
Chapter 3

Alternatives

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3. ALTERNATIVES

3.1 Introduction

This chapter of the EIAR describes how the DART+ 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 EIA process.

This consideration of alternatives has been informed by the relevant national, regional and local policy context and need for the project as described in Chapter 2. This assessment has been undertaken in accordance *inter alia* with 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 (“the EIA Directive”), the Transport (Railway Infrastructure) Act 2001 (as amended and substituted), the European Union (Railway Orders) (Environmental Impact Assessment) (Amendment) Regulations 2021.

3.1.1 EIA Requirements

Article 5(d) of EIA Directive 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”.

This requirement has been transposed into Irish law by Section 39 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. 743/2021) which *inter alia* provides that:

The applicant shall ensure that an environmental impact assessment report-

- a) is prepared by competent experts.
- b) subject to section 39(3), contains-
 - (i) a description of the proposed railway works comprising information on the site, design, size and other relevant features of the proposed works.
 - (ii) a description of the likely significant effects of the proposed railway works on the environment.
 - (iii) the data required to identify and assess the main effects which the proposed railway works are likely to have on the environment.
 - (iv) a description of any features of the proposed railway works, and any measures envisaged, to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment.
 - (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.
 - (vi) a summary in non-technical the above information.

and

- c) takes into account the available results of other relevant assessments under European Union or national legislation with a view to avoiding duplication of assessments.
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 Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports (2017) documents 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 ‘and 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 ‘min-EIA’) of each alternative is not required”.

3.2 Approach to Alternatives

Policy influence, project history as well as the previous studies that have led to the development of the DART+ Programme have influenced the design of the proposed development. The sections below set out the evolution of the DART+ Programme to where we are today.

3.2.1 Policy Influence

The Transport Strategy for the Greater Dublin Area, 2016-2035, documents the intention to implement the DART+ Programme, which will provide DART services as far north as Drogheda; to Hazelhatch on the Kildare Line; to Maynooth in the west and to the M3 Parkway. It proposes that the DART services will operate to a high frequency with adequate capacity to cater for the passenger demand. It is anticipated that DART services in the city centre section of the network will operate to a regular ten minute service frequency in the peak hours from 2016 and will transition to a five minute service frequency following the completion of the DART+ Programme.

The advancement of priority elements of DART + Programme was promoted under the National Development Plan (NDP) 2018-2027. As discussed in Chapter 2, the NDP outlines the scope of the DART+ Programme to include investment in new rolling stock, new infrastructure and the electrification of the Sligo line to Maynooth and M3 parkway, the Northern line to Drogheda and the Kildare line to Celbridge/Hazelhatch to create a full metropolitan area DART network with all lines linked and connected. The NDP does not make provisions for any new tunnelling but does include the utilisation of the existing Phoenix Park tunnel.

3.2.2 Relevant Project History

The Dublin Area Rapid Transit (DART) has its origins dating back to the 1970's and was delivered as Phase 1 the Rail Improvement Strategy. It was a heavy rail upgrade and electrification programme, delivered in 1984 with the opening of the original DART line from Howth to Bray. Subsequent phases of rail improvement and electrification were planned but deferred due to the economic recession of the 1980s. In the 1990s exchequer funding was preferred for the development of the motorway network.

The publication of the draft Transport Policy Document ‘A Platform for Change’ in 2001 (Dublin Transportation Office, 2001), reinvigorated investment focus in heavy rail and formalised the benefit of using heavy rail as the spine of an integrated public transport scheme. Since 2001, Iarnród Éireann has progressed railway improvement projects in accordance with the objectives of DART Expansion as funding permitted.

Iarnród Éireann's previous priority was to deliver, as early as possible, the DART Underground tunnel link beneath the city centre tunnel. 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. Between September 2015 and the publication of the National Development Plan (NDP) in February 2018, Iarnród Éireann and the

NTA worked collaboratively in the assessment of lower cost technical solutions thus defining the DART+ Programme.

3.2.3 Previous studies

The design team has carried out a review of, and has accepted, the conclusions of the previous studies and advanced the design development on the basis of the conclusions and project data included in these reports. The sections below outline the previous studies that have set the foundation of the DART+ West design development.

3.2.3.1 DART Expansion Programme Options Assessment (2018)

This DART Expansion Programme Options Assessment Report presented an options selection study carried out by Jacobs Systra on behalf of the NTA in respect of the proposed DART Expansion consistent with the extent of proposed electrified railway network as set out in the Greater Dublin Area Transport Strategy 2016-2035. It examined six alternative network design options with a view to optimising train service specification and demand.

The study carried out a comparative modelling assessment of the options in accordance with the Common Appraisal Framework. Based on the assessment and a KPI evaluation, Scheme Bundle 6 came out as the preferred DART Expansion Scheme Bundle, as it will provide substantial benefits to the rail network and passengers, significantly boosting passenger numbers.

Scheme Bundle 6 consists of:

- Closing Glasnevin Junction to the crossover of services from The Phoenix Park Tunnel (PPT) and Maynooth lines.
- Upgrading of Newcomen Junction to a permanently open Junction through the installation of a Canal Drop Lock.
- Re-opening of East Wall Junction to commuter and DART services.
- Re-opening of North Strand Junction to commuter and DART services.
- Re-configured Connolly Station.
- New Docklands Station further to the south.
- Upgrading of Tara Street Station.
- A new turnback facility at Dun Laoghaire or Bray stations.

Figure 3-1 illustrates Bundle 6 as conceived in the final stages of the study:

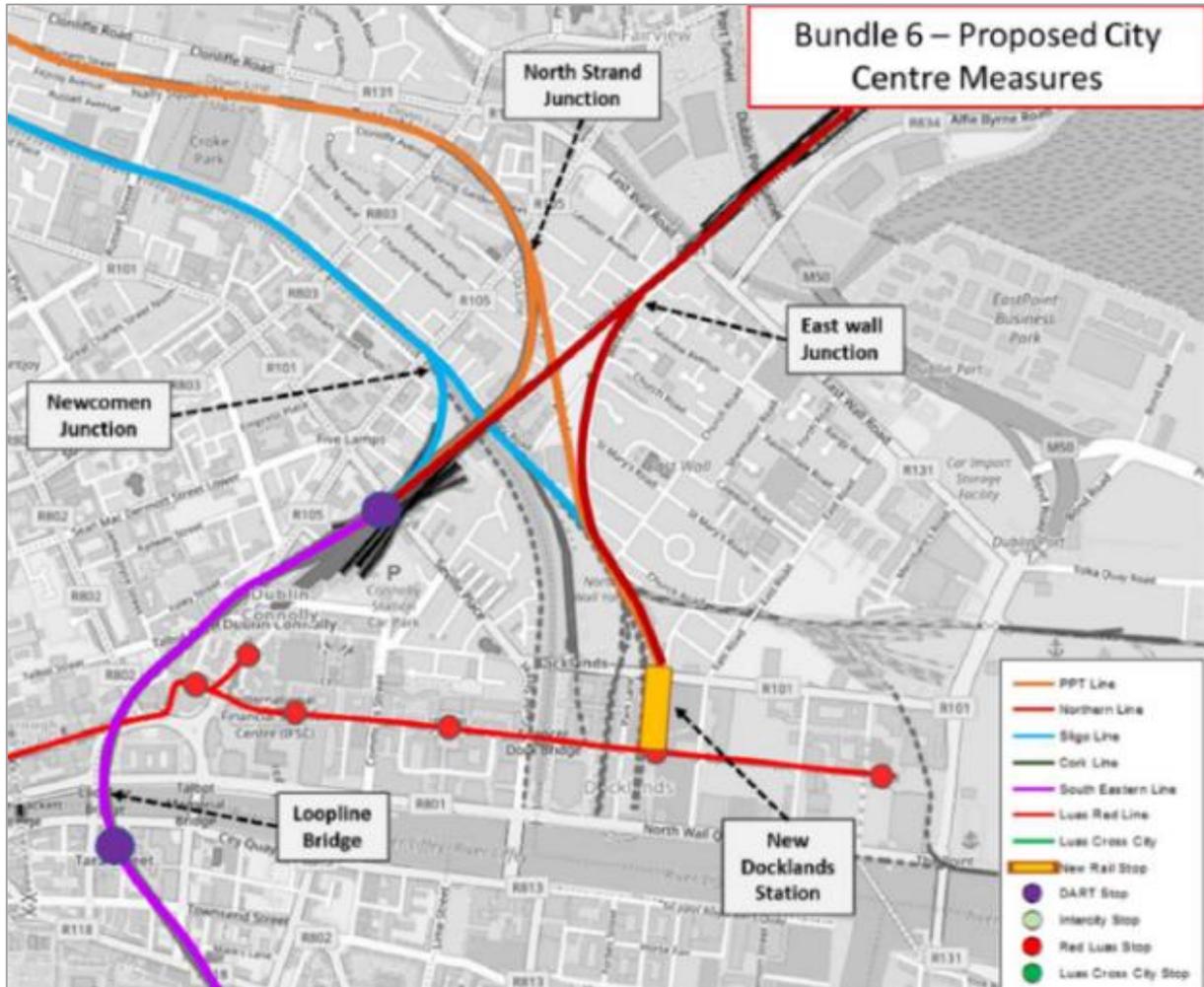


Figure 3-1 Bundle 6 Details: City Centre

3.2.3.2 NTA DART Expansion Programme Future Patronage Modelling

This report represents a further development of the study present in Section 3.2.3.1. Prepared by Jacobs Systra, it presents considerations of future demand on the expanded DART network by undertaking strategic transport modelling using the preferred option: Scheme Bundle 6 and Train Service Specification Option 2.



Figure 3-2 Train Service Specification Option 2

The service specification incorporates TPHPD arriving in Docklands as follows: Maynooth Line - 0, Phoenix Park Tunnel Line - 10, Northern Line - 0.

The study implements 2028 and 2043 unlimited rail scenarios to explore the latent demand which may be present along each of the principal lines associated with the project with TPHPD arriving in Docklands as follows: Maynooth Line - 0, Phoenix Park Tunnel Line - 10, Northern Line - 0.

The modelling study made the following conclusions:

- Latent demand exists on the Maynooth, Northern and Southern Lines.
- For the Maynooth line, there is peak latent demand of 4,006 (34% of total NDP boarders) on the line in 2028 and peak latent demand of 5,496 (39% of total GDA Strategy boarders) in 2043.
- While the proposed TSS for the Kildare Line provides sufficient capacity to service future demand requirements, there is still a small level of latent demand of 518 (8% of the total NDP borders) on the line in 2028 and 890 (11% of the total GDA Strategy borders) in 2043.

3.2.3.3 Train Service Specification (TSS)

The design team has developed a RailSys model for DART+ Programme network for the base year reflecting the current railway infrastructure and train service specification and for the Design year incorporating enhanced infrastructure and an associated Train Service Specification (TSS).

The work carried out by IDOM built on the previous work carried out by Jacobs Systra, bringing it to an enhanced level. The October 2018 study by Jacobs Systra included a proposed working timetable for the project which is used in the IDOM study as a reference or baseline timetable.

At this stage of the study the Baseline Train Service Specification (TSS) has been reviewed for its feasibility as a representation of a maximum peak hour train traffic.

The study examined the feasibility of the train services specification with “Balanced City Centre” Train services with priority for the northern line traffic at Connolly Station and with infrastructure enhancements as follows:

- A “Do Minimum” provision at Connolly Station with slight adjustments and with discontinued use of the Newcomen chord.
- Provision for electrification of the whole DART+ network and adequate signalling reconstruction (with regard to the City Centre Resignalling Project (CCRP)).
- Provision for construction of the enhanced Station in the Docklands area (named Spencer Dock Station) with several platforms and access from three lines.
- Provision for a 4-track arrangement of the whole Heuston to Hazelhatch section, with two electrified, suburban, “slow” tracks on the northern side of the line.

For the modelling exercise adequate reserves were applied in accordance with the UIC (International Union of Railways (Union Internationale des Chemins de fer) rules to achieve a workable train timetable with an adequate level of robustness.



Figure 3-3 DART+ West Train Service Specification

From the study the design team developed a project TSS. The TSS used for this stage of the study is represented in graphical form in Figure 3-3.

This project TSS was used to inform the demand modelling study and fleet projections. The fleet projections and timetable subsequently informed the options selection process for the depot and sidings. The TSS also feeds into decisions in respect of the closure of the level crossings.

3.2.3.4 DART Expansion - Rail Electrification Assessment

This report, prepared by Jacobs Systra in 2019 considered Iarnród Éireann's strategic objectives around future rail electrification as part of the DART Expansion (now DART+ Programme), and addressed the following:

- Development of a short, medium and long-term electrical energy strategy both for DART Expansion (now DART+ Programme) and the main-line inter-city rail network.
- Establishment of a preferred approach for the electrification of rail lines in the Greater Dublin Area for both new and existing electrified lines.
- The future procurement of long term assets such as rolling stock and infrastructure.

The report sought to identify the issues and solutions associated with the electrification of the GDA rail network with specific consideration given to two electrification options: 1500 V DC and 25 kV AC. The difference between the options is based on the type of source supply system that is used while powering the electric locomotive options.

A pros and cons assessment has been undertaken for 1500 V DC and 25 kV AC to highlight the positive and negative elements of both options when compared to one another in the context of GDA rail electrification.

OPTION	PROS	CONS
1500 V DC	<ul style="list-style-type: none"> • Overall, the 1500 V DC system is estimated to cost €100.8M less to install, operate, and maintain over the first 30 year period than a full 25 kV AC System. • The 1500 V DC system is estimated to cost €53M less to install, operate, and maintain over the first 30 year period than electrifying new lines in 25 kV AC and retaining the existing 1500 V DC network. • The capital cost is estimated to be €133m less for full implementation of 1500 V DC, when compared to full 25 kV AC. • The capital cost is estimated to be €53m less for newly electrified lines only, when conversion of the existing 1500 V DC to 25 kV AC is not included in the cost for the 25 kV AC scenario. • There will be no significant impact on the existing electrified section of the DART network, with little or no service disruption during extension works anticipated. • Existing fleet and new rolling stock units will be able to operate with flexibility across the DART network. • Iarnród Éireann has significant in-house experience of 1500 V DC systems so expansion of the same system should not create technical issues unknown to them. • Traction substation compounds are smaller with overall site compound including roads likely to be 1000m². • Generally, there is greater flexibility to deal with N-1 degraded conditions in case of incident at a substation. 	<ul style="list-style-type: none"> • The system is estimated to cost €0.89M more to operate and maintain per annum based on O&M cost estimates. This will increase further when dual voltage or bi-mode rolling stock are no longer required for the 25kV AC Option. • A higher number of traction substations are required, estimated at 31 substations in total. • The commissioning of a high number of traction substations, estimated at 18, may create scheduling issues for connection, commissioning and energisation works carried out by ESB. • Intercity electrification at 25 kV AC can still be delivered, however, this will result in a global electrified rail system, GDA and InterCity, in two types type of electrification. • Stray currents need to be assessed for newly electrified line, however, Iarnród Éireann is familiar with these requirements due to experience of the existing 1500 V DART Network.

Figure 3-4 Pros and Cons assessment taken for 1500 V DC

OPTION	PROS	CONS
25 kV AC	<ul style="list-style-type: none"> ○ The system is estimated to cost €0.89M less to operate and maintain per annum. The running cost savings can be expected to increase further when dual voltage fleet are replaced with 25kV AC EMUs following full conversion to 25kV AC. ○ Requires substantially fewer traction substations, likely to be 4-5 for a 1 x 25 kV AC scenario. ○ Less maintenance work is required overall due to the smaller number of traction substations. ○ 25kV AC technology is most suited for longer distance trips and is compatible with longer term electrification of InterCity services without the need for dual voltage technology. ○ Provides an opportunity for further expansion of the DART network, to Sallins as an example, without the need to deliver additional traction substations. ○ Provides an opportunity for a global electrified rail system, GDA and InterCity, in one type of electrification. This is beneficial from a resourcing and asset management perspective. 	<ul style="list-style-type: none"> ○ Overall, a full 25 kV AC system is estimated to cost €100.8M more to install, operate, and maintain over the first 30 year period. ○ Electrifying new lines in 25 kV AC and retaining existing 1500 V DC network is estimated to cost €53M more to install, operate, and maintain over the first 30 year period than a 1500 V DC network. ○ The capital cost is estimated to be €133m more for full implementation of 25 kV AC, when compared to 1500 V DC option. ○ The capital cost is estimated to be €53m more for newly electrified lines only, when conversion of the existing 1500 V DC to 25 kV AC is not included in the cost for the 25 kV AC scenario. ○ Iarnród Éireann are not familiar with 25 kV AC systems. The introduction of a new system may result in technical issues that are currently unknown to them. ○ Requires a strategy where 25kV AC and 1500 V DC co-exist on the network. This requires the inclusion of three 1500 V DC/ 25kV AC neutral zone interfaces. ○ New dual voltage or bi-mode rolling stock units are required to ensure interoperability for units across the network. ○ Depots at Maynooth and Drogheda need to accommodate dual voltage rolling stock or bi-mode rolling stock ○ A mitigation measure is required where existing fleet continue to be maintained at Fairview Depot. This measure is retained until the existing fleet become ready for scrappage from 2035 onwards. ○ There may be significant disruption to existing DART services as a result of the conversion works. Existing masts could potentially be retained but other components (arms, insulators, head spans, etc) need replacement. The resolution of sub-optimal clearance issues will involve works to approximately 20 structures. The gradual phasing of these works could help mitigate against this disruption. ○ Traction substation compounds are larger with overall site compound including roads likely to be 3000m². ○ EMC interference for 25 kV AC systems is higher and mitigation measures are required. Existing DART infrastructure will need to be immunised. ○ 25 kV AC systems result in unbalanced loads on the system that need to be managed. ○ Generally, there is less flexibility to deal with N-1 degraded conditions in case of incident at a substation. ○ The 2 x 25 kV AC system requires two substations. This means that all newly electrified lines must be commissioned at the same time to provide traction substation redundancy associated with N-1 degraded conditions. This is not considered a feasible option due to the need for all lines to be electrified simultaneously

Figure 3-5 Pros and Cons assessment taken for 25 kV AC

At an early stage of development of DART+ West discussions with the ESB resulted in the 1500 V DC system being chosen by Iarnród Éireann to be implemented on the DART+ Programme.

3.3 Overview of Alternatives Considered

3.3.1 Do Nothing

In the Do-Nothing scenario the proposed development does not go ahead and therefore the capacity and potential of the public transport system would remain restricted. Without intervention there would be continued growth of traffic congestion and environmental emission targets will not be met. In the absence of enhanced capacity, journal time and reliability, the ability to attract new passengers is limited, particularly from private

car users. The DMU fleet will continue to operate along the Maynooth line and the reliance on fossil fuels continues. The risk of vehicle strikes at the level crossings is not alleviated as well as strategic objectives are not met.

3.3.2 Do Minimum

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

3.3.3 Do Something “Preferred Option”

The Do-Something “Preferred Option” scenario provides for the proposed development to go ahead (as described in Chapter 4 Description of the Proposed Development), and project objectives are met. Here, the passenger capacity and frequency of trains is increased all while traffic congestion at the level crossings has been reduced. The frequency and quality of service that will be provided will provide a viable transport alternative to communities along the route and help encourage people from private car use. 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.

3.4 Options selection process

3.4.1 MCA methodology

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

Table 3-1 CAF Parameters

CAF parameter	Summary description
Economy	Economy relates to impacts of a transport investment on economic growth and competitiveness are assessed under the economic impact and economic efficiency criteria
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.
Safety	Safety is concerned with the impact of the investment on the number of transport related accidents
Physical Activity	This relates to the health benefits derived from using different transport modes

The information required to carry out the MCA is set out below with the proposals in respect of the proposed development:

Table 3-2 Information required to carry out MCA

Information needed	Project approach
The options to be analysed	Component options are presented for each
The evaluation criteria that will be used to analyse the options	The above criteria are broken into sub-criteria each of these are used to carry out a comparative assessment of the options.
The importance of these criteria.	For individual scheme components a qualitative and or quantitative mechanism has been used dependent on the perceived appropriateness for each component
The evaluation of the options on the different criteria. These evaluations can be given a numerical or ordinal (comparative) scale.	The evaluations are on the basis of colour coding as described in Table 3-4

The common set of six CAF parameters and criteria has been identified for the proposed development. Sub-criteria are developed under each of the distinct design elements as appropriate to meet the project objectives. The six CAF parameters and criteria are presented in Table 3-3.

Table 3-3 CAF Criteria employed for MCA of DART+ West design elements

CAF Parameter	Criteria	SET Electrification	OHLE Clearance at Structures	Permanent Way	Level Crossings	Stations	Depot	Depot Access	Substations & Technical Buildings	Construction Compounds
1. Economy	Construction and Land Cost		✓	✓	✓	✓	✓	✓		✓
	Long Term Maintenance costs		✓	✓	✓	✓	✓	✓		✓
	Traffic Functionality		✓		✓		✓	✓		
	Train Operation Functionality / Economic Benefit			✓		✓				
	Passenger Demand					✓				
	Passenger Journey Time Reduction			✓		✓				
	CAPEX	✓							✓	
	OPEX	✓							✓	
2. Integration	Transport Integration		✓	✓	✓	✓		✓		✓
	Adaptability in the future						✓			
	Land Use Integration		✓	✓	✓	✓	✓	✓		✓
	Geographical Integration	✓	✓	✓	✓	✓	✓		✓	✓
	Other Government Policy		✓	✓	✓	✓	✓			✓
	Integration with existing equipment	✓							✓	

CAF Parameter	Criteria	SET Electrification	OHLE Clearance at Structures	Permanent Way	Level Crossings	Stations	Depot	Depot Access	Substations & Technical Buildings	Construction Compounds
	Integration with parallel projects / contracts	✓							✓	
	Buildability during operation	✓							✓	
	Obsolescence	✓							✓	
	Ownership or open technology								✓	
3. Environment	Noise and Vibration	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Air Quality and Climate		✓	✓	✓	✓	✓	✓	✓	✓
	Landscape and Visual (including light)	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Biodiversity (flora and fauna)		✓	✓	✓	✓	✓	✓	✓	✓
	Cultural, Archaeological and Architectural Heritage		✓	✓	✓	✓	✓	✓	✓	✓
	Water Resources		✓	✓	✓	✓	✓	✓	✓	✓
	Agriculture and Non-Agricultural		✓	✓	✓	✓	✓	✓	✓	✓
	Geology and Soils (including waste)		✓	✓	✓	✓	✓	✓	✓	✓
	Radiation and Stray Current	✓	✓	✓	✓	✓	✓	✓	✓	✓
4. Accessibility & Social inclusion	Impact on Vulnerable Groups	✓	✓	✓	✓	✓			✓	✓
	Impact on the local residents						✓	✓		
	Stations Accessibility		✓	✓	✓	✓				✓
	Social Inclusion		✓	✓	✓	✓	✓			✓
	Accessibility by Road									✓
5. Safety	Security						✓			
	Ease of supervision Staff flows						✓			
	Road flows						✓			
	Rail Safety	✓	✓	✓	✓	✓			✓	✓
	Vehicular Traffic Safety		✓	✓	✓	✓		✓		✓
	Pedestrian, Cyclist and Vulnerable Road user Safety	✓	✓	✓	✓	✓		✓	✓	✓
	RAM	✓								
	Structural safety		✓							
6. Physical Activity	Connectivity to adjoining cycling facilities		✓	✓	✓	✓	✓			✓

CAF Parameter	Criteria	SET Electrification	OHLE Clearance at Structures	Permanent Way	Level Crossings	Stations	Depot	Depot Access	Substations & Technical Buildings	Construction Compounds
	Permeability and local connectivity opportunity		✓	✓	✓	✓	✓	✓		
	Health benefits	✓							✓	

Criterion

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

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

Comparative assessment

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

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

A comparative assessment was undertaken for each option developed, where in general, for each positively scored option there must be an opposing negatively scored option. Table 3-4 provides an overview of the comparative colour coded scale for assessing the criteria and sub-criterion. For illustrative purposes, this scale is colour coded with advantageous options graded to 'dark green' and disadvantaged options graded to 'dark brown'.

Table 3-4 Comparative colour coded scale for assessing the CAF criteria and sub-criteria

Colour	Description
Dark Green	Significant comparative advantage over all other options
Light Green	Some comparative advantage over all other options
Yellow	Comparable to all other options
Light Brown	Some comparative disadvantage over all other options
Dark Brown	Significant comparative disadvantage over all other options

For each individual assessment the parameter and associated criteria and sub criteria are considered and options are compared against each other based on the comparative scale, ranging from having '*significant advantages over other options*' to having '*significant comparative disadvantages over other options.*' Options

that are comparable were assigned '*comparable across all other options*'. Options were compared under each criterion, before those criterion are aggregated to give a summary score for each parameter. The aggregated assessment considers the sub-criteria/assessment methodology and potential impacts and significance of those impacts when compared with the other options being assessed. The aggregated scores are compared to establish the options with more advantages over other options arriving at the preferred option. The MCAs are presented in the MCA matrices contained in the individual chapters in this report.

NOTE: A degree of professional judgement was used by the specialist undertaking the assessment. For example, environmental criterion assessments take into consideration the comparative likely potential impact and the significance value of the environmental factor to be impacted which is reflected in the aggregated summary ranking of that criteria.

3.4.2 Stage 1

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

3.4.3 Stage 2

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

3.5 Consultation

Stakeholder engagement and consultation during the design process and development of alternatives is a key element to the delivery of major infrastructure projects such as DART+ West. The purpose of these consultations is to engage the public in the scheme'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, Environmental Impact Assessment (EIA) and Railway Order (RO) process.

The main public participation stages in the project development are illustrated below:

- Non-statutory public consultation no.1 Emerging Preferred Option (Autumn 2020).
- Non-statutory public consultation no.2 Preferred option (Summer 2021).
- Local Ashtown public consultation on the revised preferred option (Spring, 2022).

The process of establishing the Preferred Option evolved in the following stages:

- A Preliminary Option Selection Report was concluded in July 2021 setting out the initial options and concluding with the identification of an Emerging Preferred Option. This report can be found on the www.dartplus.ie webpage.
- A first round of non-statutory public consultation (PC1) was undertaken on the 'Emerging Preferred Option' from the 26th August 2020 to the 21st October 2020.
- Development of the Preferred Option (October 2020-July 2021). This was informed by the feedback from the first round of public consultation, stakeholder and community engagement and the

availability of additional design information with the design of the Emerging Preferred Option evolving with further alternatives considered.

- A second round of non-statutory public consultation (PC2) was undertaken on the Preferred Option (July 2021-October 2021). The full Option Selection Report can be found on the www.dartplus.ie webpage.
- All feedback received from the second round of public consultation was fed into the final design of the preferred option. Due to the significant amount of feedback received in relation to the preferred option at Ashtown, a revised preferred option specific to Ashtown was established.
- A local Ashtown public consultation was undertaken on the revised preferred option specific to Ashtown (March 2022-April 2022).
- Finalisation of the Preferred Option - informed by feedback from the overall public consultation process, continuing stakeholder engagement and the availability of additional design information, the Preferred Option was finalised.

The iterative development of the DART+ West project has been informed by a review of feedback and new information received during each stage of public consultation and as data, such as topographical surveys and environmental information was collected and assessed. The findings reports relating to PC1 and PC2 (including details on the local Ashtown public consultation) can be found in Appendix A3.1 Public Consultation No.1 Consultation Findings Report, and Appendix A3.2 Public Consultation No. 2 Consultation Findings Report in Volume 4 of this EIAR, respectively. These reports described the communications strategy undertaken to inform the public of the project, the principal concerns and issues raised by the public and how these were addressed.

Additionally, the four local authorities, Dublin City Council, Fingal County Council, Kildare County Council and Meath County Council have been consulted and have engaged throughout the design and EIA process. The design team introduced the project, presented the PC1 and PC2 options and have had follow up meetings to include specific items to ensure due consideration and integration into the design and EIA process.

Meetings have also been held with statutory consultees to include the Development Applications Unit (DAU) of the Department of Housing, Local Government and Heritage including NPWS, National Monuments section and the Architectural Advisory Unit and Waterways Ireland.

3.6 Assessment of Alternatives - Do Something

This section presents an overview of the reasonable preferred option alternatives considered and the process involved in selecting the preferred alternative. These are discussed under the key infrastructural elements of the project under the following headings:

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

3.6.1 Electrification, re-signalling and telecommunications

The proposed development provides for the electrification and re-signalling of the existing railway. To provide electrical power to the trains Overhead Line Equipment (OHLE) and electrical substations will be needed. To facilitate the control of the trains a new signalling system and telecommunications infrastructure will be needed.

Overhead Line Equipment is the name given to the assembly of masts, gantries and wires found along electrified railways which deliver electrical power to the trains. Operationally, environmentally and from the perspective of passenger service and comfort, OHLE is the preferred means of powering trains throughout the world. The OHLE elements of the project are more highly visible than signalling or telecommunications systems which have a lower key presence along the railway.

3.6.1.1 Background

The Maynooth & M3 Parkway Lines are not currently electrified. The existing DART network is electrified and proposed design needs to be integrated with the existing infrastructure. The existing DART electrified lines are 1,500 V DC systems supplying some 53 km of railway corridor (45 km double track and 8 km of single track). The electrified lines are served by electrical infrastructure that comprises 13 electrical substations and 7 track paralleling huts (TPHs or Switch-houses), distributed at intervals along the DART line from Malahide and Howth on the northern side to Greystones on the southern side. The DART was originally installed between Howth and Bray in 1983. In 1999, the system was extended from Howth Junction to Malahide on the northern side (8 km of double track) and from Bray to Greystones on the southern side (8 km of single track). The OHLE system also includes a further 2.5 km of trolley wire at Fairview depot and various stabling sidings at Malahide, Fairview, Connolly, Bray and Greystones.

The proposed DART+ West is an expansion of the existing DART electrification and therefore both new and existing systems must be compatible and integrated. The existing electrical sub-system includes the substations which take in power at 38 kV from ESB, condition it and convert it to 1,500 V DC supply and connect to the OHLE system.

3.6.1.2 Previous studies

A power study has been undertaken to confirm the requirements for the DART+ West. The conclusion of the study is illustrated in Figure 3-6. The new electrical substations supply a nominal voltage of 1500 V DC to the electrified railway. A total of twelve substations are required, distributed along the network.



Figure 3-6 Schematic Layout of Substations along DART+ West

The power demand for each substation included in the design will be fed at 38 kV AC from ESB. The distribution of the substations along the line is dictated by the availability of adequate power from the electrical power network and the power draw of each section of the railway. The optimal selection of sites for substations is dictated by the availability of suitable locations within CIÉ property (where possible) or in third party lands, and local considerations of access, security and visibility. The design of substations will be to the requirements of ESB technical standards.

3.6.1.3 OHLE Support Structures

For the typical twin track configuration of DART+ West, two principal alternative OHLE configurations have been chosen following engineering assessment. The options considered are largely equivalent from an environmental perspective and the choice of arrangement to be used will be driven by the geometric or geotechnical constraints evident at the location of a proposed OHLE structure. The two alternatives are shown diagrammatically in Figure 3-7 and Figure 3-8.

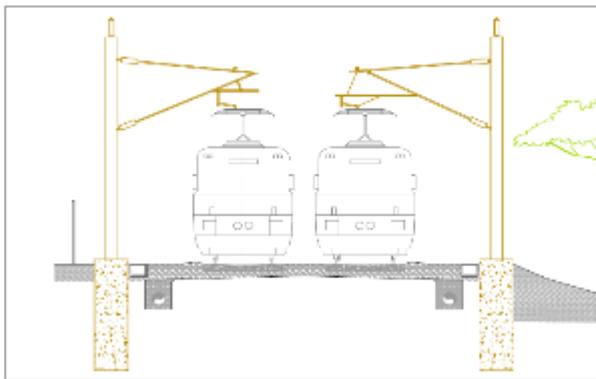


Figure 3-7 Single Track Cantilever cross section

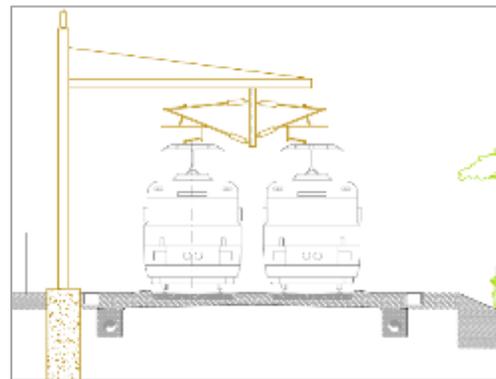


Figure 3-8 Twin Track Cantilever cross section

3.6.1.4 Support Structures in Stations

At stations the use of the typical cantilevered mast structures to support electrical wires is not appropriate. Rather portal type structures are typically used consisting of two steel legs supporting a steel beam. A sample is shown in Figure 3-9.



Figure 3-9 Sample DART OHLE portal structure

DART+ West proposes a portal solution for stations as shown in Figure 3-10.

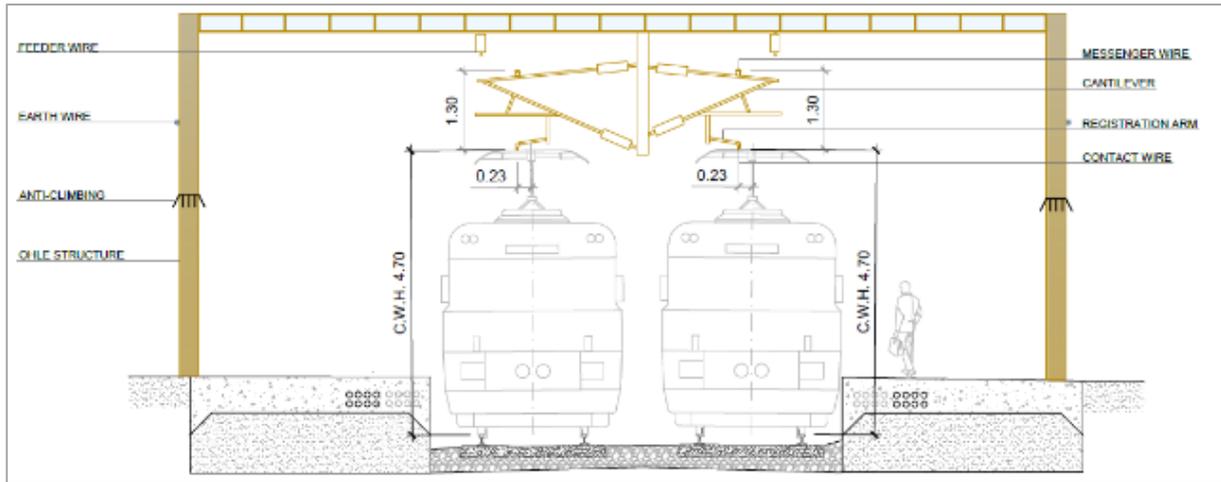


Figure 3-10 Proposed DART+ West OHLE structure in stations

The existing Maynooth Line and its stations were not designed for electrification. When introducing OHLE, existing structures may not comply with the requirements set out in EN 50122-1: Railway Applications- Fixed Installations- Electrical safety, earthing and the return circuit. Protective provisions against electric shock regarding protection against direct contact with electrified components. The graphic in Figure 3-11 illustrates the clearance requirements for protection of the public.

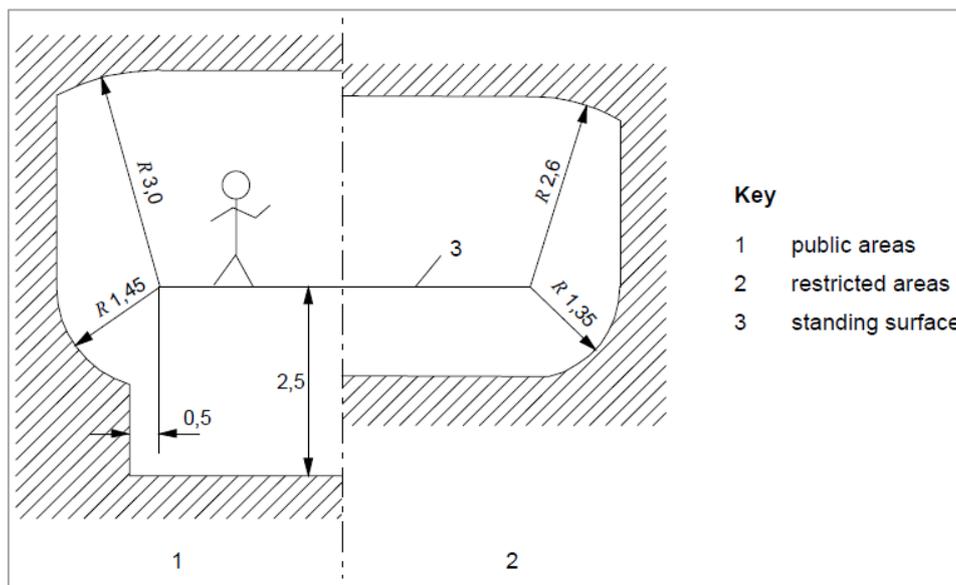


Figure 3-11 Minimum clearances to live parts outside vehicles and to live parts of OHLE from standing surfaces

The clearances given are minimum values which are required to be maintained at all temperatures and in the full range of electrical and mechanical loads of the conductors. Portals, in stations, offer an effective means of achieving compliance with this legal requirement as it permits the support of electrified components at the centre of the track, see Figure 3-12.

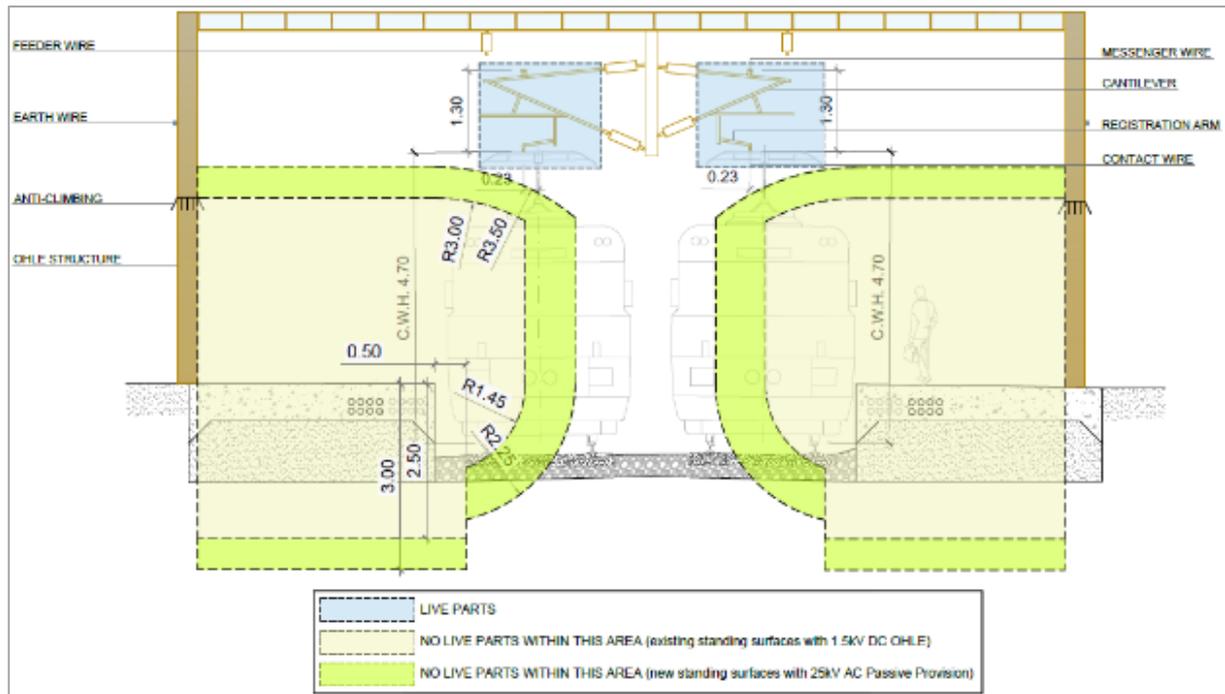


Figure 3-12 Portal in Stations for DART+ West: Protection against direct contact (25kV AC Passive Provision is not applicable to DART+ West)

3.6.1.5 Substations and technical buildings

As part of the proposed DART+ West project, new technical buildings and cabinets are required to support the electrification, the signalling and the communications between the train / systems and the signalman. They include the following principal elements:

- Substations.
- Technical building associated with Signalling purposes (referred to as SER).
- Technical buildings associated with Telecommunication purposes (referred to as TER).
- Technical buildings associated with Low Voltage purposes (referred to as ASP, PSP and MV substations).

For technical reasons, these buildings are distributed sporadically along the line. In the following sections, more details are provided on the size and characteristics of each of the buildings. To determine the location of each one, a MCA has been undertaken.

3.6.1.5.1 Spencer Dock substation

The power study determined the requirement for an electrical substation in Spencer Dock. The preferred option is Option 3, that includes the construction of a new station at Spencer Dock, which drives the Spencer Dock substation options.

Figure 3-13 shows the layout and positioning of the 3 options examined for the location of the proposed Spencer Dock electrical substation.



Figure 3-13 Options for Spencer Dock electrical substation

The preferred option for the location of the proposed substation in Spencer Dock is Option 3, at the north east of the existing Docklands Station and car park, near the railway junction, marked with a yellow circle in Figure 3-13.

Option 3 – Spencer Dock substation (preferred option)

Option 3 had comparative advantages over the other options in the assessment as follows:

- Option 3 is consistent with proposals to provide a new station at Spencer Dock and to alter trackwork on the approaches to the proposed station as part of DART+ West.
- Option 3 does not impact on the existing Docklands Station.
- Access can be accommodated from the existing Iarnród Éireann access gate off Abercorn Road.
- Option 3 uses lands already dedicated to railway maintenance.

Characteristics of the preferred option, Option 3 include the following:

- Option 3 locates the proposed electrical substation at the north east of the existing Docklands Station and carpark, near the railway junction.
- It will be necessary accommodate the road access through the existing gated entrance on Abercorn Road.
- The proposed location is within the existing CIÉ lands, therefore the need for additional landtake is curtailed for this option.
- The proposed access to the CIÉ property is gated, to restrict unauthorised access.

3.6.1.5.2 Glasnevin substation

The power study determined the requirement for an electrical substation in Glasnevin. Figure 3-14 shows the location of the 6 options examined for the Glasnevin electrical substation. Options for locations of the substation in the vicinity of Glasnevin are very constrained due to:

- The heavily developed urban environment.
- The heritage nature of lands in the immediate vicinity of the railway.
- The presence of schools and high amenity lands in the vicinity of the railway.

