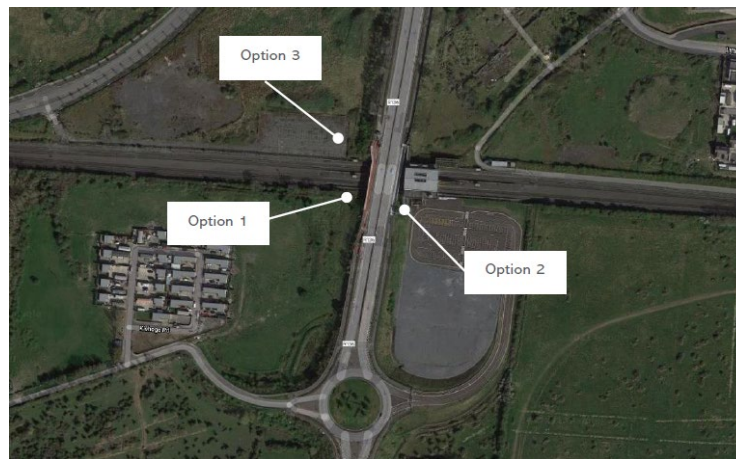


Figure 3-6 Proposed Kishoge Substation Locations

presents the summary assessment for each of the CAF parameters. In terms of Economy, Option 2 performed favourably due to ease of access and constructability due to close proximity and existing access to the R136. ESB grid connection was assumed to be comparable with other options. In terms of Integration, Option 2 had comparative advantage over other options due to the ease of access to the adjacent road network. With regard to the Environmental criteria, Option 2 performed marginally better due to an expected lesser noise impact associated with the increased distance this option is from existing residential developments when compared to the other options. This option can be most easily incorporated into the existing station building envelope, with the objectives of the SDZ met through appropriate design and siting. Option 2 performed favourably in terms of Accessibility and Social Inclusion as it is located further away from nearby residential developments. All Options were comparable in terms of Safety and Physical Activity Criteria.

The outcome from the MCA identified Option 2 as the preferred option.

Table 3.5: Kishoge Substation MCA Summary

CAF Parameters	Option Assessment 1	Option Assessment 2	Option Assessment 3
1. Economy	Some comparative disadvantage over other options	Some comparative advantage over other options	Some comparative disadvantage over other options
2. Integration	Significant comparative disadvantage over other options	Significant comparative advantage over other options	Some comparative advantage over other options
3. Environment	Some comparative disadvantage over other options	Some comparative advantage over other options	Some comparative disadvantage over other options
4. Accessibility & Social Inclusion	Significant comparative disadvantage over other options	Significant comparative advantage over other options	Some comparative advantage over other options
5. Safety	Comparable to other options / neutral	Comparable to other options / neutral	Comparable to other options / neutral
6. Physical Activity	Comparable to other options / neutral	Comparable to other options / neutral	Comparable to other options / neutral
CONCLUSION		Preferred Option	

3.6.2.3.1. Follow-up Modifications to Kishoge

Following consultation with South Dublin County Council on the proposed location of the sub-station, concerns were raised regarding the impact the location would have on future development plans for the area, notably the Urban Centre objective in the Clonburris SDZ. To address these concerns, the proposed sub-station was relocated such that it remains in the SDZ but is now proposed to be located to the west of the proposed Kishoge Urban Centre.

3.6.2.4. Park West

The power study determined the requirement for an electrical substation in Park West. The area is densely populated to the north while to the south of the rail corridor there are mainly industrial units, and to the east and west is a mixture of both industrial units and brown field sites. The M50 motorway runs in a north – south direction and effectively splits the study area.

The Do Nothing Option (Option 0) along with four additional design options (Option 1-4) were considered (Figure 3-7). The Do Nothing Option and Option 2 failed the engineering feasibility sifting process at Stage 1 as they did not meet the project objectives for electrification. Options 1, 3 and 4 were brought forward for detailed Stage 2 MCA as follows:

- Option 1: This option is located to the north of the railway and immediately east of the M50 motorway. This is a brownfield site with direct road access via Park West Avenue to the east. The existing Park West Station is located to the east and existing housing developments in the Cherry Orchard area are located further east of Park West Avenue. Existing ESB 38kV network is located immediately east of Park West Avenue. The area around Option 1 is identified within the Dublin City Development Plan as a Strategic Development Regeneration Area (SDRA 4) and is zoned Z14: “to seek the social, economic and physical development and/or rejuvenation of an area with mixed use, of which residential and Z6 (employment/enterprise uses) would be the prominent uses” in the Cherry Orchard / Park West Local Area Plan 2019 in the LAP. The area for Option 1 forms a small part of this to the north of the railway and is suggested as a good location for a convenience store in the LAP.

- Option 3: This option is located south of the railway corridor and immediately west of the M50 motorway. It is located within existing industrial estate premises / yards. Hence, this option is closer to the railway boundary fence than Option 2. Road access is more complex insofar as maintenance / operation personnel would be required to cross existing private yards / property. ESB 220kV and 38kV networks are located further to the south.
- Option 4: This option is located immediately adjacent to the south of the railway corridor, midway between the M50 bridge to the east and Station Road to the west. It is located within existing industrial estate premises / yards. Road access is more complex insofar as maintenance / operation personnel would be required to cross existing private yards / property. There is little availability in terms of existing ESB 38kV or MV network.



Figure 3-7 Proposed Park West Substation Locations

Table 3.6 presents the summary assessment for each of the CAF parameters. In terms of Economy, Option 1 performed favourably due to ease of access and constructability due to close proximity to Park West Avenue. An ESB grid connection is likely to be comparatively simple when compared to the other options. While all options considered are owned by third parties, this location is in public ownership (Dublin City Council), thus offering the potential for a simplified acquisition / negotiation process. In terms of the Integration criterion, Option 1 is located on the northern side of the tracks and hence provides a more favourable trackside location for the connection of feeder wires for OHLE equipment. It provides a better option in terms of constructability and ease of access for both the construction and operation phases. From an environmental perspective, with regard to environmental criteria, all options performed comparably. At a sub-criteria level noise and vibration had some comparative advantages for Option 1 owing to its location within a brownfield site away from residential properties (i.e. reduced noise emissions on sensitive receptors). For air quality, landscape, architectural heritage and water resources all options were considered neutral as environmental impacts are largely similar across options. For biodiversity and geology, Option 3 and 4 were identified as having some comparative advantage over Option 1. Options 3 and 4 are sited within an industrial estate with no specific biodiversity issues identified and limited requirements for soil excavations. For Option 1, as a brownfield site, habitats would be directly affected as would the extent of soil excavations and potential contamination. Option 1 offered some comparable advantage over other options regarding Accessibility and Social Inclusion. In terms of Safety, Option 1 preforms

better as the location is away from members of the public in an open brownfield site; other options are located with industrial estates in close proximity to members of the public.

The outcome from the MCA identified Option 1 as the preferred option.

Table 3.6: Park West Substation MCA Summary

CAF Parameters	Option Assessment 1	Option Assessment 3	Option Assessment 4
1. Economy	Some comparative advantage over other options	Some comparative disadvantage over other options	Some comparative disadvantage over other options
2. Integration	Some comparative advantage over other options	Some comparative disadvantage over other options	Some comparative disadvantage over other options
3. Environment	Comparable to other options / neutral	Comparable to other options / neutral	Comparable to other options / neutral
4. Accessibility & Social Inclusion	Some comparative advantage over other options	Some comparative disadvantage over other options	Some comparative disadvantage over other options
5. Safety	Some comparative advantage over other options	Some comparative disadvantage over other options	Some comparative disadvantage over other options
6. Physical Activity	Comparable to other options / neutral	Comparable to other options / neutral	Comparable to other options / neutral
CONCLUSION	Preferred Option		

3.6.3. Track Drainage

No new track drainage is proposed in this area.

3.6.4. Stations

No new stations are proposed in this section.

3.6.5. Construction Compounds

Two construction compounds are required between Hazelhatch and Park West. The proposed locations are at Hazelhatch and Park West. The preferred location at Hazelhatch has been identified at Hazelhatch & Celbridge Station adjacent to the preferred location for the proposed electrical substation.

The second is a brown field site adjacent to Park West & Cherry Orchard Station, this compound will also be used for the construction of the proposed Park West electrical substation which is proposed for this area. As there are no other suitable alternative locations for this area, multi-criteria analysis was not required for these two locations.

3.7. Park West & Cherry Orchard Station to Heuston Station

Unlike the Hazelhatch to Park West section and from Heuston Station to Glasnevin Junction section of the route, the section between Park West & Cherry Orchard Station and Heuston Station will require an increase in the width of the existing rail corridor to deliver four-tracking and vertical clearance to accommodate electrification. This combined requirement in this section increases the complexity of the works and results in over lapping interventions within the rail corridor rather than site specific interventions as is the case for the other sections where track widening is not a

requirement. With this in mind, this section of the rail line was sub-divided for further consideration of rail corridor interventions at option selection stage as follows:

- Park West & Cherry Orchard Station to Le Fanu Road Bridge;
- Le Fanu Road Bridge to Kylemore Road Bridge;
- Kylemore Road Bridge to Sarsfield Road Bridge (including Inchicore Works);
- Sarsfield Road Bridge to Memorial Road Bridge;
- Memorial Road Bridge; and
- Memorial Road Bridge to South Circular Road Junction

The option selection process included developing and evaluating a number of corridor options at each of the above sub-sections. The reader is advised that consideration of modifications to bridges for track widening and electrification clearance have been combined in most cases as both elements necessitate bridge modifications.

3.7.1. Civil and OHLE Options (including Track and Bridges)

3.7.1.1. Park West & Cherry Orchard Station to Le Fanu Road Bridge

Figure 3-8 presents the section which extends from east of Park West & Cherry Orchard Station to Le Fanu Road Bridge (OBC7). The rail corridor initially comprises four tracks at Cherry Orchard Footbridge (OBC8B) where it transitions to three tracks and again to two tracks before passing through Le Fanu Road Bridge (OBC7). There are two overbridges in the area, Cherry Orchard Footbridge (OBC8B), which is a single-span pedestrian overbridge and Le Fanu Road Bridge (OBC7), 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. 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.



Figure 3-8 Infrastructure Features between Park West & Cherry Orchard Station to Le Fanu Road Bridge

The Do Nothing Option (Option 0) along with nine additional design options (Options 1-9) were considered for the area from west of Cherry Orchard Footbridge (OBC8B) to the east of Le Fanu Road Bridge (OBC7). The nine options included track widening for all in tandem with variations on track lowering and / or raising road levels to accommodate the vertical clearance for the electrification. The Do Nothing Option, Options 1-4 and Options 7-9 failed the engineering feasibility sifting process at Stage 1 as they did not meet the project objectives for electrification. Options 5 and 6 were brought forward for detailed Stage 2 MCA as follows:

- Option 5 – This option involves the reconstruction of the Le Fanu Road Bridge (OBC7), replacing it with a larger span and higher structure and removing the skew. This option proposes increasing the road level at the bridge to a limit (0.9m approx.), above which road departures from standards would be required in order to tie back into the existing road early enough in order to limit permanent impact on private properties. An additional requirement would be to lower the track levels as needed to achieve the additional required vertical clearance. The removal of the skew also results in the requirement to realign the approach roads and in so doing necessitates that the new alignment include compliant cross-sectional elements for vulnerable user groups (pedestrians, cyclists etc.). Note, Cherry Orchard Footbridge (OBC8B) is not impacted by any of the options and no works are proposed to the bridge.
- Option 6 – This option involves the reconstruction of the Le Fanu Road Bridge (OBC7), replacing it with a larger span and higher structure and removing the skew. This option proposes splitting the required level changes 50/50 between track lowering and road raising to achieve the required OHLE clearances. Note, Cherry Orchard Footbridge (OBC8B) is not impacted by any of the options and no works are proposed to the bridge.

There was little spatial difference between the two options brought forward, therefore the main considerations for MCA stage 2 focussed on technical design matters.

presents the summary assessment for each of the CAF parameters. The MCA revealed that neither option had a comparative advantage or disadvantage over the other for any of the CAF parameters.

In order to streamline the reporting of results, it was considered appropriate to combine the two feasible options at this location into a single option which would be the Preferred Option. The detailed technical design differences between the options remaining a potential design iteration and /or comparator to be further explored through the future design process.

Table 3.7: West & Cherry Orchard Station to Le Fanu Bridge MCA Summary

CAF Parameters	Option Assessment 5	Option Assessment 6
1. Economy	Comparable to other options / neutral	Comparable to other options / neutral
2. Integration	Comparable to other options / neutral	Comparable to other options / neutral
3. Environment	Comparable to other options / neutral	Comparable to other options / neutral
4. Accessibility & Social Inclusion	Comparable to other options / neutral	Comparable to other options / neutral
5. Safety	Comparable to other options / neutral	Comparable to other options / neutral
6. Physical Activity	Comparable to other options / neutral	Comparable to other options / neutral
CONCLUSION	No comparative advantage or disadvantage. Combine to single feasible option with Option 6.	No comparative advantage or disadvantage. Combine to single feasible option with Option 5.

3.7.1.2. Le Fanu Road Bridge to Kylemore Road Bridge

Figure 3-9 presents the section of the rail line extends from just west of Le Fanu Road Bridge to east of Kylemore Road Bridge (OBC5A). The rail corridor consists of two tracks primarily below the surrounding ground level with the residential properties of Kylemore Drive and Landen Road backing onto the railway to the north, and the industrial units of Park West Industrial Estate and Westlink Industrial Estate backing onto the railway to the south. The Kylemore Road Bridge is a single-carriageway road bridge carrying road traffic over the rail corridor in a north-south direction. The bridge does not have the adequate span to fit four tracks and it is not high enough for the DART line electrification infrastructure to pass under.

On the north side of the existing corridor, there are significant residential properties along Landen Road, and Kylemore Drive, many within a 50m and 100m buffer of the current rail centreline. The area to the south of the corridor is predominantly commercial/industrial properties, and again many are within a 50m buffer. Some of the commercial/industrial operations to the south are operating under IPC (Integrated Pollution Control) licence including SRCL Ltd southeast of Kylemore Road Bridge (OBC5A) and Henkel Ireland, Thornton's Recycling and Labre Civic Amenity site west of Kylemore Road Bridge (OBC5A). The Seveso site and associated area relating to Kayfoam Woolfson Ltd. is also located to the south. Neither Le Fanu Road Bridge (OBC7) or Kylemore Road Bridge (OBC5A) are designated as on the Record of Protected Structures (RPS) or listed on the National Inventory of Architectural Heritage (NIAH).



Figure 3-9 Major Infrastructure Features between Le Fanu Road Bridge and Kylemore Road Bridge

The Do Nothing Option (Option 0) was considered along with ten additional design options (Options 1-10) for Kylemore Road Bridge (OBC5A). The Do Nothing Option, and Options 1-8 failed the engineering feasibility sifting process at Stage 1 as they did not meet the project objectives for electrification. Options 9 and 10 were brought forward for detailed Stage 2 MCA as follows.

- Options 9: This option proposes to replace the existing Kylemore Road Bridge (OBC5A). The proposed bridge would have a span and height that provides sufficient vertical and horizontal clearance for electrification, four-tracking and passive provision for potential future station platforms. The new structure would also incorporate passive provision for LUAS loading over the bridge but the impact on the geometric alignment of the approach roads associated with a potential future LUAS was not part of the requirement. Vertical clearance requirements would be achieved by a combination of track lowering and increases to road levels. To achieve the vertical clearance beneath the structure, Option 9 proposes to split the additional vertical clearance needed between road level increases (50%) and track lowering (50%).
- Option 10: As described for Option 9 however to achieve the vertical clearance beneath the structure, Option 10 proposes to increase the road level at the bridge to the level indicated as the top of LUAS slab-track level used for the now-defunct KRP2 project and then lower the track levels as needed to achieve the additional required vertical clearance. This is considered the maximum level achievable without permanently impacting the ability to provide vehicular access to some residential properties in Landen Road.

There was little spatial difference between the two options brought forward, therefore the main considerations for MCA stage 2 focussed on technical design matters.

Table 3.8 presents the summary assessment for each of the CAF parameters. The MCA revealed that neither option had a comparative advantage or disadvantage over the other for any of the CAF parameters. In order to streamline the reporting of results, it was considered appropriate to combine the two feasible options at this location into a single option which would be the Preferred Option. The

detailed technical design differences between the options remaining a potential design iteration and /or comparator to be further explored through the future design process.

Table 3.8: Le Fanu Bridge to Kylemore Road Bridge MCA Summary

CAF Parameters	Option Assessment 9	Option Assessment 10
1. Economy	Comparable to other options / neutral	Comparable to other options / neutral
2. Integration	Comparable to other options / neutral	Comparable to other options / neutral
3. Environment	Comparable to other options / neutral	Comparable to other options / neutral
4. Accessibility & Social Inclusion	Comparable to other options / neutral	Comparable to other options / neutral
5. Safety	Comparable to other options / neutral	Comparable to other options / neutral
6. Physical Activity	Comparable to other options / neutral	Comparable to other options / neutral
CONCLUSION	No comparative advantage or disadvantage. Combine to single feasible option with Option 10.	No comparative advantage or disadvantage. Combine to single feasible option with Option 9.

3.7.1.3. Kylemore Road Bridge to Sarsfield Road Bridge (including Inchicore Works)

Figure 3-10 presents the section which extends from east of Kylemore Road Bridge (OBC5A) where there is an additional siding track to the south of the mainline that provides the entrances and exits to and from Inchicore Works to the west of Sarsfield Road Bridge (UBC4) and includes the area around Inchicore Works and Khyber Pass Footbridge (OBC5). Adjacent to Inchicore are two siding tracks, the Long Siding and the Short Siding, which account for a maximum width of up to four tracks running parallel through part of the Inchicore area. Where the sidings end to the east of the Inchicore facility the third line to the south of the mainline becomes the third running line as it heads east. Currently the existing tracks through the area do not provide the required four-tracking while maintaining the functionality of Inchicore depot.

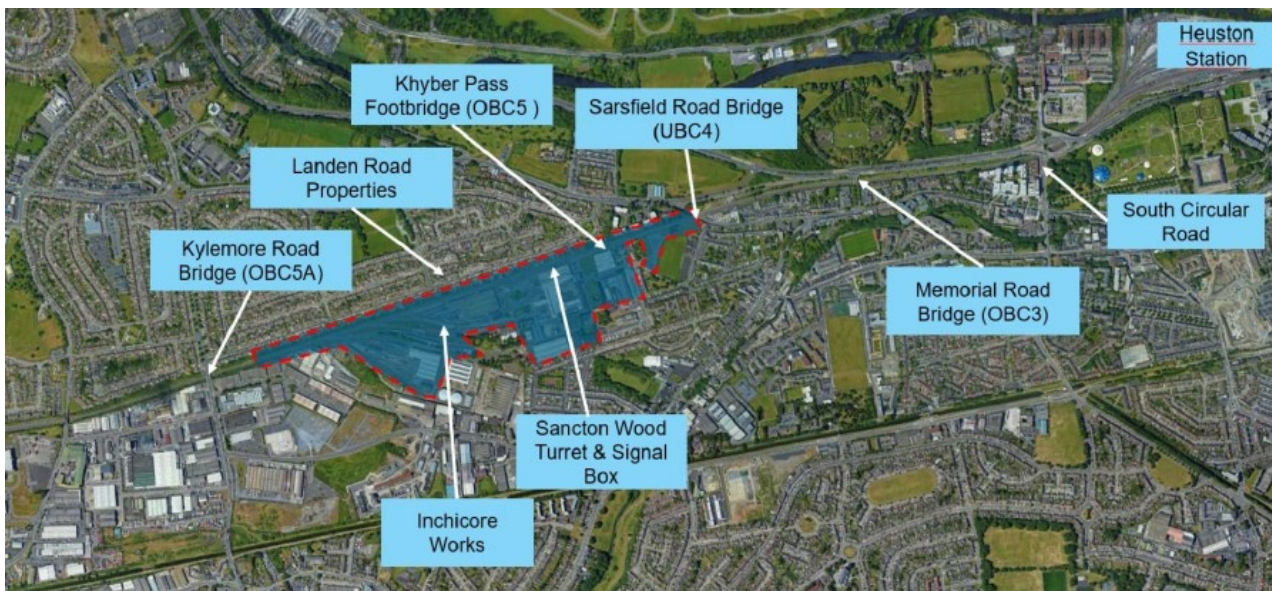


Figure 3-10 Major Infrastructure Features between Kylemore Road Bridge to Sarsfield Road Bridge