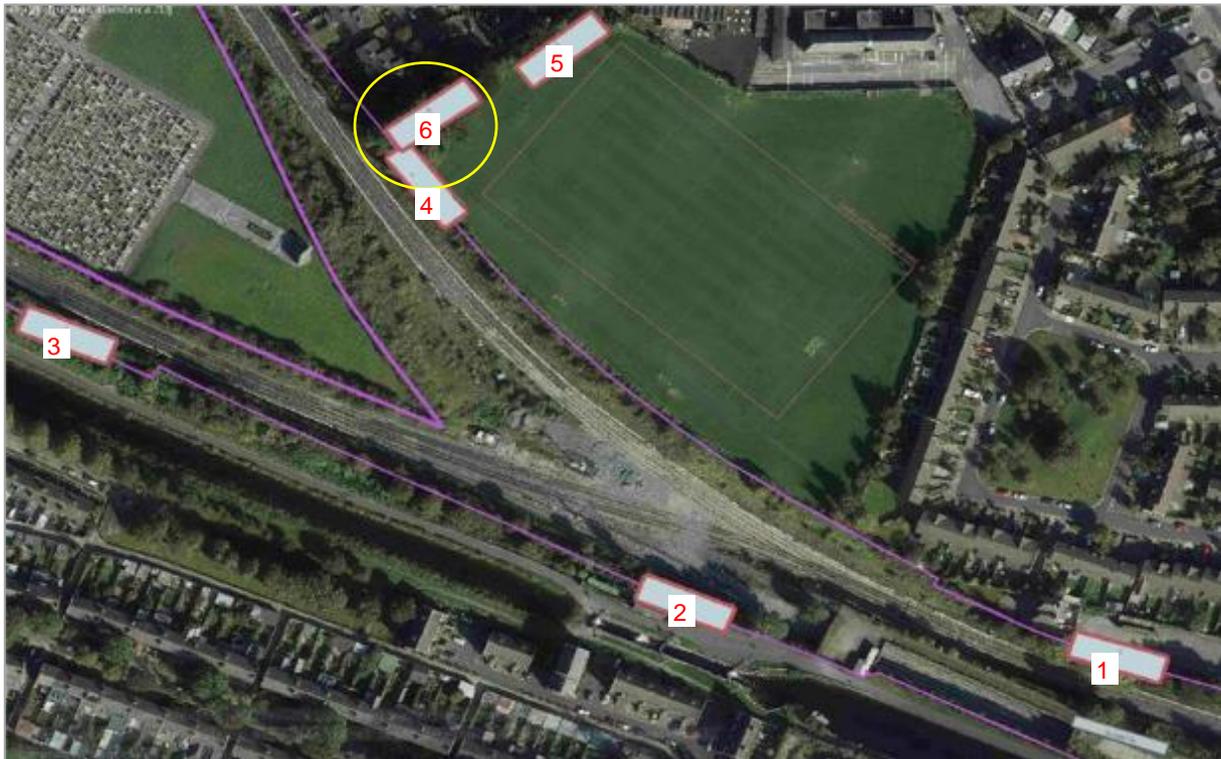


Figure 3-14 Options for Glasnevin electrical substation

The preferred option for the location of the proposed substation in Glasnevin is Option 6, to the north of the railway at the corner of the St Vincent's school sports grounds, marked with a yellow circle in Figure 3-14.

Option 6 – Glasnevin substation (preferred option)

Option 6 had comparative advantages over the other options in the assessment as follows:

- Option 6 does not impact the location of the proposed Metrolink Station which is planned to be located beneath the existing train station on the Phibsborough Road, thereby ensuring compliance with national, regional and local transportation policy.
- Option 6 does not impact on Glasnevin (Prospect) Cemetery.
- The layout of Option 6 is configured to curtail the impacts on the school sports grounds.
- Access for construction and for occasional maintenance is available from Charleville Court from which potable and foul water connections are also available.
- Option 6 does not impact on the Royal Canal proposed National Heritage Area (pNHA) and aspects of other protected structures.

Characteristics of the preferred option, Option 6 include the following:

- Option 6 locates the proposed electrical substation north of the railway, on green space at the corner of St Vincent's School sports grounds adjacent to the Charleville Court cul-de-sac.
- Charleville Court is well located to provide access to the site of the proposed substation.
- Some trees in the corner of the grounds will be affected by the proposed works.
- The proposed location is next to existing houses. Mitigation measures will be necessary during construction to facilitate the residents.
- Watermain and sewage networks are in close proximity, in Charleville Court.
- There are no clashes with existing buildings.
- The lands for the proposed substation will need to be acquired.

3.6.1.5.3 Ashtown substation

The power study determined the requirement for an electrical substation in Ashtown. Ashtown Station is located on the Dublin Connolly to Maynooth and Docklands to M3 Parkway services. It serves Ashtown, Dublin, and is located approximately 300 m north of the Ashtown roundabout on the Navan Road (R147).

There is no dedicated car parking space at the train station. The train station is located immediately east of Ashtown level crossing, which is proposed to be removed under the DART+ West project. The preferred option for replacement of access on removal of the level crossing is a full vehicular road bridge with pedestrian and cycle facilities. It is also proposed to provide a pedestrian bridge with lifts at the location of the existing level crossing. The substation location assessment must consider the preferred option for Ashtown level crossing.

Figure 3-15 shows the locations for the 2 options assessed for the Ashtown electrical substation.



Figure 3-15 Options for Ashtown substation

On completion of the MCA process for the location of the proposed substation in Ashtown it was concluded that the preferred option is Option 2, east of Ashtown Station, marked with a yellow circle in Figure 3-15.

Option 2 – Ashtown substation (preferred option)

Option 2 had comparative advantages over the other option in the assessment as follows:

- Option 2 does not impact on the existing access facilities at the existing train station or the proposed underpass along Mill Lane.
- Option 2 does not impact on commercial activities.
- Option 2 is located largely within lands owned by CIÉ. Some parkland is required from Dublin City Council.
- Potable and foul water Services are available off the existing Ashtown Road or Martin Savage Park.

Characteristics of the preferred option, Option 2 include the following:

- Option 2 locates the proposed electrical substation south of the railway and just east of Ashtown Station.
- The proposed location is partially within existing CIÉ lands, therefore some additional land take is envisaged with this option.
- The preferred option for substation location is on relatively flat terrain, and the ground level adjacent to the building will be at a level of 41.93m.
- The location falls on an existing ESB utility, IW gravity foul utility, stormwater pipes and a GNI gas man. Diversions are required. Connection to the water supply network can be established at Martin Savage Park, and a connection to the gravity foul and storm water networks can be established with the existing networks just west of the proposed substation.

Following the design development around Ashtown post-PC2 (reference Sections 3.6.4.4.2 and 3.6.5.6.2) the substation was positioned partially underneath the new pedestrian and cycle bridge. The roof structure of the substation will partially support the structure above, as can be seen in the figure below. This proposal minimises the additional land take required and minimises the impact on the GAA training field to the East.

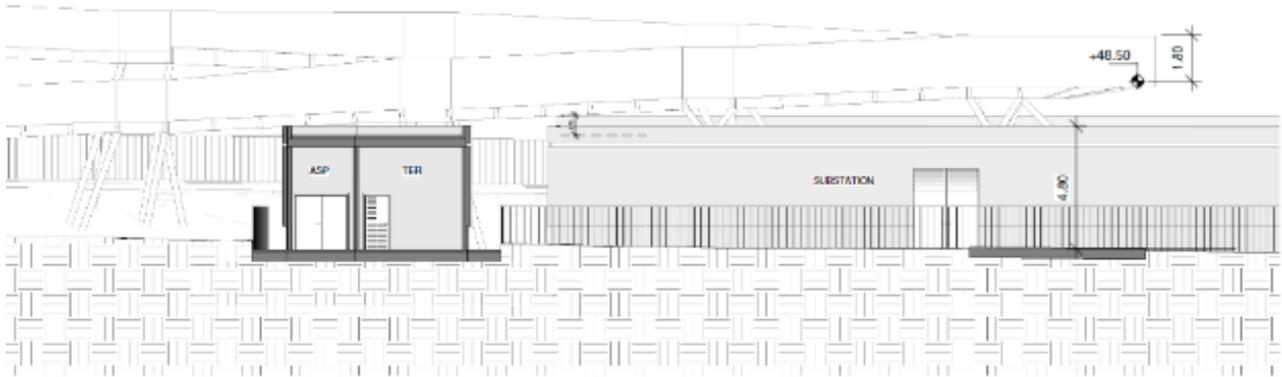


Figure 3-16 Ashtown Substation Longitudinal Section

3.6.1.5.4 Castleknock substation

The power study determined the requirement for an electrical substation in Castleknock. Castleknock Station serves the suburban centres of Castleknock and Blanchardstown. The station is parallel to the Royal Canal near the 12th lock. Available space is therefore constrained due to the canal. It is located near Castleknock town centre and adjacent to playing fields on Castleknock Avenue. It has two through platforms and space for bikes and bike lockers. No car parking is provided in the station.

Figure 3-17 shows the locations of the 3 alternative options for the Castleknock electrical substation.

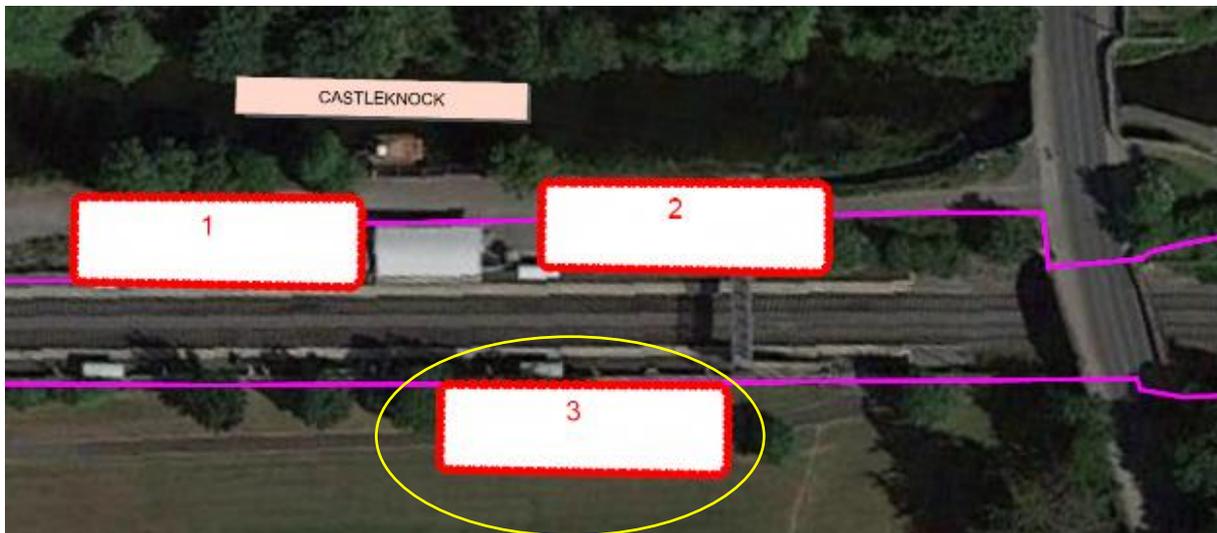


Figure 3-17 Options for Castleknock substation

The preferred option for the location of the proposed substation in Castleknock is Option 3, west of the existing R806 Castleknock Road, and south of the station. The option is marked with a yellow circle in Figure 3-17.

Option 3 – Castleknock substation (preferred option)

Option 3 had comparative advantages over other options in the assessment as follows:

- Option 3 does not impact on the existing access facilities at the existing train station.
- Option 3 does not impact on the Royal Canal or the protected Granard Bridge.

- Option 3 is immediately adjacent to lands owned by CIÉ. Some acquisition will be necessary of the adjacent park lands.
- Potable and foul water Services are available off the R806.

Characteristics of the preferred option, Option 3 include the following:

- Option 3 locates the electrical substation south of the railway, west of the existing R806 Castleknock Road.
- The proposed location is not within the existing Iarnród Éireann railway boundaries, therefore land purchase will be required.

3.6.1.5.5 Coolmine substation

The power study determined the requirement for an electrical substation in Coolmine. Coolmine Station lies on the Dublin to Maynooth and Dublin Docklands to M3 Parkway Station routes. It has a large car park next to the station, which makes it a popular park and ride location.

The station is located to the east of the level crossing on Coolmine Road. It is proposed that the existing level crossing at Coolmine will be removed as part of project. The substation location assessment takes account of the preferred option in respect of replacement of access over the level crossing.

Figure 3-18 shows the layout and positioning of the four options assessed for the Coolmine electrical substation.



Figure 3-18 Options for Coolmine substation

At Coolmine, location Option 3 was identified as the preferred option for the proposed substation. Option 3 is located off Maple Green, 400 m east of Coolmine Station and marked with a yellow circle in Figure 3-18.

Option 3 – Coolmine substation (preferred option)

Option 3 had comparative advantage over other options in the assessment as follows:

- Option 3 does not impact on the proposed pedestrian and cycle facility at the existing train station.
- Option 3 does not impact on the existing parking facilities at the train station.
- Option 3 is located principally within lands owned by CIÉ. There is curtailed land acquisition associated with this option.
- Potable and foul water Services are available on Maple Green.

Characteristics of the preferred option, Option 3 include the following:

- Option 3 locates the proposed electrical substation off Maple Green, approximately 400 m east of Coolmine Station.
- It has no clashes with buildings. A direct access can be provided along the local road network, connecting the substation to Maple Green.
- The proposed location is largely within the existing CIÉ lands. The terrain at this location is flat.

3.6.1.5.6 Dunboyne substation

The power study determined the requirement for an electrical substation in Dunboyne. Dunboyne Station serves the town of Dunboyne in County Meath. It has a parking for up to 300 cars, and 20 disabled parking spaces, enabling it to serve as a small park and ride stop.

The station building is located east of the railway, next to the parking area. The two station platforms are connected via a pedestrian bridge. The station and the parking access are next to the L2228 road.

Figure 3-19 shows the layout and positioning of the 3 options examined for the proposed Dunboyne electrical substation.



Figure 3-19 Options for Dunboyne substation

The preferred option for the location of the proposed substation in Dunboyne is Option 1, north the Dunboyne Station buildings, marked with a yellow circle in Figure 3-19.

Option 1 – Dunboyne substation (preferred option)

Option 1 had comparative advantages over the other options in the assessment as follows:

- Option 1 does not impact on the existing set down facilities serving the train station.
- Option 1 is located largely on a disused space within lands owned by CIÉ.

Characteristics of the preferred option, Option 1 include the following:

- Option 1 locates the proposed electrical substation west of the existing Dunboyne Station buildings.
- Access can be easily accommodated off the L228 along the station circulatory carriageway.
- The proposed location is largely within existing CIÉ lands, mitigating land take requirements.

- The terrain at this location is generally level, therefore no major earthworks are envisaged, and there are no clashes with existing utility networks. Connection to the foul gravity network would be just west of the proposed substation. Connection to water supply, would be through the station entrance road, connecting to the existing watermain on the L228 road.
- The road access would be through the existing one in the station and parking area, with no modifications envisaged except to remove the taxi stop. There is space for locating two parking spaces next to the substation and there are also spaces within the station parking area.
- 6 parking slots are impacted by the substation and internal parking road rerouting; two impaired mobility parking slots are impacted, but they are relocated adjacent to other impaired mobility slots (at the south).

3.6.1.5.7 M3 Parkway substation

The power study determined the requirement for an electrical substation at the M3 Parkway.

M3 Parkway is a Park and Ride station in County Meath north of Dunboyne, just off the M3 Motorway. It is the terminus station on the Docklands to M3 Parkway commuter service. It mainly serves as a large Park and Ride site, with 1,200 free car parking spaces.

A bus stop is provided but the station is no longer served by any bus routes. The access to the car park and the station is through via R157.

Figure 3-20 shows an existing Iarnród Éireann compound, which limits the substation location options. Only one option is presented in this case.

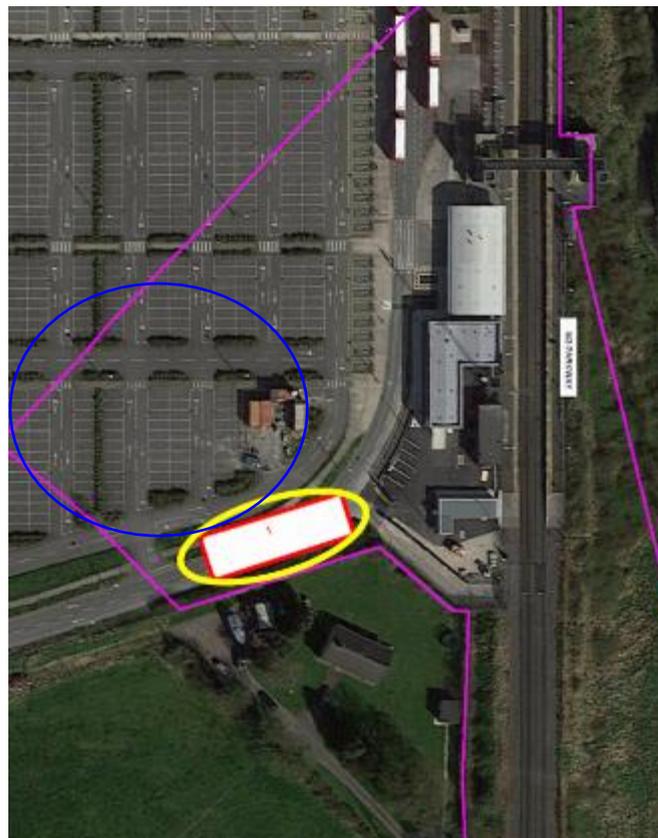


Figure 3-20 Options for M3 Parkway substation

Figure 3-20 shows the proposed location for the preferred option, Option 1 for the M3 Parkway electrical substation. Further SET buildings are to be placed within the blue area.

M3 Parkway substation

Characteristics of the preferred option, Option 1 include the following:

- Option 1 located the proposed electrical substation west of the railway and south of the existing station buildings.
- The location minimizes the impact in current parking slots, but requires a road rerouting in the west of the substation.
- The proposed location is within the existing CIÉ lands. No land acquisition is envisaged.
- The existing bus stop in the vicinity of the proposed substation can be maintained as can the bike lockers.
- There is no clash with existing utilities networks. A foul connection can be established to the existing foul system and treatment system adjacent to M3 Parkway station. A watermain connection can be established with the station water supply.

3.6.1.5.8 Hansfield substation

The power study determined the requirement for an electrical substation in Hansfield. The station is located on the Dublin Docklands to M3 Parkway service, serving the communities of Ongar, Barnwell and Clonee. From Ongar village, passengers can walk directly to Hansfield Station. There are 60 parking spaces available on the roadside controlled by Fingal County Council. The station building is in an elevated position above the double track line. The access to the station is through the northern side of the rail tracks and is located approximately 600 m south from the Ongar Distributor Road. Figure 3-21 below shows the layout and positioning of the 3 options for the Hansfield substation.



Figure 3-21 Options for Hansfield substation

The preferred option for the location of the proposed substation in Hansfield is Option 3, south of Hansfield Station, marked with a yellow circle in Figure 3-21 above.

Option 3 – Hansfield substation (preferred option)

Option 3 had comparative advantages over the other options in the assessment as follows:

- Option 3 does not impact on the existing set down and turning facilities serving the train station.
- Option 3 is located wholly on a disused space within lands owned by CIÉ.

Characteristics of the preferred option, Option 3 include the following:

- Option 3 locates the proposed electrical substation south of the railway, east of the Hansfield Station buildings. It will be necessary create an access from the existing Barberstown Lane North which is immediately to the south of the proposed substation.
- The proposed location is wholly within existing CIÉ lands. No land acquisition is envisaged for this option.
- The terrain at this location is almost flat, therefore no major earthworks are envisaged. The location of the building has no clashes with existing utilities networks. A watermain connection can be established to the existing watermain network 150 m south of the substation. There is no possible connection to foul drainage networks, hence facilities will be used at Hansfield Station.

3.6.1.5.9 Leixlip Confey substation

The power study determined the requirement for an electrical substation in Leixlip Confey. Leixlip Confey Station lies at the Captain's Hill end of Leixlip, north of the town centre, it is on the R149 regional road and has around 29 parking spaces.

The entrance to the station is south of the railway off the R149, where the main station building and the parking facilities are located. Access to the northern platform is by footbridge.

Figure 3-22 shows the proposed locations for the 2 options considered for the Leixlip Confey electrical substation.



Figure 3-22 Options for Leixlip Confey substation

The preferred option for the location of the proposed substation in Leixlip Confey at PC2 was Option 1, southwest of the existing canal bridge, Leixlip Confey Bridge, marked with a yellow circle in Figure 3-22.

Option 1 – Leixlip Confey substation (preferred option at PC2)

Option 1 had comparative advantages over the other option in the assessment as follows:

- This option is located in proximity to existing railway building infrastructure.
- This option can be easily accessed off the existing local road.
- The option is located wholly in CIÉ lands.
- Option 2 is located in existing amenity green space and a new permanent access would need to be constructed to it.
- Existing potable and foul water services are available in close proximity to Option 1.

Characteristics of the preferred option at PC2 (Option 1) include the following:

- Option 1 is located south of the railway, in the existing Leixlip Confey Station.
- The proposed location is within the existing CIÉ lands, therefore no major additional land take is envisaged with this option. However, part of the existing car park will be required to be used to accommodate the substation.
- Option 1 requires undertaking works to upgrade the road access from R149.
- For Option 1, the proposed substation will occupy the footprint of the existing parking area. There will be no space available to relocate the access road to the substation (yellow shadow), due to the residential area next to the proposed location.
- There is no clash with existing utilities networks. Both the foul gravity and water supply connections are available along the station entrance road.

3.6.1.5.9.1 Revised Preferred Option Leixlip Confey Substation

Following further design development and discussions with ESB, the ESB floorplan required to be provided increased in size from that provided in the PC2 design. There was also a new requirement for a 360 degree walkway around the substation, and a 4.5 m wide access road for vehicles to enter into the substation area.

These changes required the project to review the design and in order to accommodate these requirements the substation building would require to be a two-storey building if it was positioned in the Option 1 location. This is because there is not enough space within the station carpark area to accommodate the increased footprint required, plus the walkway and vehicle access road if the building was only one-story.

The image below shows the houses that look onto the station carpark area, and these houses would be adversely impacted should the project install a two-storey substation building in this location.

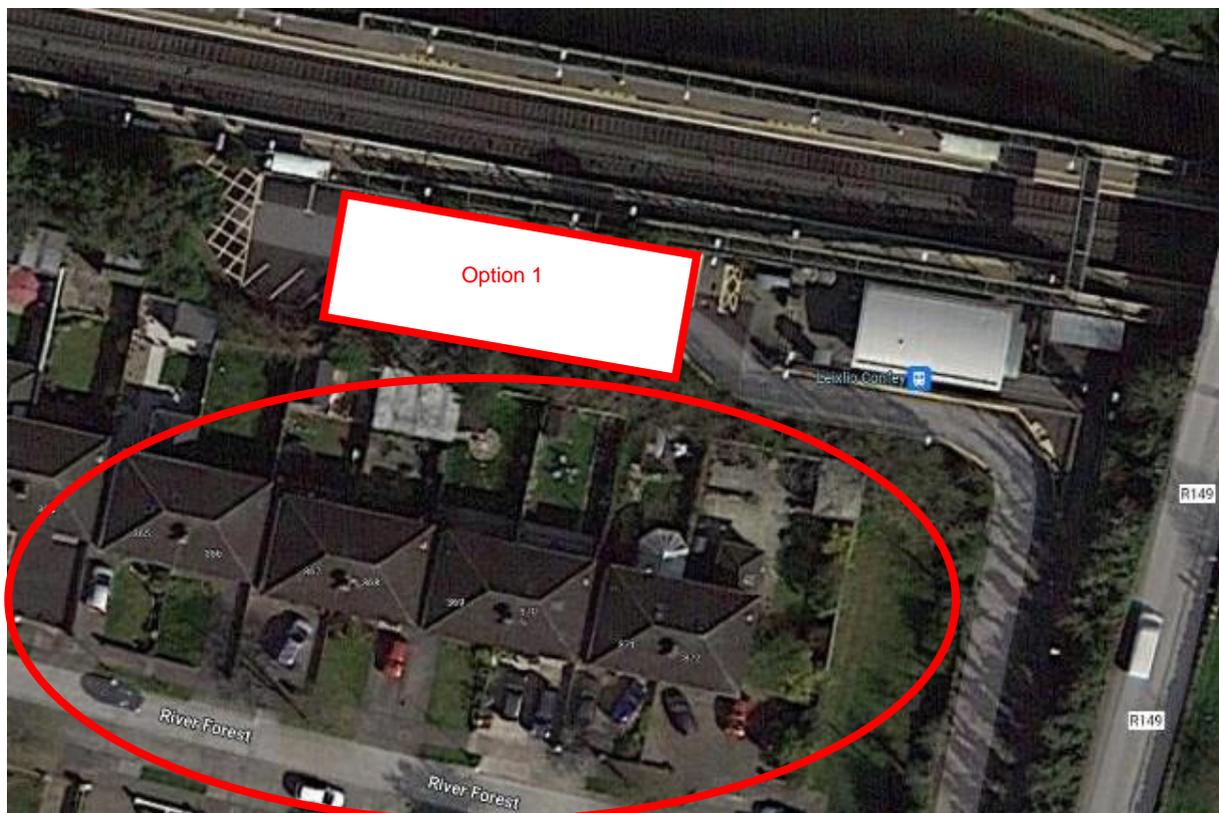


Figure 3-23 Houses affected by two-storey substation building

The project was then forced to revert to Option 2 as described above. Option 2 has the following advantages over Option 1:

- Option 2 can be a one-storey building, which minimises the visual impact on residents in the area.
- Option 2 would impact less on the existing station access and parking, and more parking for the station would be possible, when compared to Option 1.
- Option 2 can provide a new separate permanent access without impacting the station one.
- Option 2 includes a screening planning in the north of the substation to screen it from the royal canal.
- Existing potable and foul water services are available in close proximity to Option 2.

Characteristics of the revised preferred option (Option 2) include the following:

- Option 2 is located south of the railway, to the East of the existing Leixlip Confey Station and OBG 14 Cope Bridge.
- The proposed location does not impact on either the station access or the station parking slots.
- Land take is envisaged with this option.
- There is no clash with existing utilities networks. Both the foul gravity and water supply connections are available at the closest road at the south of the substation.

3.6.1.5.10 Blakestown substation

The power study determined the requirement for an electrical substation in Blakestown, between Maynooth and Leixlip (Louisa Bridge) stations. Collinstown Industrial Park is located to the north of the study area. This area also includes residential properties. South of the railway are the areas of Kilmacredock, Grangewilliam and Glen Easton.

In this area, both margins of the Royal Canal are connected via Deey Bridge. There is a level crossing over the railway at Blakestown, it is proposed that the level crossing will be removed as part of the project. The R148 runs east west along the northern extent of the study area. The area south of the railway is served by the R449 and the local road network which links to the both the R148 at Pikes Bridge and the R449.

Figure 3-24 shows the layout and positioning of the 3 options for the Blakestown electrical substation. Option 2 emerged as preferred from the MCA process. The proposed location is close to the existing railway level crossing, south west of Deey Bridge and 13th Lock, marked with a yellow circle in Figure 3-24.



Figure 3-24 Options for Blakestown substation

Option 2 – Blakestown substation (Preferred Option)

Option 2 had comparative advantages over other options in the assessment as follows:

- This option is located in proximity to existing railway building infrastructure.
- This option can be easily accessed from the existing local road.
- There is currently telecoms infrastructure at the location of Option 3.
- Option 1 is located in a remote position from existing access routes. It is considered inappropriate to propose access off the R449 at the location of the proposed substation.
- Existing potable and foul water services are available in close proximity to Option 2.

Characteristics of the preferred option, Option 2 include the following:

- Option 2 is located south of the railway, near the existing level crossing, south west of Deey Bridge & 13th Lock on the Royal Canal. It is 1.8 km west of Leixlip (Louisa Bridge) Station.
- The proposed location is not within existing CIÉ lands, therefore it will be necessary to purchase additional land.
- With this option, it will be necessary create an access off the existing road. Operational phase access will be along the existing local road network, which connects to the R148 and the R449.
- This option is in a rural area where there are no clashes with buildings or access infrastructure. As part of the substation access, parking spaces would have to be provided.
- There is no clash with existing utilities networks. The connection to water supply is available next to the substation. The connection to foul gravity network is envisaged over the existing Deey Bridge and north to the R148.

3.6.1.5.11 *Maynooth substation*

The power study determined the requirement for an electrical substation in Maynooth. Maynooth Station is situated south of the Royal Canal. The access to Maynooth Station is via a footbridge west of the station, which leads to Leinster Street, or by the road bridge on the R406 Straffan Road to the east of the station.

Maynooth Station has two platforms which are connected by a footbridge. Platform 1 is north of the railway where the station building is located, and Platform 2 is on the southern side of the station, next to residential areas.

There are 222 parking spaces, five of them disabled, next to the station building. The access to the north platform is level and a fenced sidewalk is provided for pedestrians, connecting the R406 Straffan Road with the entrance to the station building.

Figure 3-25 shows the layout and positioning of the four options considered for the Maynooth electrical substation.



Figure 3-25 Options for Maynooth substation

The preferred option for the location of the new substation in Maynooth is Option 4, close to the existing footbridge, marked with a yellow circle in Figure 3-25.

Option 4 – Maynooth substation (Preferred option)

Option 4 had comparative advantages over other options in the assessment as follows:

- It is located adjacent to the public road and to existing services.
- It has mitigated impact on the Royal Canal.
- It has mitigated impact on existing parking facilities at the station.
- Other options result in greater impact on station facilities and on movement throughout the station.

Characteristics of the preferred option, Option 4 include the following:

- Option 4 locates the proposed electrical substation south of the railway, remote from the canal and near R406 Straffan Road.
- The proposed location is within existing CIÉ lands, therefore significant land acquisition is not envisaged with this option.
- The existing pedestrian ramp access and vehicular access to the R406 will require realignment to accommodate the proposed substation in this location.
- It is proposed to re-route the pedestrian walk along the route, at the north and east of the substation.
- The carpark will be reduced in number by 12 parking spaces, to accommodate the proposed substation. Parking for substation access will be served by the existing station parking facilities.
- Realignment of the station access road can be accommodated within the existing station boundary. This will require typical roadworks construction activity.

3.6.1.6 Location Assessment for other SET Buildings

The proposed locations of low key SET buildings and cabins were assessed. The buildings, PSPs, SEBs, TERs etc are however typically small units located within stations or along the line where they do not have a significant impact on their surroundings. They are often co-located with stations buildings and electrical substations.

3.6.2 Structures

To facilitate electrification as part of DART+ West project it is necessary to make differing structural interventions. The following list provides a summary of the principal structural interventions included in this project:

- Interventions at existing structures:
 - Reconstruction of existing arch bridges and flat deck bridges altered to obtain additional vertical clearance.
 - Alteration of an existing bridge deck incorporating timber way beam rail support with an alternative imbedded rail system at underbridge UBD233 to obtain additional vertical clearance for overhead electrical lines.
 - Due to the future design of the Spencer Dock Station, part of the existing Sheriff Street Bridge must be demolished during the construction of the Spencer Dock Station and will then be rebuilt to its original elevation.
 - Underpinning may be required at specific structures where track lowering will impinge on existing foundations.
- OHLE structures:
 - OHLE support structures (foundations, cantilever masts, portal gantries & headspans).
- Proposed new bridge structures:
 - Proposed new bridge structures to facilitate access in the vicinity of the proposed depot.
 - Proposed new bridge structures at level crossings.
- Retaining wall structures and parapet enhancements:
 - U-sections for general cases and piling walls for special cases are required along the track area near Spencer Dock Station, to protect the track from groundwater.
 - Cantilever retaining walls are required for some OHLE cross sections used for supporting soil laterally, so that it can be retained at different levels on the two sides.
 - Parapets heightening design at existing bridges, existing footbridges and existing railway boundary walls.

3.6.2.1 Clearance at bridges

Electrifying the railway requires the installation of overhead electrical lines along the railway. The lines pass under existing bridges. In many instances the existing bridges are too low to accommodate the overhead lines at their normal heights and special measures are warranted to facilitate the electrification. The proposed measures are considered on a ranked basis with increasing scale of intervention. The measures examined, from lowest to highest degree of intervention, are as follows:

- Accept reduced wire height under an existing bridge.
- Lower the railway under an existing bridge and underpin bridge as necessary.
- Raise the deck of an existing bridge to provide more height under the bridge.
- Deconstruct the deck of an existing bridge and reconstruct at a higher level.
- Realign the railway to avoid the constraint associated with the existing bridge.

In many instances a combination of the above options has been adopted to ensure minimal intervention.

All the existing bridges were examined and classified in respect of the height available for electrification under the bridges. Each bridge was colour coded for height ranges as set out in Table 3-5.

Table 3-5 IÉ electrical clearance categories

Clearance Category	Available height under bridge (mm)	Category	Interventions
Enhanced	≥ 5620		<ul style="list-style-type: none"> • No Special Interventions are needed.

Clearance Category	Available height under bridge (mm)	Category	Interventions
Minimum Normal	5619 - 4710		<ul style="list-style-type: none"> A reduced height OHLE solution is achievable.
Special Reduced	4709 - 4495		<ul style="list-style-type: none"> Considerations of risk dictate whether a reduced height OHLE solution is acceptable or if track lowering and bridge deck alterations are necessary.
Black Structure	< 4495		<ul style="list-style-type: none"> Track lowering and/or bridge deck alterations are necessary.

Challenging structures, i.e., those with less than 'Enhanced' clearance as defined in Table 3-5, are shown in Figure 3-26. The figure indicates the bridge codes only rather than the common names for the bridges for the purposes of clarity of the figure, however the common names for the bridges are also indicated in the sections of this chapter where the individual bridges are discussed.

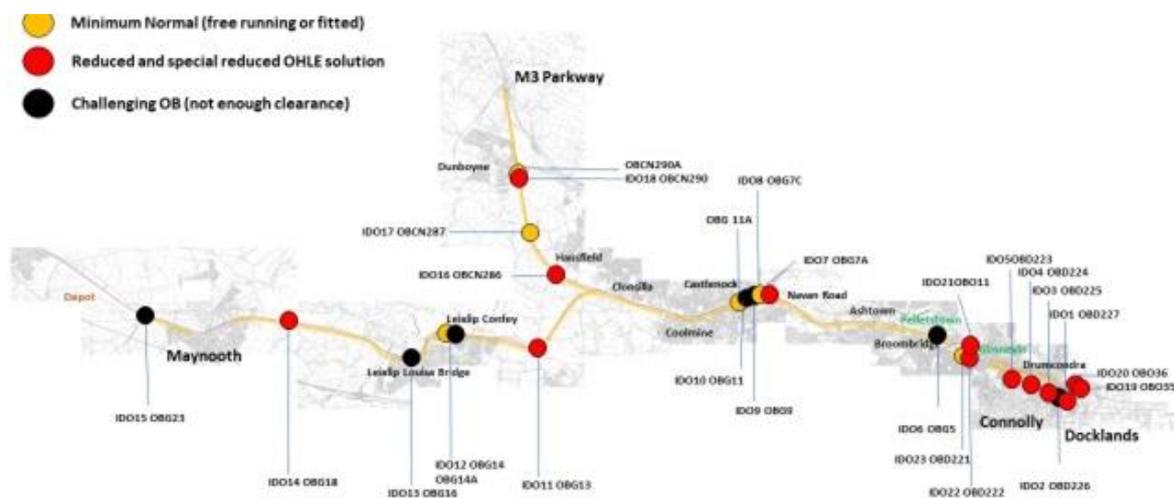


Figure 3-26 Overbridges with less than 'Enhanced' clearance

3.6.2.2 Track lowering and realignment interventions at existing bridges

Table 3-6 provides a list of existing bridge structures where it is proposed to facilitate the installation through the implementation of track lowering on the approaches to the bridge and under the bridge. In addition, it is proposed to realign the track at Jacksons Bridge OBG23 to avoid impacts on the existing bridge. The approach set out in 3.6.2.1 was used to select the preferred option.

Table 3-6 Track lowering interventions at existing bridge structures

Structure	Proposed solution
OBO11 Cross Guns (on Prospect Road)	Track lowered by between 250 mm and 550 mm
OBO36 (Ossory Road Bridge)	Track lowered by 20 mm
OBD227/227A/227B, Railway Bridge	Track lowered by between 250 mm and 550 mm
OBD226 Newcomen Bridge	Track lowered by between 250 mm and 550 mm
OBD225 Clarke's Bridge	Track lowered by between 250 mm and 550 mm
OBD224 Clonsilla Bridge	Track lowered by between 250 mm and 550 mm
OBD223 Binn's Bridge	Track lowered by between 250 mm and 550 mm
OBD222 (Cross Guns / Westmorland Br)	Track lowered by between 250 mm and 550 mm
OBD221	Track lowered by between 250 mm and 550 mm
OBG7A (West M50 Roundabout / Navan Road)	Track lowered by between 250 mm and 550 mm

Structure	Proposed solution
OBG13 adjacent to Collins Bridge	Track lowered by between 250 mm and 550 mm
OBG18 Pike Bridge	Track lowered by between 250 mm and 550 mm
OBCN286 Barnhill Bridge	Track lowered by between 250 mm and 550 mm
OBCN290/290A Dunboyne Bridge	Track lowered by between 250 mm and 550 mm

3.6.2.3 Structural interventions at existing bridges

Table 3-7 below provides a comprehensive list of structural interventions required at low clearance bridge structures throughout the project on completion of the options selection process. The approach set out in 3.6.2.1 was used to select the preferred option.

Table 3-7 Structural interventions at existing bridge structures

Structure	Proposed solution
Sheriff Street Upper Viaduct	Four spans of the viaduct to be replaced with a configuration to a matching road profile but with less spans and sufficient height under the viaduct to facilitate electrification and also to facilitate the proposed Spencer Dock Station
OBG5 Broomebridge	Replace bridge masonry arch with one to higher profile
OBG9 Old Navan Road Bridge	Raise the bridge deck (and modify parapets)
OBG11 Castleknock Bridge	Replace bridge masonry arch with one to higher profile
OBG14 Leixlip Confey Bridge	Replace bridge masonry arch with one to higher profile
OBG16 Louisa Bridge	Raise the bridge deck (and modify parapets)

3.6.2.4 Proposed alterations to existing bridges

3.6.2.4.1 Existing bridges requiring decks to be raised

Due to insufficient vertical clearance for the overhead electrical lines to be carried under bridges, there are two existing flat deck bridges which need to be raised to address the shortfall in vertical clearance. The MCA process identified the deck lift option to be the preferred option in respect of these bridges due to the curtailment of impact associated with this intervention. The bridges are listed below:

- OBG9 Old Navan Road Bridge.
- OBG16 Louisa Bridge.

The adjacent Canal bridge at OBG9 Old Navan Road is a protected heritage structure and the adjacent Canal bridge at OBG16 Louisa Bridge is a proposed protected structure. It is important the integrity of the adjacent structures is respected as part of the bridge alteration proposals. The change in appearance due to the proposed bridge lift process will not be significant. Where the existing parapets on the bridges are low, it will be necessary to raise them to a height of 1.8 m over the railway for safety reasons.

OBG9 Old Navan Road bridge

OBG9 is a single span flat deck bridge, 13.76 m wide and 8.5 m long, located on the Old Navan Road in Blanchardstown, Fingal. To provide clearance to the overhead electrified lines to be carried under the bridge the deck needs to be raised by a minimum of 320 mm. This is a modest lift and can be achieved with curtailed impact on the road above.

OBG16 Louisa Bridge

The OBG16 is a single span flat deck bridge, 14 m wide, located in Leixlip, at Louisa Bridge Station. It carries the R148 regional road over the Royal Canal and the railway and is a principal means of access along the east west corridor at this location. The span of the bridge is 8.5 m (measured square to the railway) and it crosses

the railway on a skew. A separate heritage bridge in the form of a masonry arch spans the Royal Canal just to the west of the railway bridge.

To provide clearance to the overhead electrified lines to be carried under the bridge the deck needs to be raised by a minimum of 290 mm. This is a modest lift and can be achieved with curtailed impact on the road above and can be achieved without modification to the protected canal bridge.

3.6.2.4.2 Existing bridges requiring deck reconstruction

Due to insufficient vertical clearance for the catenary equipment under bridges, there are existing arch bridges which require deck reconstruction to increase the vertical clearance. Appendix A3.3 in Volume 4 of this EIAR presents a report on the option selection process undertaken at each of these structures and are presented in summary form below.

Masonry arch bridges adjacent to protected Canal bridges:

- OBG5 Broome Bridge.
- OBG11 Castleknock Bridge.

Proposed protected masonry arch bridge:

- OBG14 Leixlip Confey Bridge.

Considering the historical value of sensitive bridges, three structural solutions were proposed at the optioneering study stage to increase the vertical clearance of the bridge:

- Structural Option A: Alterations to incorporate a precast arch deck to a raised profile.
- Structural Option B: Alterations to incorporate a precast frame deck to a raised profile.
- Structural Option C: Alterations to raise the profile of the existing arch.

Option C is considered to exhibit a higher risk profile than solutions A & B, as it is a relatively innovative solution, untested in Ireland. It is therefore, assigned comparative disadvantage over other options in this regard in the MCA. Options A & B secure varying consistency with the form of the existing arch while providing the necessary height to accommodate the proposed electrification. Option A, the precast arch maintains the geometry of the existing masonry arch with less aesthetic impact than evident for Option B, the precast frame solution. Although option B permits a slight reduction in the height of the lift of the bridge arch, its shape has very significant negative visual impact.

Option A (precast arch deck) has been selected as the preferred option for all existing arch bridges. The contribution of a Conservative Architecture study is an essential part of the design development associated with the preferred option for the protected arch bridges.

To accommodate the design for the proposed Spencer Dock Station, it will be necessary to remove five spans of the existing Sheriff Street Upper Viaduct. The spans will be replaced with structural elements of similar appearance to the existing viaduct and of span configuration to suit the design of the proposed station.

The following paragraphs provide further details in respect of each of the above existing bridge structures.

OBG5 Broome Bridge

To achieve a sufficient vertical clearance for the catenary equipment under the bridge, at least 450 mm lift of the bridge deck is required. It is noted that pre-existing flooding issues in the vicinity of this bridge, and the proximity of the existing Broombridge train station platforms curtail the scope for the application of a track lowering solution at this location.

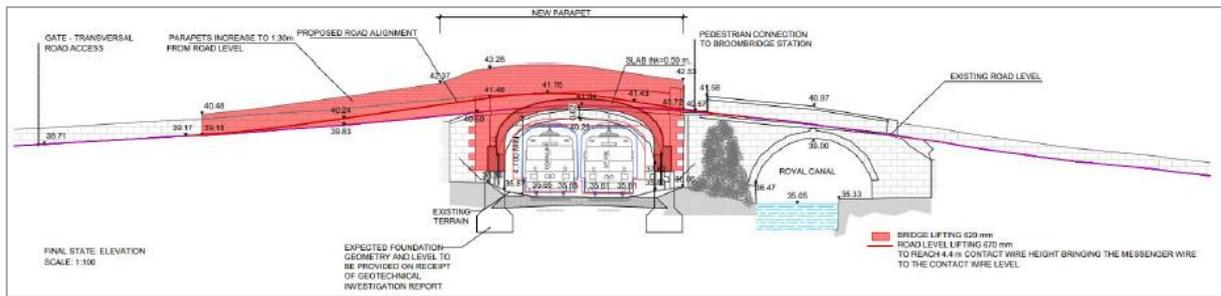
The bridge is an 8.5 m wide, two span masonry arched structure, incorporating a span over the railway and one over the canal. The spans are sufficiently far apart for them to be considered structurally independent. It

is considered that alterations can be carried out on the railway arch without impacting the arched span over the canal. The railway span is approximately 8.5 m long (measured square to the railway) and it is skewed across the railway. The bridge also accommodates ramped access to the northern platform of Broombridge train station.

A one-way shuttle system is in place for road traffic over the bridge. There is access to the Royal Canal immediately north of the bridge. Although road diversions are available, road closures associated with construction will impact on local access.

It is expected that the proposed alteration to the bridge will not impact on the ramped access to Broombridge Station.

Figure 3-27 shows OBG5 Broome Bridge with the precast arch deck solution:



To achieve a sufficient vertical clearance for the overhead electrical lines which pass under the bridge, the precast arch deck solution has been proposed, requiring the bridge deck to be raised by at least 330 mm.

Sheriff Street upper viaduct

The proposed Spencer Dock Station passes under the existing Sheriff Street upper viaduct, see Figure 3-29.

It comprises a multiple span structure of riveted plate girder construction. The spans are simply supported on brick piers. The plate girder beams support a concrete slab beneath road level and parapets on the bridge are of solid brick construction. It is proposed that any alterations to the bridge will be consistent with the appearance of the existing structure.



Figure 3-29 Sheriff Street upper viaduct

The existing viaduct crosses over the existing road access to temporary parking facilities and to the existing Docklands Train Station on CIÉ lands north of Sheriff Street and the disused railway which served the Liffey Quayside in the past.

The alterations to this bridge are driven, principally by engineering constraints. It is necessary to maintain the existing parking access under the viaduct and the structural configuration must accommodate the four platforms proposed as part of the Spencer Dock station proposals. 5 spans of the existing viaduct are affected.

The proposed five span configuration provides for the construction of two reinforced concrete piers centred on the platforms below. It is proposed that the replacement bridge decks will comprise precast concrete beam construction with concrete slab. The depth of construction will match the adjacent existing spans and the positioning of edge beams will be consistent with the existing deck configuration.

3.6.2.4.3 Other existing bridges

- Existing steel underbridge UBD233; It is proposed to replace the existing way beams on this railway underbridge with an embedded rail system to facilitate lowering the track over the bridge by approximately 20 mm.
- Where it is proposed to carry out track lowering at existing railway overbridges to achieve clearance for the overhead electrical lines, underpinning will be implemented as appropriate.
- The existing Bailey's Bridge OBG24 provides accommodation access over the railway. With proposals to construct the new depot immediately south of the railway at this location, it will not be practicable to maintain access at this point. It is proposed to divert this accommodation access over the proposed depot access bridge OBG23A and to remove the existing bridge as part of the project.

3.6.2.5 Design development

3.6.2.5.1 OBG14 Cope Bridge

At PC2, DART+ West project presented only the bridge arch reconstruction for OBG14 in order to provide sufficient clearance for the OHLE to pass beneath the railway bridge. Comments received from Kildare County Council (KCC) submission at PC2 stated the following points:

- Cope Bridge capacity is recognised as being critical to deliver a significant urban expansion of c.1765 residential units north of the railway.
- The bridge provides the only direct road link planned between the development and Leixlip Town.
- Like-for-like replacement would not provide value for money.

Discussions have taken place between Iarnród Éireann, the National Transport Authority and KCC and it was agreed that DART+ West would work with KCC to incorporate the widening of the existing bridge into the Railway Order Preliminary Design.

The recommendations from KCC Roads Planning Section for the OBG14 Cope Bridge widening were as follows:

- a single bridge (widening of existing bridge, faced with the original stone etc.).
- 2 lane road with overall width of 7 m, off-road 2 m wide cycle track and 2 m wide footpaths on both sides.
- public lighting provisions.
- suitable parapets.

Factors to consider in the design of the widened bridge were as follows:

1. Pedestrian/Cyclists Access to Railway Station.
2. Pedestrian/Cyclist Desire Lines North/South.
3. Access to/from Royal Canal Greenway.
4. Vehicular Access to Railway Station.
5. Interaction with junctions to existing housing estates south of Bridge.
6. Sufficient width for passing buses on route.
7. Gradient of existing bridge.
8. Potential development north of the bridge.

An optioneering exercise was completed by the team, in collaboration with KCC and with input from DART+ West Grade 1 Conservation Architects Blackwood & Associates. The following long list of options were reviewed:

- **OPTION 1a:** This would mirror existing structure and utilise precast arches, lightweight concrete infill and reuse existing stonework for the face of the bridge. Use of constant arch span.
- **OPTION 1b:** This would mirror existing structure and utilise precast arches, lightweight concrete infill and reuse existing stonework for the face of the bridge. Use of varying arch span.
- **OPTION 1c:** In-situ reinforced concrete arch with top slab – more contemporary feel and more of the original canal structure visible.
- **OPTION 1d:** Widening of the existing structure by single precast concrete arch with flat deck – contemporary feel and ability to show more of the original canal structure visible. Widened structure will carry pedestrian and cyclists only.
- **OPTION 1e:** Widening of the existing structure on both sides by single precast concrete arch with flat deck – contemporary feel and ability to show more of the original canal structure visible. The difference compared to option d is that widening will be carried out on both sides of the existing bridge. Widened structure will carry pedestrian and cyclists only.
- **OPTION 2:** New separate structure to carry road vehicles (7 m carriageway), with a single arch. Existing bridge would carry pedestrians and cyclists.
- **OPTION 3:** New separate structure to carry pedestrian and cyclists (2.5 m footpath and 2.5 m cycle path). The new bridge is providing the best view of the historical bridge. This structure shall be designed to reduce its visual impact, compared with a road bridge. The aesthetic performance for the new bridge shall be balanced compared with the existing one. Existing bridge to carry vehicles.
- **OPTION 4:** Completely new structure to carry road vehicles (7 m carriageway), with flat deck structure. Existing bridge would carry pedestrians and cyclists.

Following feedback received from KCC, Waterways Ireland and Blackwood & Associates (DART+ West's Grade 1 Conservation Architects), and further design development of potential options, the chosen preferred option uses the existing historic bridge to transport road traffic only (leaving the historic parapets in place so far as reasonably practicable) and then constructs two new steel pedestrian and cycle bridges either side of the historic bridge. This option was deemed to have the least impact on the historic bridge, while still providing a two-lane traffic crossing and pedestrian and cycle facilities on both sides of the bridge.

The following images show the design intent of the chosen option. Reference Chapter 4 Description of the Proposed Development for further design details.

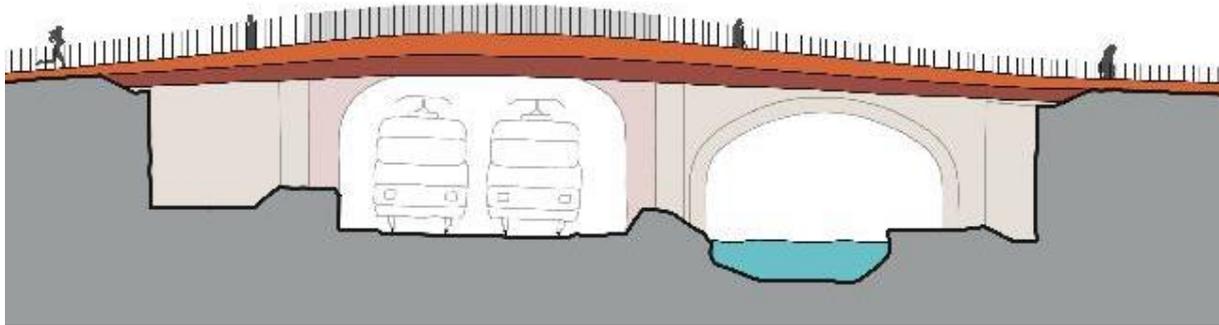


Figure 3-30 Design intent OBG14 Cope Bridge widening



Figure 3-31 3D Architectural images OBG14 Cope Bridge widening



Figure 3-32 Layout OBG14 Cope Bridge widening

3.6.3 Permanent way

DART+ West is characterised by the objective to enhance capacity along the existing railway corridors (permanent way). As part of this study, it was necessary to examine the existing infrastructure for pre-existing deficiencies and opportunities for enhancement. In this regard, the following were examined:

- The scope for the removal of existing speed restrictions consequent on the existing horizontal and vertical alignment of the track.
- The provision of a double-track configuration west from Maynooth to the proposed depot and for connection to the depot.
- The need for track modification necessary to optimise the project Train Service Specification (TSS).
- The scope for track alignment modification to ensure the availability of the clearances at structures necessary to meet overhead electrification needs.

- Opportunities for adjustment of track alignment to address localised pre-existing flooding issues.
- Enhancements to the drainage network.
- Alterations to boundary treatment to secure the railway.

In addition, with the introduction of a proposed station at Spencer Dock, it was necessary to alter the layout of railway tracks in the Docklands to accommodate access to the proposed station.

3.6.3.1 Speed restriction removal

One of the objectives in the permanent way design is to remove, if possible, pre-existing speed restrictions on the railway. The following sections have been identified as having speed restrictions due to the existing track alignment:

- Drumcondra curve alignment, between Croke Park and Drumcondra Station on GSWR line.
- Liffey Junction, between Broombridge Station and Glasnevin Junction.
- Ashtown curve alignment, between Ashtown Station and Navan Road Station.
- Old Lucan north station curves alignment, between Clonsilla Station and Leixlip Confey Station.
- Leixlip curves alignment, within and nearby Leixlip Louisa Bridge Station.

An assessment was undertaken for each section with the following three options:

1. Do Nothing, maintaining the speed restriction.
2. Do-Minimum, upgrading the speed limit without major works if possible.
3. Increase speed up to 110 kmph.

The results of the assessment led to the recommendation of the first option, "Do Nothing", in all five sections. The main reasons for this recommendation are:

- The options require major significant civil works on the main line, at existing overbridges or land acquisition due to horizontal or vertical realignments.
- The operations software (RailSys) speeds graphs show that even by improving the track geometry, the operating speeds do not improve.
- Although RailSys speed graphs show that a possible improvement in track geometry would be beneficial, the results obtained from modelling speed improvements give insignificant runtime decrement from the operational point of view.

3.6.3.2 Spencer Dock permanent way alignment

The project team produced an initial design of three solutions proposed for Docklands Site A (A1, A2, and A3) and two solutions for Spencer Dock Site B (B1 and B2).

The design of these options has the following key points:

- at least a single-track connection should be provided to the East Wall Yard. Assuming freight traffic is to run during the night and off-peak times, such connection should provide access to the Northern line and alternatively the MGWR line or the GSWR line (both TSS Baseline and Alternative Scenarios).
- at least two platform tracks accessible from the GSWR line (TSS Baseline Scenario).
- platform track accessible from the Northern line (TSS Alternative Scenario).

The preferred option, Docklands B2 (now named Spencer Dock Station), provides better integration with the surrounding buildings by aligning the platform of the station to the North Lotts planning scheme gridlines. This alignment also makes the layout more compatible with the structure of the buildings above. The platforms need to be pushed southwards so the tracks can connect with the different lines while achieving the required radius.

Docklands Station Option B2 contains four tracks and two island platforms. This layout:

- Allows MGWR line access to all four platforms.
- Allows GSWR line access to two platforms and the Northern line access to one platform.
- Allows MGWR, GSWR, and Northern Line interconnection.
- Provides enhancement of the station capacity and operational flexibility.
- Provides an East Wall Yard connection with the Northern line, the Phoenix Park Line (GSWR) and the Maynooth Line (MGWR).
- Requires the demolition and reconstruction of a portion of Sheriff Street Upper viaduct to accommodate the new track layout.

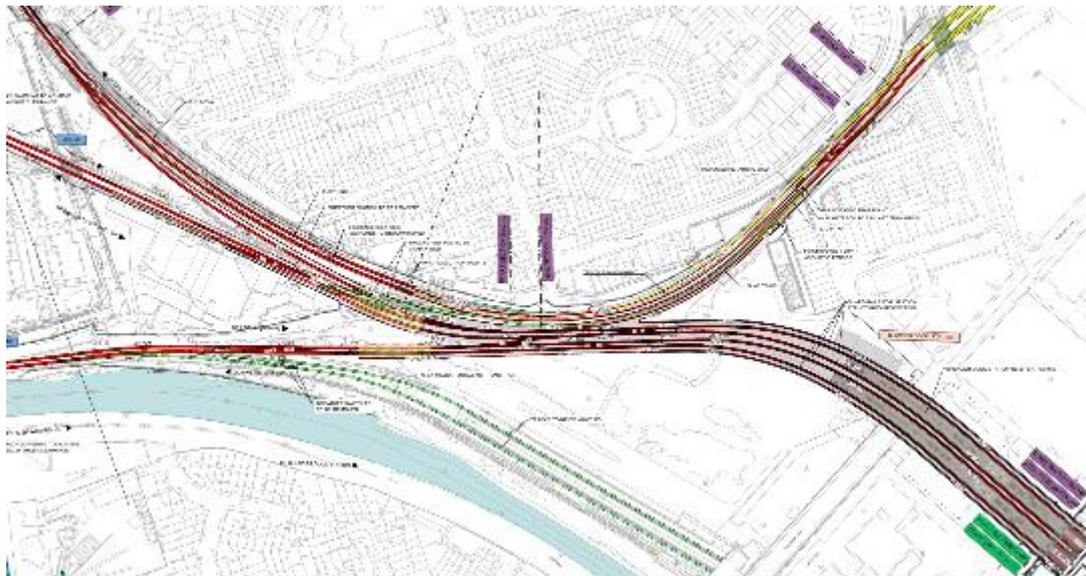


Figure 3-33 Docklands option B2 general layout plan

The alignment proposal impacts on the three buildings (ESB and SET) placed at the exits of Docklands Station platforms, which have to be relocated as part of the project.

Docklands Option B2 is underground at a level -3.5 m bgl, and the track that enters/exits the station runs for more than 300 m below the natural ground, in a proposed structural type U section to protect the track from groundwater and against uplift pressure.

In that case, the type of track proposed is a ballast less track (slab track) solution.

3.6.4 Level Crossings

Level crossings are a major constraint to surrounding road networks causing congestion and increased journey times for all modes of traffic including pedestrians and cyclists. The main aim of the proposed development, and the overarching DART+ Programme, is to increase passenger capacity and train frequencies. Increased train frequencies will result in additional level crossings closures and subsequent increase in congestion and delays in the surrounding road network.

A number of options were developed and examined in respect of the treatment of each level crossing. The options broadly include the following:

- Keep the level crossing in place with future Train Service Specification in operation.
- Implement CCTV control on the level crossing with the full Train Service Specification in place.
- Close the level crossing without providing alternative infrastructure irrespective of the consequent severance and road traffic impact.
- Close the level crossing with provision of appropriate alternative bridge crossing infrastructure proximal to the level crossings to replace vehicular, pedestrian and cycle access.

- Close the level crossing and construct a pedestrian and cycle bridge local to the level crossing to replace access for non-motorised users and divert vehicular traffic onto the local road network with or without out corresponding capacity enhancement dependent on the scale of traffic diversion.
- Lower the railway in the vicinity of the level crossing sufficient to provide clearance for the electrified railway to pass under proposed bridge infrastructure at the level crossing.

The design team has examined the feasibility of meeting the project objectives while keeping the existing level crossings in place and it has concluded that the project objectives cannot be delivered safely on this basis. Although it is considered that the level crossings need to be removed for operational and safety reasons, the option of retention of the level crossings has been included in the MCA process so it can be assessed across the full spectrum of criteria in a similar way to other options considered.

3.6.4.1 Previous studies

In August 2019 CSEA / Systra completed the Maynooth Line Transport Study Final Report, on behalf of the NTA and Iarnród Éireann, in respect of the implications of permanently closing six level crossings along the Maynooth rail line. The traffic outcomes of this study have been used in the MCA process to determine the preferred option at the selected level crossings.

The methodology applied to this study involved a road-based assessment and a pedestrian and cyclist assessment. The options were developed to identify what extent of replacement road infrastructure, if any, is required to allow the level crossings to be closed without having significant impacts on network performances. The options considered are outlined below:

- The Do Minimum scenario where the level crossings are closed without the provision of any replacement infrastructure.
- Options 1-3 investigated if providing a replacement at one of the level crossings within the N3/N4/M50 boundary area would be appropriate to accommodate the re-routing of traffic from other closed crossings.
- Options 4-6 provided replacement infrastructure at a combination of level crossings, to identify if there is any particular location where a road-based alternative may not be needed.
- Option 7 considered closing the Ashtown level crossing to vehicular traffic to identify the impact this would have on the surrounding road network.
- Option 8 includes the provision of replacement road infrastructure at Ashtown, Coolmine, Clonsilla and Barberstown. This option represented a 'Do Everything' scenario with all crossings replaced about from Porterstown (alternative bridge at Diswellstown Rd) and Blakestown.

Based on the results of the road-based assessment undertaken, it was recommended that Ashtown, Coolmine and Barberstown would require road based replacement infrastructure to facilitate the closure all level crossings on the Maynooth rail line to vehicular traffic. The findings of the pedestrian and cyclist assessment concluded that pedestrian and cycle access to be provided for Ashtown, Coolmine and Clonsilla. For Barberstown, it is envisaged that the replacement road infrastructure at this location will be sufficient to cater for future pedestrian and cyclist movements and that due to the low usage level at Blakestown level crossing, it is recommended that no replacement infrastructure for pedestrians and cyclists is required.

The design team has carried out a review of, and has accepted, the conclusions of the above report and the design development was advanced on the basis of the conclusions and project data included in the report. In addition, design development was carried out in respect of local area impacts of additional options considered in progressing from emerging preferred option to confirmation of the preferred option in respect of each level crossing.

3.6.4.2 Do-nothing option

The Do Nothing scenario for level crossings considers leaving the current level crossings in place. Table 3-8 and Table 3-9 presents the statistics of the current number of level crossing closures for each level crossing on the Maynooth Line and the associated closure time for the AM and PM peak hours. As indicated in the

tables, the level crossings are currently closed for 20-40 minutes in the peak AM and PM hour. Therefore, this option is not a realistic prospect as it is contrary to the project objectives to increase train capacity to 12 trains per direction per hour. This option was included as an option to provide a robust comparative assessment

Table 3-8 AM Railway Stats for the Level Crossings – CSEA Systra Aug 2019

Level Crossing	No. Trains Passing	No. Closures	Total Closure Time	Average Time per Closure
Ashtown	13	6	00:36:42	00:06:07
Coolmine	12	9	00:41:35	00:04:37
Porterstown	12	7	00:32:46	00:04:41
Clonsilla	12	7	00:30:58	00:04:25
Barberstown	9	6	00:26:03	00:04:21
Blakestown	7	5	00:23:48	00:04:46

Table 3-9 PM Railway Stats for the Level Crossings – CSEA Systra Aug 2019

Level Crossing	No. Trains Passing	No. Closures	Total Closure Time	Average Time per Closure
Ashtown	11	6	00:36:32	00:06:05
Coolmine	11	7	00:34:14	00:04:53
Porterstown	10	6	00:19:57	00:03:20
Clonsilla	10	4	00:26:30	00:06:38
Barberstown	7	6	00:20:37	00:03:26
Blakestown	7	6	00:21:54	00:03:39

3.6.4.3 Do-minimum option

The do-minimum scenario for level crossings considers the closure of the crossings with no alternative access provided. This option is wholly consistent with the project objectives but is not appropriate for this instance. For this scenario all traffic would be diverted to alternative routes around the crossing location and the traffic impact would be unacceptable based on current and future development in the area.

3.6.4.4 Do-something option

3.6.4.4.1 Ashtown level crossing

In addition to the Do-minimum and Do-nothing scenarios, the do-something options assessed as Stage 1 MCA are described in Table 3-10.

Table 3-10 Ashtown level crossing do something options

Option	Description
Option 1	Closure of the level crossing and online Overbridge along Ashtown Road
Option 2	Closure of the level crossing and Underbridge on Mill Lane
Option 3	Closure of the level crossing and Overbridge on Mill Lane
Option 4 & 4a	Closure of the level crossing and provision of link from River Road to Navan Parkway Station grade separated junction and the construction of an underbridge structure at existing Ashtown level crossing for pedestrian and cycle access.
Option 4 & 4b	Closure of the level crossing and link from River Road to Navan Parkway Station grade separated junction and the construction of an overbridge structure at existing Ashtown level crossing for pedestrian and cycle access.
Option 5	Closure of the level crossing and provision of low clearance underbridge east of existing crossing.

Option	Description
Option 6	Closure of the level crossing and road overbridge 250 m east of existing crossing connection to Ashtown.
Option 7	Closure of the level crossing and road overbridge 250 m east of existing crossing with new link to Navan Road.
Option 8	Closure of the level crossing and provision of a pedestrian/cycle overbridge – as Option 4b.
Option 9	Closure of the level crossing and lowering of the railway vertical alignment with bridge over railway and canal at Ashtown level crossing, retention of the canal and locks west of the level crossing.

Figure 3-34 presents the options at Ashtown level crossing considered in the Stage 1 MCA on aerial photography.

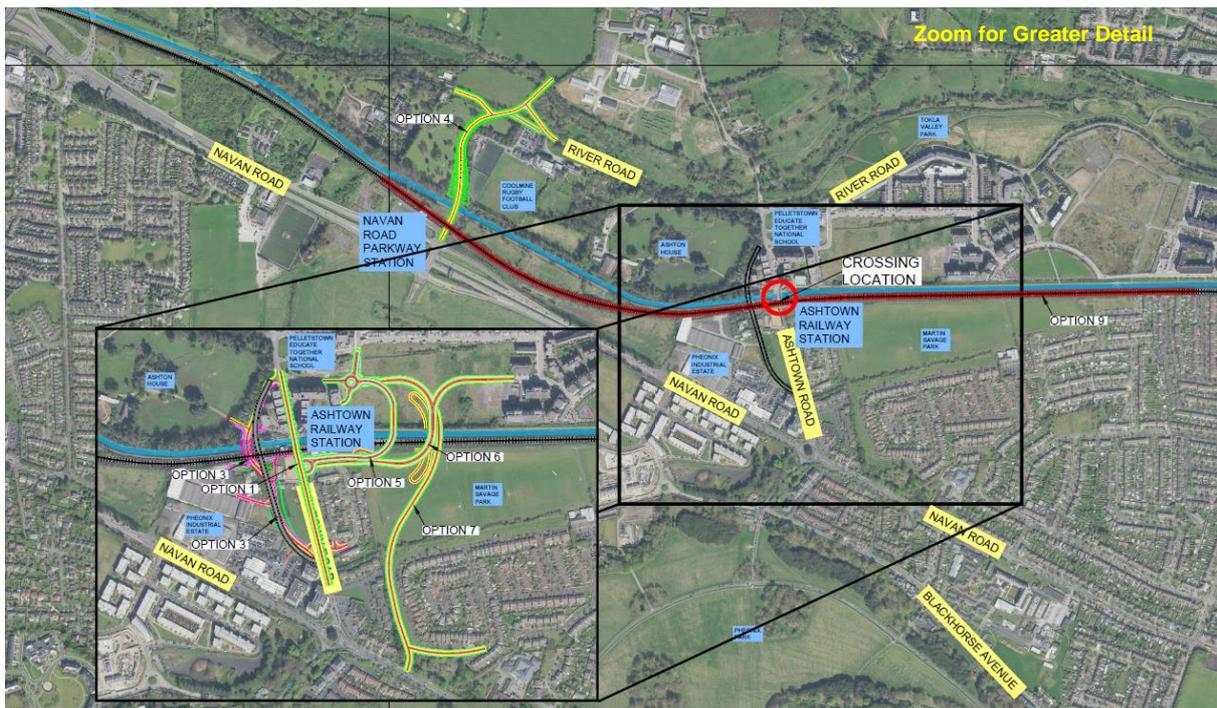


Figure 3-34 Ashtown level crossing options (Copyright Ordnance Survey Ireland – 0039720)

Option 1 – Online overbridge

This option would close the level crossing. This online scheme would require a new bridge to be constructed over the canal and railway. This would lift the existing carriageway by at least 7.0 m above the railway line, accommodating a cross section of a 6.5 m roadway with 1.0 m rubbing strips on both sides. Pedestrian and cycle access cannot be readily accommodated on the main line alignment due to the constrained width available between buildings along the multistorey streetscape north of the level crossing.



Figure 3-35 Ashtown option 1 – online overbridge (Copyright Ordnance Survey Ireland – 0039720)

The topography is such that the northern approach (where the ground falls away towards the Tolka River) would be steep and would also require significant modifications to the recent development of the area, both over-ground and underground.

The length of the approach on the northern side would be approximately 180 m and be at a gradient of 12% and 140 m on the southern side at a gradient of 5%. The bridge over the rail line would be at a level of 51.9 m OD with a deck level 7.0 m above the rail level.

Option 2 – Underbridge on Mill Lane

This option would entail re-routing Ashtown Road along its old alignment (pre-Royal Canal) on Mill Lane and passing under both the railway and the Royal Canal. The option can accommodate a cross section of a 6.5 m carriageway with 1.8 m footpaths on both sides and 2.5 m two-way cycle track on the eastern side. It is proposed to curtail the footpath along the west of the alignment fronting the listed Ashton House curtilage to a 0.5 m rubbing strip and provide a pedestrian crossing at this location to minimise the impact on the heritage property. An at-grade turning head and drop-off are proposed to be provided each side of the railway.

The length of the option is approximately 150 m on the northern side and 300 m south of the rail line. The option would drop to an approximate level of 37.5 m OD under the railway which is at a level of 45.6 m OD at the bridging point. On both sides of the railway a separate pedestrian and cycle link is proposed to provide enhanced access for non-motorised users. These shared spaces would have a width of 3.0 m.

It is feasible to cross at this location, as it is upstream of the double lock on the canal and the canal is at the same approximate level as the adjacent railway. This option would require some property acquisition and modifications to existing accesses.

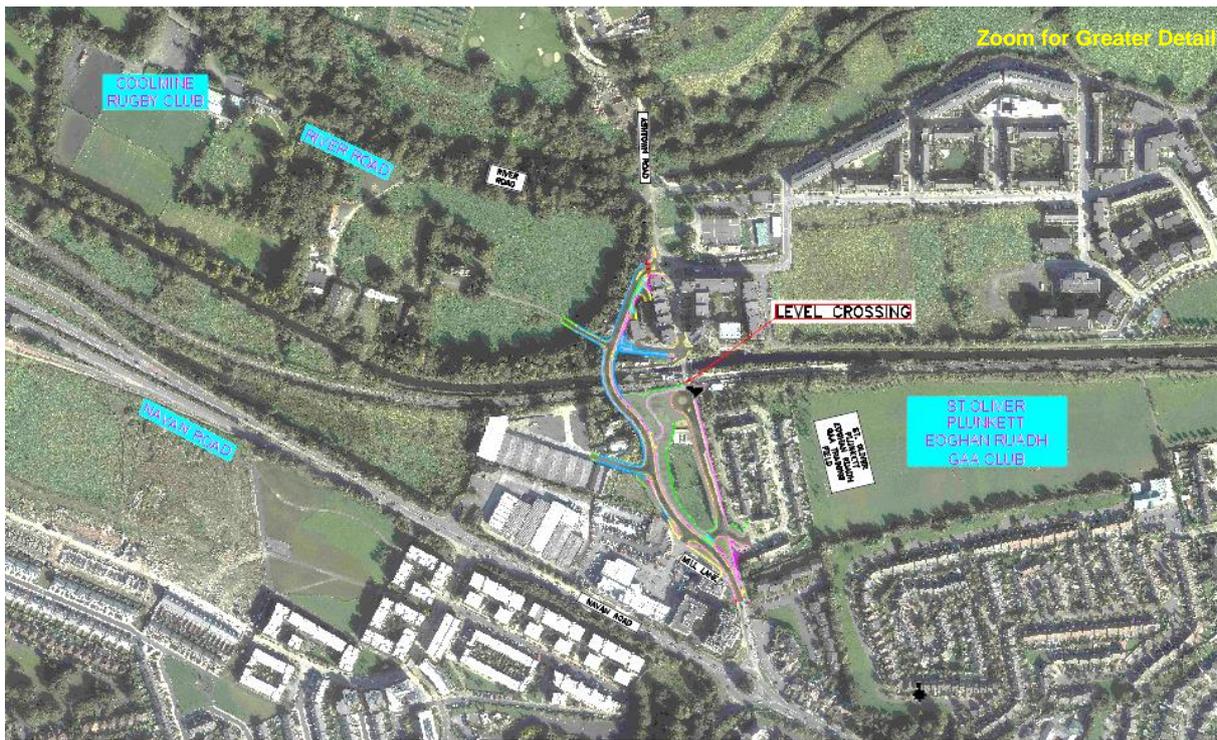


Figure 3-36 Ashtown option 2 under rail and canal (Copyright Ordnance Survey Ireland – 0039720)

Option 3 – Overbridge on Mill Lane

This option entails re-routing Ashtown Road along its old alignment (pre-Royal Canal) on Mill Lane and passing over both the railway and the Royal Canal. The option can accommodate a cross section of a 6.5 m carriageway with 1.8 m footpaths and 2.5 m cycleway on both sides of the road. The bridge will be highly skewed to the canal and railway and will be approximately 70 m long. It incorporates walls along the western boundary of the road to preserve the listed Mill buildings adjacent and to curtail the impact on Ashton House estate to the north of the canal. An at-grade turning head and drop-off will be provided each side of the railway.

The length of the option is approximately 180 m on the northern side and 300 m south of the rail line. The option would rise to an approximate deck level of 52.9 m OD, 7.3 m above the rail the rail which is a at a level of 45.6 m OD at the bridging point. On both sides of the railway a separate pedestrian and cycle link is proposed to provide enhanced access for non-motorised users. These shared spaces would have a width of 3.0 m. Due to the alignment of Mill Lane North of the canal, falling away from the train station, it will be necessary to provide elevated ramps from the train station to the overbridge for these accesses.

It is feasible to cross at this location, as it is upstream of the double lock on the canal and the canal is at the same approximate level as the adjacent railway. This option would require some property acquisition and modifications to existing accesses. It will extend further north to the River Road and will extend into the lands of Ashton House.



Figure 3-37 Ashtown Option 3 – Overbridge on Mill Lane (Copyright Ordnance Survey Ireland – 0039720)

Option 4 – Link from River Road to Navan Parkway Station grade separate junction with pedestrian / cycle crossing in Ashtown

This option is a combined route including Option 4 and 4a. The Option 4 route is located approximately 1 km to the west of the existing level crossing at Ashtown at the grade separated junction on the Navan Road serving Phoenix Park Railway Station. At this location there is scope to construct a new road link over the canal and railway to link to River Road. This could either descend to tie into River Road or be designed to pass over it to cross the Tolka River and connect onwards to the Dunsink lands. In the latter case, a short spur would be provided to link to River Road, in both cases this would involve significant diversions and land acquisition. The option can accommodate a cross section of a 6.5 m carriageway with 2 m footpaths and 1.75 m cycle tracks on both sides.

The road would be at a similar level to the existing Phoenix Park junction crossing the rail at a level of approximately 55.4 m OD before descending to tie to the level of the River Road at a level of 34.7 m OD. The road on the northern side would be at a gradient of approximately 6% over a length of approximately 300 m.

This option also includes the construction of a new underbridge (route 4a) under the railway and canal in Ashtown to provide pedestrian and cycle access. This option would drop to a level of approximately 40.1 m OD to tie in with the existing road to the north of the rail line providing a pedestrian and cycling link north and south of the rail line with a 6 m wide cross section in order to match the existing cross sections of the surrounding road network with a 3 m footway.

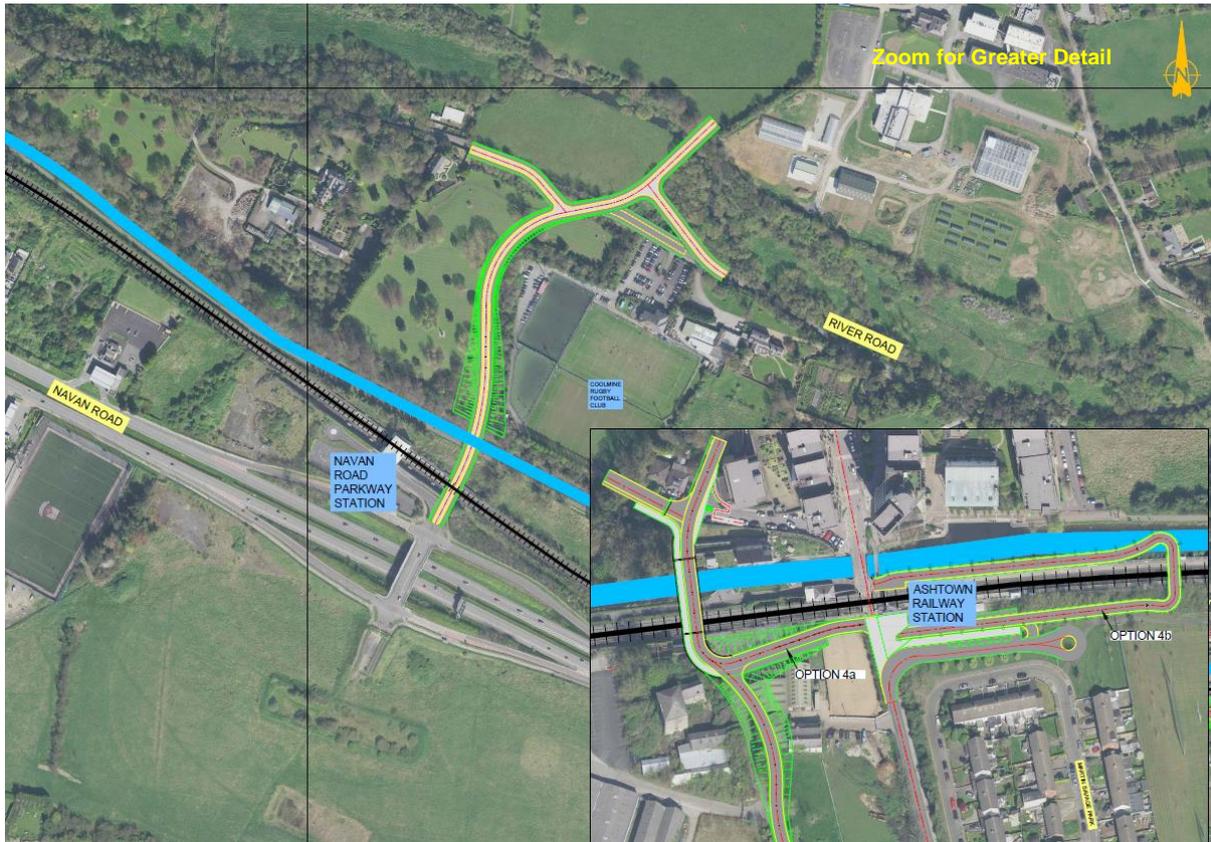


Figure 3-38 Ashtown Option 4 over Rail and Canal at Navan Parkway Station (Copyright Ordnance Survey Ireland – 0039720)

Option 5 – Underbridge east of existing crossing

This option would involve construction of a new road link parallel to the south of canal before turning northwards and under the rail and canal to connect with Rathborne Avenue to the north of the Canal. This route would descend from the Ashtown Road and run between Ashtown Railway Station and Martin Savage Park residential estate. The route would cross under the railway and canal at right angles before rising in a cutting to join into the existing circulatory roads to the north of the Pelletstown Development, impacting on the development lands. The option can accommodate a cross section of a 6 m carriageway with 1.8 m footpaths and 1.7 m cycle track on the western side of the carriageway and a 1.5 m footpath and 1.5 m cycle track on the eastern side of the carriageway.

The railway is at a level of 42.5 m OD and the canal at a level of 39.5 m with this option at a level of 32.0 m OD below providing 3.7 m clearance. Due to the required levels for tying into the existing road network the normal clearance envelope under the railway would have to be reduced.

This option would have the disadvantage that it would not have the necessary design clearance for double decker buses, other higher delivery vehicles and service vehicles that use this route at present. As the option would be in a cutting for most of its length this would be a disadvantage to cyclists, pedestrians and vulnerable road users. The underpass would also require a pumped drainage system.



Figure 3-39 Ashtown Option 5 – Underbridge east of existing crossing (Copyright Ordnance Survey Ireland – 0039720)

Option 6 – Overbridge 250 m east of existing crossing with connection to Ashtown

This option would cross the railway and canal approximately 250 m east of the existing level crossing. It incorporates a tightly curved plan layout which facilitates a link to the existing Ashtown road at the train station. The link would traverse the green area between Ashtown Station and Martin Savage Park and would climb to cross over the railway and canal to tie into the new circulation roads through the Ashtown / Pelletstown Development, impacting on active planning permission for residential development (DCC Planning Ref. 3666/15, ABP ref. PL29N.246373). The option can accommodate a cross section of an 8 m carriageway with 1.8 m footpaths on both sides and 2.5 m two-way cycle track on both sides.

The option would bridge over the railway and canal with approach gradients of 6% either side. The rail level at the crossing is approximately 42.1 m OD and the canal at 39.3 m OD with the bridge level over the railway at 50.00 m OD. The road level crests to a height of 52.0 m OD, 60 m south of the rail line before descending over the rail and canal. The option can be walled or can be constructed with open embankments to provide a softer texture to the scheme. The provision of landscaped embankments would result in a need for more land acquisition.

There would also be impacts on Martin Savage Park home to St Oliver Plunket's GAA club to the south and would be located within zoned housing development land within the Ashtown - Pelletstown SDZ to the north of the rail line and canal.

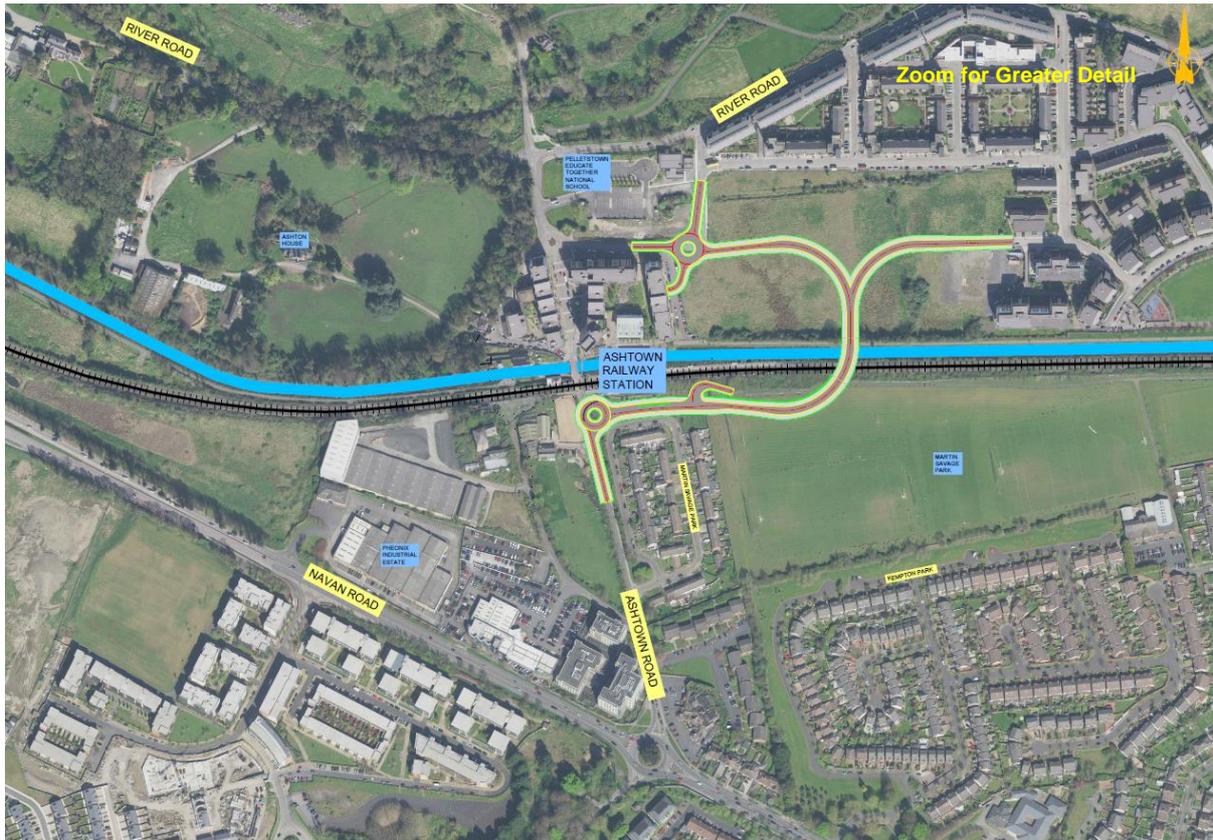


Figure 3-40 Ashtown Option 6 – Overbridge 250 m east of existing crossing (Copyright Ordnance Survey Ireland – 0039720)

Option 7 - Road overbridge 250 m east of existing crossing with new road link to Navan Road

This option would involve the construction of a new road in front of Kempton Gardens from the Navan Road and a new bridge over the canal and railway accommodating a cross section of a 6.5 m carriageway with 1.8 m footpaths and 2.5 m cycle tracks on both sides.

The option would bridge over the railway and canal with approach gradients of 6% either side. The rail level at the crossing is approximately 42.1 m OD and the canal at 39.3 m OD with the bridge level over the railway at 50.00 m OD. The road level crests to a height of 52.0 m OD, 60 m south of the rail line before descending over the rail and canal.

The route would then tie into the new circulation roads through the Pelletstown Development to the north of the canal. Separate 4 m wide shared space cycle and pedestrian facilities to be provided both north of south of the canal linking from Ashtown Road to the proposed option.

This option will have impacts on the residents of Kempton Gardens. Furthermore, it would require the construction of a significant new junction on the Navan Road. There would also be impacts on Martin Savage Park home to St Oliver Plunket's GAA club to the south and would be located within zoned housing development land within the Ashtown - Pelletstown SDZ to the north of the rail line and canal. The option can be walled or can be constructed with open embankments to provide a softer texture to the scheme. The provision of landscaped embankments would result in a need for more land acquisition.

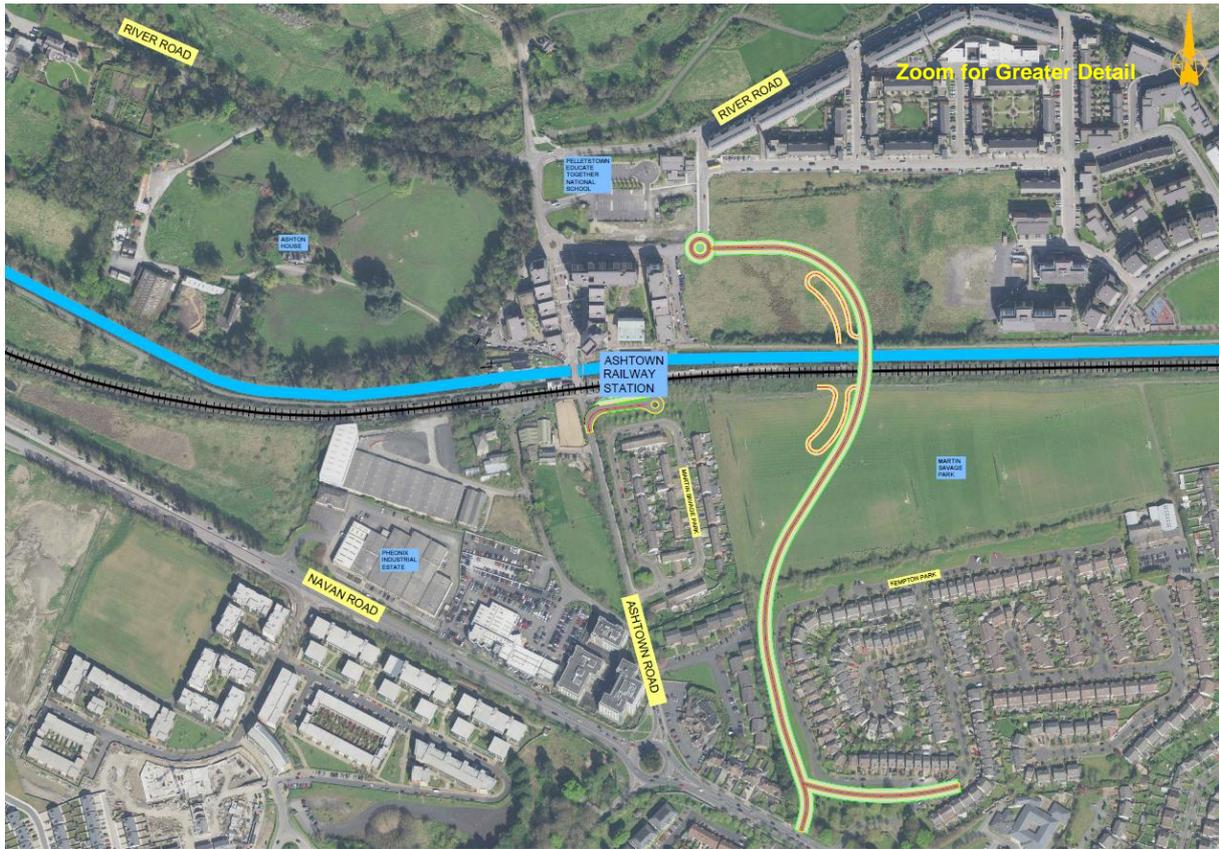


Figure 3-41 Ashtown option 7 – Overbridge with connection to the N3 Navan Road (Copyright Ordnance Survey Ireland – 0039720)

Option 8 – Provision of a pedestrian/cycle overbridge

This option includes the provision of a new Pedestrian and cycle footbridge with a 5 m wide cross section over the canal and railway. It includes the demolition of the existing cable stayed footbridge at the level crossing and the station footbridge to provide space for the proposed bridge.