The Do Nothing Option (Option 0) along with four additional design options (Options 1-4) were considered for this area. The Do Nothing Option and Options 1 and 2 failed the engineering

feasibility sifting process at Stage 1 as they did not meet the project objectives for electrification. Options 3 and 4 were brought forward for detailed Stage 2 MCA as follows:

- Options 3: This option provides an additional track to the north and includes electrification of the lines to facilitate DART services. It also maintains operational requirements of the Inchicore Works and sidings. The track enhancements are achieved to the north towards the boundary with Landen Road properties.
- Options 4: This option provides an additional track to the south and includes electrification of the lines to facilitate DART services. It also maintains operational requirements of the Inchicore Works and sidings. The track enhancements are achieved to the south towards the boundary with Inchicore Works.

Table 3.9 presents the summary assessment for each of the CAF parameters. The MCA identified that Option 4 was preferred for economy because it requires less permanent land take than Option 3 – in particular from the residential properties to the north along Landen Road. It also required less retaining structure to the north to contain the resulting slope. Option 4 also demonstrated ‘Some Comparative Advantage’ over Option 3 because for integration as it will have less long-term impact on residential properties and residentially zoned land. Land to the south is identified as having significant regeneration potential and is part of the Naas-Ballymount-Cherry Orchard-Park West Urban Regeneration Development Fund (URDF) Masterplan, currently being prepared by Dublin City Council and South Dublin County Council. It is anticipated in the long term that low density industrial units will give way to more sustainable high-density development adjacent to the railway.

In terms of environment Option 4 was found to have a ‘Some Comparable Advantage’ over Option 3 in terms of minimising the potential effect on: Noise and Vibration, Air and Climate; Landscape and Visual; Water Resources, Agricultural and Non-agricultural land use; and Geology and Soils factors. Moving the railway and works south away from the residential properties to the north was the key advantage of Option 4 although impacts were recorded in relation to architectural heritage associated with a Signal Box (Protected Structure) and turret within Inchicore works. The remaining CAF parameters were found to be neutral.

Overall considering all CAF parameters, Option 4 was identified as the Preferred Option.

Table 3.9: Kylemore Road Bridge to Sarsfield Road Bridge MCA Summary

CAF Parameters	Option Assessment 3	Option Assessment 4
1. Economy	Some comparative dis-advantage to the other option	Some comparative advantage to the other option
2. Integration	Some comparative dis-advantage to the other option	Some comparative advantage to the other option
3. Environment	Some comparative dis-advantage to the other option	Some comparative advantage to the other option
4. Accessibility & Social Inclusion	Comparable to other options / neutral	Comparable to other options / neutral
5. Safety	Comparable to other options / neutral	Comparable to other options / neutral
6. Physical Activity	Comparable to other options / neutral	Comparable to other options / neutral
CONCLUSION		Preferred Option

3.7.1.3.1. Khyber Pass Footbridge

The track alignment through Khyber Pass Footbridge (OBC5) is linked to the permanent way solution in the wider area. The Khyber Pass Footbridge (OBC5) has insufficient horizontal and vertical clearance to accommodate the four tracking and the electrification. In parallel to the permanent way solution in the wider area, consideration was given to the footbridge.

The Do Nothing Option (Option 0) along with three additional design options (Option 1-3) were considered for the Khyber Pass Footbridge. The Do Nothing Option and Options 1 and 2 failed the engineering feasibility sifting process at Stage 1 as they did not meet the project objectives for electrification. Only Option 3 was found to be feasible.

- Option 3: This option proposes to replace the existing Khyber Pass Footbridge (OBC5) structure with a new structure that has adequate vertical clearance to achieve the required contact wire height and OHLE clearance and a span that facilitates a minimum horizontal clearance to abutments of 4.5m.

Stage 2 MCA was not required as only one option (Option 3) was considered feasible. Option 3 was considered the preferred option. This was compatible with the MCA for the wider area.

3.7.1.4. Sarsfield Road Bridge to Memorial Road Bridge

Figure 3-11 presents the section which extends from the west side of Sarsfield Road Bridge (UBC4) to 50m west of Memorial Road Bridge (OBC3). It is approximately 470m in length. Sarsfield Road Bridge (UBC4) carries three rail tracks over the single-carriageway Sarsfield Road below. Sarsfield Road Bridge (UBC4) is a major feature of the area. It is a single-span highly skewed steel rail bridge supported on masonry abutments with steel bearings. Sarsfield Road facilitates traffic moving in a north-south direction beneath the rail corridor. The carriageway width beneath the bridge is narrow. At Sarsfield Road Bridge (UBC4), the rail corridor is on an embankment. Further to the east, the railway is at grade then generally returns to a cutting which gradually steepens on approach to Memorial Road Bridge (OBC3). The area does not currently have any provisions for electrification.

The Sarsfield Road Bridge (UBC4) is not listed on the Record of Protected Structures (RPS) or listed on the National Inventory of Architectural Heritage (NIAH). West of this underbridge on the southern side of the rail corridor, there is a truck rental company. The land use then gives way to residential development associated with Sarsfield Road, Woodfield, and Murray's Cottages. This area also hosts two features listed on the NIAH and on the Record of Protected Structures for Dublin City: Cleary's Pub and the Inchicore National School. North of the corridor at Sarsfield Road Bridge (UBC4) there is a strip of open space, a horse sanctuary/field. Further north is Con Colbert Road. The open green space associated with Liffey Gaels GAA club is located to the north-west and the open space associated with the National War Memorial Gardens to the north-east.

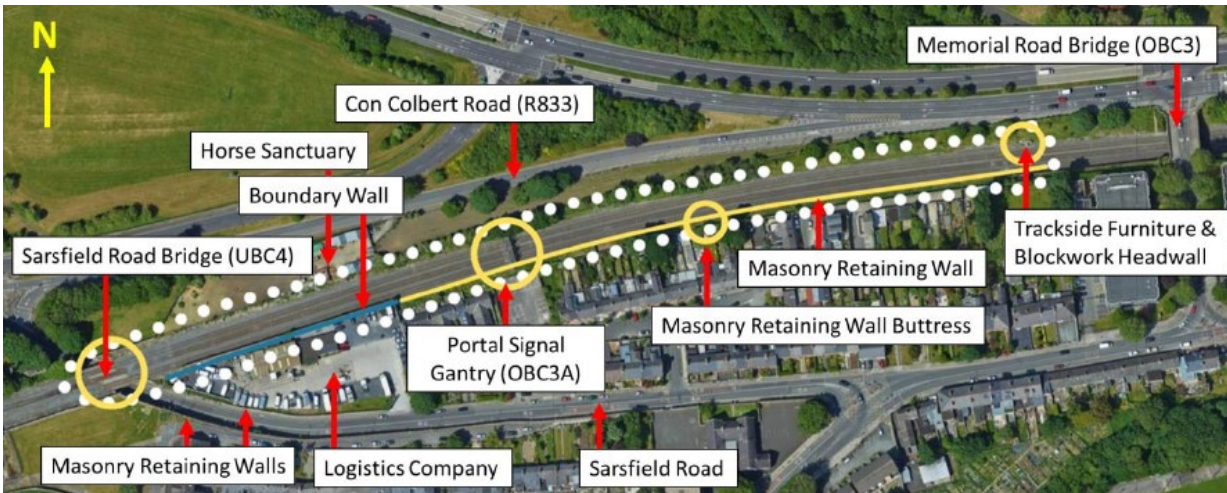


Figure 3-11 Major Infrastructure Features between Sarsfield Road Bridge and Memorial Road Bridge

The Do Nothing Option (Option 0) along with three additional design options (Options 1-3) were considered in this area. The Do Nothing Option (Option 0) along with Options 1 and 3 failed the engineering feasibility sifting process at Stage 1 as they did not meet the project objectives for electrification. Option 2 was the only option considered feasible.

- Option 2: This option proposes to replace the existing Sarsfield Road Bridge with 2 no. new bridges each carrying 2 no. tracks. The northern bridge would have a span of 14m (approx.) and positioned at the existing abutment location, while the southern bridge would have a span of 21m (approx.) and be positioned to the south of the existing abutments. Each of the proposed bridges would have a width of 8.3m (approx.) and carry 2 no. tracks with a 1.4m (approx.) wide walkways on the outer side of each structure.

Stage 2 MCA was not required as only one option (Option 2) was considered feasible. Option 2 was considered the preferred option.

3.7.1.4.1. Memorial Road Bridge (OBC3)

Figure 3-12 presents the section at Memorial Road Bridge (OBC3). The track alignment through Memorial Road Bridge (OBC3) is linked to the permanent way solution in the wider area. The section is approximately 65m in length and extends from the east side of Memorial Road Bridge (OBC3) to 50m west of Memorial Road Bridge (OBC3). The permanent way currently consists of three tracks. The tracks fall in level from west to east towards Heuston Station. There is currently no longitudinal drainage system installed along the permanent way. Memorial Road Bridge (OBC3) is a major feature of this area; and it carries two lanes of northbound traffic over the rail corridor. There are currently no southbound lanes in Memorial Road. The junction of Memorial Road and the Chapelizod Bypass is immediately north of the bridge, and it is signalled. The junction of Memorial Road and Inchicore Road is approximately 75m south of the bridge. Con Colbert House is located on the south-east and south-west sides of the structure. These buildings house data centres. The rail corridor is in cutting (i.e. the rail level is below the surrounding ground level). The corridor is formed by retaining walls along the south side of the trace and earthwork cutting slopes along the north side. The south side of the rail corridor is retained with a battered masonry retaining wall. The north side of the rail corridor is formed with a cutting slope.