The proposed bridge would cross the rail and Canal at a level of approximately 50.0 m OD where the rail is at a level of 43.0 m OD and the canal at a level of 39.7 m OD.

Separate pedestrian stairs could be provided with this option as well to ease pedestrian access and rails for pushing cycle on if required.

Constraints on bridge crossing here include the train station, the Royal Canal, the protected railway structures, and the canal bridge. Vehicular traffic will need to divert around the crossing, the diversion being an estimated 4.8 km to the west or 5.7 km to the east.



Figure 3-42 Ashtown Option 8 – Provision of a Pedestrian/Cycle Overbridge (Copyright Ordnance Survey Ireland – 0039720)

Option 9 – Lowering of the railway vertical alignment

This option would entail lowering the track alignment for approximately 1 km east and west of Ashtown Station with a track gradient of maximum 1%. This would result in a 7 m clearance for overhead cables at the location of the existing level crossing. A road bridge would be required at the location of the existing level crossing to facilitate traffic movements. The proposed road bridge would tie in with the existing protected canal bridge. The existing station, footbridge and building on the south western side of the crossing would need to be demolished to facilitate the works. The track lowering would extend to the Navan Road Parkway to the west. The station is in a deep retained cut. Option 9 would require reconstruction of the station platforms.

Ashtown Station would be reconstructed at ground level with pedestrian access to the platform at track level. The platform would be approximately 200 m in length on both sides of the railway line. A new footbridge would be required for passengers to access the northern platform. On the eastern approach the rail line is bounded by playing fields and residential properties to the south and the Royal Canal and Ashtown town centre to the north. To facilitate the lowering of the rail line, retaining walls would be required on the north and southern side of the rail line. The height of the retaining walls would range from 2 m to 7 m. On the western approach the rail line is bounded by an industrial area with warehouses, stables and fields to the south and the Royal Canal, fields and Ashtown town centre on the northern side. The track vertical realignment will extend to the Navan Road Parkway Station. Alterations to the Parkway Station could be avoided by reducing the depth of the cut for lowering the railway and increasing the soffit level of the new road bridge at the level crossing.

This option would have significant impact on the Royal Canal channel and all of the associated heritage structures along the realigned section of railway. This includes the masonry arched bridge, the locks and the lock keeper's cottage.

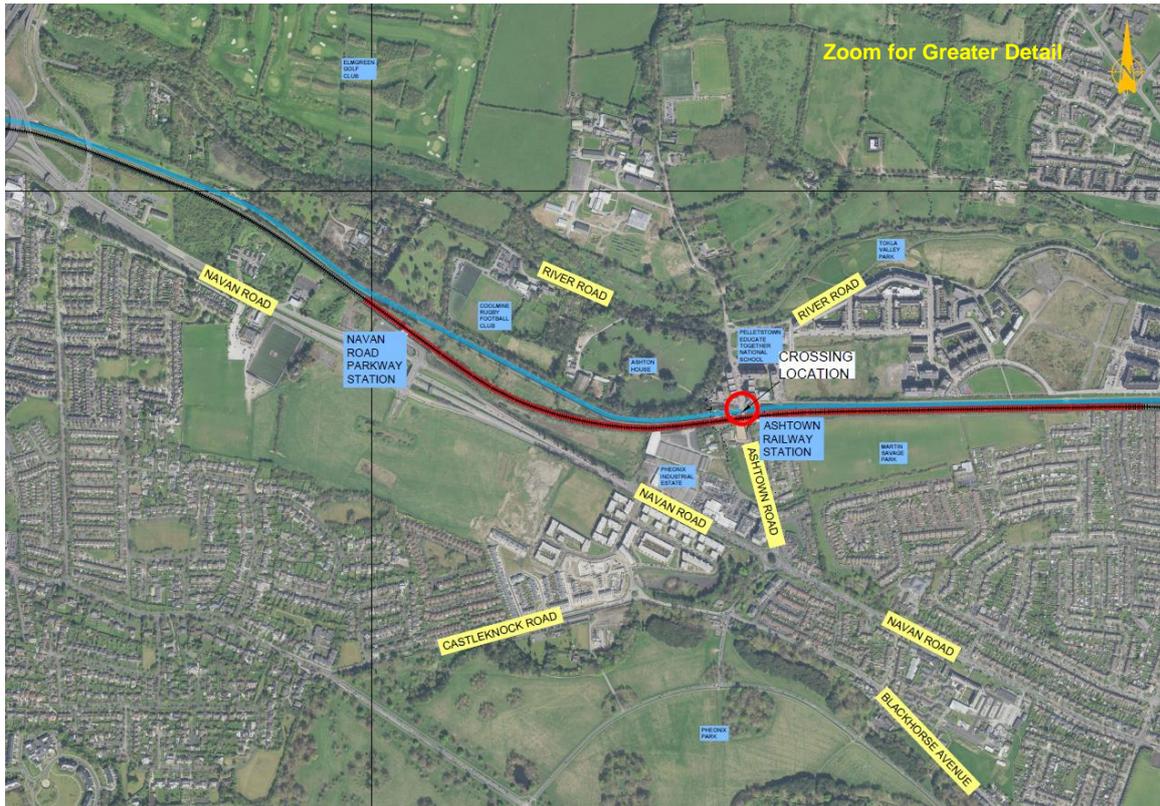


Figure 3-43 Ashtown Option 9 - Lowering of the Railway Vertical Alignment (Copyright Ordnance Survey Ireland – 0039720)

Options Assessment Stage 1

Table 3-11 provides a summary matrix of the comparative assessment undertaken as part of Stage 1 MCA.

Table 3-11 Stage 1 MCA Matrix

Criteria	Do Nothing	Do Minimum	Options									
			1	2	3	4+4a	4+4b	5	6	7	8	9
Economy	Some Disadvantage	Some Advantage										
Integration	Some Disadvantage	Some Advantage										
Environment	Some Disadvantage	Some Advantage										
Social inclusion	Some Disadvantage	Some Advantage										
Safety	Some Disadvantage	Some Advantage										
Physical Activity	Some Disadvantage	Some Advantage										
Shortlisted for Stage 2 MCA	No	No	No	Yes	Yes	No	Yes	No	Yes	No	No	No

Economy

The Do Nothing is rated Some Disadvantage as it results in the level crossing being unavailable to road users for substantial periods in the hour and requires significant ongoing operation and maintenance costs.

The Do Minimum option is rated Some Advantage as it is the least expensive option but does not meet the transportation needs of the project.

Options 4+4a, 4+4b, rated Significant Disadvantage because they involve the construction of substantial works at two locations, Option 5 is rated Significant Disadvantage because it passes under the existing train station and curtails the traffic which can use the underpass. Option 9 is rated Significant Disadvantage due to the expense of lowering the railway over a long distance.

Options 2 and 6 are rated Significant Advantage as they address the access need and are significantly less expensive than other bridge options.

Options 2, 7 and 8 rate Some Disadvantage due to the fact that although they meet the transport needs, they are more expensive than Options 2 and 6.

Integration

The Do Nothing and Do Minimum options are rated Significant disadvantage as they both reduce connectivity due to the reduced availability of access over the railway on implementation of the proposed working timetable on the railway.

Option 7 is rated Significant Disadvantage as it is more remote than other options, impacts on the GAA pitches south of the railway and on planned development north of the railway.

Option 8 is rated Significant Disadvantage on Integration as it severs the road linkage over the railway without providing replacement infrastructure for road vehicles.

Options 4+4a and 4+4b are rated Some Advantage as, although they impact on the rugby grounds west of Ashtown and the high amenity grounds there, they address local access issues in Ashtown.

Option 1 is rated Some Negative due to the negative impact this option has on the urban realm North of the canal and railway.

Environment

The Do Minimum and the Do Nothing Options have significant comparative advantage over other options under the Environment criteria as it is likely to have minimal impacts on the receiving environment.

Option 8 has some comparative advantage over other options as it supports sustainable mode of travel only at this location, thereby reducing vehicular traffic in the area. This option also has a reduced impact on visual receptors, requires minimal non-agricultural land take and earthworks when compared to other options.

Options 1, 4 & 4a and 4 & 4b have some comparative disadvantage over other options due to directed impacts on protected cultural heritage sites such as the demesne landscapes associated with Ashbrook and Ashtown Lodge (Options 4 a & b) and Longford Bridge (Option 1). However, these options have the potential to result in reduced impacts on sensitive noise and air receptors. Option 5 also has some comparative disadvantage to other options as it has greater potential for resulting in impacts on sensitive visual, air and noise receptors. Additionally, Option 5 has potential for disturbance to Light-bellied Brent Goose (Qualifying Interest for SPAs).

Options 2, 3, 6, and 7 have significant disadvantages over other options as they will move traffic to a new location and will have an impact on the greatest number of sensitive air, noise, and visual receptors. These options also have potential for impacts to Royal Canal pNHA arising from noise, artificial lighting and impacts to water quality during construction. Option 9 also has significant disadvantage over other options due to its construction related impacts on sensitive noise and air receptors, and the potential impact to water quality of the Royal Canal pNHA. Works within the Royal Canal have the potential to impact fish and crayfish which will have to be taken from the canal prior to works. Demolition works could also disturb and displace fauna.

Accessibility and Social Inclusion

The Do Nothing and Do Minimum options are rated Significant Disadvantage due to the curtailment of access over the railway and canal associated with them. Community facilities affected by constrained or severed access over the canal and railway include Shopping facilities, Giraffe Childcare, Pelletstown Educate Together National School - North of the railway and Halfway House, Ashtown Post Office, St Dominic's College, Meaghers Pharmacy, Daughters of Charity - south of the railway.

Option 1 scores Some Disadvantage due to the access constraints placed on non-motorised users by this option. It is not practicable to facilitate pedestrian and cycle access online as part of this scheme due to the narrow corridor available between the multistorey buildings on each side of Ashtown Road.

Options 2, 3, 5 and 9 rate Significant Advantage as these options best accommodate access for non-motorised users over the canal and railway in close proximity to the existing level crossing.

All other options rate Some Advantage as they accommodate non-motorised access but with longer diversion than options 2, 5 and 9.

Safety

The Do Nothing and Option 5 are rated Significant Disadvantage in respect of safety as the former does not remove the level crossing from the railway and the latter introduces a low clearance bridge to the railway network which represents a hazard to road and rail traffic. In addition, due to the curtailment of access over the railway associated with these options and the absence of proposed infrastructure to replace road access, traffic is diverted onto the local road network without enhancements to accommodate it.

Options 2, 3, 4+4a and 4+4b are each rated Significant Advantage as they provide high quality replacement local while securing removal of the level crossing from the railway network. Options 6 and 7 rate. Some Advantage as they secure comprehensive, safe access similar to Options 2,3 and 4 but along longer diverted routes.

Option 8 is rated Some Disadvantage as the provision of local non-motorised access over the railway at the level crossing by bridge without replacement infrastructure for road traffic results in vehicular traffic being diverted onto the local road network without associated enhancements to accommodate the additional traffic.

Option 9 is rated Some Disadvantage as it includes significant and prolonged impact on the live railway during construction.

Physical Activity

The Do Nothing is rated Significant Disadvantage due to the curtailed availability of high-quality access over the railway associated with it to local social amenities. The principal high amenity greenspaces in the vicinity of the existing train station include the Royal Canal, Oliver Plunkett Gaelic football grounds south of the railway; Phoenix Park, south of the railway and the amenity zoned lands northwest of the level crossing. Increased closures of the level crossing would reduce access to each of them.

The Do Minimum and Option 1 are rated Significant Disadvantage due to the severely curtailed availability of high-quality access over the railway associated with them local social facilities and amenities.

Options 2, 3, 4, 5 and 8 are rated Significant Advantage as they provide for equivalent or enhanced access local social facilities and amenities.

Options 6 and 7 are rated Some Advantage as they provide access to local social facilities and amenities by slightly longer routes than other bridge options.

Options Assessment Stage 2

Following on from the Stage 1 Option Assessment/Multi-Criteria Analysis section above, the options that have progressed to MCA Stage 2 are highlighted in Table 3-12. The Stage 2 option selection will provide a more detailed comparison between the highlighted options to establish the preferred option.

Table 3-12 Ashtown level crossing MCA2 progressed options

Option	Description
Option 2	Closure of the level crossing and Underbridge on Mill Lane
Option 3	Closure of the level crossing and Overbridge on Mill Lane
Option 4 & 4b	Closure of the level crossing and link from River Road to Navan Parkway Station grade separated junction and the construction of an overbridge structure at existing Ashtown level crossing for pedestrian and cycle access.
Option 6	Closure of the level crossing and road overbridge 250 m east of existing crossing connection to Ashtown.

Table 3-13 provides a summary matrix of the comparative assessment undertaken at Stage 2 to identify the preferred option. Excerpts of the matrix are provided under each of the criteria below with an assessment of why the preferred option has been selected.

Table 3-13 Stage 2 MCA Matrix - Ashtown

Criteria	Option 2	Option 3	Option 4 +4b	Option 6
Economy				
Integration				
Environment				
Accessibility and Social Inclusion				
Safety				
Physical Activity				
Preferred Option	Yes	No	No	No

As can be seen from the above Option 2 – The underpass offline to the west of the existing level crossing has been identified as the preferred option over Options 3, 6 and 4+4b.

Economy

The total Capital cost of the schemes are of similar orders with Option 4+4b slightly cheaper than the other options. The ongoing inspection and maintenance cost associated with Options 3 and Option 4+4b is higher than that of other options due to the inclusion of multiple structures in the options. Options 2, 3 and 6 perform better from the perspective of traffic functionality as they provide crossings in closest proximity to the existing level crossing. The other options include longer diversions.

On balance Options 2 and 6 are rated Some Advantage over the other options on Economy.

Integration

Option 2 is rated as Some Advantage over other options primarily due to the underground nature of the option and fewer direct impacts to transport and land use zoning. Option 2 offers improvements between modes, subject to satisfactory access to train station platforms and a reduction in journey times. The route is largely on the desire line of transport customers and includes pedestrian and cycle tracks. Option 2 will also impact less high amenity zoned land than Option 4+4b and Option 6. All options would reduce journey times due to the removal of the delay associated with the level crossing. Option 2 also has advantages as it would not have

the same issues regarding transport integration, severance and impacts on bus services as is evident for Option 4+4b.

Option 3 is rated Some Advantage over other options as the route is largely on the desire line of transport customers and includes pedestrian and cycle tracks. Option 2 will also impact less high amenity zoned land than Option 4+4b and Option 6. Option 3 also has advantages as it would not have the same issues regarding transport integration, severance and impacts on bus services as is evident for Option 4+4b.

Option 4+4b is rated Some Disadvantage principally due to the fact that it involves construction at 2 locations, much of the work in lands zoned 'high amenity'.

Option 6 is rated some disadvantage over other options due to potential severance to existing connectivity on the northern side of the canal and railway due to the requirement to construct the approach ramps. It is also a slightly more circuitous route for pedestrians & cyclists than other options. Furthermore Option 6 has a significant disadvantage over other options due to the direct impacts to existing and future residential zoned lands and amenity lands. Option 6 conflicts with permitted residential development (DCC Ref. 3666/15, ABP ref. PL29N.246373).

Environment

Option 4+4b is rated as having Significant Advantage over other options as it is in a primarily undeveloped non-agricultural lands (property curtilage) resulting in advantages over other options due to the less impacts from air, noise and direct impacts to landowners and sensitive receptors. It would have a minor direct impact on agricultural property. However, this online option located in mainly an open countryside landscape results in very significant landscape and visual impacts. In addition to Options 2 and 3, this option is hydrologically connected to European sites downstream in the Tolka Estuary and Dublin Bay. There is no risk of Likely Significant Effects to this or any other European site. There is potential for impacts to Royal Canal pNHA arising from noise, artificial lighting and impacts to water quality during construction. Loss of some woodland, marsh, treeline and hedgerow habitat is anticipated.

Option 2 is rated Significant Disadvantage due to the aggregated assessments under each sub-criterion. However, this is primarily due to the underground nature of the option which brings with it increased geological, hydrogeological, hydrological, ecological impacts when compared with the other options – these are not considered to be significant risks to the environment and can be managed during construction.

Options 2 will impact have a profound impact on Ashtown Stables and equine holding. Option 2 will also have significant impacts on Ashtown landscape character and structure, trees and woodlands of lands between Ashtown Lodge (and its associated lodge). Due to the overbridge Option 4b will have more and significant impacts than other options due to impacts to High Amenity areas, identified as a Nature Development Area in the Fingal Development Plan. Tree and Woodland preservation objectives and RPSs (similar to Option 2).

Option 2 and Option 3 will have direct impacts on gate lodge, entrance and demesne associated with Ashton House (RPS 690). Indirect impacts on mill and outbuildings (RPS 691) and Pelletstown House (structure of architectural merit). Potential indirect impacts on Royal Canal (RPS No. 944a) and the Royal Canal 10th Lock (RPS No. 944b). Potential to encounter archaeological deposits that may survive in undeveloped areas and path of former roadway. Option 3 impacts are more extensive as they will extend across a larger of the zoned High Amenity area and will be more visually intrusive on the landscape due the overbridge nature of the option.

Option 2 underbridge and therefore would be less intrusive on the landscape and visual environment than the other options.

Under the biodiversity sub-criterion all options will impact ecological resources due to noise, artificial lighting and impacts to water quality during construction phase, particularly at the Royal Canal pNHA and in zoned high amenity areas.

Option 6 is rated Significant Disadvantage due to the direct impacts to Martin Savage Park which is a known foraging habitat for Light-Bellied Brent Geese, a Qualifying Interest of SPAs in the area. Impacts to this area would likely result in the project screening in for Appropriate Assessment which would have significant planning and environmental risks associated with this option.

Accessibility and Social Inclusion

Option 4+4b is rated Some Disadvantage due to the road diversion associated with relocating access for vehicular traffic west of Ashtown. Community facilities affected by constrained access over the canal and railway include Shopping facilities, Giraffe Childcare, Pelletstown Educate Together National School - North of the railway and Halfway House, Ashtown Post Office, St Dominic’s College, Meaghers Pharmacy, Daughters of Charity - south of the railway.

Option 6 is rated Some Disadvantage as the route for non-motorised road users incorporates a longer diversion than for Options 2 and 3.

Option 2 is rated Some Advantage as it is located more centrally than other options and better secures access to community facilities for existing residents.

Safety

All options secure closure of the level crossing. Options 3 and 6 are rated some disadvantage over other options as the detours for non-motorised users are slightly longer for those options than for others.

Physical Activity

All options are considered to perform equally in respect of Physical Activity.

3.6.4.4.2 Revised Ashtown Preferred Option

During consultation significant public feedback was received in relation to the preferred option being presented for Ashtown Level Crossing. As committed to by the project team, all feedback was analysed and a re-assessment of the option selection process was undertaken. This re-assessment exercise has introduced additional and modified options for Ashtown and has identified a revised preferred option for Ashtown. The sections below detail the introduction of additional and modified options and the re-evaluation of the MCA. For more details on the public consultation feedback, refer to Appendix A3.2 Public Consultation No. 2 Consultation Findings Report in Volume 4 of this EIAR.

The amendments to options consequent on the review are summarised in Table 3-14 below with details of additional options developed:

Table 3-14 Summary Table of Alterations to Options and Additional Options

PC2 Option	Changes Proposed for Consideration MCA
Opt 1 Overbridge on Ashtown Road	Opt 1 – No Change
Opt 2 Underbridge on Mill Lane	Opt 2 – Narrowed, walled, mini roundabout added to south, separate ped-cycle bridge added at reconfigured station, Set down area reconfigured
Opt 3 Overbridge on Mill Lane	Opt 3 – Narrowed, walled, mini roundabout added to south, separate ped-cycle bridge added at reconfigured station
Opt 4&4a Navan Parkway Station Link Road, Pedestrian Cycle Underbridge at Ashtown	Opt 4+4a – No change
Opt 4&4b Navan Parkway Station Link Road, Pedestrian Cycle Overbridge at Ashtown	Opt 4+4b – separate ped-cycle bridge at reconfigured station included in place of proposed pedestrian cycle bridge, Set down area reconfigured

PC2 Option	Changes Proposed for Consideration MCA
Opt 5 Low clearance underbridge east of existing crossing.	Opt 5 – No change
Opt 6 Overbridge east	Opt 6 – No change
Opt 7 Overbridge east with R147 Link	Opt 7 – No change
Opt 8 Pedestrian / Cycle Bridge only	Opt 8 – Replace with reconfigured Station and pedestrian cycle bridge only
Opt 9 Lower the Railway	Opt 9 – No change
	Opt 10 – New Option – Underbridge, West of Mill, Cycleway on Roadway, separate ped-cycle bridge added at reconfigured station;
	Opt 11 – New Option - Pedestrian Cycle Bridge at Reconfigured Station, Upgrades to Local Road Network
	Opt 12 – New Option - Road Link from Navan Parkway Interchange with bridge over the railway crossing through Ashton HSE Lands, separate ped-cycle bridge added at reconfigured station
	Opt 13 - New Option – Over, West of Mill, Cycleway on Roadway, separate ped-cycle bridge added at reconfigured station

Figure 3-44 below provides a graphic illustration of all options identified for assessment as part of the review of feedback received during public consultation no.2.

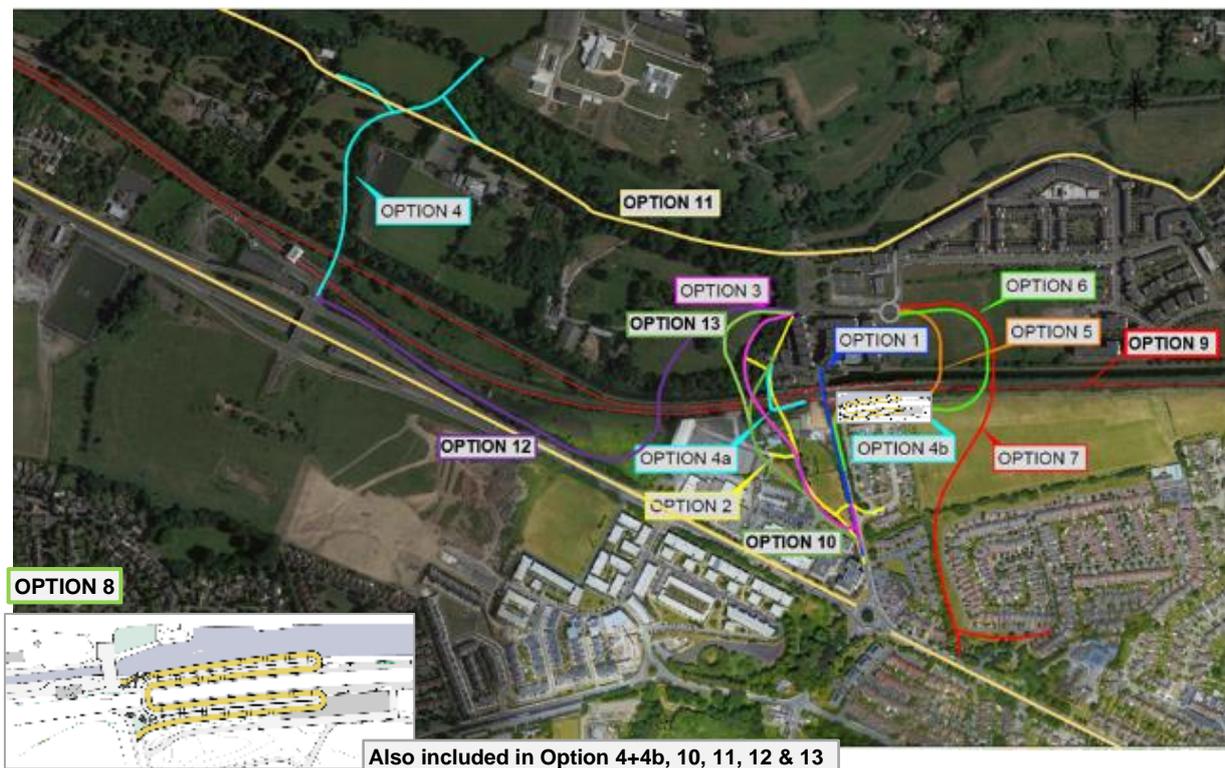


Figure 3-44 Revised Ashtown PC2 Review Options

Option 1 Online Overbridge

This option would close the level crossing with replacement road access. As an online scheme it would require a new bridge to be constructed over the canal and railway. This would lift the existing carriageway by at least 7.0 m above the railway line, accommodating a cross section of a 6.5 m roadway with 1.0 m rubbing strips on both sides. Pedestrian and cycle access cannot be readily accommodated on the main line alignment due to the constrained width available between buildings along the multistorey streetscape north of the level crossing.

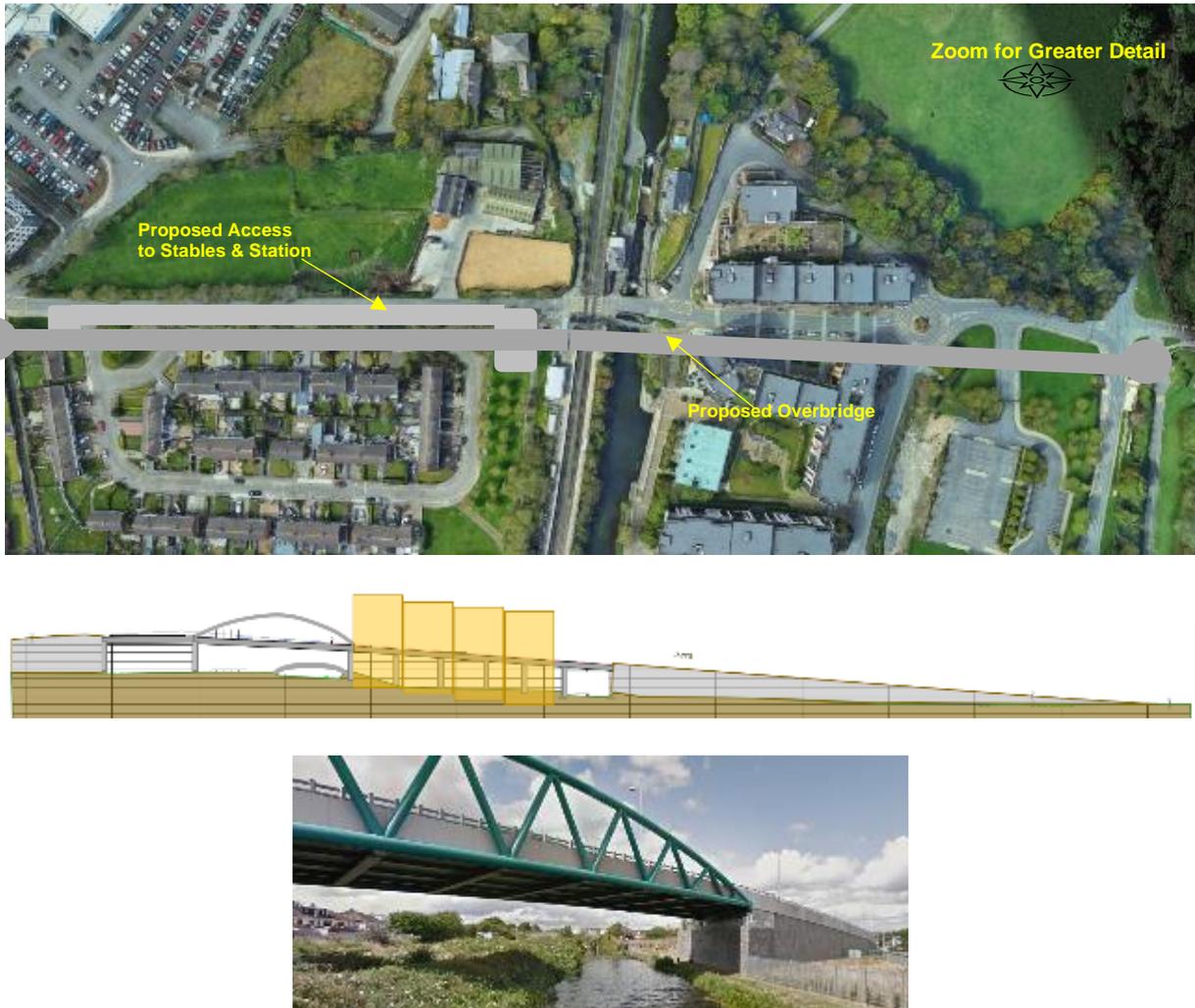


Figure 3-45 Ashtown Option 1 – Online Overbridge (Copyright Ordnance Survey Ireland – 0039720)

The topography is such that the northern approach (where the ground falls away towards the Tolka River) would be steep with gradients of up to 8% and would require significant modifications to the recent development of the area, both above and below ground.

The length of the approach on the northern side would be approximately 180 m and 140 m on the southern side at a gradient of 5%. The bridge over the rail line would be at a level of 51.9 m ODMH with a deck level 7.0 m above the rail level. This option would pass over and along the streetscape immediately north of the level crossing and would front a range of business and residential properties. To facilitate access to Ashtown Stables and the train station will be necessary to construct a road, at grade, adjacent to the proposed walled embankment approach to the bridge crossing.

Option 2 (Revised) – Underbridge on Mill Lane

Option 2 was presented as the preferred option as part of public consultation no.2. A plan layout of the option presented is shown in Figure 3-46.

This option involved re-routing Ashtown Road along its old alignment (pre-Royal Canal) on Mill Lane and passing under both the railway and the Royal Canal. It accommodated a cross section of a 6.5 m carriageway with 1.8 m footpaths on both sides and 2.5 m two-way cycle track on the eastern side of the road. It proposed to curtail the footpath along the west of the alignment fronting the listed Ashton House curtilage to a 0.5 m rubbing strip and provided a pedestrian crossing at this location to minimise the impact on the heritage property. An at-grade turning head and drop-off were proposed to be provided each side of the railway.

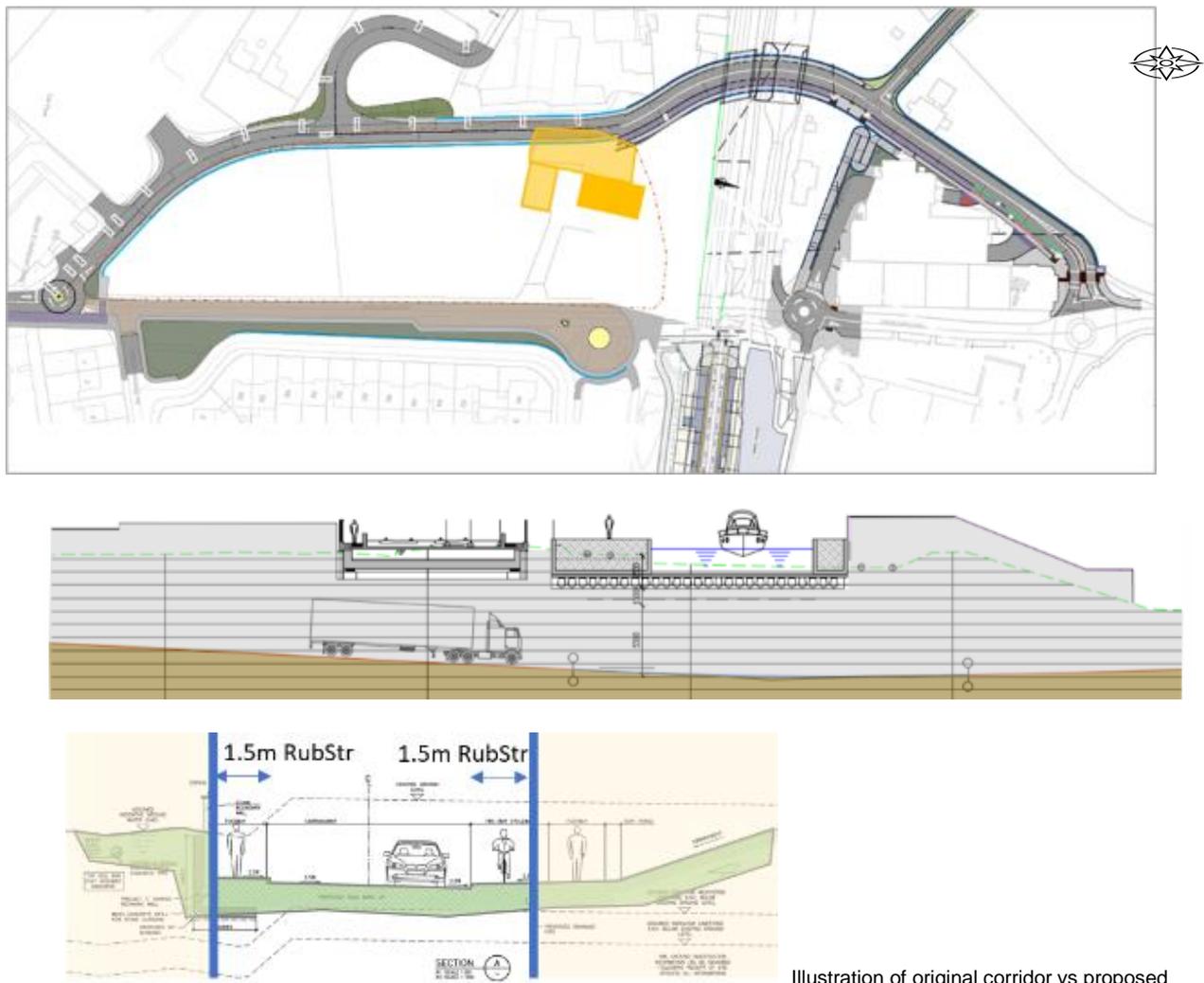


Illustration of original corridor vs proposed

Figure 3-46 Ashtown Option 2 Under Rail and Canal (Copyright Ordnance Survey Ireland – 0039720)

The length of the option was approximately 150 m on the northern side and 300 m south of the rail line. The option dropped to an approximate level of 37.5 m ODMH under the railway which is at a level of 45.6 m ODMH at the bridging point. On both sides of the railway a separate pedestrian and cycle link was proposed to provide enhanced access for non-motorised users. These shared spaces would have a width of 3.0 m.

The option was further examined in seeking to address concerns raised as part of PC2 and the following refinements are proposed as part of the revised Option 2 as follows:

- The design standard of the road will be reduced incorporating departures from standard to better skirt the Stables lands, while retaining a 6.5 m wide carriageway.
- The pedestrian and cycle access through the underpass will be removed. Instead, only emergency escape provisions will be made in the form of a 1.5 m wide rubbing strip on each side of the road.
- The proposed ramped access through the lands of Ashtown Stables will be removed.
- Rather than provide battered slopes on the approach to the railway and canal, it is proposed to incorporate walls on the approaches to the canal and railway which are below existing ground level.
- Pedestrian, cycle, mobility impaired and disabled access across the canal and railway will be provided for over a proposed steel bridge on the footprint of the reconfigured train station
- Urban landscaping and set down provisions south of the railway will be reconfigured to curtail the impact on Ashtown Stables.

This revised Option No.2 leaves much of the site of the Ashtown Stables intact, resulting in the principal stable building and Pelletstown House being retained. The third building on the site would however need to be

demolished and portions of land acquisition along the western and southern boundaries cannot be avoided as part of this option.

The revised option is illustrated in Figure 3-47 below. It also includes a long section characterising the proposed canal and railway underbridges. A section has been provided to illustrate the original proposed cross section in comparison to the proposed narrower cross section.

Option 3- Overbridge on Mill Lane

This option entails re-routing Ashtown Road along its old alignment (pre-Royal Canal) on Mill Lane and passing over both the railway and the Royal Canal. The option at the outset of PC2 accommodated a cross section of a 6.5 m carriageway with 1.8 m footpaths and 2.5 m cycleway on both sides of the road.

The bridge was highly skewed to the canal and railway and was approximately 70 m long. It incorporated walls along the western boundary of the road to preserve the listed Mill buildings adjacent and to curtail the impact on Ashton House estate to the north of the canal. An at-grade turning head and drop-off was proposed each side of the railway.

The length of the option was approximately 180 m on the northern side and 300 m south of the rail line. The option would rise to an approximate deck level of 52.9 m ODMH, 7.3 m above the rail the rail which is at a level of 45.6 m ODMH at the bridging point.

On both sides of the railway a separate pedestrian and cycle link was envisaged to provide enhanced access for non-motorised users. These shared spaces would have a width of 3.0 m. Due to the alignment of Mill Lane North of the canal, falling away from the train station, it would be necessary to provide elevated ramps from the train station to the overbridge for these accesses.





Figure 3-47 Ashtown Option 3 – Overbridge on Mill Lane (Copyright Ordnance Survey Ireland – 0039720)

It is feasible to cross at this location, as it is upstream of the double lock on the canal and the canal is at the same approximate level as the adjacent railway. This option would require some property acquisition and modifications to existing accesses. It extends further north than Option 2 to the junction at the end of Mill Lane and extends into the lands of Ashton House rather than skirting the curtilage.

The option was further examined in seeking to address concerns raised as part of public consultation no.2 and the following refinements are proposed as part of the revised Option 3 as follows:

- The pedestrian and cycle access across the proposed overbridge will be removed. Instead, only emergency escape provisions will be made in the form of a 1.5 m wide rubbing strip on each side of the road.
- The proposed ramped access along the northern boundary of Ashtown Stables will be removed.
- Rather than provide battered slopes on the approach to the railway and canal, it is proposed to incorporate walls on the approaches to the canal and railway which are below existing ground level.
- It is proposed to introduce a bridge over the access drive to Ashton House.
- Pedestrian, cycle, mobility impaired and disabled access across the canal and railway will be provided for over a proposed steel bridge on the footprint of the reconfigured train station
- Urban landscaping and set down provisions south of the railway will be reconfigured to curtail the impact on Ashtown Stables.

Figure 3-47 provides an updated plan layout for the proposed option. It also shows a partial longitudinal section illustrating the construction height and the steep gradient (8.0%) of the proposed alignment north of the railway to tie into the existing roundabout at the northern end of Mill Lane. A photograph of the nearby Reilly's Overbridge is included to illustrate the character of the proposed infrastructure.

Option 4 (4+4a, 4+4b)- Link from River Road to Navan Parkway Station Grade Separate Junction with Pedestrian/ Cycle Crossing in Ashtown

This option is a combined route including Option 4 with either 4a or 4b. The Option 4 route is located approximately 1 km to the west of the existing level crossing at Ashtown at the grade separated junction on the Navan Road serving Phoenix Park Railway Station. At this location there is scope to construct a new road link over the canal and railway to link to River Road. This could either descend to tie into River Road or be designed to pass over it to cross the Tolka River and connect onwards to the Dunsink lands. In the latter case, a short spur would be provided to link to River Road, in both cases this would involve significant diversions and land acquisition. The option can accommodate a cross section of a 6.5 m carriageway with 2 m footpaths and 1.75 m cycle tracks on both sides.

The road would be at a similar level to the existing Phoenix Park junction crossing the rail at a level of approximately 55.4 m ODMH before descending to tie to the level of the River Road at a level of 34.7 m ODMH. The road on the northern side would be at a gradient of approximately 6% over a length of approximately 300 m. This option also includes the construction of a new pedestrian and cycle bridge (route 4a) under the railway and canal in Ashtown or a bridge over the railway (route 4b) on the footprint of the reconfigured station.

The proposed underbridge (route 4a) would drop to a level of approximately 40.1 m ODMH to tie in with the existing road to the north of the rail line providing a pedestrian and cycling link north and south of the rail line with a 6 m wide cross section in order to match the existing cross sections of the surrounding road network with a 3 m footway. The proposed overbridge (route 4b) rises to a level of approximately 51.3 m ODMH over the railway.

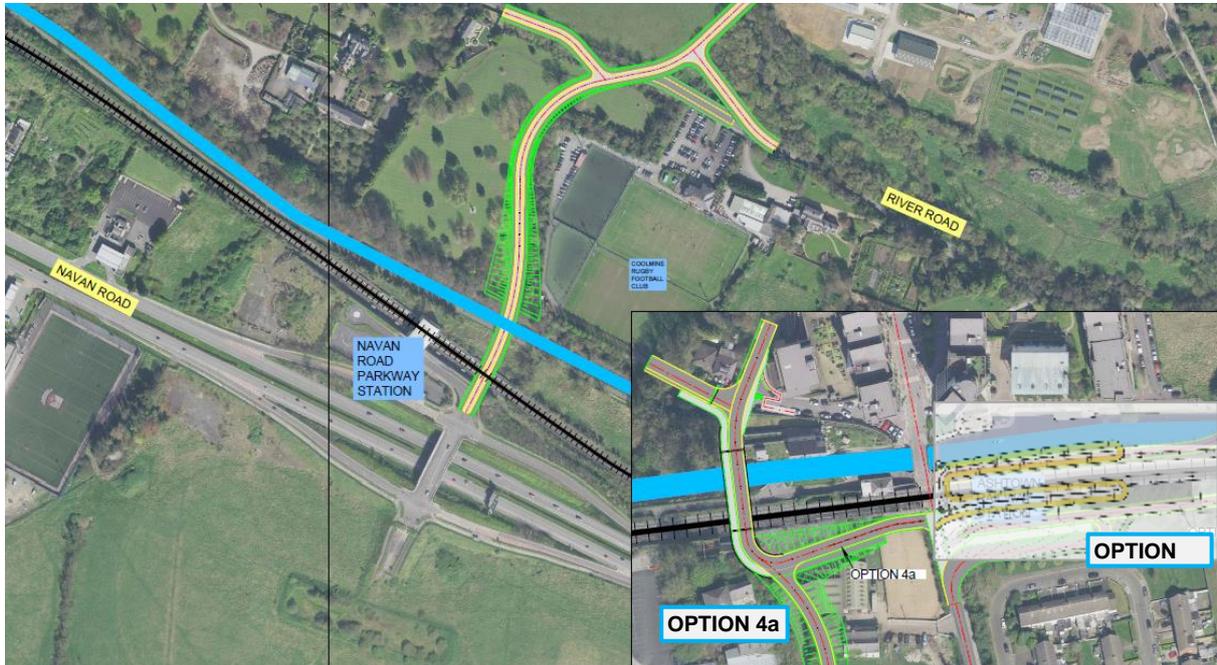


Figure 3-48 Ashtown Option 4 over Rail and Canal at Navan Parkway Station

Option 5- Underbridge East of Existing Crossing

This option would involve construction of a new road link parallel to the south of canal before turning northwards and under the rail and canal to connect with Rathborne Avenue to the north of the Canal. This route would descend from the Ashtown Road and run between Ashtown Railway Station and Martin Savage Park residential estate. The route would cross under the railway and canal at right angles before rising in a cutting to join into the existing circulatory roads to the north of the Pelletstown Development, impacting on the development lands. The option can accommodate a cross section of a 6 m carriageway with 1.8 m footpaths and 1.7 m cycle track on the western side of the carriageway and a 1.5 m footpath and 1.5 m cycle track on the eastern side of the carriageway.