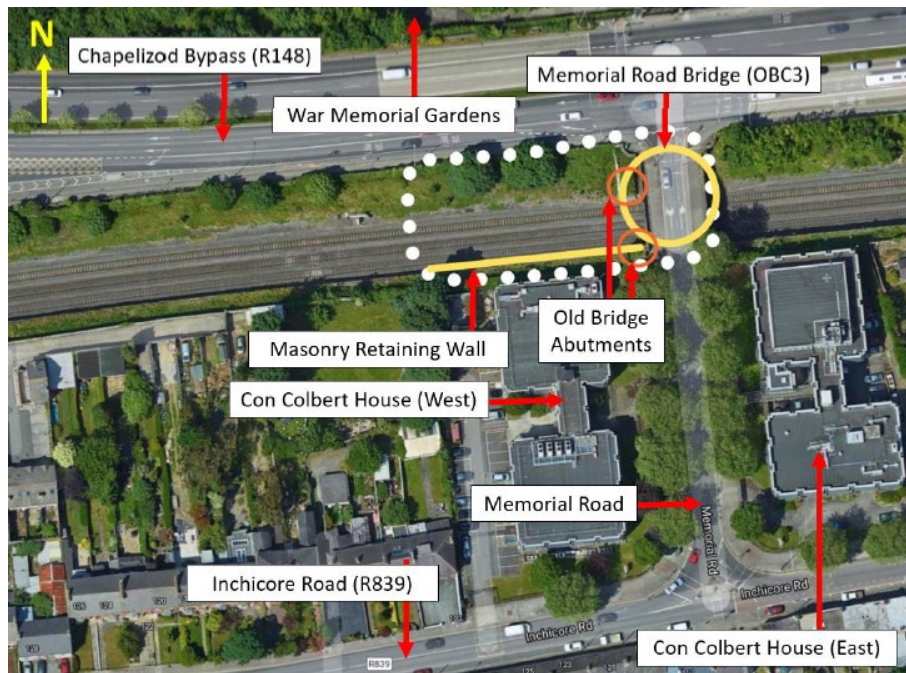


Figure 3-12 Major Infrastructure Features at Memorial Road Bridge

The Do Nothing Option (Option 0) along with six additional design options (Options 1-6) were considered for this area. The Do Nothing and Options 1, 2, 4 and 5 failed the engineering feasibility sifting process at Stage 1 as they did not meet the project objectives for electrification. Options 3 and 6 were brought forward for detailed Stage 2 MCA as follows.

- Option 3 – This option involves the replacement of the Memorial Road Bridge (OBC3), with a greater span and width; the works would involve the entire burden of achieving OHLE clearance through track lowering; in order to limit impact on road users and adjacent land holdings. The aim being to limit impact on vehicular and vulnerable road users and adjacent land holdings. It is proposed to lower track levels by up to 1.15m to achieve a desirable OHLE contact wire clearance of 4.7m. Alternatively, reducing track lowering to 0.7m if the prior is deemed unachievable. In either case the road levels would be reinstated to their existing levels.
- Option 6 - This option involves the replacement of the Memorial Road Bridge (OBC3), with a greater span and width; the works would involve almost the entire burden of achieving OHLE clearance through track lowering with a nominal increase to road level on. The aim being to limit impact on vehicular and vulnerable road users and adjacent land holdings. It is proposed to increase the road level to a maximum level, above which works to the Chapelizod Bypass would be required, in addition to lowering the track levels as needed to achieve the additional required vertical clearance. The road raising at the bridge would only be 50mm (approx.); thereby reducing the track lowering required under Option 3 by the equivalent depth.

Table 3.10 presents the summary assessment for each of the CAF parameters. The MCA concluded that neither option had a comparative advantage or disadvantage over the other for any of the CAF parameters. The point of difference between the options related to construction stage impacts to the road surface, including potential to impact trees which form the ‘avenue vista’ of the road; however, these potential impacts can be addressed through detailed construction stage planning and alone

would not be reasonable to evaluate the MCA above neutral finding. Option 3 was brought forward as the Preferred Option, while Option 6 remained a potential design iteration of Option 3.

Table 3.10: Memorial Road Bridge MCA CAF Summary

CAF Parameters	Option Assessment 3	Option Assessment 6
1. Economy	Comparable to other options / neutral	Comparable to other options / neutral
2. Integration	Comparable to other options / neutral	Comparable to other options / neutral
3. Environment	Comparable to other options / neutral	Comparable to other options / neutral
4. Accessibility & Social Inclusion	Comparable to other options / neutral	Comparable to other options / neutral
5. Safety	Comparable to other options / neutral	Comparable to other options / neutral
6. Physical Activity	Comparable to other options / neutral	Comparable to other options / neutral
CONCLUSION	Preferred option	

3.7.1.5. Memorial Road Bridge to South Circular Road Junction

This section which extends from the east side of Memorial Road Bridge (OBC3) to 10m west of IE720A (points). This section is approximately 750m in length. The permanent way currently consists of three tracks between Memorial Road Bridge (OBC3) and South Circular Road Bridge (OBC1). The number of tracks increases to the east side of South Circular Road Bridge (OBC1) at Islandbridge Junction. This includes three tracks which continue towards Heuston, multiple tracks then splay and enter at Heuston Station.

There are two major road overbridges, these are South Circular Road Bridge (OBC1) and St. John's Road Bridge (OBC0A). Together these structures carry road traffic across the rail line and facilitate traffic movements at the junction of South Circular Road (R111), the Chapelizod Bypass (Con Colbert Road - R148) and Chapelizod Bypass (St. John's Road West - R148). The local road network and South Circular Road Junction are a major feature. This intersection is one of the busiest in Dublin and is highly congested during peak travel times.

The area around St. Johns Road includes the site of a burial (RMP DU018-020284). The Zone of Archaeological Potential for the Historic City of Dublin (RMP DU018-020) is also in this area and incorporates the potential site of an early medieval cemetery which follows the natural gravel ridgeline between Memorial Park to Heuston Station. As noted in the previous section, the Memorial Road Bridge (OBC3) at the western extent of this section is aligned with the Lutyens designed ceremonial entrance to the National War Memorial Gardens (which is listed on the Dublin City Council's Record of Protected Structures).

The Do Nothing Option (Option 0) along with eight additional design options (Options 1-8) were considered for this area. The Do Something Options included the reconstruction of the South Circular Road Bridge (OBC1), replacing it with a larger span and higher structure and provision of a new cut and cover portal structure. The Do Nothing Option and Options 1, 3 and 5 failed the engineering feasibility sifting process at Stage 1 as they did not meet the project objectives for electrification. Options 2, 4, 6, 7 and 8 were brought forward for detailed Stage 2 MCA as follows:

- Option 2 – This option involves the reconstruction of the South Circular Road Bridge (OBC1), replacing it with a larger span and higher structure, the works would also involve track lowering.
- Option 4 – This option involves the replacement of the South Circular Road Bridge (OBC1) with an over widened portal which could be constructed in phases, works would also involve track lowering.
- Option 6 – This option involves the retention of the existing South Circular Road Bridge (OBC1) and the construction of a new cut and cover portal structure.
- Option 7 – This option is similar to Option 2 but would incorporate a minor and localised increase to road levels on the Chapelizod Bypass on the north west side of the new bridge.
- Option 8 – This option is similar to Option 4 but would incorporate a minor and localised increase to road levels on the Chapelizod Bypass on the north west side of the new bridge.

Table 3.11 presents the summary assessment for each of the CAF parameters.

The MCA identified that Option 6 was the least expensive option having regard to land take, traffic disruption (temporary works) and capital costs of the works. Option 8 was the most expensive because of extent of capital works and potential for greater traffic disruption. Option 6 was the only option that would leave the Intercity and Regional Rail service tracks approximately at the same level as they currently are. This would negate the need to implement a substantial track lowering in these tracks to accommodate a new electrification driven by the DART tracks, which in this case run under a new separate structure, thus avoiding the significant works required to the wall in response to lowering the track.

Neither Option 2 or 7 allowed for phased construction (requiring the removal of the entire bridge) and this would result in significant disruption and diversions (and associated costs) during construction for users immediately around the junction, businesses in the area (in particular Inchicore) but also strategically in the context of the wider transport network. While the other options (Option 4, 6 and 8) allowed for phased construction maintaining local and strategic access, Option 6 allowed for phasing in localised areas, allowing traffic to continue throughout the construction period with local diversions. Having regard to the importance of the South Circular Road Junction for local and strategic access to economic activities Option 6 was preferred because the nature of the proposed works can facilitate shorter traffic disruption / diversions than other options. It also does necessitate the construction of a retaining wall between the existing and the new tracks from South Circular Road Junction to Memorial Road.

In terms of the Environmental sub-criteria, Option 6 was found to have 'Some Comparable Advantage' over the other options in terms of minimising the potential effect on: Air and Climate (less effect on traffic during construction); Landscape and Visual; Cultural Heritage and Architectural Heritage; and Agricultural and Non-agricultural land use factors. Option 6 has less effect on the housing to the southwest of South Circular Road Bridge (OBC1).

In terms of Accessibility and Social Inclusion, while there is no comparative advantage or disadvantage between Options 2, 4, 7 and 8, in service it is considered that Option 6 would not have

the same degree of flexibility or marginally less available space to provide facilities for road users. Hence, Option 6 was found to have ‘Some Comparable Disadvantage over Other Options’.

In terms of Safety, Options 6 and 8 are identified as having ‘Some Comparative Advantage’ over Options 2, 4 and 7. This relates to a combination of risks associated with steep gradients, requirements to underpin walls and whether construction can be phased to provide sufficient space to accommodate vulnerable road users.

In terms of Physical Activity, there is no comparative advantage or disadvantage between all the options. In terms of Physical Activity all options are identified as comparable.

Overall considering all CAF parameters, Option 6 was identified as the preferred option.

Table 3.11: Memorial Road Bridge to Sarsfield Road Bridge MCA Summary

CAF Parameters	Option Assessment 2	Option Assessment 4	Option Assessment 6	Option Assessment 7	Option Assessment 8
1. Economy	Some comparative disadvantage compared to other options	Some comparative disadvantage compared to other options	Significant comparative advantage compared to other options	Some comparative disadvantage compared to other options	Significant comparative disadvantage compared to other options
2. Integration	Some comparative disadvantage compared to other options	Some comparative disadvantage compared to other options	Some comparative disadvantage compared to other options	Some comparative disadvantage compared to other options	Some comparative disadvantage compared to other options
3. Environment	Some comparative disadvantage compared to other options	Some comparative disadvantage compared to other options	Some comparative disadvantage compared to other options	Some comparative disadvantage compared to other options	Some comparative disadvantage compared to other options
4. Accessibility & Social Inclusion	Some comparative disadvantage compared to other options	Some comparative disadvantage compared to other options	Some comparative disadvantage compared to other options	Some comparative disadvantage compared to other options	Some comparative disadvantage compared to other options
5. Safety	Some comparative disadvantage compared to other options	Some comparative disadvantage compared to other options	Some comparative disadvantage compared to other options	Some comparative disadvantage compared to other options	Some comparative disadvantage compared to other options
6. Physical Activity	Comparable to other options / neutral	Comparable to other options / neutral	Comparable to other options / neutral	Comparable to other options / neutral	Comparable to other options / neutral
CONCLUSION			Preferred		

3.7.2. Substations

3.7.2.1. Park West & Cherry Orchard Station to Le Fanu Road Bridge

No substations are proposed in this section therefore no alternatives have been considered.

3.7.2.2. Le Fanu Road Bridge to Kylemore Road Bridge

The power study determined the requirement for an electrical substation in Kylemore.

The Do Nothing Option (Option 0) along with two additional design options (Option 1 and 2) were considered. The Do Nothing Option and Option 1 failed the engineering feasibility sifting process at Stage 1 as they did not meet the project objectives for electrification.

- Option 2: This site is located on private land adjacent to the rail corridor; it is located on a currently unused site. While this Option will necessitate land acquisition, it is considered satisfactory for its proximity to the local road network and proximity to the railway. The proposed permanent way alignment additional tracks and headshunt will also necessitate some land acquisition in this area.

Stage 2 MCA was not required as only one option (Option 2) was considered feasible. Option 2 was considered the preferred option.

Follow-up Modifications

Following consultation feedback on the proposed location of the substation, further consideration was given to a location within Inchicore Works. A location within CIÉ Inchicore rail depot on the southern side of the railway was identified. The proposed location for the substation is now on the western boundary of the Inchicore depot, adjacent to the Kylemore Industrial Estate. The area is a brownfield site currently used as a maintenance and storage area. Access to the site is from Jamestown Road via an existing access gate to the Inchicore depot. A dedicated and segregated vehicle access route will be provided within the depot from the site entrance to the substation to provide safe and unfettered access for ESB staff. Unlike the original preferred option, this site removes the need for acquisition of private land.

3.7.2.3. Kylemore Road Bridge to Sarsfield Road Bridge (including Inchicore Works)

While no substations were proposed in this section and therefore no alternatives considered, it is noted that the modified location for the Kylemore substation now falls within this section. See Section 3.7.2.2 above.

3.7.2.4. Sarsfield Road Bridge to Memorial Road Bridge

No substations are proposed in this section therefore no alternatives have been considered.

3.7.2.5. Memorial Road Bridge

No substations are proposed in this section therefore no alternatives have been considered.

3.7.2.6. Memorial Road Bridge to South Circular Road Junction

No substations are proposed in this section therefore no alternatives have been considered.

3.7.3. Track Drainage – Attenuation Solutions

A new drainage system is proposed for Park West & Cherry Orchard Station to Heuston in order to meet the increased runoff volumes generated by the new four-tracking layout, as well as the attenuation requirements needed to comply with the allowable discharge rates. The new drainage system is based on three independent drainage networks (Network 1, Network 2 and Network 3) based on three outfall locations. As part of the design process different attenuation solutions have been assessed. These are outlined below.

3.7.3.1. Network 1 (Cherry Orchard to Inchicore Works)

Network 1 drains the track length from Cherry Orchard up to Inchicore Works. The following attenuation solutions were assessed:

- Option 1: Implementation of an infiltration tank as a Sustainable Urban Drainage Systems (SuDS) solution;
- Option 2: Open attenuation pond;
- Option 3: Closed attenuation tank.

Option 1 offered some advantages from an environmental perspective as SuDS provides the best opportunity for integration of Nature Based solutions which have advantages for biodiversity, climate and climate mitigation. However, the option was discounted due to the risk of rising groundwater levels at the track sub-base and platform layers. The shallow groundwater table may affect the stability of the platform and cause major damages if water levels reach the proposed electrification system along the tracks.

The level difference between the required pond bottom and ground levels in Option 2 showed an average pond depth of 7.3m, assuming pond slopes of 1:3, with a required plan area of approximately 4766m². Option 2 was discounted due to the hazard generated by an open pond of 7.3m deep and the extension of the area required to implement this solution.

Based on the above, Option 3 attenuation tank was identified as the preferred option. With this solution the required attenuation depth is reduced to 2.65m with a plan area of 1574m².

3.7.3.2. Network 2 (Inchicore Works to Sarsfield Road Underbridge)

Network 2 drains the track length from Inchicore Depot to Sarsfield Road Underbridge. The following attenuation solutions were assessed.

- Option 1 : Implementation of an infiltration tank as a SuDS solution;
- Option 2: Open attenuation pond;
- Option 3: Closed attenuation tank.

Option 1 offered some advantages from an environmental perspective as SuDS provides the best opportunity for integration of Nature Based solutions which have advantages for biodiversity, climate and climate mitigation. However, the option was discounted due to the risk of rising groundwater levels at the track sub-base and platform layers. The shallow groundwater table may affect the stability of the platform and cause major damages if water levels reach the proposed electrification system along the tracks.

The level difference between the required pond bottom and ground levels in Option 2 showed an average pond depth of 3m, however, the available land in this zone is not sufficient to develop this solution, the proposed four-tracking layout and the existing infrastructure represent the main constraints. Option 2 was therefore discounted.

Based on the above, Option 3 attenuation tank was identified as the preferred option in order to eliminate the land intake constraints. The required tank depth of this solution is 2.65m with a plan area of 832m².

3.7.3.3. Network 3 (Sarsfield Road Underbridge to Heuston West)

Network 3 drains the new track arrangement from Sarsfield Road Underbridge to Heuston West. The following attenuation solutions were assessed.

- Option 1 : Implementation of an infiltration tank as a SuDS solution;
- Option 2: Open attenuation pond;
- Option 3: Closed attenuation tank.

Option 1 offered some advantages from an environmental perspective as SuDS provides the best opportunity for integration of Nature Based solutions which have advantages for biodiversity, climate and climate mitigation. However, the option was discounted due to the risk of rising groundwater levels at the track sub-base and platform layers. The shallow groundwater table may affect the stability of the platform and cause major damages if water levels reach the proposed electrification system along the tracks. Moreover, Clancy Quay Barracks is located at tank level, therefore if an infiltration tank is used, the residential area could present flooding issues, which makes this an unfeasible solution.

The available open area for Option 2 was not sufficient to locate a pond facility without introducing a major hazard in the area.

Based on the above, Option 3 attenuation tank was identified as the preferred option in order to eliminate the landtake and hazard constraints. The required tank depth of this solution is 2.65m with a plan area of 1216m².

3.7.4. Stations

No stations are proposed in this section of the route. The proposed new Heuston West Station is addressed in Section 3.8.

3.7.5. Construction Compounds

3.7.5.1. Park West & Cherry Orchard Station and to Le Fanu Road Bridge

Four construction compounds are required within the limits of the corridor between Park West & Cherry Orchard Station and Le Fanu Road Bridge. These are located at: Friel Avenue; Cherry Orchard Avenue; Le Fanu Bridge and the Main Contractor Offices & Compound.

3.7.5.1.1. Friel Avenue

A small construction compound is required 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 south side of the corridor west of Le Fanu Bridge. The site is located on green space, adjacent to the rail line and Friel Avenue. The site is privately owned commercial property and would need to be temporarily acquired for the duration of the works. Other options along the southern rail boundary were not considered due to the narrow space available between the railway corridor and existing infrastructure/buildings and due to the location of the proposed works. Constructing a compound to the right of Friel Avenue on the existing privately owned car park may be possible but the requirement to cross Friel Avenue to transport plant and materials would be a significant

inconvenience to construction/the landowner. The site will be reinstated following completion of the works.

3.7.5.1.2. Cherry Orchard Avenue

A small construction compound is required on the northside 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 (OBC7). The proposed site is currently a green area with direct access to the rail corridor. The site is owned by DCC and would need to be temporarily acquired for the duration of the works. A site west of the existing footbridge was not considered as the proposed retaining wall is highest near the proposed site location, which requires good access via a construction compound to remove the necessary spoil and material arising from the wall installation.

3.7.5.1.3. Le Fanu Road Bridge

There is a requirement for construction compounds at each corner of Le Fanu Road Bridge (OBC7) to facilitate the bridge reconstruction works and also to provide access to the rail corridor for construction of the new retaining wall structures. As no other suitable alternative locations in the area were identified for construction compounds, optioneering was not required.