The railway is at a level of 42.5 m ODMH and the canal at a level of 39.5 m with this option at a level of 32.0 m ODMH below providing 3.7 m clearance. Due to the required levels for tying into the existing road network the normal clearance envelope under the railway would have to be reduced.

This option would have the disadvantage that it would not have the necessary design clearance for double decker buses, other higher delivery vehicles and service vehicles that use this route at present. As the option would be in a cutting for most of its length this would be a disadvantage to cyclists, pedestrians and vulnerable road users. The underpass would also require a pumped drainage system. It is not proposed to alter this option as part of the Ashtown review.

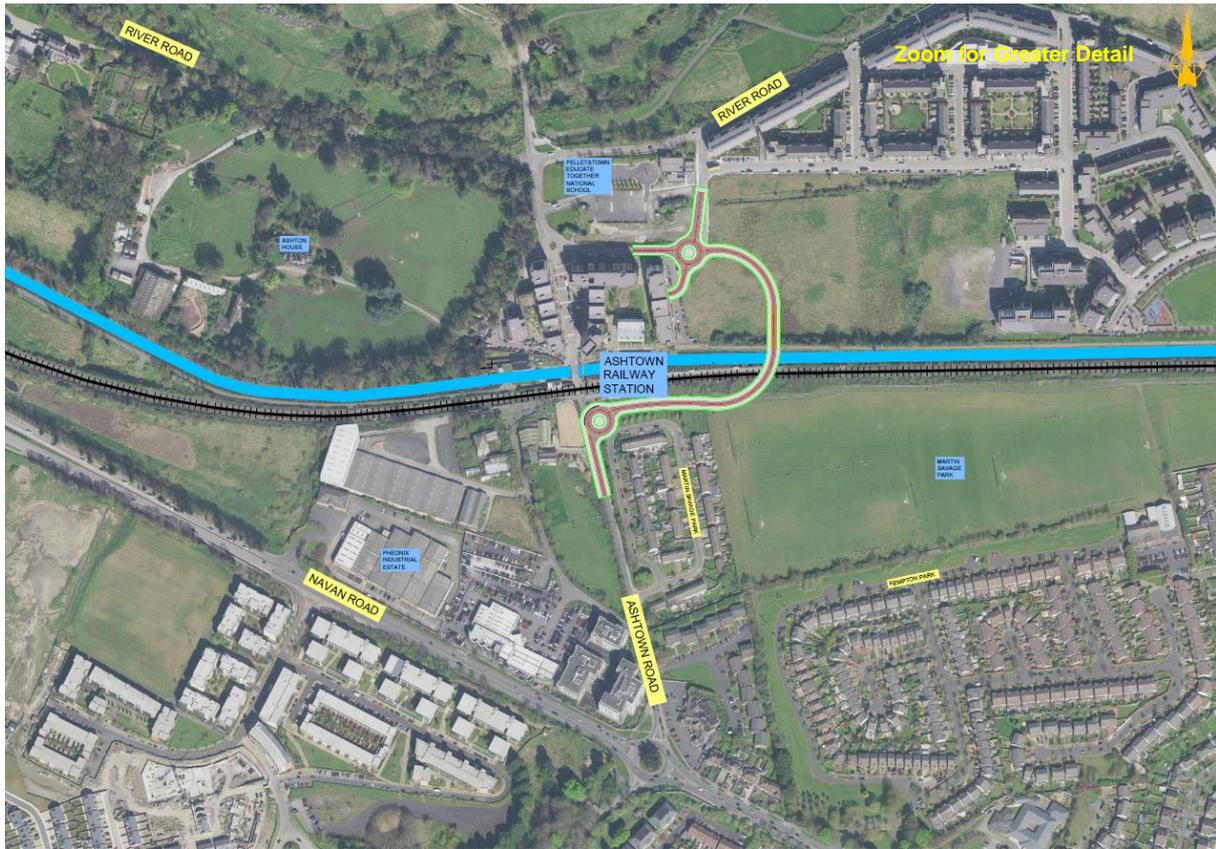


Figure 3-49 Ashtown Option 5 – Underbridge East of Existing Crossing (Copyright Ordnance Survey Ireland – 0039720)

Option 6 – Overbridge 250m East of Existing Crossing with Connection to Ashtown

This option would cross the railway and canal approximately 250 m east of the existing level crossing. It incorporates a tightly curved plan layout which facilitates a link to the existing Ashtown road at the train station. The link would traverse the green area between Ashtown Station and Martin Savage Park and would climb to cross over the railway and canal to tie into the new circulation roads through the Ashtown / Pelletstown Development, impacting on active planning permission for residential development (DCC Planning Ref. 3666/15, ABP ref. PL29N.246373). The option can accommodate a cross section of an 8 m carriageway with 1.8 m footpaths on both sides and 2.5 m two-way cycle track on both sides.

The option would bridge over the railway and canal with approach gradients of 6% either side. The rail level at the crossing is approximately 42.1 m ODMH and the canal at 39.3 m ODMH with the bridge level over the railway at 50.00 m ODMH. The road level crests to a height of 52.0 m ODMH, 60 m south of the rail line before descending over the rail and canal. The option can be walled or can be constructed with open embankments to provide a softer texture to the scheme. The provision of landscaped embankments would result in a need for more land acquisition.

There would also be impacts on Martin Savage Park home to St Oliver Plunket's GAA club to the south and would be located within zoned housing development land within the Ashtown - Pelletstown SDZ to the north of the rail line and canal. It is not proposed to alter this option as part of the Ashtown review.

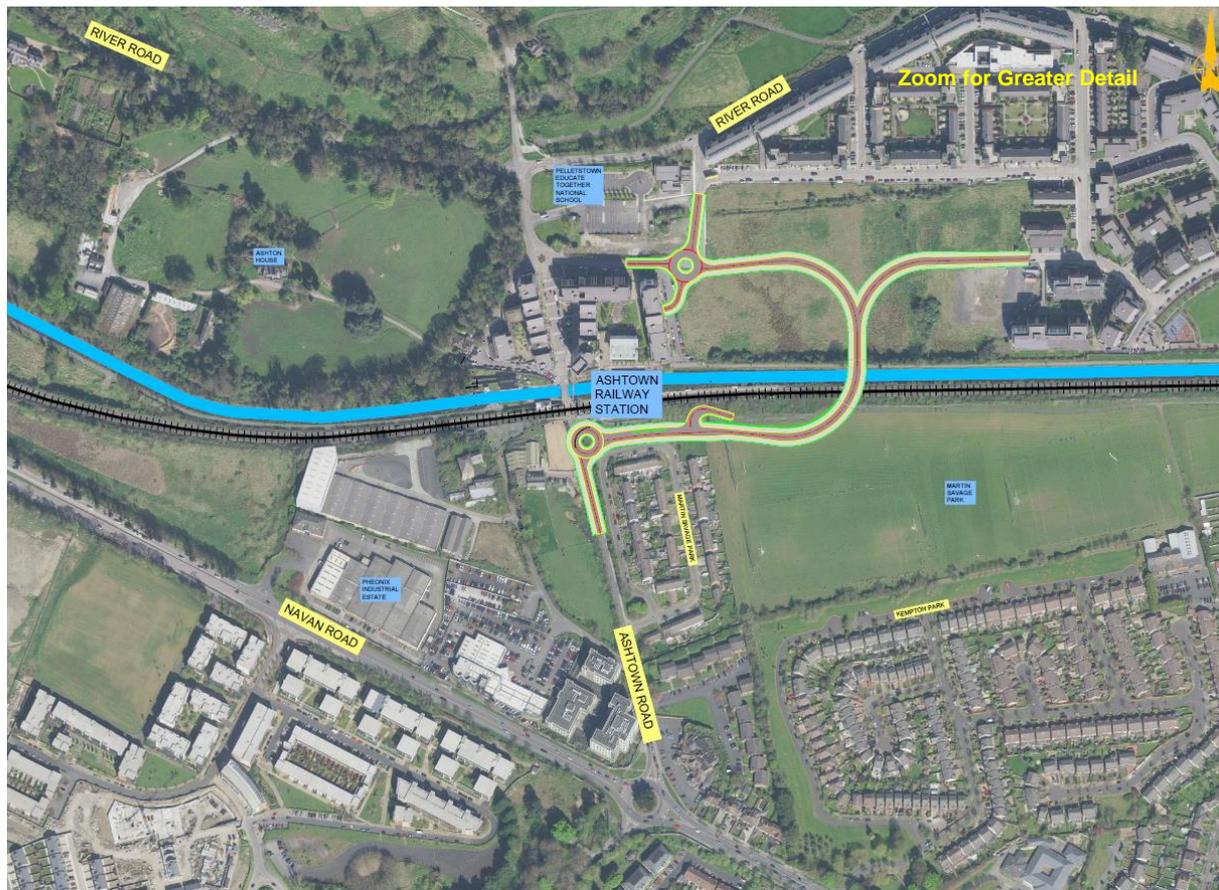


Figure 3-50 Ashtown Option 6 – Overbridge 250 m East of Existing Crossing (Copyright Ordnance Survey Ireland – 0039720)

Option 7- Road Overbridge 250m East of Existing Crossing with New Road Link to Navan Road

This option would involve the construction of a new road in front of Kempton Gardens from the Navan Road and a new bridge over the canal and railway accommodating a cross section of a 6.5 m carriageway with 1.8 m footpaths and 2.5 m cycle tracks on both sides.

The option would bridge over the railway and canal with approach gradients of 6% either side. The rail level at the crossing is approximately 42.1 m OD and the canal at 39.3 m OD with the bridge level over the railway at 50.00 m OD. The road level crests to a height of 52.0 m OD, 60 m south of the rail line before descending over the rail and canal.

The route would then tie into the new circulation roads through the Pelletstown Development to the north of the canal. Separate 4 m wide shared space cycle and pedestrian facilities to be provided both north of south of the canal linking from Ashtown Road to the proposed option.

This option will have impacts on the residents of Kempton Gardens. Furthermore, it would require the construction of a significant new junction on the Navan Road. There would also be impacts on Martin Savage Park home to St Oliver Plunket's GAA club to the south and would be located within zoned housing development land within the Ashtown - Pelletstown SDZ to the north of the rail line and canal. The option can be walled or can be constructed with open embankments to provide a softer texture to the scheme. The provision of landscaped embankments would result in a need for more land acquisition. It is not proposed to alter this option as part of the Ashtown review.

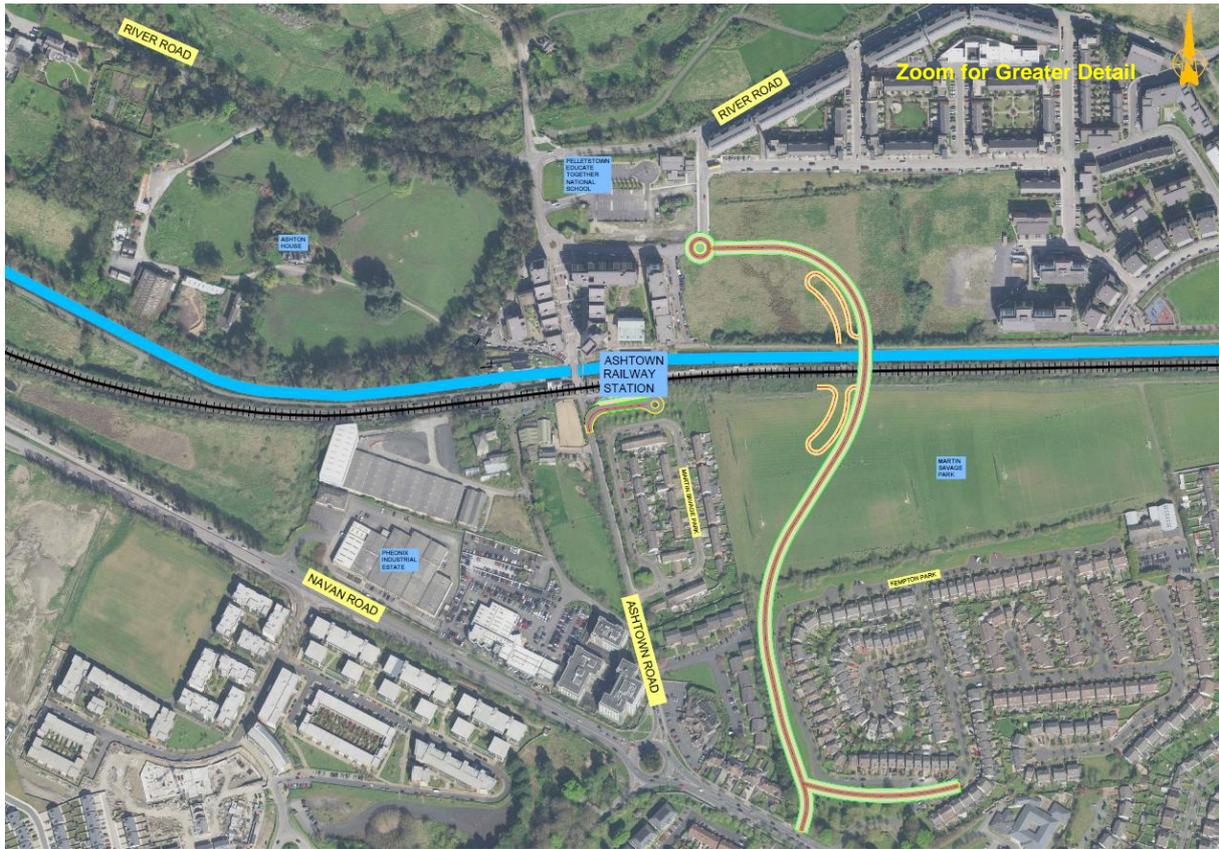


Figure 3-51 Ashtown Option 7 – Overbridge with Connection to the N3 Navan Road (Copyright Ordnance Survey Ireland – 0039720)

Option 8 Provision of a Pedestrian/Cycle Overbridge Only with Station Reconfiguration

This option includes the provision of a new pedestrian and cycle footbridge with a 5 m wide cross section over the canal and railway. It includes the demolition of the existing cable stayed footbridge at the level crossing and the station footbridge to provide space for the proposed bridge.

The proposed bridge at commencement of PC2 crossed the railway and canal at a level of approximately 50.0 m ODMH where the rail is at a level of 43.0 m ODMH and the canal is at a level of 39.7 m ODMH.

Separate pedestrian stairs were proposed with this option as well to ease pedestrian access and rails for pushing bicycles on, if required.

Constraints on bridge crossing here included the train station, the Royal Canal, the protected railway structures, and the canal bridge. Vehicular traffic would need to divert around the crossing, the diversion being an estimated 4.8 km to the west or 5.7 km to the east. This option is shown in Figure 3-52.

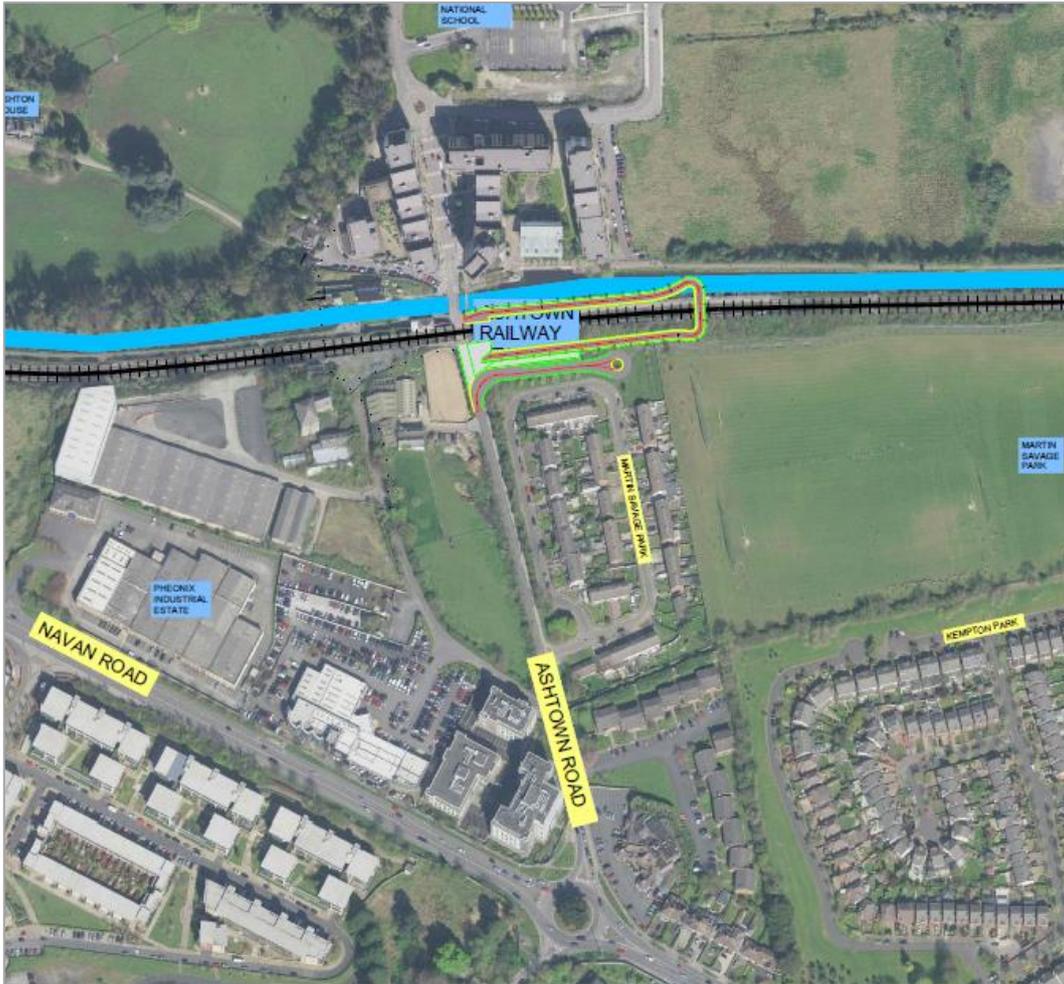


Figure 3-52 Ashtown Option 8 – Original Option

As part of the review, it is proposed to alter this option by inclusion of the proposed pedestrian cycle bridge and reconfigured train station as illustrated in Figure 3-53. No measures are proposed as part of this option to accommodate diverted traffic on the local road network.

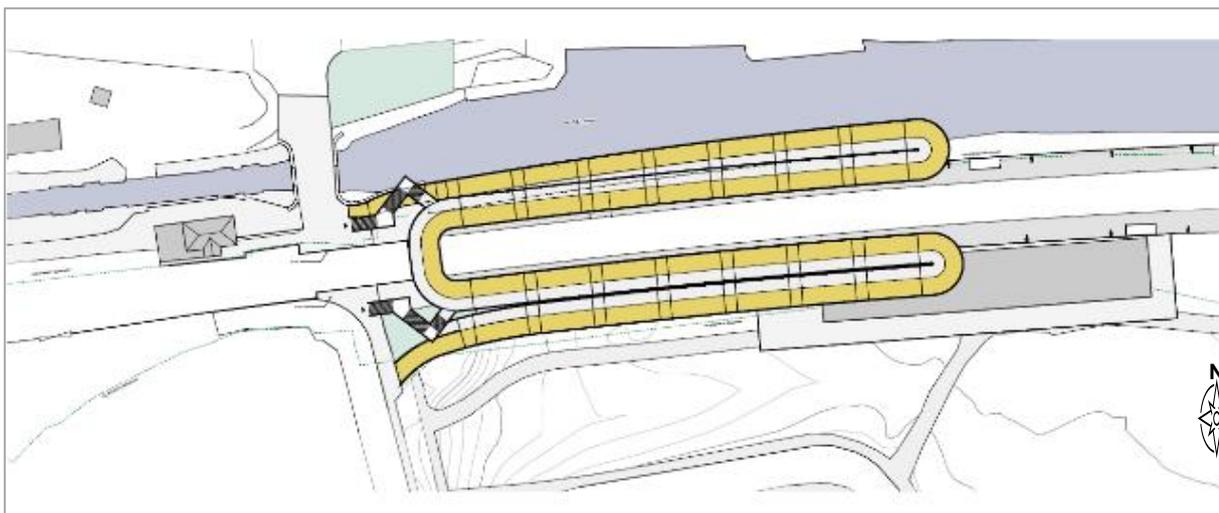


Figure 3-53 Ashtown Option 8 – Provision of a Pedestrian/Cycle Overbridge (Copyright Ordnance Survey Ireland – 0039720)

Option 9- Lowering of the Railway Vertical Alignment

This Option would entail lowering the track alignment for approximately 1 km east and west of Ashtown Station with a track gradient of maximum 1%. This would result in a 7 m clearance for overhead cables at the location of the existing level crossing. A road bridge would be required at the location of the existing level crossing to facilitate traffic movements. The proposed road bridge would tie in with the existing protected canal bridge. The existing station, footbridge and building on the south western side of the crossing would need to be demolished to facilitate the works. The track lowering would extend to the Navan Road Parkway to the west. The station is in a deep retained cut. Option 9 would require reconstruction of the station platforms.

Ashtown Station would be reconstructed at ground level with pedestrian access to the platform at track level. The platform would be approximately 200 m in length on both sides of the railway line. A new footbridge would be required for passengers to access the northern platform. On the eastern approach the rail line is bounded by playing fields and residential properties to the south and the Royal Canal and Ashtown town centre to the north. To facilitate the lowering of the rail line, retaining walls would be required on the north and southern side of the rail line. The height of the retaining walls would range from 2 m to 7 m. On the western approach the rail line is bounded by an industrial area with warehouses, stables and fields to the south and the Royal Canal, fields and Ashtown town centre on the northern side. The track vertical realignment will extend to the Navan Road Parkway Station. Alterations to the Parkway Station could be avoided by reducing the depth of the cut for lowering the railway and increasing the soffit level of the new road bridge at the level crossing.

This option would have significant impact on the Royal Canal channel and all of the associated heritage structures along the realigned section of railway. This includes the masonry arched bridge, the locks and the lock keeper's cottage.

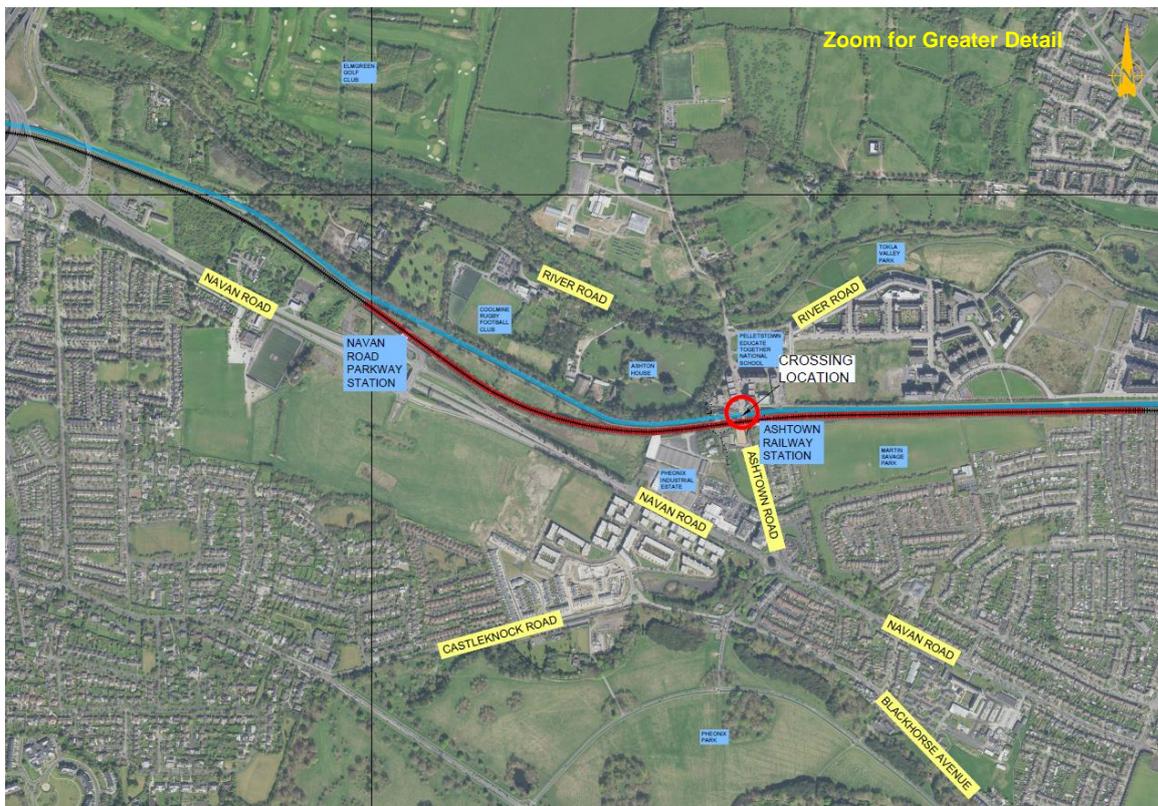


Figure 3-54 Ashtown Option 9 - Lowering of the Railway Vertical Alignment (Copyright Ordnance Survey Ireland – 0039720)

Option 10 Underbridge on Mill Lane

This is an additional option developed as part of the review of Ashtown options consequent on feedback received as part of public consultation PC2. It would entail re-routing Ashtown Road along its old alignment (pre-Royal Canal) on Mill Lane and passing under both the railway and the Royal Canal. The option can accommodate a cross section of a 6.5 m carriageway with 1.5 m rubbing strip on the western side of the road and a 3.65 m wide pedestrian / cycle way along the eastern side of the road. It is proposed to curtail the footpath along the west of the alignment fronting the listed Ashton House curtilage to a 0.5 m rubbing strip and provide a pedestrian crossing at this location to minimise the impact on the heritage property. An at-grade turning head and drop-off are proposed to be provided each side of the railway.

The length of the option is approximately 170 m on the northern side and 300 m south of the rail line. The option would drop to an approximate level of 37.5 m ODMH under the railway which is at a level of 45.6 m ODMH at the bridging point. On both sides of the railway a separate pedestrian and cycle link is proposed to provide enhanced access for non-motorised users. These shared spaces would have a width of 3.0 m.

It is feasible to cross at this location, as it is upstream of the double lock on the canal and the canal is at the same approximate level as the adjacent railway. This option would require some property acquisition and modifications to existing accesses. This option also proposes the inclusion of the enhanced non-motorised access at the reconfigured train station.

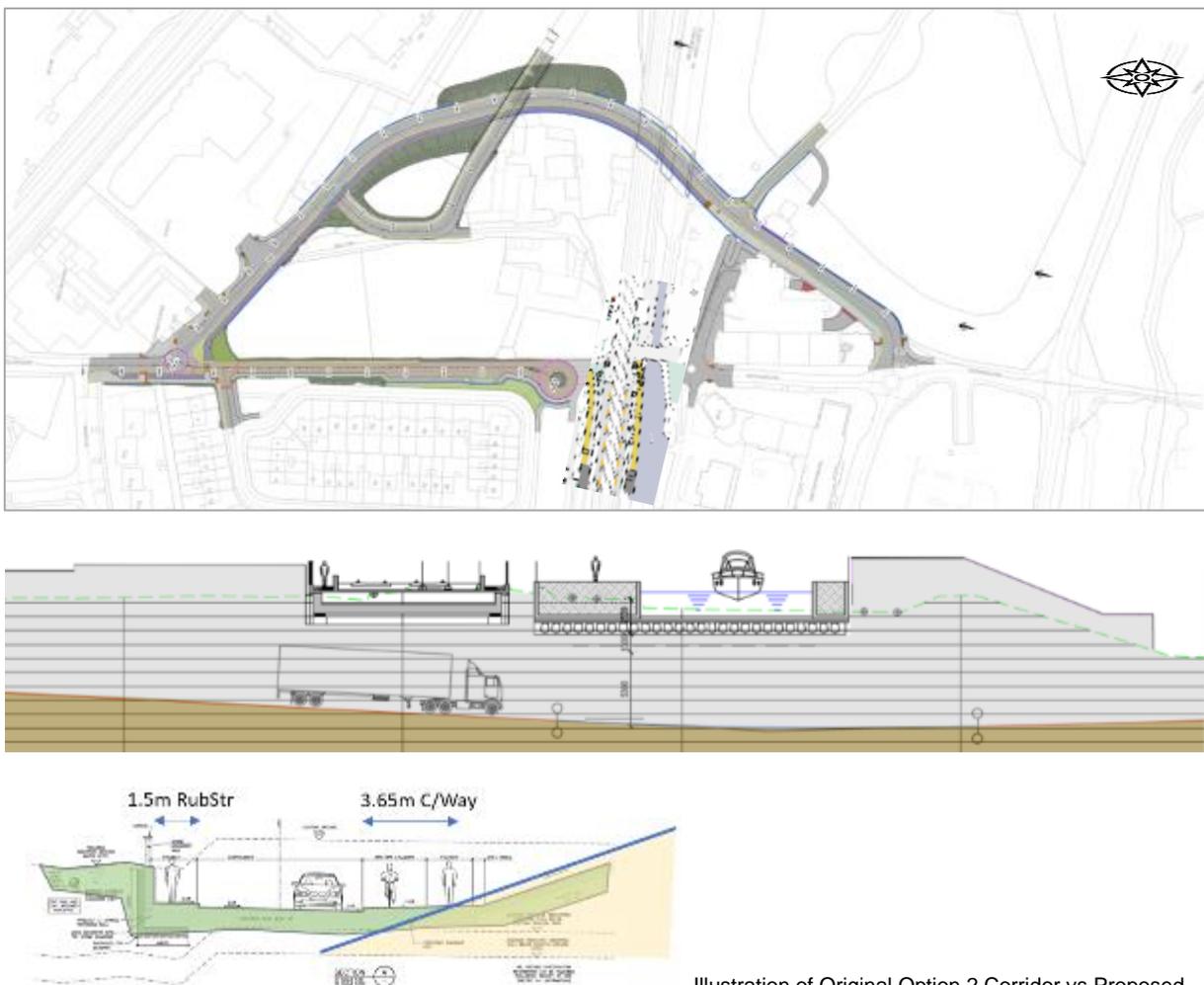


Illustration of Original Option 2 Corridor vs Proposed

Figure 3-55 Ashtown Option 10 Under Rail and Canal

Option 11 – Pedestrian / Cycle Bridge at Reconfigured Station and Upgrade of Local Road Network

This additional option would entail closing the level crossing at Ashtown without the provision of a replacement vehicular crossing. It is proposed that the local road network would be upgraded to carry any traffic diverted consequent on closure of the level crossing. It also proposes the inclusion of the enhanced non-motorised access at the reconfigured train station. The existing River Road is currently in poor condition with no pedestrian or cycle facilities along much of its length. Proposed improvements to River Road include the construction of a 2.0 m wide footpath at locations where none currently exist. This will require land acquisition and the removal of existing vegetation along sections of the road.

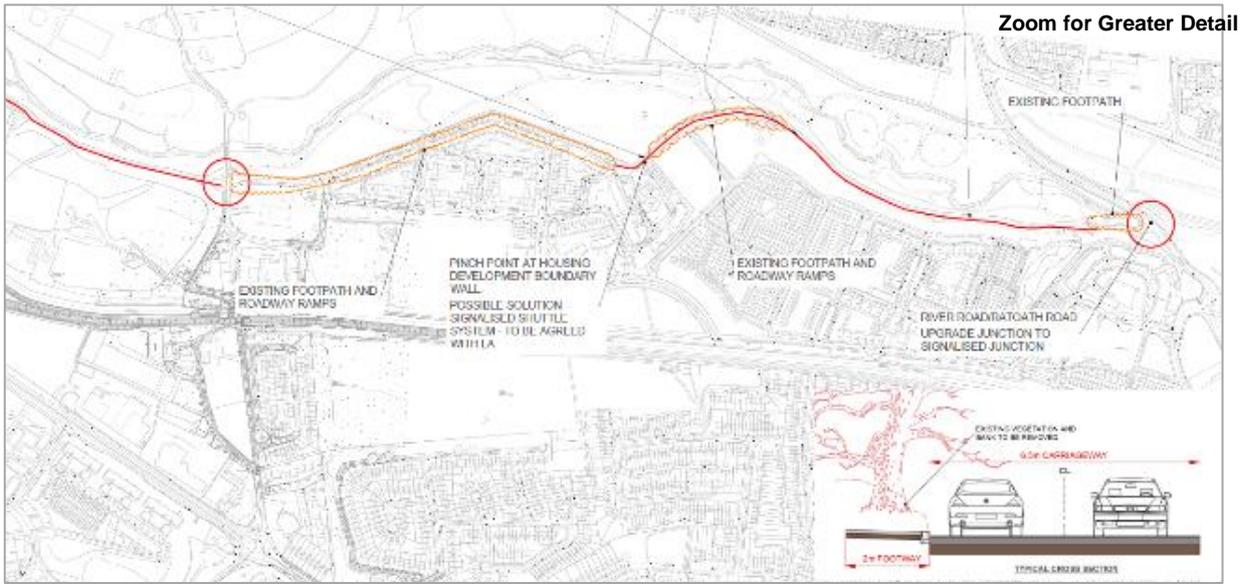


Figure 3-56 Ashtown Option 11 Level Crossing Closure with Road Upgrade - East

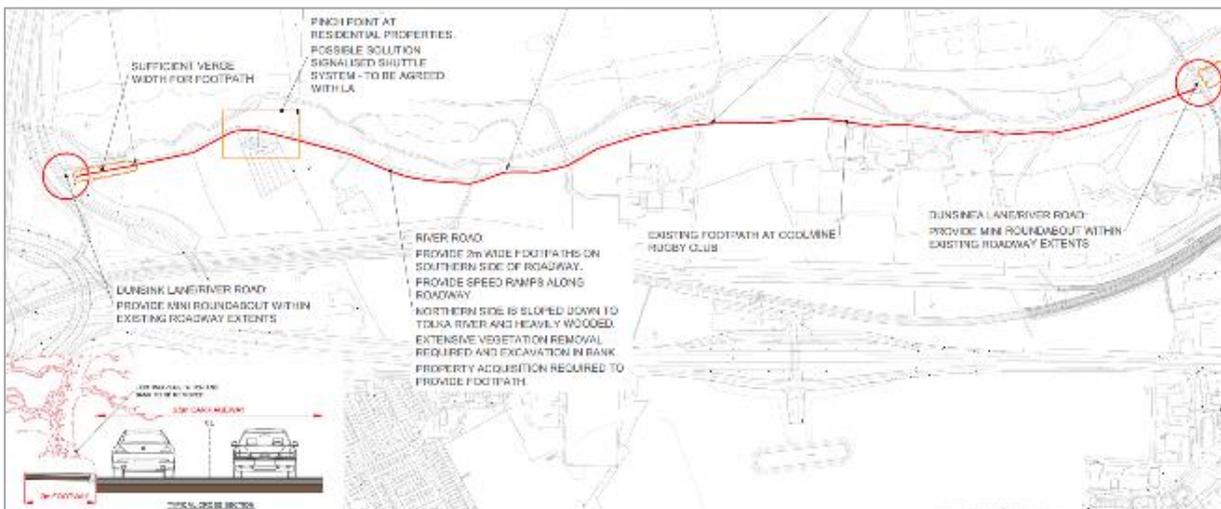


Figure 3-57 Ashtown Option 11 Level Crossing Closure with Road Upgrade - West

At some locations it is impracticable to widen the road. At these locations it is proposed to reduce the width of the existing road carriageway to allow the construction of a footpath and to implement signal-controlled shuttle system on these sections of roadway.

Where residential properties are located along these narrowed sections of roadway they will be provided with demand activated signals which will stop traffic in both directions to allow the residents exit their properties safely.

The length of River Road affected by the proposed works is approximately 3.6 km. It is proposed as part of road improvements to provide a signal-controlled junction with the Ratoath Road.

Some traffic is expected to be diverted along the R147 Navan Road, Nephin Road and the Ratoath Road consequent on closure of the level crossing at Ashtown. This is likely to result in up to 2 mins additional cycle time on junctions in the peak hour. It is not proposed to enhance the capacity of the junctions to accommodate this extra traffic.

Option 12- New Link Road to Navan Parkway Train Station with Overbridge crossing of the Railway and Canal

This additional option would entail closing the level crossing at Ashtown and diverting vehicular access away from Ashtown Gate. Traffic would cross the canal and railway along a new road constructed between Navan Parkway Station and the roundabout at the northern end of Mill Lane along a new roadway which runs parallel to the R147 Navan Road before crossing over the canal and railway and passing through the grounds of Ashton House. A plan layout of the proposed roadway is shown in Figure 3-58 below, along with a long section illustrating the steepened gradient along the walled section of roadway through Ashton House. The proposed roadway would accommodate pedestrian and cycle facilities.



Figure 3-58 Ashtown Option 12: Navan Parkway Station to Mill Lane over the Canal and Railway

The length of the option is approximately 1km. The option would rise to an approximate deck level of 52.9 m ODMH, 7.3 m above the rail the rail which is a at a level of 45.6 m ODMH at the bridging point.

It is feasible to cross at this location, as it is upstream of the double lock on the canal and the canal is at the same approximate level as the adjacent railway. This option would require some property acquisition and modifications to existing accesses.

This option also proposes the inclusion of the enhanced non-motorised access bridge at the reconfigured train station. It also includes for set down and turning facilities to north and south of the train station in Ashtown.

Option 13 – Overbridge on Mill Lane West of the Mill

This is an additional option developed as part of the Ashtown review consequent on feedback received as part of public consultation PC2. It would entail re-routing Ashtown Road along its old alignment (pre-Royal Canal) on Mill Lane and passing over both the railway and the Royal Canal. The option can accommodate a cross section of a 6.5 m carriageway with 1.5 m rubbing strip on the western side of the road and a 3.65m wide pedestrian / cycle way along the eastern side of the road. The option is shown on plan in Figure 3-59 which also includes a long section illustrating the steep gradient on the approach to the northern end of Mill Lane and a photograph of the existing Reilly’s Overbridge to illustrate the nature of the bridge crossing and walled embankment construction proposed as part of this option.



Figure 3-59 Ashtown Option 13 Canal & Railway Overbridge West of Mill with Access Enhancements at Station

The length of the option is approximately 170 m on the northern side and 300 m south of the rail line. The option would rise to an approximate deck level of 52.9 m ODMH, 7.3 m above the rail which is at a level of 45.6 m ODMH at the bridging point.

This option also proposes the inclusion of the enhanced non-motorised access bridge at the reconfigured train station and also includes for set down and turning facilities to north and south of the train station in Ashtown.

This option would require some property acquisition and modifications to existing accesses. An at-grade turning head and drop-off are proposed to be provided each side of the railway.

Table 3-15 provides a summary matrix of the comparative assessment undertaken as part of Stage 1 MCA. Options deemed to be feasible and comparably more advantageous than other options are identified to progress to Stage 2 MCA for further assessment.

Table 3-15 Stage 1 MCA Matrix

Criteria	Do-Nothing	Do Min	Options													
			1	2	3	4+4a	4+4b	5	6	7	8	9	10	11	12	13
Economy	Light Green	Dark Green	Light Green	Light Green	Light Green	Light Green	Light Green	Light Green	Light Green	Light Green	Light Green	Light Green	Light Green	Light Green	Light Green	Light Green
Integration	Light Green															
Environment	Light Green															
Social Inclusion	Light Green															
Safety	Light Green															
Physical Activity	Light Green															
Shortlisted for Stage 2 MCA	No	No	No	No	No	No	Yes	No	No	No	No	No	Yes	Yes	Yes	Yes

Economy

The Do-Nothing option is rated as having Some Comparative Disadvantage over other options as it results in the level crossing being unavailable to all transport users for substantial periods in the hour and requires significant ongoing operation and maintenance costs. This option results in an estimated 2750 additional vehicle kilometres daily.

The Do-Minimum option is rated as having Significant Comparative Advantage over other options as it delivers on the train service specification for the project with significantly less expense than other options. It does however result in severing access over the railway at Ashtown. This option results in an estimated 2750 additional vehicle kilometres daily.

Options 4+4a, 4+4b are rated Some Comparative Advantage over other options because, although there is significant cost associated with construction of these options, they are effective in delivering traffic functionality. They result in a detour for traffic but a marginal reduction of traffic on the R147 and on Ashtown Roundabout. This option results in an estimated 810 additional vehicle kilometres daily.

Option 5 is rated Some Comparative Disadvantage because it passes under the existing train station and curtails the traffic which can use the underpass. This option results in an estimated 270 additional vehicle kilometres daily.

Option 9 is rated Significant Comparative Disadvantage due significant costs associated with lowering the railway over a long distance and the associated long term maintenance needs. This option results in additional estimated daily traffic of 2690 vehicles through Ashtown village.

Options 2, 3, 10, 12 and 13 are rated Some Comparative Disadvantage over other options as they include the additional cost associated with the construction of a pedestrian and cyclist bridge and the reconfiguration of

Ashtown train station while they have base capital costs equivalent to, or higher than other options. These options results in an estimated 270 additional vehicle kilometres daily.

Options 6 and 7, situated in Ashtown are less expensive than Options 2, 3 10, 12 and 13 as they do not include the pedestrian cycle bridge at the reconfigured station. Despite costing less, they are rated Some Comparative Advantage over other options due to the extremes associated with the Do Nothing, Do Minimum and Option 9. These options results in an estimated 270 additional vehicle kilometres daily.

Option 8 is rated Some Comparative Advantage over other options due to its comparatively low cost relative to other options which maintain vehicular access locally. It does not perform as well as the Do-Minimum option as it includes the cost of a reconfigured station and the enhanced non-motorised access associated with it. This option results in an estimated 2750 additional vehicle kilometres daily.

Option 11 is rated Some Comparative Advantage over other options due to its lower cost relative to other options and due to the fact that it goes some way to addressing the vehicular traffic impacts associated with removing access at the level crossing. This option results in an estimated 2750 additional vehicle kilometres daily.

Integration

The Do-Nothing and Do-Minimum options are rated as having Significant Comparative Disadvantage over other options as they both reduce connectivity across the railway and to the train station for all transport modes due to the reduced availability of access over the railway on implementation of the proposed working timetable on the railway.

Option 1 is rated Significant Comparative Disadvantage over other options due to the negative impact this option has on the urban realm north of the canal and railway and on access for all transport modes across the railway associated with the option.

Option 10 is rated Significant Comparative Advantage over other options as it meets sustainable transport goals through the provision of full access local to the level crossing and due to its constrained plan footprint which mitigates its impact on lands zoned for development and amenity lands.

Options 2, and 3 are rated Some Comparative Advantage over other options as they have similar characteristics to Option 10 but do not provide for sustainable transport modes along the proposed roadways.

Options 4+4a and 4+4b are rated Some Comparative Advantage over other options as, although they impact on the rugby grounds west of Ashtown and the high amenity grounds there, they address local access issues in Ashtown for cyclists, pedestrians and vulnerable users.