3.7.5.1.4. Main Contractors Compound

It is proposed to locate the contractor's main construction compound and project management office in the area adjacent to Le Fanu Road Bridge. The site is needed 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 compound is located close to and ideally with direct access to the work site. The site must be fully serviced with electricity, water, sewerage and telecoms and must have good access to the public road network.

The Do Nothing Option (Option 0) along with three additional design options (Option 1-3) for were considered (Figure 3-13). The Do Nothing Option and Options 2 and 3 failed the engineering feasibility sifting process at Stage 1 as they did not meet the project objectives. Only Option 1 was identified as meeting the necessary requirements.

- Option 1: This option is located on private land, it is a hardstanding area, currently used for truck parking. The current access is via Friel Avenue. There is also an old access point from Killeen Road which is currently blocked off. Option 1 is the closet of the 3 options to the work site. This option would require temporary land acquisition and temporary relocation of the existing truck parking to an alternative location, potentially south to the hardstanding area immediately adjacent to the site.

Stage 2 MCA was not required as only one option (Option 1) was considered feasible. Option 1 was considered the preferred option.



Figure 3-13 Proposed Main Contractor Construction Compound Locations

Follow Up

Following consultation with the affected landowner operating from the preferred location for the contractor’s main construction compound, the proposed location was revisited to establish if the main car parking area could be avoided in favour of the vacant lands. The design team reviewed the engineering constraints for the proposed compound location and developed a further option using a combination of both Option 2 and 3. This new option was brought forward.

3.7.5.2. Le Fanu Bridge to Kylemore Road Bridge

A construction compound is required between Le Fanu to Kylemore Road Bridge at Kylemore Road Bridge (OBC5A) to facilitate the reconstruction of Kylemore Road Bridge and localised works associated with widening of the rail corridor. Four discrete construction compounds at the four corners of the bridge are required. Due to the nature of the works, the construction compounds are required in the immediate vicinity of the bridge. no other suitable alternative locations in the area were identified through the option development process, the selected construction compound locations did not require multi-criteria analysis.

3.7.5.3. Kylemore Road Bridge to Sarsfield Road Bridge

Three construction compounds are required in the area around Inchicore Works and Khyber Pass Footbridge. These are the proposed locations at Inchicore, Khyber Pass Footbridge and Sarsfield Road.

3.7.5.3.1. Inchicore Works

Access is required for localised works, in particular materials processing, and the proposed location for the construction compound is required to facilitate this work. As there are no other suitable alternative locations in the area, the selected construction compound locations did not require multi-criteria analysis.

3.7.5.3.2. Khyber Pass Footbridge

Access is required for localised works, in particular the bridge reconstruction, the proposed locations for the construction compounds are required to facilitate this work. As there are no other suitable alternative locations in the area, the selected construction compound locations did not require multi-criteria analysis.

3.7.5.3.3. Sarsfield Road

Access is required for localised works, in particular the attenuation tank and the track works east of the main depot maintenance building local to the attenuation tank area. This compound is required for the Sarsfield Road Under-Bridge (UBC4) and track works immediately adjacent to the bridge area, with the close proximity of works in this section it is practical to make use of the same site particularly as many of the works will be concurrent and it minimises haulage noise and disruption to surrounding residents. As there are no other suitable alternative locations in the area, the selected construction compound locations did not require multi-criteria analysis.

3.7.5.4. Sarsfield Road Bridge to Memorial Road Bridge

One construction compound is required at the vicinity of Sarsfield Road Under-Bridge (UBC4) at Sarsfield Road. The railway underbridge at Sarsfield Road needs to be widened to accommodate the widened track corridor. A new underground attenuation tank is also required in this area, as part of the modifications to the drainage system, the new tank will be located adjacent to the car park at the entrance to the CIÉ Inchicore Works.

The Sarsfield Road compound consists of three discrete sites proposed to facilitate the bridge reconstruction, underground attenuation tank installation and localised works in the rail corridor. The general principle is to provide access to each corner of a bridge where it is being replaced. See Section 5.4.5.8.1 of Chapter 5 Construction Strategy of this EIAR for further details and layout of the proposed compound.

The works are taking place in a spatially constrained location, the proposed location for the construction compounds are the only ones with available space in this area. The construction compounds are required to serve the localised works in this area. As no other suitable alternative locations in the area were identified through the option development process, the selected construction compound locations did not require multi-criteria analysis.

One construction compound is also required in the vicinity of Memorial Road Bridge (OBC3) at Memorial Road Bridge.

Memorial Road Bridge is being replaced with a wider structure and there is no space for temporary diversion of the road traffic on to a temporary adjacent bridge, so Memorial Road will be closed for a period of time. It is therefore proposed to utilise the remainder of Memorial Road as a construction compound. This site will accommodate offices, parking for workers vehicles and site vehicles and a materials storage and laydown area. See Section 5.4.6.9 of Chapter 5 Construction Strategy of this EIAR for further details and layout of the proposed compound.

Options north of Con Colbert Road were explored but due to a lack of access to the railway due to the presence of the main road itself, no other options were considered feasible. The works are taking place in a spatially constrained location, the proposed location for the construction compound is the

only one available space in this area. The construction compound is required to serve the localised works in this area. As no other suitable alternative locations in the area were identified through the option development process, the selected construction compound location did not require multi-criteria analysis.

3.7.5.5. Memorial Road Bridge to South Circular Road Junction

One construction compound is required in this area in the vicinity of South Circular Road / Chapelizod Bypass (Con Colbert Road). This is required to service the South Circular Road junction works and the widening of the rail corridor along this section of the route. The construction compound will also need to act as the facility for moving materials from roadside to trackside by means of steep ramps. The proposed works at the South Circular Road will require significant space for either in situ or precast concrete works, excavations and retaining wall operations. See Section 5.4.6.10 of Chapter 5 Construction Strategy of this EIAR for further details and layout of the proposed compound.

Only one location has been identified for a construction compound to service the works at South Circular Road junction. The proposed construction compound is adjacent to Chapelizod Bypass (Con Colbert Road), to the west of the South Circular Road junction, and to the east of Memorial Road bridge. The proposed site is primarily located within the CIÉ boundary and is constrained by Chapelizod Bypass (Con Colbert Road) to the north and residential properties to the south. As no other suitable alternative locations in the area were identified through the option development process, the selected construction compound location did not require multi-criteria analysis.

3.8. Heuston Station to Glasnevin Junction

3.8.1. Civils and OHLE (including Tracks and Bridges)

The permanent way for this section of the railway corridor consists of two tracks from St. John's Road Bridge (OBC0A) to the Liffey Bridge (UBO1), and then two tracks running through the Phoenix Park Tunnel (PPT) and the remaining length of the scheme to connect with the DART+ West at Glasnevin Junction. No additional lateral clearance is required at this location. All track layout modifications can be accommodated with localised track works. As such no alternatives were generated for four-tracking is proposed in this section.

The main constraint to the electrification requirements of the Project is the low clearances of existing overbridges in the area, as some of the existing bridges do not have enough vertical clearance to install the new overhead electrification system. The following section address the alternatives considered to achieve vertical clearance for all bridges along the PPT and Phoenix Park Tunnel Branch Line. The following principles were applied to sifting of options:

- Where a bridge could accommodate the electrification infrastructure without interventions (Do Nothing) it was automatically taken as the preferred option;
- Where bridge interventions could be accommodated within the CIE property without the need to acquire private lands (Do Minimum), it was taken as the preferred option.

This section is sub-divided into two sub-sections as follows: Conyngham Road Bridge (OBO2) to Phoenix Park Tunnel; and North of Phoenix Park Tunnel to Glasnevin Junction.

3.8.1.1. East of St Johns Road Bridge (OBC0A) and Phoenix Park Tunnel

This part of the scheme extends from East of St John’s Road Bridge (OBC0A) to the north portal of Phoenix Park Tunnel, encompassing Liffey Bridge (UBO1) and Conyngham Road Bridge (OBO2) – see Figure 3-14. The permanent way in this area consists of 3 lines at grade until the branch lines cross the River Liffey over UBO1 where there are 2 tracks until the end of the area. The tracks pass beneath Conyngham Road Bridge (OBO2) before entering the Phoenix Park Tunnel. An existing arch viaduct supports the tracks between the Liffey Bridge (UBO1) and the Conyngham Road Bridge (OBO2).

The main feature in this area is the Phoenix Park Tunnel, that has a length of approximately 700m and has two ballasted tracks through the tunnel.

The Liffey Bridge (UBO1) which spans the River Liffey near Heuston Station is also a listed heritage feature on the NIAH (regional importance), as is a sentry box on the southern bank and approximately 150m west of the rail centreline. The Liffey is known to host salmonid fish species, and the section of the river from just upstream of bridge all the way to the coast is designated as an Annex I Habitat, as it is the uppermost part of the Liffey Estuary. DCC has a landscape protection objective (Z11) to “*protect and improve canal, river and coastal amenities*”, which includes the River Liffey. The tracks pass beneath Conyngham Road (OBO2) before entering the Phoenix Park Tunnel which is itself is a key recreational and amenity area for residents and tourists and is classed by Dublin City Council as a site of archaeological potential and a Conservation Area. The Wellington Monument, approx. 100m to the east of the tunnel is a listed heritage feature on the NIAH, and the view from this monument is a DCC Protected View.

The People’s Park is located in the area south of the tunnel and has a playground adjacent to Infirmary Road; the People’s Park is also a listed heritage feature on the NIAH (of regional importance). The Sean Heuston Monument is located approx. 100m to the south of the centreline of the tunnel and is a listed heritage feature on the NIAH; another feature just south of this monument is listed on the RPS.