Option 5 is rated Some Comparative Disadvantage over other options as it does not facilitate non-motorised access as effectively as other options local to the level crossing, it does not provide effective vehicular access across the railway and canal and it impacts on planned development north of the railway.

Option 6 and 7 are rated Some Comparative Disadvantage over other options as they do not facilitate non-motorised access as effectively as other options local to the level crossing. They also impact on the GAA pitches south of the railway and on planned development north of the railway.

Option 8 is rated Significant Comparative Disadvantage over other options on Integration as it severs the road linkage over the railway without providing replacement infrastructure for road vehicles.

Option 9 is rated Some Comparative Advantage over other options as, although it facilitates electrification of the railway and the train service specification, it will impact negatively on the services for a period of up to 3 years during construction and the existing listed bridge and locks at the level crossing will constrain the implementation of upgrades to surface access over the canal and railway. A new train station would be

depressed below existing ground level and result in more circuitous access to the station platforms. The option will impact directly on protected structures including the Royal Canal, canal locks and Longford Bridge.

Option 11 is rated Some Comparative Disadvantage over other options as, although it maintains pedestrian and cycle access at Ashtown Station, vehicular connectivity to existing and future developments will be impacted. The option is largely consistent with high level objectives to promote sustainable transport modes over other modes, it is contrary to the GDATS objective to enhance linkages to planned developments. It is also contrary to objectives in the Ashtown and Pelletstown LAP and the FCC Development Plan which appear to support the maintenance of access at Ashtown.

Option 12 is rated Some Comparative Advantage over other options rather than Significant Comparative Advantage due to the degree of impact it has on the high technology zoned lands south of the railway.

Option 13 is rated Some Comparative Advantage over other options as it exhibits many of the characteristics of Option 10 but severs the high amenity zoned lands in two rather than skirting the curtilage of them.

Environment

The Do–Minimum and the Do-Nothing options have Significant Comparative Advantage over other options under the Environment criteria as it is likely to have minimal impacts on the receiving environment.

Options 1, and 4 & 4b have Some Comparative Disadvantage over other options due to the direct impacts on protected cultural heritage sites such as the demesne landscapes associated with Ashbrook and Ashtown Lodge (element 4b) and Longford Bridge (Option 1). However, these options have the potential to result in reduced impacts on sensitive noise and air receptors. Option 1 results in significant visual impact on Ashtown Village while Option 4+4b has visual impact on former demesne lands caused by the raised bridge and extensive high embankments.

Options 2, 3, 10 and 13 have Significant Comparative Disadvantages over other options as they will move traffic to a new location on the western edge of Ashtown which will result in impact on different sensitive air, noise, and visual receptors. These options also have potential for impacts to Royal Canal pNHA arising from noise, artificial lighting and impacts to water quality during construction. Options 3 and 13 are above ground and exhibit significant visual impact on sensitive receptors. Options 2, and 3 also have significant direct impact on Ashtown Stables. Option 2 also has potential for disturbance to Light-bellied Brent Goose (Qualifying Interest for SPAs). Options 10 and 13 have significant direct impact on Burke Brothers and Son Ltd. wholesale business.

Options 4+4a and 7 have Significant Comparative Disadvantages over other options as they will move traffic to new locations and will have an impact on the greatest number of sensitive air, noise, and visual receptors. These options also have potential for impacts to Royal Canal pNHA arising from noise, artificial lighting and impacts to water quality during construction. Option 4+4a requires the upgrade of a section of River Road which will require the removal of the existing boundary treatment, hedge line and trees to facilitate the construction of a new footpath. This option also affects the floodplain of the Tolka River. Option 7 also has potential for disturbance to Light-bellied Brent Goose (Qualifying Interest for SPAs).

Option 5 also has Some Comparative Disadvantage over other options as it has greater potential for resulting in impacts on sensitive visual, air and noise receptors. Additionally, Option 5 has potential for disturbance to Light-bellied Brent Goose (Qualifying Interest for SPAs).

Option 6 is rated Some Comparative Disadvantage over other options as it will move traffic to a new location and will have an impact on a greater number of sensitive air, noise, and visual receptors. These options also have potential for impacts to Royal Canal pNHA arising from noise, artificial lighting and impacts to water quality during construction. It has potential for disturbance to Light-bellied Brent Goose (Qualifying Interest for SPAs).

Option 8 has Some Comparative Advantage over other options as it supports sustainable mode of travel only at this location, thereby reducing vehicular traffic in the area. This option also has a reduced impact on visual receptors, requires minimal non-agricultural land take and earthworks when compared to other options.

Option 9 is rated Significant Comparative Disadvantage over other options due to its construction related impacts on sensitive noise and air receptors, and the potential impact to water quality of the Royal Canal pNHA. Works within the Royal Canal have the potential to impact fish and crayfish which will have to be taken from the canal prior to works. Demolition works could also disturb and displace fauna.

Option 11 is rated Some Comparative Advantage over other options as it takes traffic away from the local Ashtown area distributing it onto other trafficked routes. It avoids the construction of substantial bridgeworks associated with a road crossing of the canal and railway. It is not rated as advantageous as Option 10 as its impacts are along a 3.6 km stretch of road. It also results in impacts on the flood plain of the Tolka river and the riparian way along the river. It impacts on the boundary of the listed Ashton House and on heritage properties further to the west.

Option 12 is rated Some Comparative Disadvantage over other options due to its impacts on the listed Ashton House estate which is split in two by the proposed option. It also impacts indirectly on the Royal Canal, Pelletstown House, the Canal Locks and the Mill. This option has significant visual impact as it crosses the railway and canal at height and is on embankment through Ashton House.

Accessibility and Social Inclusion

The Do-Nothing and Do-Minimum options are rated Significant Comparative Disadvantage over other options due to the curtailment of access over the railway and canal associated with them. Community facilities affected by constrained or severed access over the canal and railway include Shopping facilities, Giraffe Childcare, Pelletstown Educate Together National School - North of the railway and Halfway House, Ashtown Post Office, St Dominic's College, Meaghers Pharmacy, Daughters of Charity - south of the railway. A similar rating applies to Option 1 as it also does not adequately address the need for effective pedestrian and cycle access across the railway. It is not practicable to facilitate pedestrian and cycle access online as part of this scheme due to the narrow corridor available between the multistorey buildings on each side of Ashtown Road.

Options 2, 3 and 4+4a are all rated Some Comparative Disadvantage over other options due to the degree of impact they have on Ashtown Stables which serves as a significant community resource.

Option 9 is rated Significant Comparative Advantage over other options as it leaves access provisions at Ashtown largely as they are except for the removal of the level crossing. The existing listed canal bridge constrains access over the canal for vulnerable users but it is considered this does not alter the rating of the option. Option 5 also provides for local access for non-motorised users with modest detour.

All other options rate Some Comparative Advantage over other options as they accommodate non-motorised access but with longer diversion than options 5 and 9. Options 10, 11, 12 and 13 also provide pedestrian, cycle access and access for vulnerable users at the location of the existing level crossing.

Safety

The Do-Nothing and Option 5 are rated Significant Comparative Disadvantage over other options in respect of safety as the former does not remove the level crossing from the railway and the latter introduces a low clearance bridge to the railway network which represents a hazard to road and rail traffic. In addition, due to the curtailment of access over the railway associated with these options and the absence of proposed infrastructure to replace road access, traffic is diverted onto the local road network without enhancements to accommodate it.

Option 1 is rated Some Comparative Advantage over other options as it facilitates removal of the level crossing.

Options 2, 4+4a, 4+4b, 10, 12 and 13 are each rated Significant Comparative Advantage over other options as they provide high quality replacement local while securing removal of the level crossing from the railway network. Options 6 and 7 rate Some Comparative Advantage as they secure comprehensive, safe access similar to Options 2,3 and 4 but along longer diverted routes.

Option 8 is rated Some Comparative Disadvantage over other options as the provision of local non-motorised access over the railway at the level crossing by bridge without replacement infrastructure for road traffic results in vehicular traffic being diverted onto the local road network without associated enhancements to accommodate the additional traffic.

Option 9 is rated Some Comparative Disadvantage over other options as it includes significant and prolonged impact on the live railway during construction.

Option 11 is rated Some Comparative Disadvantage over other options in respect of safety as it does not provide for segregated access for vulnerable road users. This is because there is insufficient space to widen River Road to accommodate cycle facilities.

Physical Activity

The Do-Nothing is rated Significant Comparative Disadvantage over other options due to the curtailed availability of high-quality access over the railway associated with it to local social amenities. The principal high amenity greenspaces in the vicinity of the existing train station include the Royal Canal, Oliver Plunkett Gaelic football grounds south of the railway; Phoenix Park, south of the railway and the amenity zoned lands northwest of the level crossing. Increased closures of the level crossing would reduce access to each of them.

The Do-Minimum and Option 1 are rated Significant Comparative Disadvantage over other options due to the severely curtailed availability of high-quality access over the railway associated with them local social facilities and amenities.

Options 2,3,4+4b, 5, 8, 9, 10, 11, 12 and 13 are rated Significant Comparative Advantage over other options as they provide for equivalent or enhanced access to local social facilities and amenities.

Options 6 and 7 are rated Some Comparative Advantage over other options as they provide access to local social facilities and amenities by slightly longer routes than other bridge options but are disadvantaged as ramped access from the station is narrower than for other options. Furthermore, the options impact on the GAA grounds south of the railway.

Stage 2 Options Assessment

Following on from the Stage 1 Option Assessment / Multi-Criteria Analysis section above, the options that progressed to MCA Stage 2 are highlighted in Table 3-16. The Stage 2 option selection provides further comparison between the highlighted options to establish the preferred option.

Table 3-16 Ashtown Level Crossing MCA2 Progressed Options

Option	Description
Option 4 & 4b	Closure of the level crossing and link from River Road to Navan Parkway Station grade separated junction and the construction of a separate ped-cycle and disabled access bridge added at a reconfigured station
Option 10	Underbridge, west of mill, cycleway on roadway, and a separate ped-cycle and disabled access bridge added at a reconfigured station
Option 11	Pedestrian / cycle and disabled access bridge at reconfigured station, upgrades to local road network
Option 12	Road link from Navan Parkway Interchange with bridge over the railway crossing through Ashton House lands, separate ped-cycle and disabled access bridge added at a reconfigured station

Option	Description
Option 13	Overbridge west of mill, cycleway on roadway, separate ped-cycle and disabled access bridge added at a reconfigured station.

Table 3-17 provides a summary matrix of the comparative assessment undertaken at Stage 2 to identify the preferred option. Excerpts of the matrix are provided under each of the criteria below with an assessment of why the preferred option has been selected.

Table 3-17 Stage 2 MCA Matrix - Ashtown

Criteria	Option 4+4b	Option 10	Option 11	Option 12	Option 13
Economy					
Integration					
Environment					
Accessibility and Social Inclusion					
Safety					
Physical Activity					
Preferred Option	No	Yes	No	No	No

As can be seen from the above Option 10 – The underpass offline to the west of the listed mill building has been identified as the preferred option over Options 4+4b, 11, 12 and 13.

The sections below provide summaries of the MCA Stage 2 assessment under each criterion that resulted in Option 2 being selected as the preferred option.

Economy

Option 11 is rated Some Comparative Advantage over other options as it is less expensive than them. The options were compared in respect of long term maintenance costs over the 120 year period, the design life of a bridge. Options 4+4b, 11 require fewer bridges and less extensive retaining wall structures to be maintained than do other options and are consequently rated Some Comparative Advantage over other options. In summary, Option 4+4b rates Some Comparative Advantage over other options as it incorporates fewer structures to be maintained on an ongoing basis, and although it diverts local northbound journeys by up to 1.5 km, it serves to draw traffic away from the R147, and reduces pressure on the Ashtown Road Roundabout. Option 11 rates Some Comparative Advantage over other options as its capital cost and ongoing maintenance costs are lower than for other options. The greater traffic impact associated with Option 11 over other options is not sufficient to warrant a more onerous comparative rating in the context of traffic management within the M50 boundaries. Options 10, 11 and 12 are rated Some Comparative Disadvantage over other options as they include a greater number of structures than the other options, which are of significant complexity, and they result in some increase in traffic on the diverted Ashtown Road.

Integration

Options 10 and 13 exhibit comparative advantage over other options, particularly in respect of land use integration. To preserve balance across the matrix, it is considered that Options 10 and 13 should be rated Significant Comparative Advantage over other options, and all other options should be rated Significant Comparative Disadvantage over other options.

Environment

Option 4+4b is rated Significant Comparative Disadvantage over other options due the higher visual impact of this option in comparison to other options and the need to construct earthworks for extensive embankments

north of the canal. It also has direct impacts on former demesne landscape and both direct and indirect impacts the on Royal Canal at 2 No. locations. It has greater impact on biodiversity associated with high level works through amenity lands, floodplain and riparian way along River Road. This option has lesser impact on commercial enterprises than other options but does have minor to moderate indirect impact on businesses on each side of the railway due to removal of vehicular access over the railway at Ashtown.

Options 10 is rated Some Comparative Advantage over other options due the lower visual impact associated with the below ground character of the proposed infrastructure in comparison to other options and the curtailed footprint limiting the impact on high amenity and high technology zoned lands. This option does not impact on the floodplain of the Tolka River as do other options. The smaller footprint also results in a smaller biodiversity impact associated with this option. Option 10 has a direct impact on the entrance and gate lodge to Ashton House (RPS 690) and an indirect impact on the mill and outbuildings (RPS 691) but the impact is considered less than for Options 12 and 13. This option impacts most heavily on the Burke Brothers and Son Ltd., wholesale business located along the southwestern boundary of the site. The impacts on this property are profound in that it would need to operate on a significantly smaller site or relocate to remain in business should Option 10 be adopted as preferred option for DART+ West at Ashtown.

Option 11 is rated Significant Comparative Advantage over other options due the lower visual impact associated with the at-grade nature of much the proposed infrastructure in comparison to other options. There are also less earthworks associated with this option in comparison to other options as it does not include the construction of overbridges, walled embankments and underbridges evident in other options. This option has indirect impact on Ashton House (RPS 690) as it includes proposed roadworks fronting the curtilage of the property. This compares to a direct impact along the boundary and through the grounds of Ashton House (RPS 690) associated with other options. This option impacts on the floodplain of the Tolka River as does Option 4+4b. The need to construct a footpath, boundary and drainage works as part of this option results in a biodiversity impact along the riparian way associated with the Tolka River and impact on the floodplain of the river.

Options 12 is rated Some Comparative Disadvantage over other options due the higher visual impact of this option in comparison to other options and the need to construct earthworks for extensive embankments north and south of the canal. It also has indirect impact on the Royal Canal at the bridge crossing and splits the grounds of the protected Ashton House (RPS 690). It has greater impact on biodiversity associated with high level works through amenity lands.

Option 13 is rated Significant Comparative Disadvantage over other options as it will be more visually intrusive on the landscape due the overbridge and walled embankment nature of the option. This option includes for the construction of earthworks for extensive embankments north and south of the canal. It will extend across lands zoned High Amenity and High Technology. It will have direct impacts on the demesne associated with Ashton House (RPS 690) and indirect impacts on the gate lodge and entrance. It has indirect impacts on the mill and outbuildings (RPS 691) and Pelletstown House (structure of architectural merit) and potential indirect impacts on Royal Canal (RPS No. 944a) and the Royal Canal 10th Lock (RPS No. 944b). This option has greater impact than other options on biodiversity associated with high level works through amenity lands. This Option is comparable to Option 10 in respect of its impact on Burke Brothers and Son Ltd., Gowan Motors, and Ashtown Stables.

Accessibility and Social Inclusion

Options 4+4b and 12 are rated Some Comparative Disadvantage due to the road diversion associated with relocating access for vehicular traffic west of Ashtown. Community facilities affected by constrained access over the canal and railway include Shopping facilities, Giraffe Childcare, Pelletstown Educate Together National School - North of the railway and Halfway House, Ashtown Post Office, St Dominic's College, Meaghers Pharmacy, Ashtown Stables, Daughters of Charity - south of the railway.

Option 11 is rated Some Comparative Disadvantage over other options as the route for non-motorised road users incorporates a longer diversion than for other options and there is limited scope accommodating non-motorists along River Road.

Options 10 and 13 are rated Some Comparative Advantage as they are located closer to Ashtown Road than other options and better secure access to community facilities for existing residents.

Safety

All options secure closure of the level crossing. Option 11 is rated Some Comparative Disadvantage over other options as it is not practicable to provide off road cycle facilities on River Road due to the constraints of adjacent development, heritage properties and the proximity of the floodplain of the Tolka River which extends to the northern boundary wall fronting River Road.

Physical Activity

All options are considered to perform equally in respect of Physical Activity.

Design Development of the Preferred Option

During the option selection and design development process opportunities were identified for improvements to the accessibility arrangements for pedestrians, cyclists and mobility impaired users at the level crossing. These design developments in terms of accessibility are presented in section 3.6.5.6.2 of this chapter.

3.6.4.4.3 Coolmine level crossing

In addition to the Do Minimum and Do Nothing scenarios, the do-something options assessed as Stage 1 MCA are described in Table 3-18.

Table 3-18 Coolmine level crossing do something options

Option	Description
Option 1	Closure of the level crossing with online overbridge.
Option 2	Closure of the level crossing with online underbridge with opening canal bridge.
Option 3	Closure of the level crossing with a new overbridge connecting St. Mochta's Grove to Luttrellpark Road with a footbridge at Coolmine Station.
Option 4	Closure of the level crossing with a new underbridge with opening Canal Bridge Connecting St. Mochta's Grove to Luttrellpark Road.
Option 5	Closure of the level crossing with new underbridge connecting St. Mochta's Grove to Luttrellpark Road with diversion of Royal Canal over the proposed road.
Option 6	Closure of the level crossing and overbridge to east of Coolmine Road and Carpenterstown Road.
Option 7	Closure of the level crossing and provision of a pedestrian/cycle overbridge.
Option 8	Modifications to level crossing with online road bridge and lowering of the railway vertical alignment.
Option 9	Closure of the level crossing and upgrade to existing road network.
Option 10	Closure of the level crossing and online underbridge including droplock solution.

As a result of the public consultation process (PC1), two new options had been developed and assessed in Stage 1 MCA. All Do Something options except Option 8 include the closure of the existing level crossing.

Figure 3-60 presents the Do Something options considered in Stage 1 MCA on aerial photography.

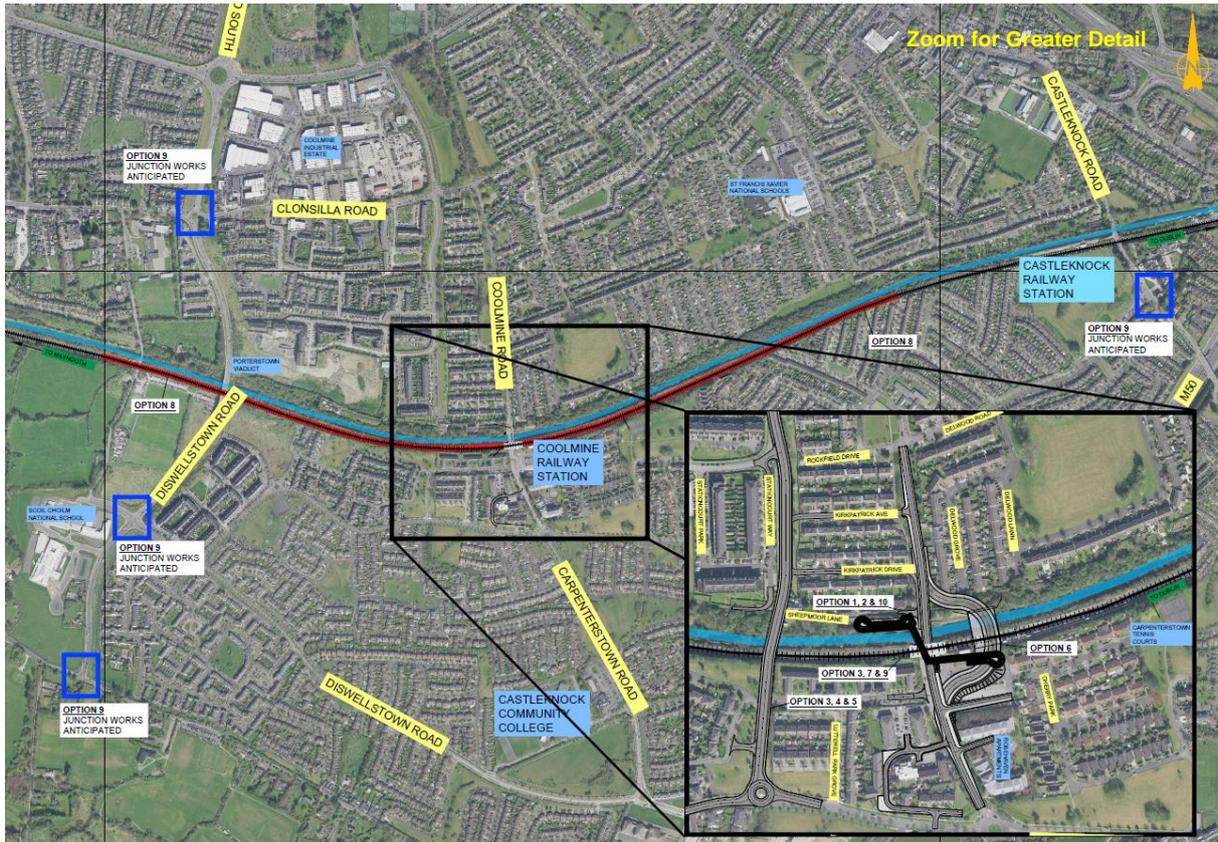


Figure 3-60 Coolmine level crossing do something options (Copyright Ordnance Survey Ireland – 0039720)

Option 1 – Online overbridge

Option 1 involves the construction of a new bridge above the railway along the current alignment of the existing Coolmine Road. The road will ramp up to the bridge from 245 m on the northern side and 210 m on the southside of the proposed bridge. The provision of the new bridge will facilitate the closure of the level crossing. Due to the increase of the vertical alignment of the road, the road tie-in to adjacent residential roads extends east and west of the main Coolmine Road.



Figure 3-62 Coolmine option 2 – Online underbridge with opening Canal Bridge (Copyright Ordnance Survey Ireland – 0039720)

Option 3 – New overbridge connecting St. Mochta’s Grove/ Station Court to Riverwood Court and footbridge

Option 3 involves the construction of a new road bridge over the railway and canal located 180 m to the west of the existing crossing. The road will ramp up to the bridge from 185 m on the northern side and 170 m on the southside of the proposed bridge. The provision of the new bridge will facilitate the closure of the level crossing. The option also includes a provision of a foot/cycle bridge on Coolmine Road to facilitate non-motorised access to the station at the existing location.

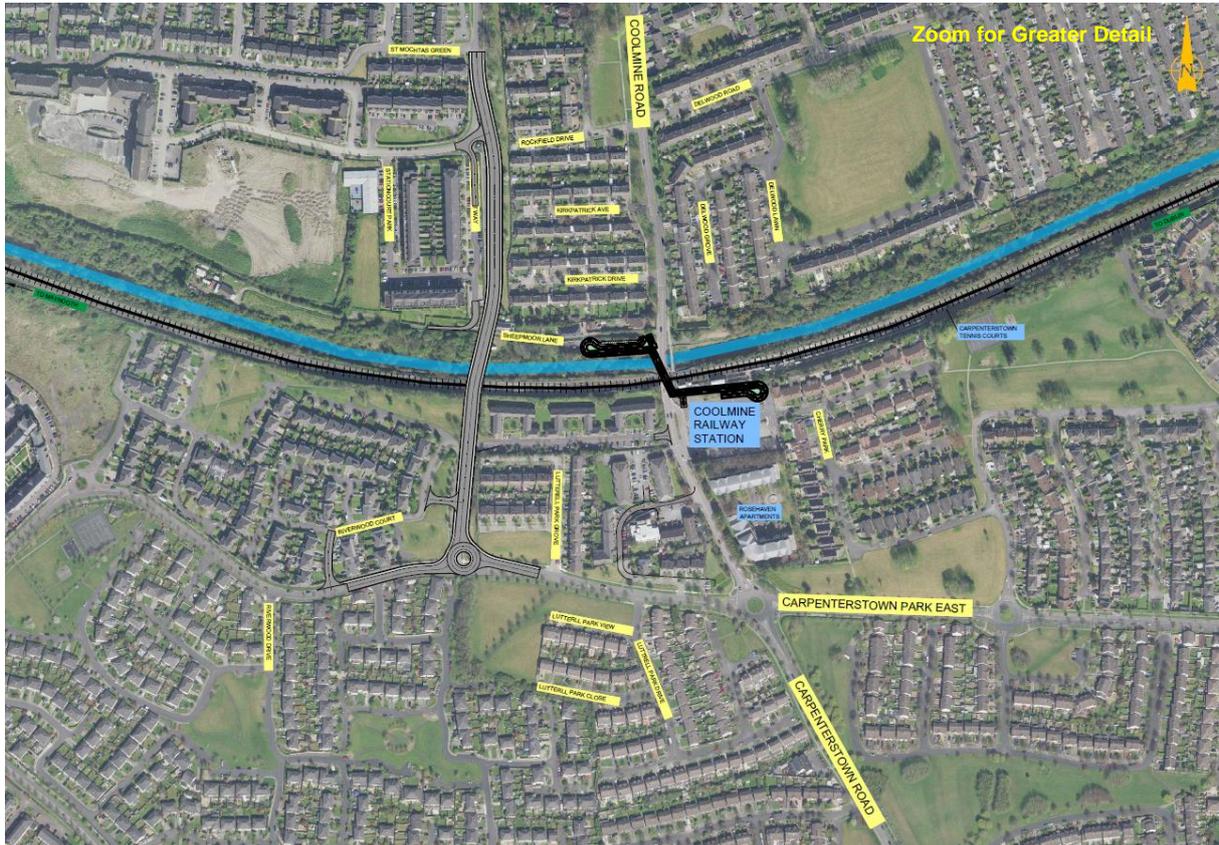


Figure 3-63 Coolmine option 3 – New overbridge connecting St. Mochta’s Grove to Lutterallpark Road (Copyright Ordnance Survey Ireland – 0039720)

Option 4 – New Underbridge with opening canal bridge connecting St. Mochta’s Grove to Riverwood Court and pedestrian and footbridge

Option 4 involves the construction of a new road tunnel/underpass under the railway which then passes over the canal via an opening bridge located 180 m to the west of the existing crossing. The road will ramp up to the bridge from 185 m on the northern side and ramp down into the underpass 170 m to the south. The provision of the new underpass and bridge combination will facilitate the closure of the level crossing. The option also incorporated a pedestrian / cycle bridge at the level crossing similar to Option 3.



Figure 3-64 Coolmine option 4 – New underbridge with opening canal bridge connecting St. Mochta’s Grove to Riverwood Court (Copyright Ordnance Survey Ireland – 0039720)

Option 5 – New underbridge connecting St. Mochta’s Grove / Station Court to Riverwood Court with diversion of Canal over the proposed road

Option 5 involves the construction of a new road tunnel/underpass under the railway and canal located 180 m to the west of the existing crossing. This option will require work to divert the canal vertically to allow the road to pass beneath. The provision of the new underpass will facilitate the closure of the level crossing. The road will ramp down into the tunnel/underpass from 185 m on the northern side and ramp down into the underpass 170 m to the south. The option also incorporated a pedestrian / cycle bridge at the level crossing similar to Option 3.



Figure 3-65 Coolmine option 5 - new underbridge connecting St. Mochta’s Grove / Station Court to Riverwood Court with diversion of Royal Canal over the proposed road (Copyright Ordnance Survey Ireland – 0039720)

Option 8 – Lowering of the railway vertical alignment

Option 8 involves the lowering of the railway to retain the use of Coolmine Road as a road bridge. The provision of the new bridge will facilitate the closure of the level crossing. The option entails lowering the track alignment for approximately 1 km east and west of Coolmine Station.

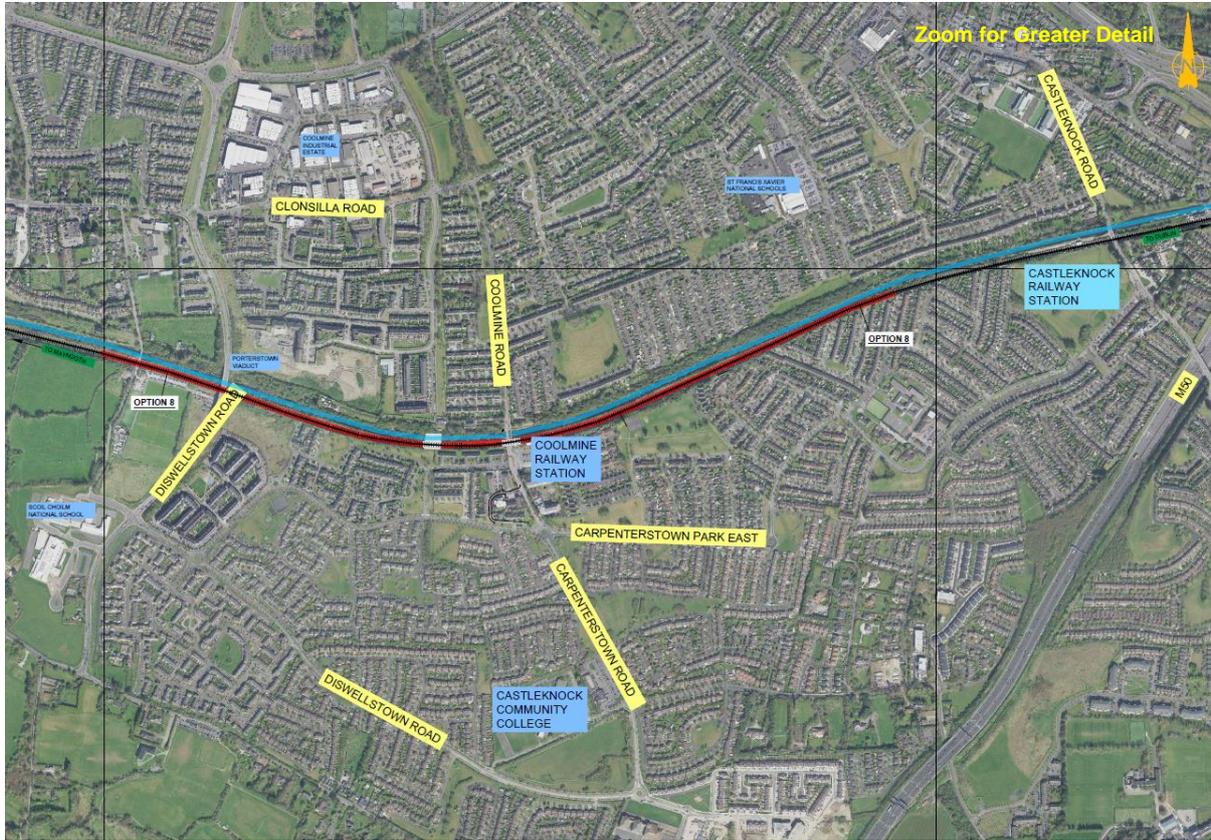


Figure 3-68 Coolmine option 8 - lowering of the railway vertical alignment (Copyright Ordnance Survey Ireland – 0039720)

Option 9 – Upgrade of local road network

Option 9 involves the construction of a new cycle/foot bridge over the railway and canal on Coolmine Road. The provision of the new bridge will facilitate the closure of the level crossing but would require diversion of traffic to surrounding crossings of the railway, particularly Dr. Troy Bridge to the west and Castleknock Bridge to the east. A traffic analysis was undertaken to determine the increased volume of traffic on the surrounding road network that would be created by the closure of the level crossing. The traffic analysis identified four junctions that would require upgrading to cater for increased traffic volumes. The four junctions are as follows and outlined in blue in Figure 3-69:

- Diswellstown Road/Porterstown Road Junction to the south west of the level crossing.
- Porterstown Road Junction to the south west of the level crossing.
- Diswellstown Road/Clonsilla Road Junction to the north west of the level crossing.
- Castleknock Road/Park Lodge Junction to the west of the level crossing.

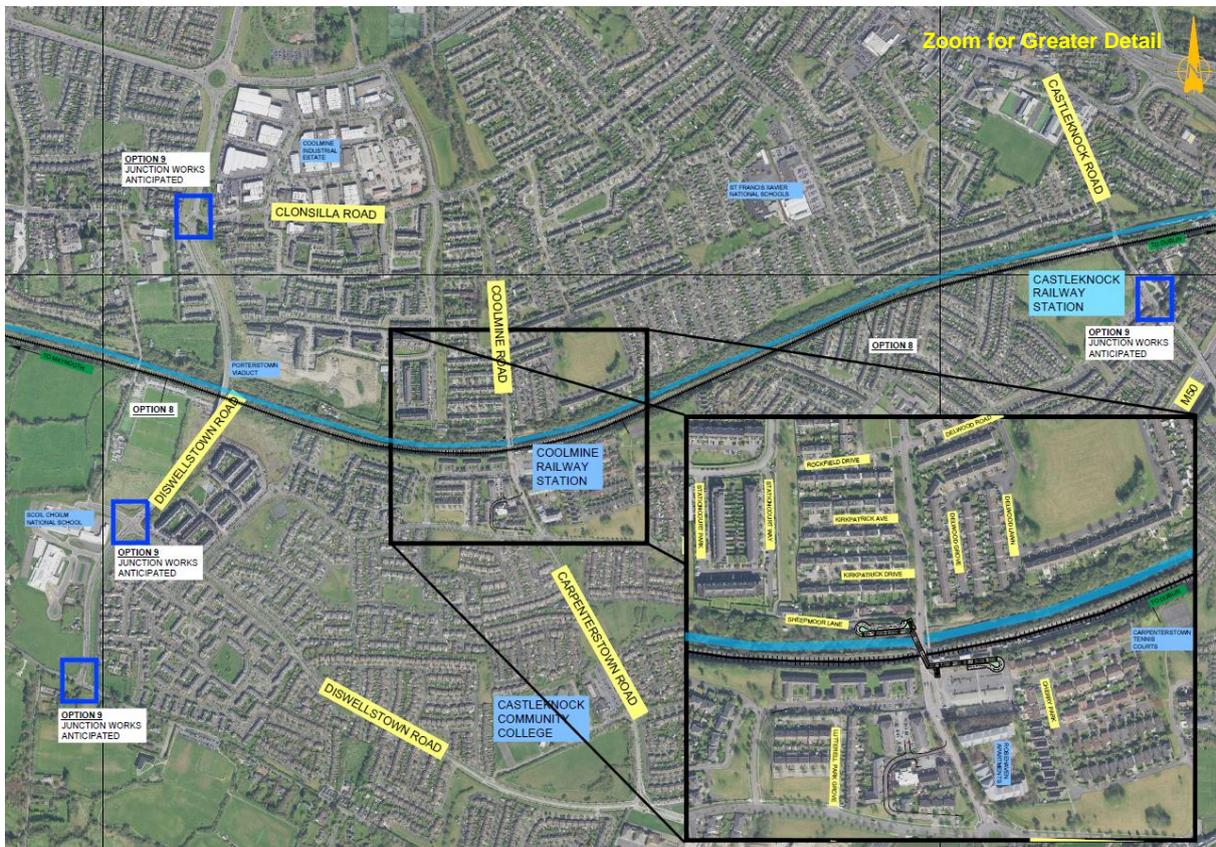


Figure 3-69 Coolmine option 9 – upgrade of local road network (Copyright Ordnance Survey Ireland – 0039720)

Option 10 – Online underbridge including droplock solution

Option 10 involves the construction of a new road tunnel/underpass under the railway which then passes over the canal. In order to allow sufficient room for the road to pass over the canal, a “drop lock” solution is proposed on the canal. The road will ramp up to the bridge from 245 m on the northern side and ramp down into the underpass 210 m to the south. The provision of the new underpass and bridge combination will facilitate the closure of the level crossing. Due to the increase of the vertical alignment of the road, the road tie-in to adjacent residential roads extend east and west of the main Coolmine Road.



Figure 3-70 Coolmine Option 10 – Online Underbridge including Droplock Solution (Copyright Ordnance Survey Ireland – 0039720)

Option Assessment Stage 1

Table 3-19 provides a summary matrix of the comparative assessment undertaken as part of Stage 1 MCA for Coolmine. Options deemed to be feasible and comparably more advantageous than other options are identified to progress to Stage 2 MCA for a more detailed assessment.

Table 3-19 Coolmine - Stage 1 MCA matrix

Criteria	Do Nothing	Do Minimum	Options											
			1	2	3	4	5	6	7	8	9	10		
Economy	Light Green													
Integration	Light Green													
Environment	Light Green													
Social inclusion	Light Green													
Safety	Light Green													
Physical Activity	Light Green													

Criteria	Do Nothing	Do Minimum	Options										
			1	2	3	4	5	6	7	8	9	10	
Shortlisted for Stage 2 MCA	No	No	Yes	No	Yes	No	No	No	Yes	No*	No	Yes	No

Note:

*Option 7 was not brought forward as Option 9 provides the same infrastructure with additional road improvements while being rated superior.

The sections below provide summaries of the MCA Stage 2 assessment that resulted in Option 2 being selected as the preferred option.

Economy

The Do Nothing is rated Some Disadvantage as it results in the level crossing being unavailable to road users for substantial periods in the hour and requires significant ongoing operation and maintenance costs.

The Do Minimum option is rated Some Advantage as it is the least expensive option but does not meet the transportation needs of the project.

Option 1 is rated Some Advantage as it includes an overbridge constructed online. It does not require the construction of an additional pedestrian / cycle bridge. Due to the fact that it requires construction activities to be carried out in traffic it incurs significant additional cost due to stages construction consequences, prolonged duration and disrupted activity.

Options 2, 4, 5, 8 and 10 are rated Significant Disadvantage as they have significantly higher capital cost than other options and also have ongoing operational, inspection and maintenance obligations associated with them.

Option 3 is rated Significant Advantage as it is the most cost effective scheme providing full replacement infrastructure associated with level crossing removal and includes modest ongoing inspection and maintenance costs.

Option 6 is more expensive than Option 3 and is consequently rated Some Advantage over while providing equivalent infrastructural improvements to Option 3.

Option 7 is rated Some Advantage over other options as the capital cost associated with it is low but this is offset by the negative transportation impacts consequent on removing the level crossing without providing replacement vehicular infrastructure. Option 9 is scored Some Advantage as it addresses the need for replacement infrastructure along the existing road network.

Integration

The Do Nothing option is rated Some Disadvantage as the curtailed availability of access over the level crossing restricts the degree to which objectives in respect of enhanced social integration can be achieved, however it does satisfy the local area objective of retaining the right of way over the existing level crossing.

The Do Minimum option is rated Significant Disadvantage as it completely severs the level crossing without replacement infrastructure.

Options 1 to 5 and 10 are all rated Some Advantage as they provide enhanced local access but close the right of way at the level crossing.

Option 6 is rated Significant Disadvantage as it provides enhanced local access but impacts on the train station carpark and closes the right of way at the level crossing.

Option 7 is rated Some Disadvantage as it closes the right of way over the level crossing without replacement vehicular infrastructure, consequently reducing access to the station car park from the north.

Option 8 is rated Some Disadvantage as it closes the right of way over the level crossing and impacts on the existing train station.

Option 9 is rated Some Disadvantage as it closes the right of way over the level crossing and requires vehicular traffic to divert along the existing road network enhanced to carry the additional traffic.

Environment

Under the environment criteria, Do Nothing and the Do Minimum Options have Significant Comparative Advantage over other options as they induce minimal changes to the receiving environment. Options 7 and 9 also have a significant comparative advantage over other options as they only support sustainable mode of travel at this location, thereby reducing traffic in the area. These options are also at an advantage as they do not have any potential direct impacts on protected structures, namely the Kirkpatrick Bridge and the Royal Canal (RPS).

Options 1 and 2 have some comparative advantage to other options under the environment criteria. Options 1 and 2 are online and will have neutral traffic – related impacts on the noise and air sensitive receptors in the area and reduced impacts due to minimal habitat loss. Option 1 will, however have a direct impact on one protected structure, the Kirkpatrick Bridge (RPS). Option 1 also has a significant disadvantage on the visual setting of the residential area.

Options 3, 4, 5 have some comparative disadvantage to other options. Options 3, 4, 5 will move traffic to new locations and will have an impact on noise, air and visual sensitive receptors. The ecological corridor of the Royal Canal is also likely to be fragmented through the introduction of overbridge structures as part of these options while removal of vegetation and hedgerows along the canal is also likely. Option 2 also has some comparative disadvantage to other options as it has the potential to directly impact Kirkpatrick Bridge (RPS); have water quality impacts in the Royal Canal; and removal of roadside tree-lined hedgerows. Option 6 also has some comparative disadvantage to other options as it will move traffic to a new location and will have an impact on noise, air and visual sensitive receptors.

Options 8 and 10 have significant comparative disadvantage over other options as they will have the potential to directly impact Kirkpatrick Bridge and the Royal Canal (RPS). The diversion / realignment of the Royal Canal proposed as part of both options has the potential to significantly impact on the water quality and aquatic fauna of the canal.

Accessibility and Social Inclusion

The Do-Nothing and Do-Minimum options are rated Significant Disadvantage due to the curtailment of access over the railway and canal associated with them. Community facilities affected by reduced access include Carpenterstown Community College, health facilities in Castleknock, commercial facilities at the Coolmine Industrial Estate and the train station.

Option 7 is rated Some Advantage as it closes the level crossing and provides replacement access for non-motorised users. It does however require vehicular traffic to divert along the local road network.

All other options rate Significant Advantage as they provide full effective alternative access to community facilities.

Safety

The Do Nothing is rated Significant Disadvantage in respect of safety as it does not remove the level crossing from the railway. In addition, due to the curtailment of access over the railway associated with this option and

the absence of proposed infrastructure to replace road access, traffic is diverted onto the local road network without enhancements to accommodate it.

Although the Do-Minimum option, rated Significant Disadvantage in respect of safety, closes the level crossing, its impacts are equivalent to those of the Do Nothing Option.

Option 7 is rated Some Disadvantage as it closes the level crossing to vehicular traffic without providing replacement infrastructure and diverts the traffic onto the local road network without associated improvements.

Options 2, 4 and 5 are each rated Some Advantage as they provide high quality replacement local access but incorporate opening bridges which present an unconventional hazard to cyclists and pedestrians.

Option 8 is rated Some Disadvantage as it includes significant disruption to the live railway for a sustained period during construction and retains ongoing enhanced inspection and maintenance obligations in service.

Option 9 is rated Some Disadvantage as it includes significant and prolonged impact on the live railway during construction.

All other options are rated Significant Advantage as they remove the level crossing with appropriate additional infrastructure constructed to address the affected traffic.

Physical Activity

The Do Nothing is rated Significant Disadvantage due to the curtailed availability of high quality access over the railway associated with it to local social amenities. The principal high amenity greenspace in the vicinity of the existing train station is the Royal Canal. Increased closures of the level crossing would reduce access to the Royal Canal.

The Do-Minimum and Option 1 are rated Significant Disadvantage due to the severely curtailed availability of high quality access over the railway associated with them local social facilities and amenities.

Options All other options are rated Significant Advantage as they provide for equivalent or enhanced access local social facilities and amenities.

Options Assessment Stage 2

Following on from the Stage 1 Option Assessment/Multi-Criteria Analysis section above, the options that have progressed to MCA Stage 2 are highlighted in Table 3-20. The Stage 2 option selection will provide a more detailed comparison between the highlighted options to establish the preferred option.