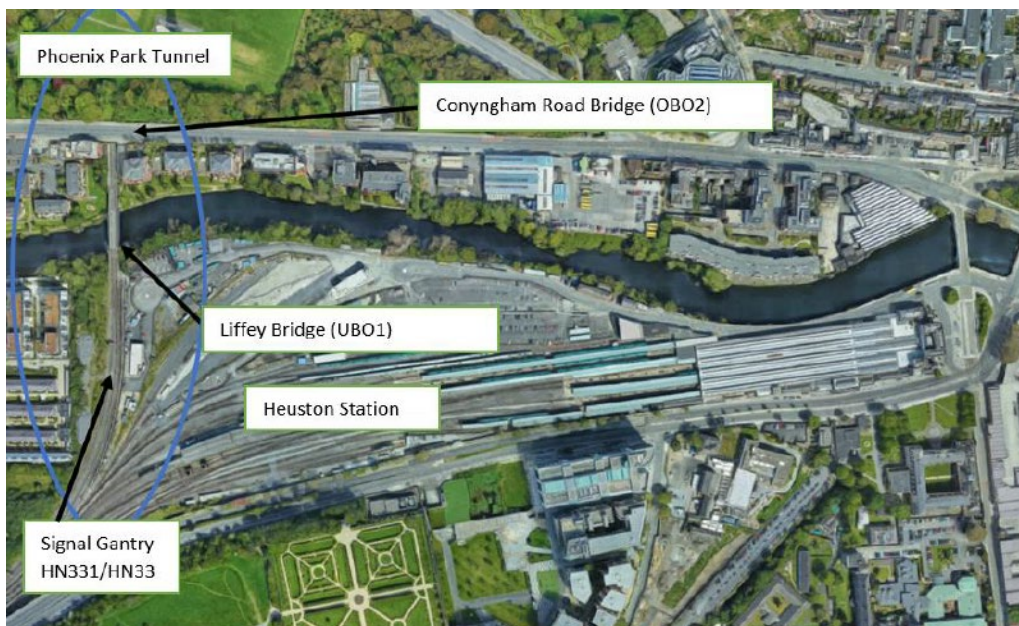


Figure 3-14 Approach to the Phoenix Park Tunnel

3.8.1.1.1. Conyngham Road Bridge (OBO2)

The Do Nothing Option (Option 0) along with two additional design options (Option 1 and Option 2) were considered. The Do Nothing Option failed the engineering feasibility sifting process at Stage 1 as it did not meet the project objectives for electrification. A Do Minimum (Option 1) and a Do Something (Option 2) both passed the sifting process. As a feasible Do Minimum Option was available it was identified as the Preferred Option.

- Option 2: This option combines track lowering with structural intervention of Conyngham Road Bridge (OBO2) and lifting of Conyngham Road in order to provide sufficient vertical clearance to accommodate electrification by providing room for the OHLE – albeit with a reduced contact wire height.

3.8.1.1.2. Phoenix Park Tunnel

The Do Nothing Option (Option 0) along with one additional design option (Option 1) was considered. The Do Nothing Option failed the engineering feasibility sifting process at Stage 1 as it did not meet the project objectives for electrification. Option 1, the Do Minimum Option was identified as feasible. The Phoenix Park Tunnel is limited in terms of possible interventions and the Do Minimum is realistically the only feasible option. It will therefore be taken forward to the Preferred Route.

- Option 1: New track alignment and slab track, with OHLE. Tunnel may require improvement works.

3.8.1.2. North of Phoenix Park tunnel to Glasnevin Junction

This part of the scheme connects the Dublin-Cork line with the Maynooth line and extends from the Phoenix Park Tunnel in the south to Glasnevin Junction in the north. The rail corridor is primarily in cutting (i.e. the rail level is below the surrounding ground level), the corridor is formed mainly by earth embankments, the track passes under 8 no. overbridges and over 1 no. culvert. The northern boundary of this section of the line is approx. 10m east of Glasnevin Cemetery Road Bridge (OBO10), after this point the line extends to join the Maynooth Line and the interface with the DART+ West Project. The options selection for each of the structures along this section of route are presented in the following sections.

3.8.1.2.1. McKee Barracks Bridge (OBO3)

The Do Nothing Option (Option 0) was the only option considered for McKee Barracks Bridge (OBO3) as it passed the engineering feasibility sifting process, meeting the project objectives for electrification. Stage 2 MCA was not required. In general, the Do Nothing Option (Option 0) provided standard clearance for electrification and did not identify any significant environmental issues.

3.8.1.2.2. Blackhorse Avenue Bridge (OBO4)

The Do Nothing Option (Option 0) along with two additional design options (Options 1 and 2) were considered for the Blackhorse Avenue Bridge (OBO4). The Do Nothing Option failed the engineering feasibility sifting process at Stage 1 as it did not meet the project objectives for electrification. As Option 1 (Do Minimum) was a feasible option and no impacts on environmental sites of national or international significance were identified, Option 1 was identified as the preferred option. Stage 2 MCA was not necessary.

3.8.1.2.3. Old Cabra Road Bridge (OBO5)

The Do Nothing Option (Option 0) was the only option considered for Old Cabra Road Bridge (OBO5) as it passed the engineering feasibility sifting process, meeting the project objectives for electrification. Stage 2 MCA was not required. In general, the Do Nothing Option provided standard clearance for electrification and did not identify any significant environmental issues.

3.8.1.2.4. Cabra Road Bridge (OBO6)

The Do Nothing Option (Option 0) along with two additional design options (Options 1 and 2) were considered for Cabra Road Bridge (OBO6). The Do Nothing Option failed the engineering feasibility sifting process at Stage 1 as it did not meet the project objectives for electrification. As Option 1 (Do Minimum) was a feasible option and no impacts on environmental sites of national or international significance were identified, Option 1 was identified as the preferred option. Stage 2 MCA was not necessary.

3.8.1.2.5. Faussagh Avenue Bridge (OBO7)

The Do Nothing Option (Option 0) along with two additional design options (Options 1 and 2) were considered for Faussagh Avenue Bridge (OBO7). The Do Nothing Option failed the engineering feasibility sifting process at Stage 1 as it did not meet the project objectives for electrification. As Option 1 (Do Minimum) was a feasible option and no impacts on environmental sites of national or international significance were identified, Option 1 was identified as the preferred option. Stage 2 MCA was not necessary.

3.8.1.2.6. Royal Canal and LUAS Twin Arches (OBO8)

The Do Nothing Option (Option 0) along with two additional design options (Options 1 and 2) were considered for Royal Canal and Luas Twin Arch (OBO8). The Do Nothing Option failed the engineering feasibility sifting process at Stage 1 as it did not meet the project objectives for electrification. As Option 1 (Do Minimum) was a feasible option and no impacts on environmental sites of national or international significance were identified, Option 1 was identified as the preferred option. Stage 2 MCA was not necessary.

3.8.1.2.7. Maynooth Line Twin Arch (OBO9)

The Do Nothing Option (Option 0) along with two additional design options (Options 1 and 2) were considered for the Maynooth Line Twin Arch (OBO9). The Do Nothing Option failed the engineering feasibility sifting process at Stage 1 as it did not meet the project objectives for electrification. As Option 1 (Do Minimum) was a feasible option and no impacts on environmental sites of national or international significance were identified, Option 1 was identified as the preferred option. Stage 2 MCA was not necessary.

3.8.1.2.8. Glasnevin Cemetery Road Bridge (OBO10)

The Do Nothing Option (Option 0) along with two additional design options (Options 1 and 2) were considered for Glasnevin Cemetery Road Bridge (OBO10). The Do Nothing Option and Option 1 (Do Minimum) failed the engineering feasibility sifting process at Stage 1 as they did not meet the project objectives for electrification. Option 2 was the only feasible option available therefore Stage 2 MCA was not required. In general, Option 2 did not identify any significant environmental issues.

3.8.2. New Heuston West Station

Following feedback at PC1, delivery of a new station at Heuston West is included within the scope of the Project. 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 both to Connolly and the new Spencer Dock station in the Docklands area.

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

The Do Nothing Option along with five additional design options (Option A-E) were considered. The station is located wholly in CIÉ lands (and more specifically at the location of the existing platform 10) and having regard to the specific requirements for the station (as set out above), the options for assessment were largely a technical and design matter relating to the station's configuration, including access arrangements. The Do Nothing Option failed to deliver the Project objectives or meet the project requirements. The five options A-E were brought forward for detailed Stage 2 MCA as follows.

- Option A: General arrangement with footbridge accessed by lifts and stairs
- Option B: General arrangement with footbridge accessed by ramps and stairs
- Option C: General arrangement with underpass via the Liffey Railway Bridge arches to be accessed by lift and stairs. Stairs to follow the embankment profile.
- Option D: General arrangement with underpass via the Liffey Railway Bridge arches to be accessed by stairs and ramps. Ramps run parallel to Liffey River.
- Option E: General arrangement with underpass via the Liffey Railway Bridge arches to be accessed by lift and ramps. Ramps run parallel to platforms

Table 3.12 presents the summary assessment for each of the CAF parameters. Across the MCA, those options with ramps are preferred under Economy because of the maintenance / servicing requirements of lifts which have a significant operational cost. Other matters were occupancy on land in the embankment, outside of the CIÉ property. In terms of potential for future urban regeneration, an underpass is considered less favourable as they are perceived to be less secure for users.

All options are equally affected by current local and national government policies. However, the underpass options occupy the River Liffey embankment beyond the CIÉ property boundary, with impact on environmental and River Liffey policy matters within the Protection Area.

From an Environmental perspective, there is considerable visual impact in the River Liffey embankment in Options C, D and these options however also require major earthworks. Despite ramps and stairs being suited to the existing topography, these earthworks are anticipated for the construction of lifts (Option C); as well as to adapt the embankment to the required geometry of the station.

All options provide PRM access and a connection between two parts of the city currently disconnected. Ramp access to the footbridge or underpass is considered in this case preferable to lift access, as it does not depend on the station attendance and provides a higher capacity and flexibility for passengers, public and cyclists. The underpass options would be less accepted by users, as those options would be perceived less secure. From the perspective of Transport Safety there is no difference between the options. The options of the bridge underpass require longer travel routes. The urban connection of these options is less advantageous. If a riverside walk were to be developed, this situation would improve, but in the current situation, options C to E are more disadvantageous.

The preferred option is Option B which includes the provision of a footbridge accessed by ramps and stairs. It also provides the most direct connection between east and west areas and is the preferred option in respect of the majority of CAF Parameters.

Table 3.12: Heuston West Station MCA Summary

CAF Parameters	Option A	Option B	Option C	Option D	Option E
1. Economy	Some comparative disadvantage over other options	Some comparative advantage over other options	Some comparative disadvantage over other options	Some comparative advantage over other options	Some comparative advantage over other options
2. Integration	Some comparative advantage over other options	Some comparative advantage over other options	Some comparative disadvantage over other options	Some comparative disadvantage over other options	Some comparative disadvantage over other options
3. Environment	Some comparative advantage over other options	Some comparative advantage over other options	Some comparative disadvantage over other options	Some comparative disadvantage over other options	Some comparative disadvantage over other options
4. Accessibility & Social Inclusion	Some comparative disadvantage over other options	Some comparative advantage over other options	Some comparative disadvantage over other options	Some comparative disadvantage over other options	Some comparative disadvantage over other options
5. Safety	Comparable to other options / neutral	Comparable to other options / neutral	Comparable to other options / neutral	Comparable to other options / neutral	Comparable to other options / neutral
6. Physical Activity	Some comparative advantage over other options	Some comparative advantage over other options	Some comparative disadvantage over other options	Some comparative disadvantage over other options	Some comparative disadvantage over other options
CONCLUSION		Preferred Option			

Follow Up

Following consultation feedback, the new station bridge and ramps will provide segregated pedestrian and cyclist access.

3.8.3. Substations

3.8.3.1. East of St Johns Road Bridge (OBC0A) and Phoenix Park Tunnel

The power study determined the requirement for an electrical substation in Islandbridge.

The Do Nothing Option (Option 0) along with five additional design options (Option 1-5) were considered. The Do Nothing Option failed the engineering feasibility sifting process at Stage 1 as it did not meet the project objectives for electrification. Options 1-5 were brought forward for detailed Stage 2 MCA as follows.

- Option 1: This Option is located to the north of the Chapelizod Bypass / South Circular Road Junction and to the south of the existing Clancy Quay residential development. It is a brownfield Option in the possession of CIÉ adjacent to the railway.
- Option 2: This Option is located to the east of the Clancy Quay development. It is a brownfield Option in the possession of CIÉ adjacent to the railway.
- Option 3: This Option is also located to the east of the Clancy Quay development on the southern bank of the River Liffey. It is a brownfield Option site in the possession of CIÉ adjacent to the railway bridge across the river.
- Option 4: This Option is located within the Heuston Yard area along the R148 (St John's Road). It is a brownfield Option in the possession of CIÉ on the southern side of the railway yard.
- Option 5: This Option is located within Heuston Yard, next to the old Guinness sidings and existing CCE Maintenance depots. It is a brownfield Option in the possession of CIÉ.

Table 3.13 demonstrates that Option 4 is the preferred option for the proposed Islandbridge traction power substation. In terms of Economy, Option 4 performs favourably due to ease of access and constructability due to close proximity to the R148 St John's Road. It was assumed that any permanent access track would require work to effectively separate it from the permanent way and thus permit access by ESB Networks personnel (unaccompanied by IÉ track protection staff). ESB grid connection is likely to be comparatively simple when compared to other options. All Options are comparative in terms of integration, with Option 4 offering some comparative advantage over other options due to the ease of access to the adjacent road network. With regard to environmental criteria, Option 4 performs marginally better due to an expected lesser noise impact as this option is located further away from existing residential developments when compared to the other options. Similarly, as distance to neighbouring residences is maximised, Option 4 offers a slight comparable advantage over other options regarding Integration and Social Inclusion. All Options are comparable in terms of Safety.

Option 4 is the preferred option.

Table 3.13: Islandbridge Substation MCA Summary

CAF Parameters	Option Assessment 1	Option Assessment 2	Option Assessment 3	Option Assessment 4	Option Assessment 5
1. Economy	Significant comparative disadvantage over other options	Some comparative disadvantage over other options	Some comparative disadvantage over other options	Significant comparative advantage over other options	Some comparative advantage over other options
2. Integration	Some comparative disadvantage over other options	Some comparative disadvantage over other options	Some comparative disadvantage over other options	Some comparative advantage over other options	Some comparative disadvantage over other options
3. Environment	Some comparative disadvantage over other options	Some comparative disadvantage over other options	Some comparative disadvantage over other options	Some comparative advantage over other options	Some comparative disadvantage over other options
4. Accessibility & Social Inclusion	Some comparative disadvantage over other options	Some comparative disadvantage over other options	Some comparative disadvantage over other options	Some comparative advantage over other options	Some comparative advantage over other options
5. Safety	Comparable to other options / neutral	Comparable to other options / neutral	Comparable to other options / neutral	Comparable to other options / neutral	Comparable to other options / neutral
6. Physical Activity	Comparable to other options / neutral	Comparable to other options / neutral	Comparable to other options / neutral	Comparable to other options / neutral	Comparable to other options / neutral
CONCLUSION				Preferred Option	

3.8.4. Construction Compounds

3.8.4.1. East of St Johns Road Bridge (OBC0A) and Phoenix Park Tunnel

One construction compound is required between east of St. Johns Road (OBC0A) and the Phoenix Park Tunnel at: Heuston West Station.

3.8.4.1.1. Heuston West Station

A construction compound is required to the west of Heuston Station, adjacent to the existing platform 10, for works to be undertaken to the new Heuston West Station (in addition to the Phoenix Park Tunnel and track work between St John's Road Bridge (OBC0A and the tunnel). A construction compound will need to be constructed on both sides of the existing railway, as access on the western side is also required for the installation of an underground attenuation tank which is to be located in this area and the utility diversions in advance of the track and station works. Equipment and material will need to be stored on this side of the railway due to the extent and type of work involved. As there are no other suitable alternative locations for the construction compound in this area, multi-criteria analysis was not required.

3.8.4.2. North of Phoenix Park Tunnel to Glasnevin Junction

Three construction compounds are required between North of Phoenix Park Tunnel and Glasnevin Junction. The three proposed construction compounds are at: Cabra; Faussagh Avenue; and Glasnevin Cemetery.

3.8.4.2.1. Cabra

The proposed construction compound at Cabra is located on the branch line which runs from Heuston Station to Glasnevin Junction, it is adjacent to the Cabra Road / Carnlough Road Junction. The rail line from the Phoenix Park tunnel to Glasnevin junction runs in a deep cutting with steep embankments on either side. The construction compound is located in an area where the ground levels off and opens up, providing good access to the rail corridor, the area is currently used by Irish Rail for track maintenance. The proposed construction compound is located on CIE property with direct access to the rail line. As there are no other suitable alternative locations in the area, the selected construction compound locations did not require multi-criteria analysis.

3.8.4.2.2. Faussagh Avenue

A construction compound is required for electrification works on the branch line from Heuston Station to Glasnevin Junction and for localised track lowering works. The proposed site is located on the eastern side of the rail corridor. The site is currently a disused public house and is in private ownership. Access to Faussagh Avenue construction compound would be via Faussagh Avenue, Quarry Road, Cabra Road, Navan Road to the M50. The rail corridor on this section of the route passes through a built-up urban area. The line is located in a deep cutting with steep embankments on either side. This particular site was identified as it is located on the eastern side of the rail corridor, which would supplement the Cabra compound, which is located to the south on the western side of the rail corridor. As there are no other suitable alternative locations in the area, the selected construction compound locations did not require multi-criteria analysis.

Follow Up

Following consultation with the affected landowner, a new housing development is proposed for this location. As such the Cabra construction compound which is on the west side of the rail corridor will be used as the main construction compound for the works on the Phoenix Park Tunnel Branch Line, in addition to the compounds located in Heuston Station. As such, this construction compound at Faussagh Avenue is no longer required.

3.8.4.2.3. Glasnevin Cemetery

A construction compound is required in this area, primarily to facilitate works to Glasnevin Cemetery Road Bridge (OBO10). The proposed location for the construction compound is in the parking area immediately adjacent to the bridge. To the south of the bridge lies Glasnevin Cemetery, to north of the bridge on either side of the proposed construction compound are residential properties, therefore not providing a feasible alternative option to the car park. The site will need to facilitate continual access to the Cemetery by the public and Cemetery workers. A temporary pedestrian bridge will need to be installed alongside the existing bridge for this purpose. Access to this site would be via Claremont Lawns estate road and the Finglas road to the M50. As there are no other suitable alternative locations in the area, the selected construction compound locations did not require multi-criteria analysis.

3.9. References

An Foras Forbartha (1971) Dublin Transportation Study.

Coras Iompair Éireann (1975). Dublin Rapid Rail Transit Study.

Department of Public Expenditure and Reform (DPER) (2021). *Project Ireland 2040: National Development Plan 2021-2030*.

Department of Transport, Tourism and Sport (DTTAS) 2016 (updated 2020). *Guidelines on a Common Appraisal Framework for Transport Projects and Programmes*.

Dublin Transportation Office (2001). *A Platform for Change - An Integrated Transportation Strategy for the Greater Dublin Area 2000 to 2016*.

Eastern and Midlands Regional Assembly (2019). *Eastern and Midlands Regional Assembly Regional Spatial and Economic Strategy 2019-2031*.

Environmental Protection Agency (2022). *Guidelines on the Information to be contained in Environmental Impact Assessment Reports*.

Jacobs and Systra (2018). *DART Expansion Programme- Electrification Options Assessment*.

National Transport Authority (2021). *Draft Transport Strategy for the Greater Dublin Area 2022-2042*.

National Transport Authority (2020). *Project Approval Guidelines*.

National Transport Authority (2015). *Transport Strategy for the Greater Dublin Area 2016-2035*.

Transport Infrastructure Ireland (2019). *Project Management Guidelines*.