Table 3-20 Coolmine level crossing do something options

Option	Description
Option 1	Closure of the level crossing with online overbridge.
Option 3	Closure of the level crossing with a new overbridge connecting St. Mochta's Grove to Luttrellpark Road with a footbridge at Coolmine Station.
Option 6	Closure of the level crossing and overbridge to east of Coolmine Road and Carpenterstown Road.
Option 9	Closure of the level crossing and upgrade to existing road network.

Table 3-21 provides a summary matrix of the comparative assessment undertaken at Stage 2 to identify the preferred option. Excerpts of the matrix are provided under each of the criteria below with an assessment of why the preferred option has been selected.

Table 3-21 Coolmine - Stage2 MCA matrix

Criteria	Option 1	Option 3	Option 6	Option 9
Economy				
Integration				
Environment				
Accessibility and Social Inclusion				
Safety				
Physical Activity				
Preferred Option	No	No	No	Yes

As can be seen from the above Option 9 has been identified as the preferred option over Options 1,3 and 6.

The sections below provide summaries of the MCA Stage 2 assessment that resulted in Option 3 being selected as the Reference Design.

Economy

The total capital cost of scheme options is of similar order with Option 9 the least expensive, Option 6 most expensive and Options 1 and 3 have intermediate costs between the two extremes. The ongoing inspection and maintenance costs associated with Option 9 are lower than that of other schemes.

Option 9 is rated Some Disadvantage in respect of Traffic Functionality to allow for the vehicular diversions associated with it on the enhanced local road network.

On balance Option 9 is rated Significant Advantage on Economy and the other options rated Significant Disadvantage.

Integration

Options 6 is rated Some Disadvantage as it impacts directly on 2 No. planning objectives, impacts on the train station and associated parking immediately adjacent and due to the construction impacts in respect of restricted access during construction.

Option 1 is rated Some Advantage as it curtails impact on the existing station carpark and buildings, impacts on 1No. planning objective and is better aligned with Government policy in respect of impact on railway facilities than Options 6 and 9. Option 3 is rated Some Advantage as it curtails impact on the existing station carpark and buildings but impacts on 2No. planning objectives in respect of crossings of the railway rather than just one.

Option 9 is rated Some Advantage as it closes the right of way over the level crossing and requires vehicular traffic to divert along the existing road network enhanced to carry the additional traffic. It provides enhanced non-motorised user access and does not impact significantly on the parking facilities at the station. Option 9 impacts on one planning objective.

Environment

Under the environment criteria, Option 9 has Significant Comparative Advantage over other options as it only supports sustainable mode of travel at this location, thereby reducing traffic in the area. This option is also at an advantage as the potential direct impact on protected structures, namely the Kirkpatrick Bridge and the Royal Canal (RPS), is less severe for this option than for other options.

Option 1 has Some Comparative Advantage to other options under the environment criteria. It is online and will have neutral traffic related impacts on the noise and air sensitive receptors in the area and reduced impacts

due to minimal habitat loss. Option 1 will, however have a direct impact on one protected structure, the Kirkpatrick Bridge (RPS). It has a significant disadvantage on the visual setting of the residential area.

Option 3 has Significant Comparative Disadvantage to other options. Options 3 will move traffic to new location and will have an impact on noise, air and visual sensitive receptors. The ecological corridor of the Royal Canal is also likely to be fragmented through the introduction of overbridge structures as part of this option while removal of vegetation and hedgerows along the canal is also likely.

Option 6 also has Some Comparative Disadvantage to other options as it will move traffic to a new location and will have an impact on noise, air and visual sensitive receptors.

Accessibility and Social Inclusion

In terms of Accessibility & Social inclusion, there is no comparative advantage or disadvantage between all the options. In terms of Integration, all options are identified as comparative.

Safety

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

Physical Activity

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

Design Development of the Preferred Option

During the design development process opportunities were identified for improvements to the accessibility arrangements and reduction in impacts associated with the preferred option. These design developments and the revised preferred option is presented in section 3.6.5.6.4 of this chapter.

3.6.4.4.4 Porterstown level crossing

In addition to the Do Minimum and Do Nothing scenarios the Do Something Options assessed as Stage 1 MCA are described in Table 3-22:

Table 3-22 Porterstown level crossing Do Something options

Option	Description
Option 1	Closure of the level crossing and provide a pedestrian link to Porterstown Viaduct
Option 2	Closure of the level crossing and provide Pedestrian and Cycle Bridge – Nested Ramps
Option 3	Closure of the level crossing and provide Pedestrian and Cycle Bridge – Straight Approach Ramps
Option 4	Closure of the level crossing and provide Pedestrian and Cycle Bridge – Alternative Nested Ramps

Figure 3-71 presents the options considered in Stage 1 MCA on aerial photography.



Figure 3-71 Porterstown level crossing Do Something Options (Copyright Ordnance Survey Ireland – 0039720)

Option 1 – Pedestrian link to Porterstown Viaduct

Option 1 proposes two pedestrian footpaths both north and south of the railway line and Royal Canal connecting Old Porterstown Road to the Porterstown Viaduct on the Diswellstown Road (R121 at Dr. Troy bridge – a vehicular and pedestrian carriageway). The provision of the new bridge will facilitate the closure of the level crossing but would require diversion of traffic to surrounding crossings of the railway. No improvements to the surrounding highway network are proposed as part of this option.



Figure 3-72 Option 1 – Pedestrian link to Porterstown Viaduct (Copyright Ordnance Survey Ireland – 0039720)

Option 2 – Pedestrian and Cycle Bridge – Nested Ramps

Option 2 involves the construction of a new cycle/foot bridge over the railway and canal. The provision of the new bridge will facilitate the closure of the level crossing but would require diversion of traffic to surrounding crossings of the railway. No improvements to the surrounding highway network are proposed as part of this option.



Figure 3-73 Porterstown Option 2 – pedestrian and cycle bridge – Nested Ramps (Copyright Ordnance Survey Ireland – 0039720)

Option 3 – Pedestrian and cycle bridge – straight approach ramp

Option 3 involves the construction of a new cycle/foot bridge over the railway and canal, with this option featuring straight ramps on either side of the railway as opposed to nested ramps. The provision of the new bridge will facilitate the closure of the level crossing but would require diversion of traffic to surrounding crossings of the railway. No improvements to the surrounding highway network are proposed as part of this option.

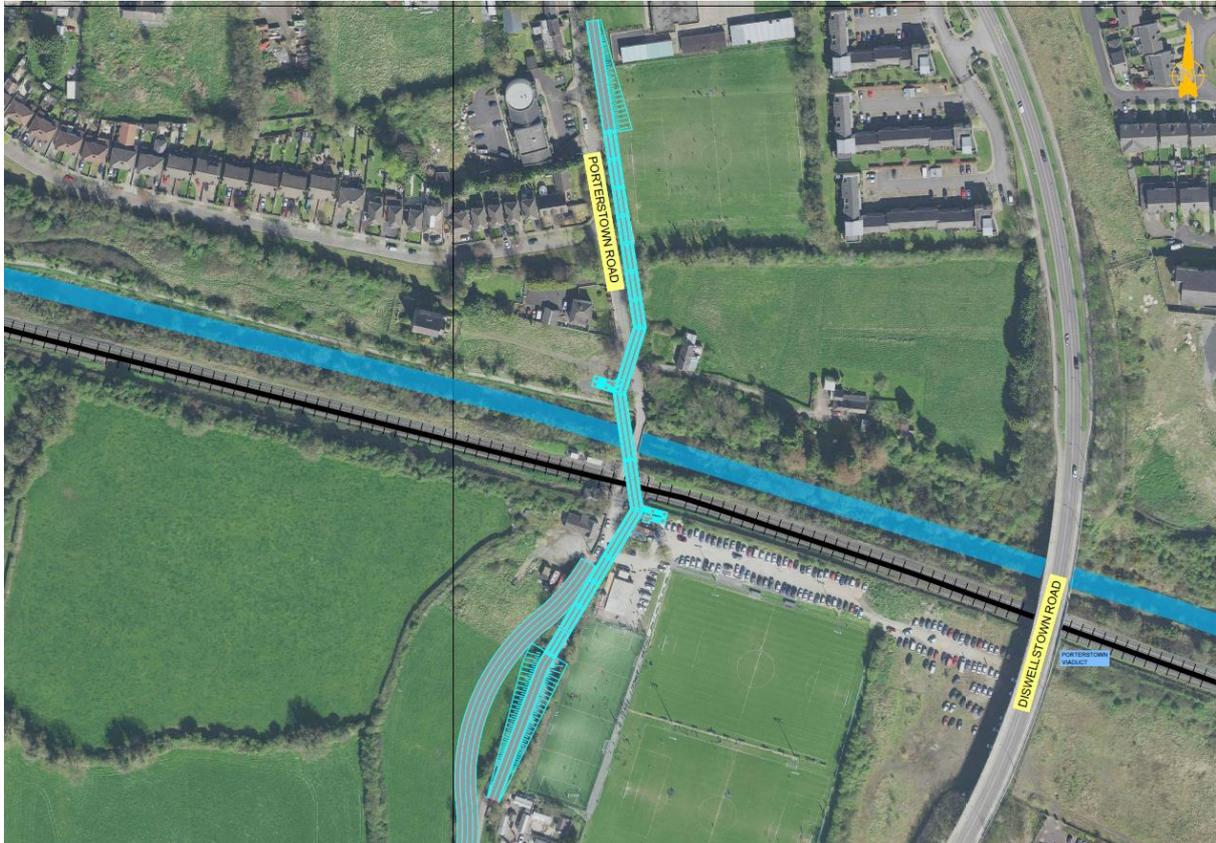


Figure 3-74 Porterstown Option 3 – Pedestrian and Cycle Bridge – Straight Approach Ramp (Copyright Ordnance Survey Ireland – 0039720)

Option 4 – Pedestrian and cycle bridge – alternative nested ramp

Option 4 involves the construction of a new cycle/foot bridge over the railway and canal. The provision of the new bridge will facilitate the closure of the level crossing but would require diversion of traffic to surrounding crossings of the railway. No improvements to the surrounding highway network are proposed as part of this option.



Figure 3-75 Porterstown Option 4 – Pedestrian and Cycle Bridge – Alternative Nested Ramp (Copyright Ordnance Survey Ireland – 0039720)

Options Assessment Stage 1

Table 3-23 provides a summary matrix of the comparative assessment undertaken as part of Stage 1 MCA. Options deemed to be feasible and comparably more advantageous than other options are identified to progress to Stage 2 MCA for a more detailed assessment.

Table 3-23 Stage 1 MCA Matrix - Porterstown

Assessment Criteria	Do Nothing	Do Minimum	Option			
			1	2	3	4
Economy	Dark Green	Light Green	Dark Green	Light Green	Dark Green	Light Green
Integration	Light Green	Dark Green	Light Green	Light Green	Light Green	Light Green
Environment	Light Green	Dark Green	Light Green	Dark Green	Dark Green	Dark Green
Social inclusion	Dark Green	Dark Green	Dark Green	Light Green	Light Green	Light Green
Safety	Dark Green	Light Green	Light Green	Light Green	Light Green	Light Green
Physical Activity	Dark Green	Dark Green	Light Green	Light Green	Light Green	Light Green
Shortlisted for Stage 2 MCA	No	No	No	Yes	Yes	Yes

The sections below provide summaries of the MCA Stage 1 assessment that resulted in Options 2, 3 and 4 being selected to advance to MCA2.

Economy

The do-nothing option is rated Significant Disadvantage as it results in a high ongoing operational, inspection and maintenance cost in addition to replacement of level crossing barrier furniture on a 20 year cycle.

The Do Minimum Option is rated Significant Advantage as construction and maintenance costs are nominal regardless of the disruption to traffic and increased journey times for road users.

Option 1 is rated as Significant Disadvantage as construction costs is high and additional land acquisition is required.

Option 2 is rate as Some Advantage as the construction costs are less than other options, maintenance costs are nominal and traffic displacement is comparable to other options.

Option 3 is rated as Some Disadvantage as construction costs are mid-range compared to other options while maintenance costs are nominal and traffic disruption is comparable to other options.

Option 4 is rated as Some Advantage as construction costs are mid-range compared to other options while maintenance costs are nominal and traffic disruption is comparable to other options.

Integration

The Do Nothing option is rated as Significant Advantage as it does not go against the local land use planning policy Objective 137. It will also facilitate continued access and integration with all modes of transport at this location, however, it does not support the delivery of the DART Expansion programme and therefore does not meet the project objectives.

The Do Minimum option is rated as Significant Disadvantage over all other options due to impact on existing local land use planning policy and no alternative access being provided for any modes of transport. Options 1, 2, 3, 4 are rated as some comparative advantage over the other options however, these options also do not support the local land use planning objective 137. These options would result in removal of the Right of Way at this location, however they offer alternatives modes of travel for pedestrian and/or cyclists.

Environment

All of the Do Something options (1, 2, 3, 4) have similar environment constraints and similar impacts when compared to the minimal intervention options of Do-Nothing and Do-Minimum. Potential impacts include significant potential impacts to architectural heritage namely indirect impacts on Keeper's Cottage (RPS No. 699) and Former Clonsilla School (RPS No. 700) and the Royal Canal (RPS No. 944a) and the potential to encounter unknown archaeological deposits that may survive in undeveloped areas. There are also landscape impacts due to the introduction of new structures over the Royal Canal RPS. There will be impacts to biodiversity particularly during construction stage due to the proximity to the Royal Canal pNHA. The Do Nothing and Do-minimum options have limited construction requirements and are rated as some comparative advantage over all other options.

Under the Biodiversity sub-criterion the Do Nothing and Do Minimum options are preferred due to fewer impact on the pNHA. All options are hydrologically connected to South Dublin Bay and River Tolka Estuary SPA. However, there is no risk of likely significant effects. There are potential impacts to Royal Canal pNHA. Option 1 and 3 have potential for impacts to bats foraging and roosting in existing bridge, buildings and trees nearby. These options would result in a loss of trees at the new bridge crossing. Option 4 would have potential for greater impacts to the pNHA than all other options due to the greater extent and closer proximity to the pNHA than other options.

All Options will impact St. Mochta's GAA club, St. Mochta's FC and St. Mochta's National School however, Option 3 will have more impacts when compared with other options.

Accessibility and Social Inclusion

Options 2, 3 and 4, those options including a pedestrian / cycle bridge with reduced diversion and designed to accommodate vulnerable users are rated Significant Advantage as they maintain access to community facilities. All other options are rated Significant Disadvantage as they effectively sever this access. The principal affected amenities in the vicinity of the level crossing include St Mochta's football grounds south of the railway, Scoil Choilm and Luttrellstown Community College and Centre south of the railway, St Mochta's National School and the Healthwell Clinic, north of the railway.

Safety

The Do Nothing option is rated Significant Disadvantage as it does not secure removal of the level crossing from the railway network. The Do-Minimum and Option 1 are rated Some Disadvantage as they divert vulnerable road users onto longer more circuitous routes. Options 2, 3 and 4 are rated Significant Advantage as they provide suitable replacement access for vulnerable road users local to the level crossing.

Physical Activity

Options 2, 3 and 4, those options including a pedestrian / cycle bridge with reduced diversion and designed to accommodate vulnerable users are rated Significant Advantage as they maintain access to amenity spaces. All other options are rated Significant Disadvantage as they effectively sever this access or result in circuitous diversion. The principal affected amenities in the vicinity of the level crossing include the Royal Canal and the amenity zoned lands south west of the level crossing.

Options Assessment Stage 2

Following on from the Stage 1 Option Assessment/Multi-Criteria Analysis section above; the options that have progressed to MCA Stage 2 are highlighted in Table 3-24. The Stage 2 option selection will provide a more detailed comparison between the highlighted options to establish the preferred option.

Table 3-24 Porterstown Level Crossing Do Something Options

Option	Description
Option 2	Closure of the level crossing and provide Pedestrian and Cycle Bridge – Nested Ramps
Option 3	Closure of the level crossing and provide Pedestrian and Cycle Bridge – Straight Approach Ramps
Option 4	Closure of the level crossing and provide Pedestrian and Cycle Bridge – Alternative Nested Ramps

Options Assessment Table 3-25 provides a summary matrix of the comparative assessment undertaken at Stage 2 to identify the preferred option. Excerpts of the matrix are provided under each of the criteria below with an assessment of why the preferred option has been selected.

Table 3-25 Stage 2 MCA Matrix- Porterstown

Criteria	Option 2	Option 3	Option 4
Economy			
Integration			
Environment			
Accessibility and Social Inclusion			
Safety			
Physical Activity			

Criteria	Option 2	Option 3	Option 4
Preferred Option	Yes	No	No

As can be seen from the above Option 2 has been identified as the preferred option over Options 3 and 4.

The sections below provide summaries of the MCA Stage 2 assessment that resulted in Option 2 being selected as the preferred option.

Economy

With regard to overall capital cost, Options 2 and 4 are the least expensive options while Option 3 is most expensive with regard to construction costs and requirement for land acquisition along the existing Porterstown Road. The options are comparable in respect of inspection and maintenance. As the Porterstown Road has already been bypassed in effect by the Diswellstown Road via the Porterstown Viaduct and an alternative route is already being used by all but local traffic, all the options are comparable in terms of traffic and associated economic benefit.

Options 2 and 4 are rated Some Advantage; Option 3 is rated Some Disadvantage.

Integration

In terms of integration, all options are comparable as they all involve the diversion of the traffic onto Diswellstown Road while maintaining access for pedestrians and cyclists at the current crossing via a bridge.

All Options do not support Fingal DP map-based Specific Objective 137 "Preserve the existing pedestrian and vehicular right of way at the level crossing at Porterstown". An alternative right of way for pedestrians and cyclist being provided as part of the options at the existing level crossing location.

The Kellystown Local Area Plan 2020 supports the DART+ programme and includes a proposed external Connections (on road/off road depending on feasibility) ways (off road) at the level crossing which would be consistent interface with the proposed Porterstown Level crossing replacement. On the northern side of the tracks an SHD application was lodged for 198 no. apartments, childcare facilities and associated site works (ABP Ref. 309622) at the Old School House Site (a protected structure), however the application was refused by ABP on 28/06/2021.

Environment

Option 2 is rated Some Advantage over other options. All options have the potential to impact several of the same protected structures such as the Old Schoolhouse and Canal bridges. The ramps of Options 2 and 4 are located in closer proximity to the Royal Canal pNHA and would result in more significant impacts during both construction and operation to the Royal Canal way. Option 4 impacts on the established trees / woodland area in proximity to the Canal. Option 3 represents a significant structure resulting in significant landscape and visual impact on roadside trees and hedgerows. It has significant visual impact for properties on Porterstown Road, north of the canal which is not evident for other options.

Accessibility and Social Inclusion

All options are considered to perform equivalently from the perspective of Accessibility and Social Inclusion as they replace severed access to equal measure.

Safety

All options are considered to perform equivalently from the perspective of Safety as they replace severed access to equal measure.

Physical Activity

All options are considered to perform equivalently from the perspective of Safety as they replace severed access to equal measure.

3.6.4.4.5 Clonsilla level crossing

In addition to the Do-Minimum and Do-Nothing scenarios described in Section 3.4.4.3 and Section 3.4.4.2, the Do Something Options assessed as Stage 1 MCA are described in Table 3-26:

Table 3-26 Clonsilla Level Crossing Do Something Options

Option	Description
Option 1	Closure of the level crossing and provide a pedestrian and cycle bridge
Option 2	Closure of the level crossing and provide an overbridge 200 m to the east of crossing
Option 3	Closure of the level crossing and provide an overbridge 370 m to the west of crossing
Option 4	Closure of the level crossing and provide an overbridge 210 m to the west of crossing
Option 5	Closure of the level crossing and provide an overbridge 200 m to the east of crossing – Online at Larchgrove
Option 6	Closure of the level crossing and provide an overbridge 200 m to the east of crossing – Online at Larchgrove
Option 7	Closure of the level crossing and provide an overbridge 200 m to the east of crossing – Online of Larchgrove with Retained Walls

Figure 3-76 presents the options considered in Stage 1 MCA on aerial photography.



Figure 3-76 Clonsilla level crossing Do Something options (Copyright Ordnance Survey Ireland – 0039720)

Option 1 – Pedestrian and cycle bridge

This option includes the provision of a new pedestrian and cycle footbridge 5 m wide. The bridge provides a connection between Clonsilla road either side of the crossing. The arrangement of the bridge utilises nested ramps to the north and south of the existing station where it crosses.

The rail level at the crossing is approximately 63.2 m OD and the canal at 61.5 m OD with the bridge level over the railway at 69.7 m OD. The ramps on either side of the bridge will not exceed 5% gradient. Constraints on bridge crossing here include the train station, the Royal Canal, the protected railway structures, and the canal bridge. Vehicular traffic will need to divert around the crossing, the diversion being an estimated 4.3 km.



Figure 3-77 Clonsilla Option 1 – Pedestrian and cycle bridge (Copyright Ordnance Survey Ireland – 0039720)

Option 2 – Overbridge 200 m to the East

Option 2 involves the construction of a new bridge above the railway and canal located 200 m to the east of the existing crossing. The road will ramp up to the bridge from 310 m on the northern side and 320 m on the southside of the proposed bridge. The provision of the new bridge will facilitate the closure of the level crossing.



Figure 3-78 Clonsilla Option 2 – Overbridge 200 m to the East (Copyright Ordnance Survey Ireland – 0039720)

The route would cross over the railway and canal at right angles before connecting into the Clonsilla Link Road. The existing R121 is proposed to be realigned to form a crossroads with the proposed overbridge link road. The option can accommodate a cross section of a 9 m carriageway with 2 m footpaths and 3 m cycle/footway on both sides.

The length of the option is approximately 310 m on the northern side and 320 m south of the rail line. The option would rise to an approximate deck level of 68.2 m OD above the rail the rail which is a at a level of 60.2 m OD at the crossing point.

This option would require some property acquisition and modifications to existing accesses.

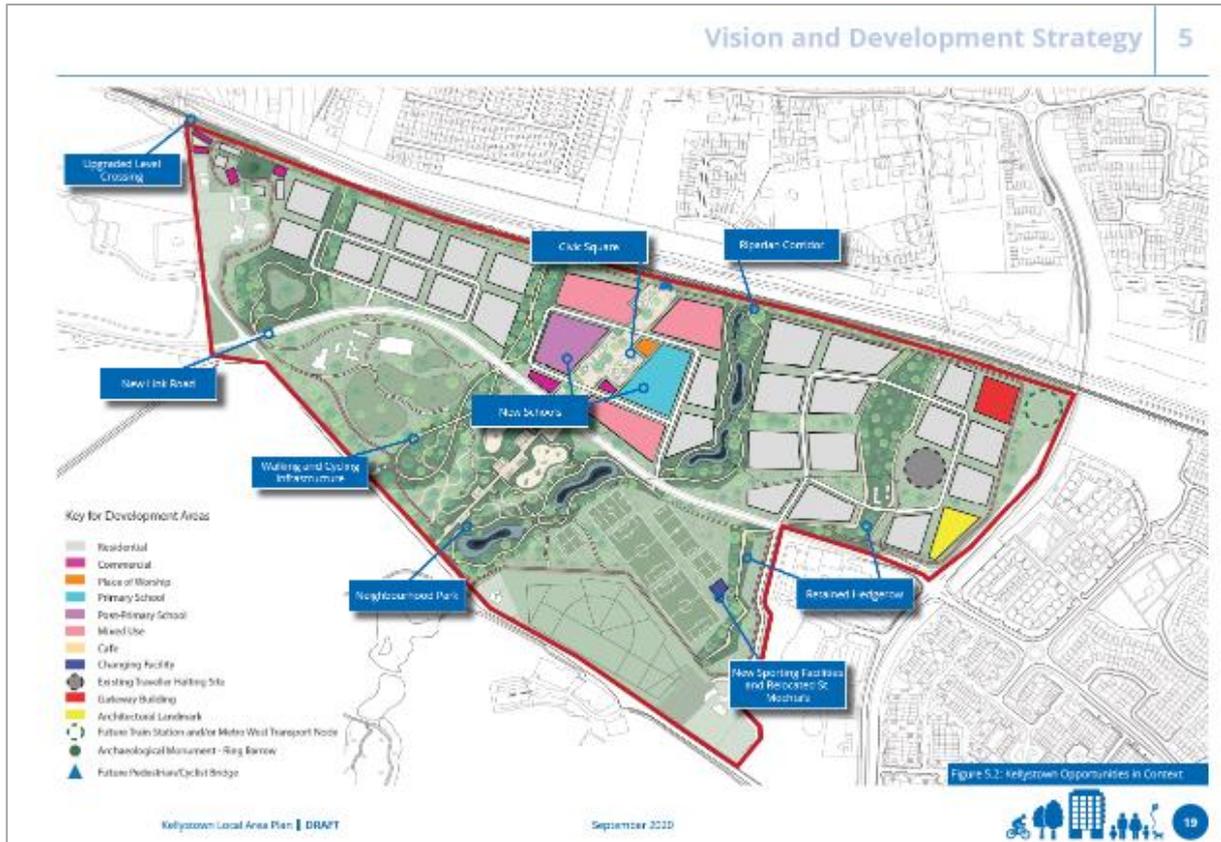


Figure 3-79 Extract from Kellystown LAP

Option 3 – Overbridge 370m to the West

This option would involve construction of a new link road located at 370 m west of Clonsilla Railway Station. This route would descend from the Woodwall Road and cross the rail and canal at right angles before connecting into the Hansfield Road. The existing Hansfield Road is proposed to be realigned into the greenfield site adjacent to the St James hospital in will pass beneath the proposed link road to re-join the existing alignment. The option can accommodate a cross section of a 7 m carriageway with 2 m footpaths and 1.5 m cycle tracks on both sides.

The length of the option is approximately 310 m on the northern side and 320 m south of the rail line. The option would rise to an approximate deck level of 68.1 m OD above the rail the rail which is a at a level of 60.1 m OD at the crossing point.

This option would require some property acquisition and modifications to existing accesses.



Figure 3-80 Clonsilla Option 3 – Overbridge 370 m to the West (Copyright Ordnance Survey Ireland – 0039720)

Option 4 – Overbridge 210 m to the West

This option would involve construction of a realignment of the existing Clonsilla road. The realignment would commence 90 m south of the existing crossing and will pass south of the Clonsilla railway station. The alignment then turns into a northern direction and bridges over the railway and canal at 210 m west of the railway station. A junction is formed with Hansfield Road 50 m north of the rail line.

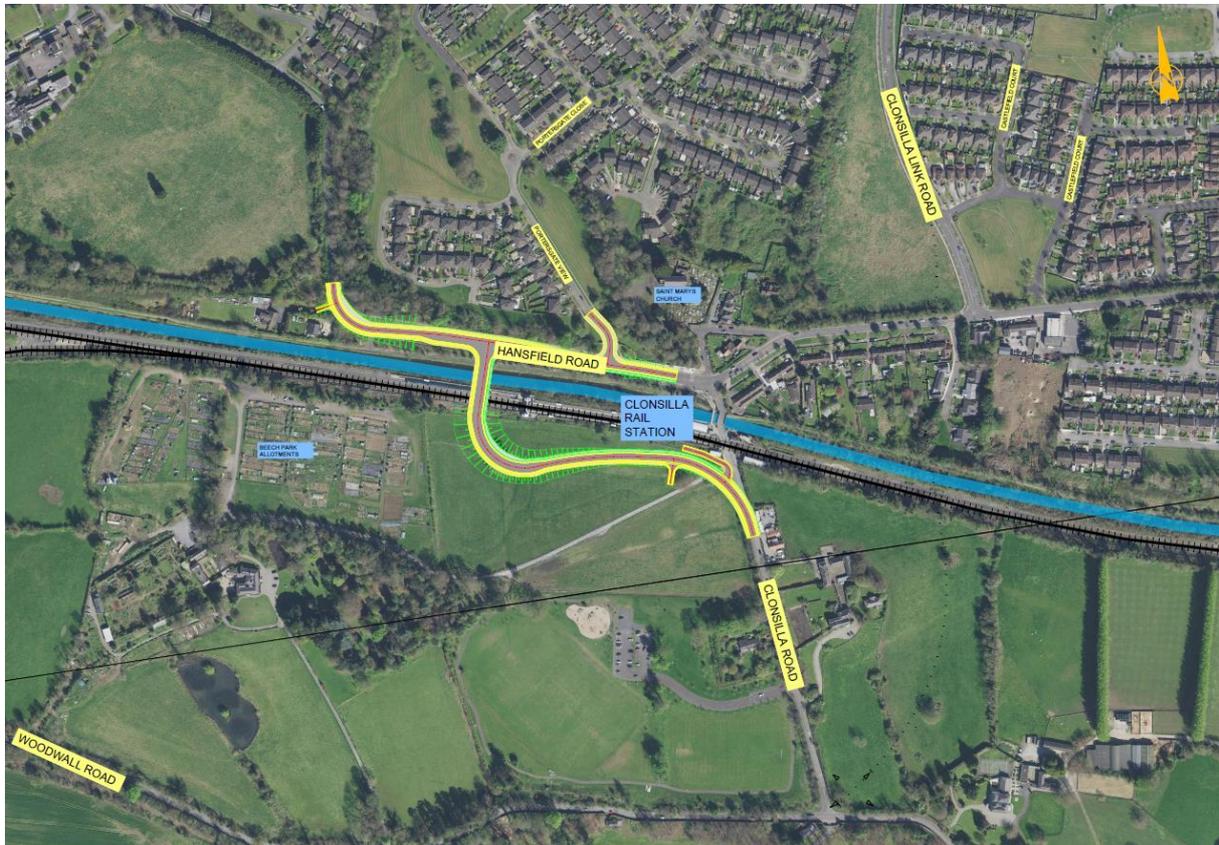


Figure 3-81 Clonsilla Option 4 – Overbridge 210 m to the West (Copyright Ordnance Survey Ireland – 0039720)

The option can accommodate a cross section of a 7 m carriageway with 2 m footpaths and 1.75 m cycle tracks on both sides.

The option would rise to an approximate deck level of 68.1 m OD above the rail the rail which is a at a level of 59.8 m OD at the crossing point. This option would require some property acquisition and modifications to existing accesses.

Option 5 – Overbridge 200m to the East – Reduced Carriageway

This option is following a very similar alignment to Option 2 with an overbridge proposed approximately 200 m east of the existing level crossing. However, a reduced 9 m carriageway width is proposed, while retaining the 3.0 m footway/cycle way, with un-retained embankments to the north of the rail crossing.

Although this option would reduce the road footprint the overall extent of the road and earthworks would be greater than Option 2. As a result, this would likely impact the surrounding properties to a greater degree.



Figure 3-82 Clonsilla Option 5 – Overbridge 200 m to the east – Reduced Carriageway (Copyright Ordnance Survey Ireland – 0039720)

Option 6 – Overbridge 200 metres to the east – online of Larchgrove

This option involves the construction of an overbridge approximately 200 metres to the east of the existing level crossing.

This overbridge will span the railway and the canal perpendicularly at a similar location to Option 2 and will tie into an existing road on the northern end of scheme and at a proposed roundabout at the southern end of the scheme. The option can accommodate a cross section of a 9.0 m carriageway with 3.0 m segregated cycle/footways on both sides.

Similar to Option 2, a structure approximately 60 metres in length would be required to span the railway. Initial examination suggests that the embankments would extend at least 80 metres on each approach to the bridge. Embankment heights on either side of the railway would be up to 8.0 metres high. The existing railway level at the proposed crossing point is at approximately 60.2 m OD with the highest proposed road level at 68.2 m OD.

Following the alignment of Larchgrove north of the railway, this option eliminates the need to demolish two properties, though embankments are brought closer to existing residences, with the bottom of the embankment approximately 3 m from the nearest house. It is unlikely that this will be acceptable to residents of the area.



Figure 3-83 Clonsilla Option 6 – Overbridge 200 metres to the East – Online of Larchgrove (Copyright Ordnance Survey Ireland – 0039720)

Option 7 – Overbridge 200 metres to the east – online of Larchgrove with retaining walls

Option 7 involves the construction of a new bridge above the railway and canal located 200 m to the east of the existing crossing. This option is following a very similar alignment to Option 2; however, to reduce the impact on adjacent residential properties the carriageway will be bounded by retaining walls. The provision of the new bridge will facilitate the closure of the level crossing.



Figure 3-84 Clonsilla Option 7 – Overbridge 200 metres to the east – online of Larchgrove with retaining walls (Copyright Ordnance Survey Ireland – 0039720)

Options Assessment Stage 1

Table 3-27 provides a summary matrix of the comparative assessment undertaken as part of Stage 1 MCA for the Clonsilla level crossing. Options deemed to be feasible and comparably more advantageous than other options are identified to progress to Stage 2 MCA for a more detailed assessment.

Table 3-27 Stage 1 MCA matrix - Clonsilla

Assessment Criteria	Do Nothing	Do Minimum	Options						
			1	2	3	4	5	6	7
Economy									
Integration									
Environment									
Social inclusion									
Safety									
Physical Activity									
Shortlisted for Stage 2 MCA	No	No	Yes	Yes	No	Yes	No	No	No

Economy

The Do Nothing option is rated Significant Disadvantage as it results in a high ongoing operational, inspection and maintenance cost in addition to replacement of level crossing barrier furniture on a 20 year cycle.

The Do Minimum Option is rated Significant Advantage as construction and maintenance costs are nominal regardless of the disruption to traffic and increased journey times for road users.

Option 1 is rated Some Advantage as total capital cost and ongoing maintenance costs are low in comparison to other bridge options while it requires that local vehicular traffic be diverted along the local road network.

All of Options 2 to 7 are rated Some Disadvantage due to the comparative low cost of other options under comparison.

Integration

The Do-nothing option would not support for DART+ West, and, although not severed, it will restrict access over the railway so it will impact on local planning policy/objectives hence is rated Some Disadvantage over other options. Do Minimum does not impact zoning objectives, however closure of the level crossing with no alternative access would prevent land use and planning integration at this location and access to Clonsilla Station from either side of the tracks/canal and restricting access to the Royal Canal greenway.

Option 2, 5,6 and 7 are rated Some Advantage over other options. They all maintain vehicular access however would interface with the Draft Kellystown LAP 2020 impacting future Open Space and residential areas. It would also impact Clonsilla village established residential, town centre and district. Further consultation would be required with FCC if any of these options were selected as the preferred option.

Option 3 and 4 would also maintain vehicular access however these options would impact extensive areas of zoned high amenity areas, protected trees and open space provisions associated with Beechpark Demesne. Option 3 would also be inconsistent with the Hansfield SDZ movement strategy and are rated some disadvantage over other options.

Option 1 is rated as some comparative advantage when compared to other options due to the discrete impacts to the surrounding environment mainly associated with the Royal Canal amenity.

Environment

The Do Minimum and Do Nothing Option have limited/no direct impacts on the environment when compared with other options and for this reason are rated significant comparative advantage.

Due to the discrete sizes of Option 1, and 4 they are rated some comparative advantage as they have less direct impacts to all aspects of the environmental sub-criteria examined.

Option 2,3 5,6 and 7 are rated some comparative disadvantage due to the extensive online nature of these option which would impact properties, direct and indirect impacts on demesne associated with the Courtyard, Beech Park House (RPS) and Clonsilla Lodge. Potential indirect impacts on the Royal Canal (RPS No. 944a) and Luttrellstown ACA. Potential to encounter unknown archaeological deposits that may survive within greenfield areas.

Option 3 and 5 are both two of the longest routes and have significant disadvantages due to extent of impacts across all environmental sub-criteria, including significant heritage impacts, air, noise and landscape impacts. Option 5 would impact the most properties and would have significant environmental impacts across all sub-criteria.

Accessibility and Social Inclusion

The Do-Nothing and Do Minimum Options rate Significant Disadvantage due to the restriction on access over the railway caused by each. Road traffic on local road network diversions in respect of station accessibility are of the order of 5.5 km. Vulnerable road users would be negatively impacted without replacement infrastructure put in place. Community facilities affected by reduced access include Shopping facilities, St Joseph's Medical Centre, St Mary's Church, 2No.Montessori School - north of the railway and The Courtyard Beechpark, Westmanstown Sports and Conference Centre, Dublin Falconry and Luttrellstown Castle Resort - south of the railway.

Options 1, 2 and 4 to 7, are rated Some Advantage as they provide alternative access for vulnerable road users. Option 3 is rated Some Disadvantage as, although it provides for alternative access for vulnerable road users, the diversion route is longer.

Safety

The Do Nothing option is rated Significant Disadvantage as it does not secure removal of the level crossing from the railway network. The Do Minimum and Option 1 are rated Some Disadvantage as they divert vulnerable road users onto longer more circuitous routes. All other options are rated Some Advantage as they provide suitable replacement access for vulnerable road users local to the level crossing.

Physical Activity

The Do Nothing and Do Minimum options are rated Significant Disadvantage due to the degree to which they curtail access over the railway at a local level. The principal high amenity greenspaces in the vicinity of the existing train station include the Royal Canal, the amenity zoned lands and golf courses south of the level crossing. Access to these will be affected by curtailment of access over the railway.

Option 1 provides for full replacement access at the level crossing for non-motorised users. It is rated Significant Advantage as a consequence. All other options are rated Some Advantage or Some Disadvantage based on the length of detour required for access to the amenity lands associated with each.

Options Assessment Stage 2

Following on from the Stage 1 Option Assessment/Multi-Criteria Analysis section above, the options that have progressed to MCA Stage 2 are highlighted in Table 3-28. The Stage 2 option selection will provide a more detailed comparison between the highlighted options to establish the preferred option.

Table 3-28 Clonsilla level crossing Do Something options

Option	Description
Option 1	Closure of the level crossing and provide a pedestrian and cycle bridge
Option 2	Closure of the level crossing and provide an overbridge 200 m to the east of crossing
Option 4	Closure of the level crossing and provide an overbridge 210 m to the west of crossing

The sections below provide summaries of the MCA Stage 2 assessment that resulted in Option 2 being selected as the preferred option. Table 3-29 summarises the result of the Stage 2 MCA.

Table 3-29 Stage 2 MCA Summary Matrix – Clonsilla

Criteria	Option 1	Option 2	Option 4
Economy			
Integration			
Environment			

Criteria	Option 1	Option 2	Option 4
Accessibility and Social Inclusion			
Safety			
Physical Activity			
Preferred Option	Yes	No	No

As can be seen from the above Option 1 has been identified as the preferred option over Options 2 and 4.

The sections below provide summaries of the MCA Stage 2 assessment that resulted in Option 1 being selected as the preferred option.

Economy

The Capital Cost and ongoing inspection and maintenance costs associated with Option 1 are significantly lower than the equivalent for other options. The traffic functionality associated with Option 1 is, however inferior to other options. Consequently Option 1 is rated Some Advantage while other options are rated Some Disadvantage.

Integration

Option 1 would result in severance of vehicular access to the train station car parking from south of the railway and would require significant re-routing of proposed L52 bus route (BusConnects). It is rated as some advantage over all other options under the Integration criteria as it supports higher level planning policy objectives in terms of DART Expansion and has less impact on zoned High Amenity and Open Spaces lands than any of the Do Something options.

Options 2 impacts the greatest amount of high amenity and open space zoned lands, it would also impact the Draft Kellystown LAP.

Option 4 provides vehicular, pedestrian and cyclist access and would impact less zoned high amenity area than Option 2 and for this reason it is rated some comparative advantage. Further consultation would be required with FCC to ensure integrated planning and transport is facilitated in this growing area.

Environment

Due to the discrete size of the pedestrian and cycle bridge Option 1 is rated Some Comparative Advantage over the other options as it has less direct impacts on the environment than the other options. Options 2 will involve a number of house acquisitions. Option 1 will have less impacts on amenity lands than Option 4. It provides fewer direct and indirect impacts on the environment compared to the construction of a new link road associated with Options 2 and 4 which would Significant Disadvantage impacts on high amenity landscapes, open space, cultural heritage including RPS. Option 1 would also reduce air quality and noise impacts in this location. Option 1 impacts on the Royal Canal, with piers impacting the footprint of the canal and localised narrowing to accommodate the proposed greenway.

Accessibility and Social Inclusion

Options 1 is rated Some Advantage as it provides alternative access for vulnerable road users immediately at the location of the level crossing and adjacent to the train station. The other options are rated Some Disadvantage as the involve some detour for access to community facilities.

Safety

Option 1 is rated Some Disadvantage as it severs vehicular traffic resulting in detour. It does however provide effective local access for vulnerable road users. The other options are rated Some Advantage as they maintain vehicular access but result in local detour for vulnerable road users.

Physical Activity

Option 1 is rated Some Advantage over other options as it provides a direct high quality replacement for access for non-motorised users. The other options are rated Some Disadvantage as they provide for the same but with local detour.

3.6.4.4.6 Barberstown level crossing

In addition to the Do minimum and Do Nothing scenarios, the Do Something Options assessed as Stage 1 MCA are described in Table 3-30:

Table 3-30 Barberstown level crossing Do Something options

Option	Description
Option 1	Online Overbridge
Option 2	Overbridge 130 metres to the west of the existing level crossing
Option 3	Overbridge 195 metres to the east
Option 4	Overbridge 250 metres to the west of the existing level crossing
Option 5	Provision of a Pedestrian/Cycle Overbridge
Option 6	Lowering of the Railway Vertical Alignment

Figure 3-85 presents the options considered in Stage 1 MCA on aerial photography.

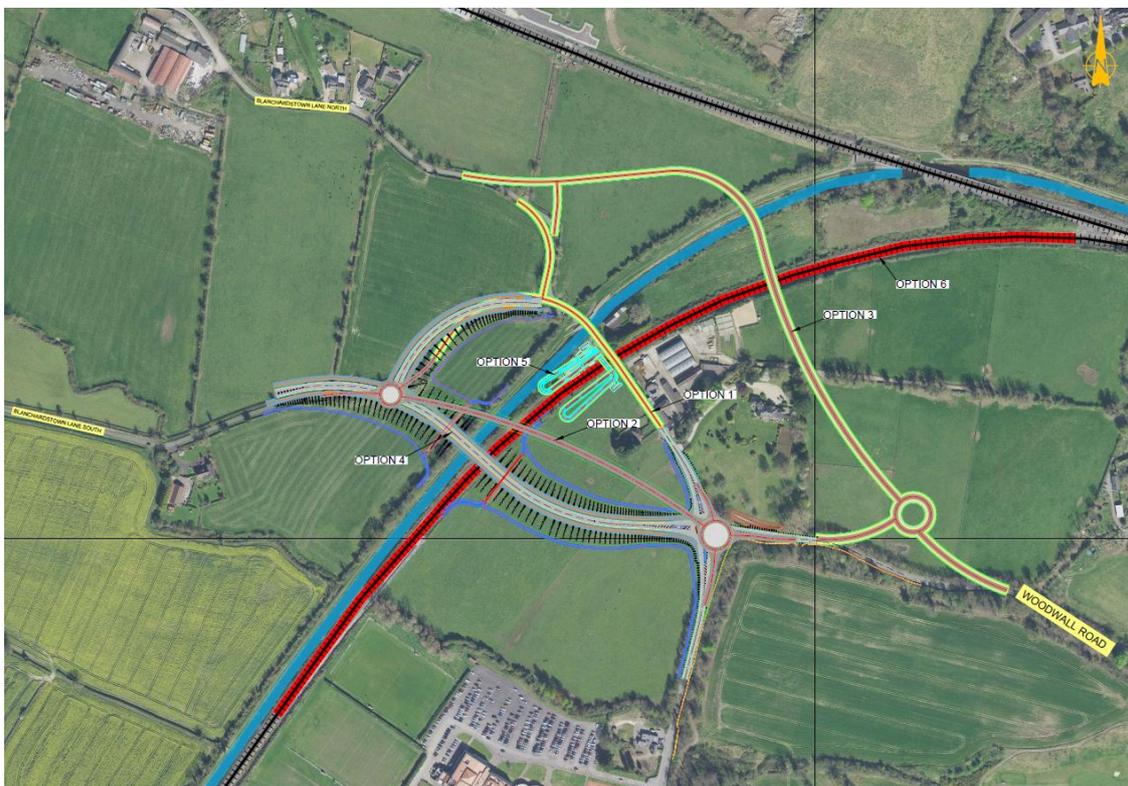


Figure 3-85 Barberstown level crossing Do Something options (Copyright Ordnance Survey Ireland – 0039720)

Option 1 - Online Overbridge

This option will be online of the existing crossing and road which will be elevated at approx. 7 m at the crossing with approaches of approx. 200 m, accommodating a cross section of a 4 m wide carriageway with 2.5 m wide footpaths on both sides. There is insufficient room for with this option to accommodate dedicated cycle tracks without increasing the overall road footprint and impact on the adjacent properties further.

A structure approximately 15 m in length would be required to span the railway with a separate bridge to span the canal of approximately 20 m. Due to the location of the bridge over the canal this option would likely require the demolition of the protected Pakenham Bridge if not fully spanned.

The railway is currently at a level of 59.5 m OD at the existing level crossing with the proposed overbridge structure being at a minimum road level of 66.8 m OD to provide the minimum clearance required for the electrification of the rail line.

Embankment heights adjacent to properties north of the railway would be up to 6.6 m while houses immediately south west of the railway would have embankments in the order of 6.4 m high adjacent to them.

Properties on either side of the road to the south-east of the railway would severely restrict the construction of an online route at this location without partial or complete property acquisitions.

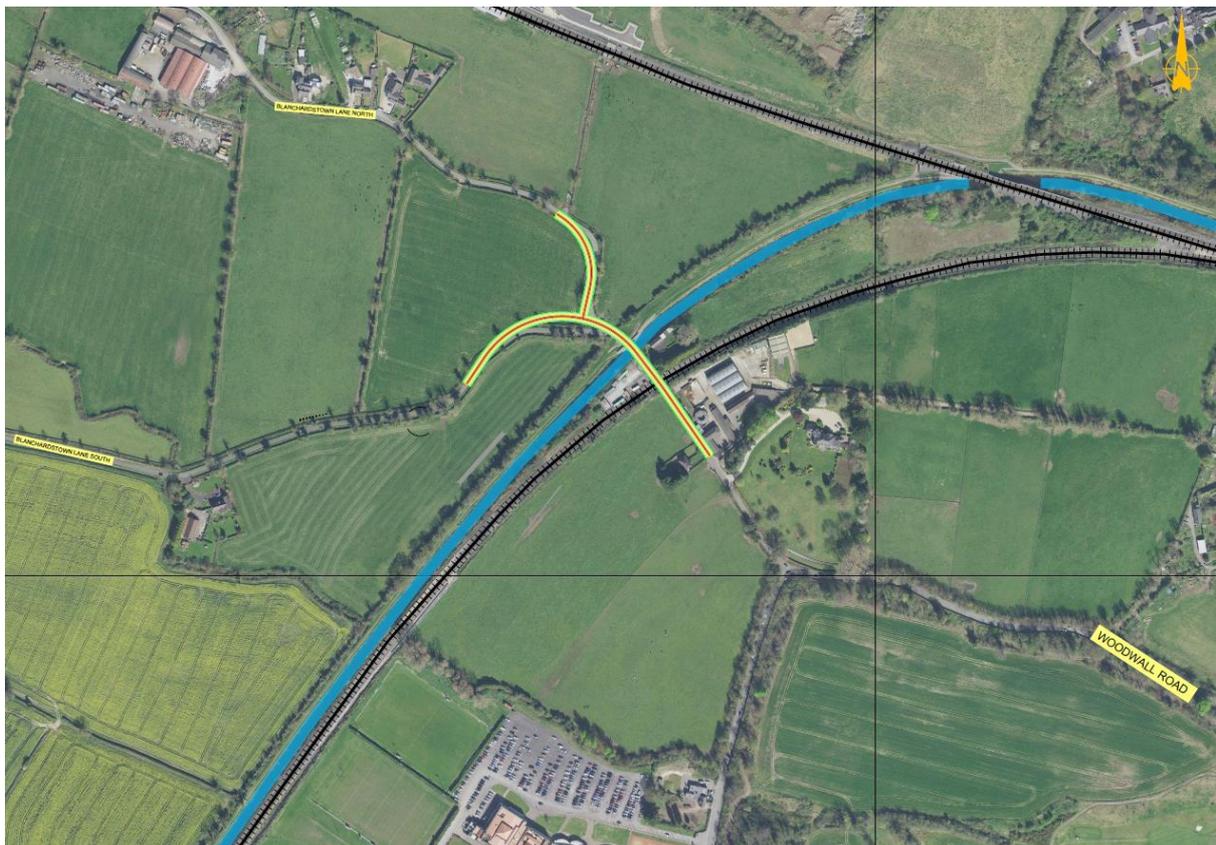


Figure 3-86 Barberstown Option 1 – online overbridge (Copyright Ordnance Survey Ireland – 0039720)

Option 2 – Overbridge 130 m to the west of the existing level crossing

This option would take the form an overbridge spanning the railway and an overbridge spanning the canal along with a roundabout at either end of route option to facilitate a tie-in with the existing road network. Alternatively, a single longer bridge crossing both the canal and the railway could be implemented. There is restricted access between the canal and the railway to construct this option.

The structure approximately 10 m in length would be required to span the railway with a separate bridge to span the canal of approximately 20 m, accommodating a cross-section of a 6 m wide carriageway with 3 m foot/cycleway on both sides.

The railway is currently at a level of 58.9 m OD at the existing level crossing with the proposed overbridge structure being at a minimum road level of 66.2 m OD to provide the minimum clearance required for the electrification of the rail line.

This option was developed to the west of the level crossing considering the known constraints, and it should be noted that this route option is slightly shorter than Option 4. This option would require land take on either side of the rail, which is primarily greenfield, but includes a residential property on the south of the rail.



Figure 3-87 Barberstown Option 2 – overbridge 130 m to the west of the existing level crossing (Copyright Ordnance Survey Ireland – 0039720)

Option 3 – Overbridge 195 m to the east

This option would take the form multiple overbridges spanning the railway, the canal along with a roundabout at either end of route option to facilitate a tie-in with the existing road network. The route approximately 195 metres to the east of the level crossing was developed considering the surrounding constraints.

This option is approximately 1150 m in length and links the R121 to the south and the Ongar Distributor Road to the north. To the north the route ties into an existing roundabout on the Ongar Distributor Road while to the south a new off-line roundabout would need to be constructed with a realignment of the R121.

Three new overbridges would be required at an elevation of approx. 7 m above the railway, one to span the Dublin Sligo Line, another over the Royal Canal and further bridge to span the Clonsilla Navan Line in the vicinity of Hansfield Station accommodating a cross-section of a 6.5 m wide carriageway with 2.5 m wide footpaths on both sides.

This option would require land take on either side of the rail which is primarily greenfield.

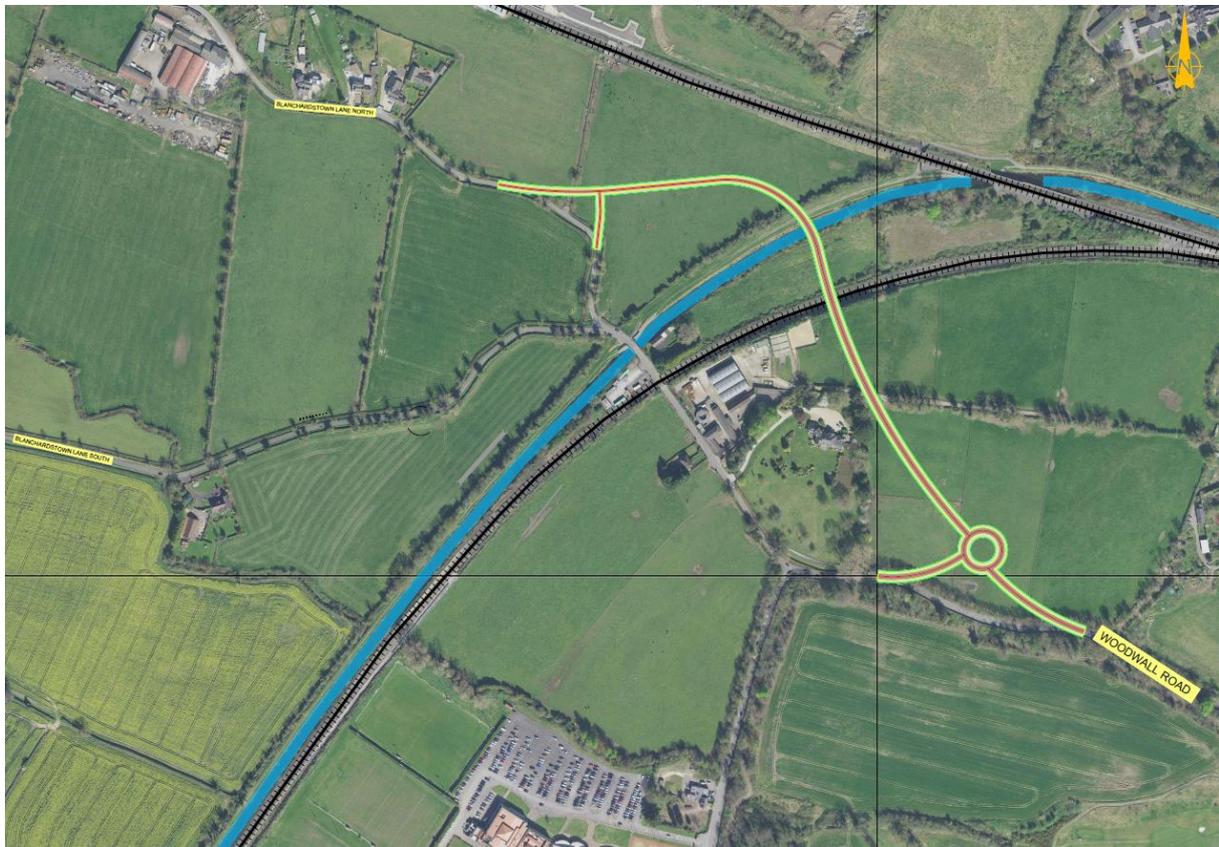


Figure 3-88 Barberstown Option 3 – overbridge 195 m to the east (Copyright Ordnance Survey Ireland – 0039720)

Option 4 – Overbridge 250 m to the West of the Existing Level Crossing

This option would take the form of a bridge spanning over the railway and the canal along with a roundabout at the northern end of the proposed route and a junction with the Kellystown Road at the southern end, facilitating a tie-in with the existing road network. There is restricted access between the canal and the railway to construct this option.

The corridor is approximately 10 m wide and the canal corridor is approximately 20 m wide, accommodating a cross section of a 7 m wide carriageway with 1.7 m raised verge on either side with a 3.8 m wide pedestrian cycleway on both sides.

The proposed overbridge structure will rise to 9.3 m above the railway to provide the minimum clearance required for the electrification of the rail line.

This option would require landtake on either side of the railway, which is primarily greenfield, but includes a residential property on the south of the railway.

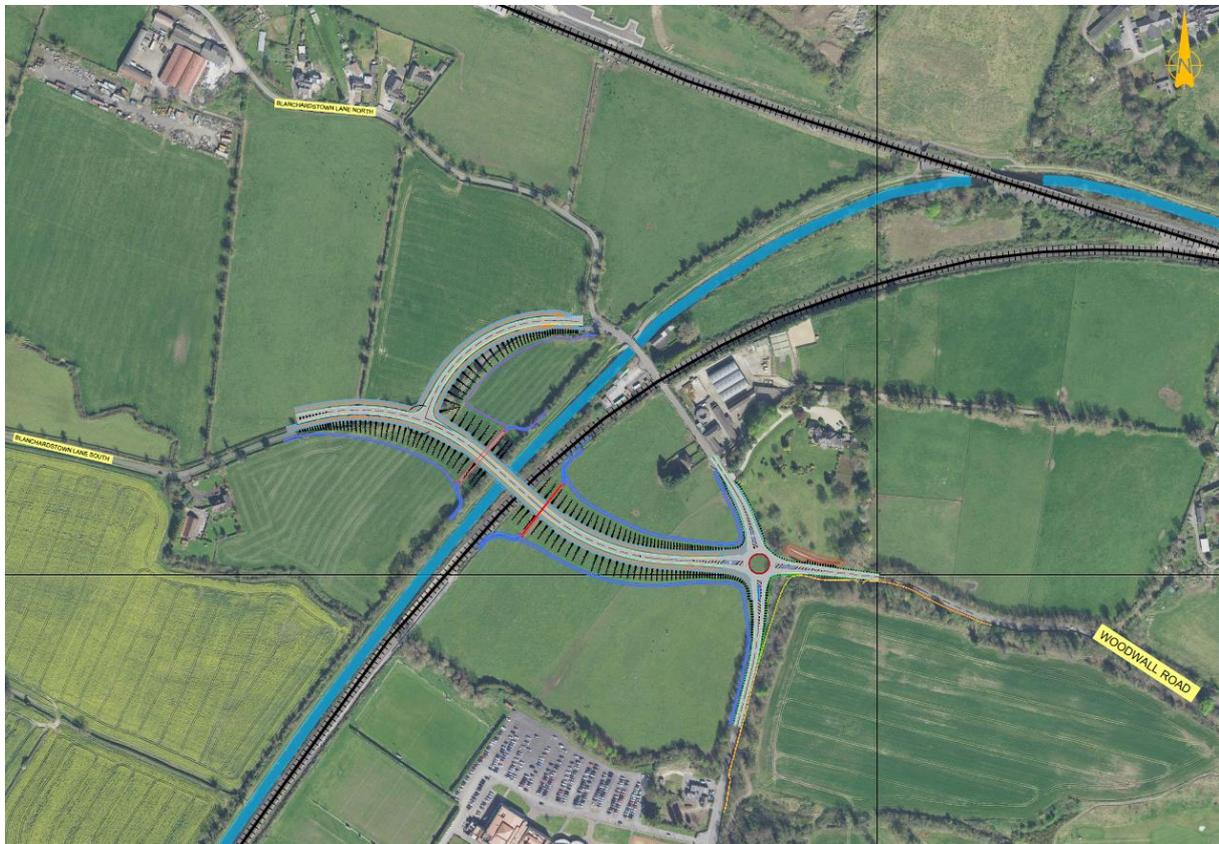


Figure 3-89 Barberstown Option 4 – overbridge 250 m to the west of the existing level crossing (Copyright Ordnance Survey Ireland – 0039720)

Option 5 – Provision of a pedestrian / cycle overbridge

This option includes the provision of a new Pedestrian and Cycle Footbridge. The bridge will provide connection for pedestrian and cyclists over the railway between Barberstown Lane and Milestown Road. Cyclists will cross the railway via a set 3.4 m wide switch back ramps on the western side of Barberstown Lane. The ramps are both approximately 150 m long at a gradient of approximately 5%. Separate pedestrian stairs will be provided on either side of the railway joining to the railway span.

The bridge will be at 66.00 m OD at its highest point, approximately 6.5 m above the railway level to provide minimum clearance for electrification of the rail line.

Constraints in the vicinity include the list Royal Canal bridge and rail infrastructure on the northern side of the rail line.



Figure 3-90 Barberstown Option 5 – provision of a pedestrian/Cycle overbridge (Copyright Ordnance Survey Ireland – 0039720)

Option 6 – Lowering of the Railway Vertical Alignment

This Option would entail lowering the track alignment for approximately 500 m east and west of the existing Barberstown Level Crossing with a track gradient at a maximum of 1%. The track lowering would commence west of the railway junction between the Maynooth Line and M3 Parkway Line.

A new road bridge would be required at the location of the existing level crossing with a soffit level approximately 3.5 m above the existing level crossing. The southern approach road would need to be realigned to meet the road level of the new road bridge. The realignment would impact the farm building to the east of the existing road and farmland to the west. The northern approach road would tie in with the existing canal bridge. To the south of the railway on the eastern approach the railway is bounded by farm buildings adjacent to the level crossing and farmland further east. A retaining wall will be required adjacent to the farm buildings for approximately 150 m with heights ranging from 2 m to 4 m. Adjacent to the farmland the lowering of the alignment could be facilitated in a cutting requiring the acquisition of a strip of farmland. Alternatively, the retaining wall could be continued for the full 500 m. To the north of the railway the railway is bounded by fields for the full 500 m. The lowering of the railway could be facilitated in a cutting but would require the CPO of a strip of the fields. Alternatively, a retaining wall could be built for 500 m ranging in height from 2 m to 4 m.

On the western approach, the railway is bounded by farmland to the south and the Royal Canal to the north. An existing railway maintenance depot is located adjacent to the level crossing on the northern side. To the south the lowering of the railway could be facilitated in a cutting requiring the acquisition of a strip of farmland. Alternatively, a retaining wall could be built for 500 m ranging in height from 2 m to 4 m. It is envisaged that the railway maintenance depot could be reinstated following the works.

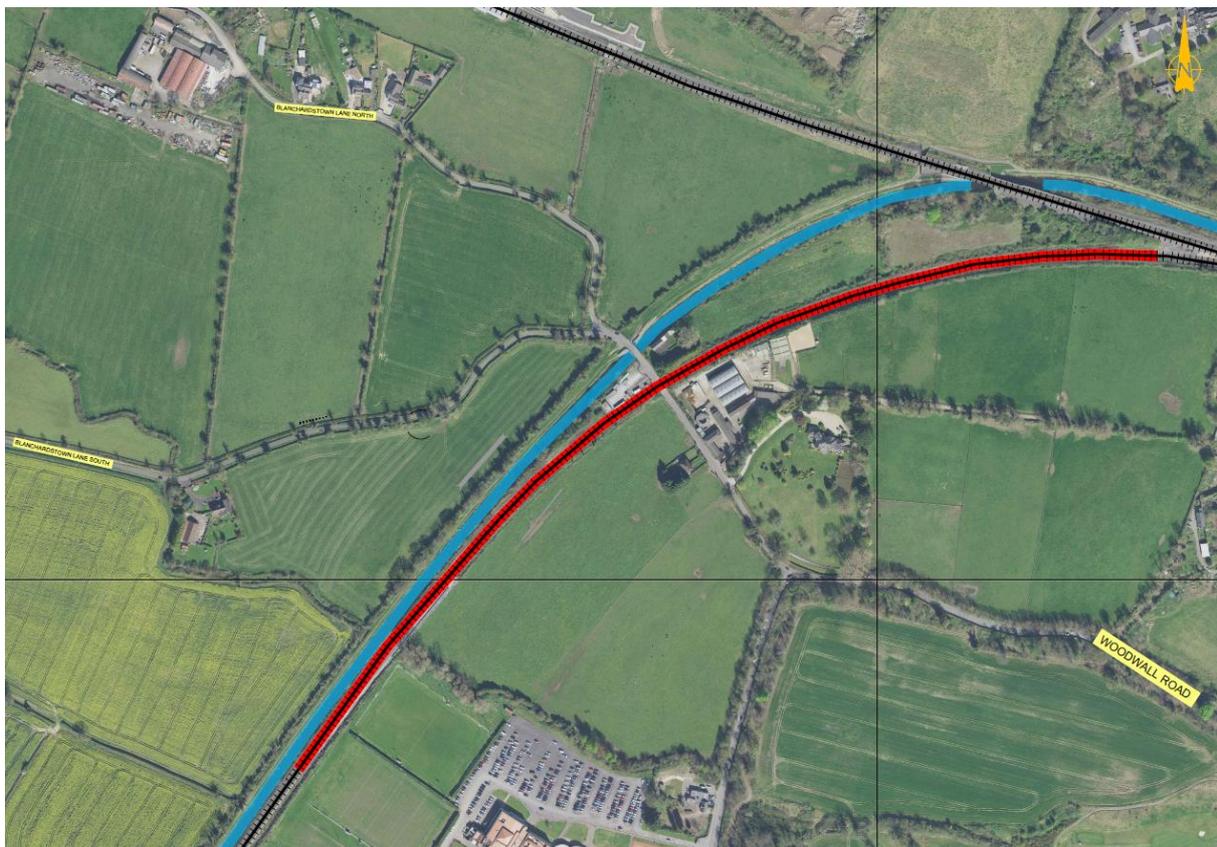


Figure 3-91 Barberstown Option 6 - lowering of the railway vertical alignment (Copyright Ordnance Survey Ireland – 0039720)

Options Assessment Stage 1

Table 3-31 provides a summary matrix of the comparative assessment undertaken as part of Stage 1 MCA. Options deemed to be feasible and comparably more advantageous than other options are identified to progress to Stage 2 MCA for a more detailed assessment.

Table 3-31 Stage 1 MCA Matrix

Assessment Criteria	Do Nothing	Do Minimum	Options					
			1	2	3	4	5	6
Economy	Some Disadvantage	Significant Advantage	Some Disadvantage	Some Disadvantage	Some Disadvantage	Some Advantage	Some Advantage	Some Disadvantage
Integration	Some Disadvantage	Significant Disadvantage	Some Advantage	Some Advantage	Some Disadvantage	Some Advantage	Some Advantage	Some Advantage
Environment	Some Advantage	Significant Advantage	Significant Disadvantage	Some Disadvantage	Significant Disadvantage	Some Disadvantage	Some Advantage	Significant Disadvantage
Social inclusion	Significant Disadvantage	Significant Disadvantage	Some Advantage	Some Advantage	Some Disadvantage	Some Advantage	Some Disadvantage	Some Advantage
Safety	Significant Disadvantage	Some Disadvantage	Some Advantage	Some Advantage	Some Advantage	Some Advantage	Some Disadvantage	Some Advantage
Physical Activity	Significant Disadvantage	Significant Disadvantage	Some Advantage	Some Advantage	Some Advantage	Some Advantage	Some Advantage	Some Advantage
Shortlisted for Stage 2 MCA	No	No	No	Yes	No	Yes	Yes	No

The sections below provide summaries of the MCA Stage 1 assessment that resulted in Options 2, 4 and 5 being selected to advance to MCA2.

Economy

The Do Nothing option is rated Some Disadvantage due to the ongoing operational, inspection and maintenance costs associated with maintenance of the level crossing and the negative transportation impacts associated with curtailed access over the railway on implementation of the proposed working timetable on the railway.

The Do Minimum option is rated Significant Advantage as this option incurs least capital cost irrespective of the negative impacts in respect of traffic functionality.

Option 6 is rated Significant Disadvantage due to the capital cost and ongoing costs associated with the option which is very high in comparison to other options.

Options 4 is rated Some Advantage as the capital cost of it is lower than that of options 1, 2 and 3 which have similar infrastructural characteristics. Option 5 is rated Some Advantage as the costs of the pedestrian / cycle bridge are lower than other bridge options but this option results in diversion of vehicular traffic.

Options 1, 2 and 3 are rated Some Disadvantage due to the higher cost of these bridge options in comparison to others.

Integration

The Do Nothing option is rated as Some Disadvantage over other options and the Do Minimum option is rated Significant Disadvantage. Both options do not support the delivery of the higher level national and regional planning policies regarding the DART+ Programme. The Do Minimum option would remove local accessibility to the Royal Canal Cycle Route entirely. The Do Nothing option would reduce local accessibility to the Royal Canal Greenway due to more frequent closures of the level crossing.

In terms of the Land Use Integration criterion, Option 3 is rated as Significant Disadvantage over other options as it crosses through the middle of a new housing estate and travels through sensitive land use zonings including 'High Amenity', 'Open Space' and over the GDA Cycle Network. Continuing northwards it travels through zoned "Residential Area" part of the Hansfield SDZ (2006). Construction of a road network through

the SDZ lands at this location would be inconsistent with the policies and objectives of the SDZ as well as impact on existing properties/residential amenity.

Options 1, 2, 4, 5 and 6 are all rated as Some Advantage with all options supporting the delivery of the higher level national and regional planning policies regarding the DART+ Programme.

Environment

The Do Nothing and Do Minimum Option have limited/no direct impacts on the environment when compared with other options and for this reason, the Do Nothing Option is rated as Some Advantage and the Do Minimum option as Significant Comparative Advantage.

Options 1, 3 and 6 are rated as Significant Disadvantage. In terms of the Landscape and Visual criterion, Options 1, 3 and 6 all have significant landscape and visual impacts on the Royal Canal corridor (RPS No. 994a), with Option 1 having very significant landscape and visual impact for 3 residential properties to either side of existing road leading to crossing and for canal side cottage at bridge and Option 3 having a visual impact for residential property on site of former Barberstown House and a potential visual impact for Beech Park House / Shackleton Gardens east of the road option. The vertical lowering associated with Option 6 would impact on setting of Pakenham bridge (RPS 0711).

In terms of the Biodiversity criterion, the demolition of the existing bridge for Option 1 could lead to significant impacts on the Royal Canal pNHA and the channelisation or realignment of the canal for Option 6 could have significant impacts to water quality and aquatic fauna which may have to be rescued prior to works. When considering the Agriculture and non- Agricultural sub-criterion, Options 1 will require the complete or partial acquisition of properties and Option 3 will have direct impact on three agricultural properties including a significant impact on an equine farm holding due to landtake and land severance.

Options 2 and 4 have both been rated as Some Disadvantage. This has been attributed to the assessments pertaining to the Landscape and Visual sub criteria and Water Resources sub criteria. Where Option 2 has a significant visual impact for two residential properties to north/north west of eastern roundabout and Option 4 has significant visual impact for residential properties, one to north west of eastern roundabout, and one south west of western roundabout. In terms of Water Resources, both options have an increased flood risk, negative impact on surface and groundwater quality during operational phase and a potential negative impact on groundwater quality during construction.

Option 5 is rated as Some Advantage due to the removal of vehicle traffic locally therefore reducing local impacts on Noise and Vibration and Air Quality. The option also has less of an indirect impact on Royal Canal (RPS 944a) in terms of the Cultural, Archaeological and Architectural Heritage assessment and in terms of Water Resources, Option 5 has a potential negative minor impact on surface and groundwater quality during construction phase and a potential positive impact on surface water quality during operational phase due to removal of traffic-related pollutants.

Accessibility and Social Inclusion

The Do Nothing and Do Minimum Options are rated Significant Disadvantage due to the restriction on access over the railway caused by each. Vulnerable road users would be negatively impacted without replacement infrastructure put in place. Community facilities affected by reduced access include Shopping facilities, Ongar Community Centre, Stone Ideas, 2No. Educate Together Schools – north west of the railway and Shackleton Gardens, Westmanstown Sports and Conference Centre, Dublin Falconry and Luttrellstown Castle Resort - south of the railway.

Options 1 and 7 are rated Significant Advantage as they reinstate severed access wholly online with minimal diversion. Option 5 is rated Some Disadvantage as it requires detour for road vehicles. Other bridge options are rated Some Advantage as they provide reinstatement access over the railway with modest diversion.

Safety

The Do Nothing option is rated Significant Disadvantage as it does not secure removal of the level crossing from the railway network. The Do Minimum is rated Some Disadvantage as it diverts vulnerable road users onto longer more circuitous routes. All other options are rated Some Advantage as they provide suitable replacement access for vulnerable road users local to the level crossing.

Physical Activity

The Do Nothing and Do Minimum options are rated Significant Disadvantage due to the degree to which they curtail access over the railway at a local level. The principal affected amenities in the vicinity of the level crossing include the Royal Canal, and the amenity zoned lands south east of the level crossing. Access to these will be affected by curtailment of access over the railway.

All other options are rated Significant Advantage as they effectively secure access to the amenity lands.

Options Assessment Stage 2

Following on from the Stage 1 Option Assessment/Multi-Criteria Analysis section above, the options that have progressed to MCA Stage 2 are highlighted in Table 3-32. The Stage 2 option selection will provide a more detailed comparison between the highlighted options to establish the preferred option.

Table 3-32 Barberstown level crossing Do Something options

Option	Description
Option 2	Overbridge 130 metres to the west of the existing level crossing
Option 4	Overbridge 250 metres to the west of the existing level crossing

Table 3-33 provides a summary matrix of the comparative assessment undertaken at Stage 1 to identify the most feasible options to progress to Stage 2 for a more detailed assessment. Excerpts of the matrix are provided under each of the criteria below with an assessment of why the preferred option has been selected.

Table 3-33 Stage 2 MCA summary matrix – Barberstown

Criteria	Option 2	Option 4	Option 5
Economy			
Integration			
Environment			
Accessibility and Social Inclusion			
Safety			
Physical Activity			
Preferred Option	No	Yes	No

As can be seen from the above Option 4 has been identified as the preferred option over Option 2 and 5.

The sections below provide summaries of the MCA Stage 2 assessment that resulted in Option 4 being selected as the preferred option.

Economy

Option 5 is rated Some Advantage due to the benefit of lower capital cost and lower ongoing inspection and maintenance costs. The benefit is offset to some degree by the curtailed traffic functionality associated with this option with diversions for road traffic of 5.5 km.

Integration

In terms of Integration, Option 2 and 4 are identified as Significant Advantage over other options, with Option 5 rated as Significant Comparative Disadvantage over other options. This is because Option 5 curtails development of the lands on either side of the railway due to severed road access. The other options facilitate development access locally.

Environment

In terms Environment, Option 5 is rated as Some Advantage over other options. When considering the Agricultural and Non-Agricultural criterion, Option 4 has less impact on an equine enterprise than Option 2. Option 2 is, therefore, rated as Some Disadvantage over other options.

Accessibility and Social Inclusion

In terms of Accessibility & Social Inclusion, Option 5 is rated Some Disadvantage over the other options due to the curtailment of access for road vehicles. The principal high amenity greenspaces in the vicinity of the existing train station include the Royal Canal, the amenity zoned lands, golf courses and allotments south of the level crossing. Other options are rated Some Advantage.

Safety

In terms of Accessibility & Social inclusion, Option 5 is rated Some Disadvantage over the other options due to the curtailment of access for road vehicles and the 5.5 km diversion associated with same. Other options are rated Some Advantage.

Physical Activity

In terms of Physical Activity, there is no comparative advantage or disadvantage between the options for permeability and local connectivity opportunity.

3.6.4.4.7 *Blakestown level crossing*

In addition to the Do Minimum and Do Nothing scenarios, the Do Something Options assessed in the Stage 1 MCA are described in Table 3-34.

Table 3-34 Blakestown level crossing Do Something option

Option	Description
Option 1	Closure of the level crossing and construction of a pedestrian and cycle bridge

Figure 3-92 presents the option considered in Stage 1 MCA on aerial photography.

Option 1 - Online Overbridge

Option 1 involves the construction of a new cycle/foot bridge over the railway and canal. The provision of the new bridge will facilitate the closure of the level crossing but would require diversion of traffic to surrounding crossings of the railway. No improvements to the surrounding highway network are proposed as part of this option.

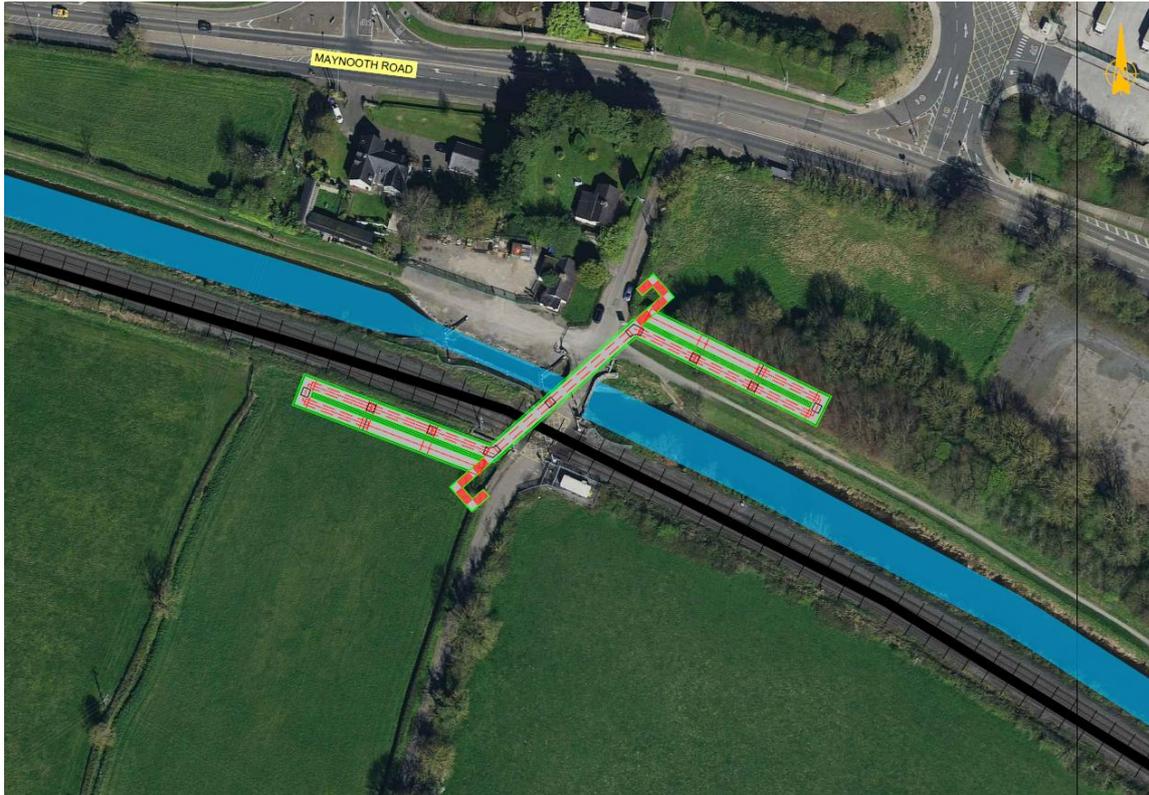


Figure 3-92 Blakestown Option 1 – Provision of a Pedestrian/Cycle Overbridge (Copyright Ordnance Survey Ireland – 0039720)

Options Assessment Stage 1

Table 3-35 provides a summary matrix of the comparative assessment undertaken as part of Stage 1 MCA. Options deemed to be feasible and comparably more advantageous than other options are identified to progress to Stage 2 MCA for a more detailed assessment.

Table 3-35 Stage 1 MCA summary assessment matrix

Assessment Criteria	Do Nothing	Do Minimum	Option 1
Economy	Dark Brown	Green	Light Brown
Integration	Light Brown	Light Green	Light Green
Environment	Green	Green	Dark Brown
Social inclusion	Light Brown	Light Brown	Light Green
Safety	Dark Brown	Light Green	Green
Physical Activity	Dark Brown	Dark Brown	Green
Shortlisted for Stage 2 MCA	No	Yes	Yes

The sections below provide summaries of the MCA Stage 1 assessment that resulted in the Do Minimum Option and Option 1 being selected to advance to MCA 2.

Economy

The Do Nothing Option is rated Significant Disadvantage here due to the ongoing cost associated with the operation, inspection and maintenance of the level crossing. Option 1 is rated Some Disadvantage as its capital cost is higher than that of the Do Nothing Option but the ongoing inspection and maintenance costs are lower. The Do Minimum option exhibits Significant Advantage as this option involves minimal initial investment and ongoing cost.

Integration

The Do Nothing option is rated as Some Disadvantage. In terms of the Land Use Integration criteria, it would not support the Kildare County Development Plan Transport Objective PT07 which seeks to promote and support the upgrading of the Maynooth line and the Leixlip LAP 2020-2023 recognises the level crossing will be required to be removed therefore this option would not support these objectives or the DART+ Programme. The Do Minimum option and Option 1 are rated as Some Advantage as they would support the delivery of the DART+ Programme which is contained in the higher level national and regional planning policy documents.

Both the Do Minimum option and Option 1 will reduce local permeability and reduce access to the Royal Canal Cycle Route. However, due to the Land Use Integration criteria, these options are the preferred options to consider in the MCA2 assessment.

Environment

Option 1 is considered to have a Significant Disadvantage due to the Landscape and Visual criteria, where there is a significant visual impact of 13th Lock/Deey bridge, a protected structure (RPS B06-14) and protected view (RC4). The Do -Nothing and Do Minimum options hold a significant advantage over Option 1.

Accessibility and Social Inclusion

Option 1, the pedestrian / cycle bridge with reduced diversion and designed to accommodate vulnerable users is rated Some Advantage as it maintains access to community facilities. All other options are rated Some Disadvantage as they effectively sever this access. The principal affected amenities in the vicinity of the level crossing include JM Motors south of the railway, the Business Barn, Intel and Jones Engineering Group, north of the railway.

Safety

The Do Nothing option is rated Significant Disadvantage as it does not secure removal of the level crossing from the railway network. The Do Minimum is rated Some Advantage as it diverts vulnerable road users onto longer more circuitous routes. The numbers affected are very low. Option 1 is rated Significant Advantage it provides local access for non-motorised users although it diverts vehicles onto longer more circuitous routes.

Physical Activity

The Do Nothing and Do Minimum Options are rated Significant Disadvantage due to the curtailment of access over the canal and railway associated with them. Option 1 with reduced diversion and designed to accommodate vulnerable users is rated Significant Advantage as it maintains access to amenity spaces. The principal affected amenities in the vicinity of the level crossing include the Royal Canal and the agricultural zoned lands south of the level crossing.

Options Assessment Stage 2

Following on from the Stage 1 Option Assessment/Multi-Criteria analysis section above, the options that have progressed to MCA Stage 2 are highlighted in Table 3-36. The Stage 2 option selection will provide a more detailed comparison between the highlighted options to establish the preferred option.

Table 3-36 Blakestown level crossing Do Something Options

Option	Description
Do Minimum	Closure of the crossings with no alternative access provided
Option 1	Closure of the level crossing and construction of a pedestrian and cycle bridge

Table 3-37 provides a summary matrix of the comparative assessment undertaken at Stage 1 to identify the most feasible options to progress to Stage 2 for a more detailed assessment. Excerpts of the matrix are provided under each of the criteria below with an assessment of why the preferred option has been selected.

Table 3-37 Stage 2 MCA summary assessment matrix - Blakestown

Criteria	Do Minimum	Option 1
Economy		
Integration		
Environment		
Accessibility and Social Inclusion		
Safety		
Physical Activity		
Preferred Option	Yes	No

As can be seen from the above the “Do Minimum” Option has been identified as the preferred option over Option 1.

The sections below provide summaries of the MCA Stage 2 assessment that resulted in “Do-minimum” being selected as the preferred option.

Economy

Option 1 is rated Significant Disadvantage over the Do Minimum as it requires investment in physical infrastructure and commitment to ongoing inspection and maintenance costs associated with the proposed bridge. Such costs are not associated with the Do Nothing Option.

Integration

The Do Nothing Option is rated Significant Disadvantage over Option 1 as it severs access over the railway resulting in reduced permeability and access to the Royal Canal.

Environment

The Do Minimum option holds Some Advantage over Option 1 as it provides the least impact on the environment compared to the construction of a new pedestrian and cycle footbridge. This option also promotes sustainable travel, therefore improving air quality and noise for the local area.

Accessibility and Social Inclusion

The Do Minimum Option is rated Some Disadvantage as it severs access over the railway for a small number of users, whereas Option 1 secures replacement access. The principal affected amenities in the vicinity of the level crossing include JM Motors south of the railway, the Business Barn, Intel and Jones Engineering Group, north of the railway.

Safety

For the Do Nothing Option, with the level crossing closed on implementation of the proposed working timetable and with no provision for supplementary infrastructure for vulnerable groups, the majority of users will be diverted onto the adjacent road network. This relates to a small number of users. The Option is rated Some Disadvantage relative to Option 1. Option 1 secures replacement access.

Physical Activity

For the Do Nothing Option, with the level crossing closed on implementation of the proposed working timetable and with no provision for supplementary infrastructure for vulnerable groups, the majority of users will be diverted onto the adjacent road network. This relates to a small number of users. The Option is rated Some Disadvantage relative to Option 1. Option 1 secures replacement access.

3.6.5 Stations

An aim of the DART+ West project is to facilitate the increase in train frequencies and to increase passenger capacity along the Maynooth Line and in the City Centre. To achieve this aim it is necessary to increase capacity at Connolly Station and in the Docklands area. This section addresses the selection process of a preferred option for Docklands capacity enhancement and Connolly Station capacity enhancement. In addition, this chapter addresses accessibility enhancements at Ashtown and Coolmine Stations consistent with proposals to remove the level crossings adjacent to them.

The design team has examined the feasibility of meeting the project objectives without alterations in the Docklands and at Connolly Station and it has concluded that the project objectives cannot be delivered on this basis. Change is necessary and, where appropriate, a number of design options were developed so as to facilitate comparison through MCA. Each was considered separately, and they are presented below.

For Docklands, in addition to alterations to permanent way infrastructure and SET investment, it is necessary to provide increased terminal facilities at station infrastructure to accommodate the proposed train service specification. The existing Docklands train station was built as a temporary facility in anticipation of the DART Underground project (DU). In 2015, the DART Underground project was deferred and Iarnród Éireann was tasked with delivering a lower cost technical solution. The NTA is currently undertaking a route selection study to establish the route for DART Underground, so that the corridor can be protected. However, delivery of DART Underground is a long-term ambition. In accordance with guidance provided by the NTA, the DART+ West project has progressed proposals and appraisals for Docklands on the basis that DART Underground does not present a technical complexity in the short to medium terms. If, and when DART Underground is progressed, it will be for that project to address the rail infrastructure that exists at that time. The proposals for Docklands have been appraised on the basis that DU does not present a technical complexity in the short to medium term. This detail is presented below.

Whilst there are proposals for some minor modification of track layouts at Connolly, the alterations at Connolly Station are necessary, primarily to accommodate the increase in passenger numbers projected for the project. Constraints on capacity relate primarily to access and egress. Alternatives have been developed and assessed by MCA. The detail is presented below.

An accessibility assessment was carried out in respect of Ashtown and Coolmine train stations to ensure persons with reduced mobility can continue to utilise these stations when the level crossings are permanently closed. The outcome of the assessment is presented below. Design solutions to address shortfalls in access were developed and, where multiple alternatives arose, they were assessed through MCA. The process and conclusions are also presented in this chapter.

3.6.5.1 Spencer Dock station

3.6.5.1.1 Previous studies

Docklands Station Options Study: Options Sift 1 Report

This report documents an assessment involving the identification of a 'long list' of site options for Docklands Station by AECOM. The study included contributions from NTA and Iarnród Éireann. Eleven site options were identified for consideration on the long list of options for assessment.

The site options were subject to a 'pre-assessment' using a range of high-level criteria. During the analysis site options were discounted for one or more of the following reasons:

- It was not practicable to develop the site option further due to a significant planning/land use issue.
- It was not practicable to develop the site option further due to a significant environmental issue, for which there was no clear means of mitigation.
- A nearby site option was as good in some respects and no worse in any respect. This criterion required some consideration of the technical difficulty in building a station on the site.

All options identified were assessed against the above criteria in a consistent manner. Sites which passed this pre-assessment were then subject to further analysis to determine the technical feasibility of the options.

Based on this approach four of the long list site options have been recommended for further assessment as part of the Sift 2. The long list of site options is presented in Figure 3-93.



Figure 3-93 Long list of site options

The report draws the following conclusions in respect of the long list of options:

Table 3-38 Report conclusions

Site	Verdict	Reason
A: Existing Docklands Station site	Take Forward	
B: East of Spencer Dock, north of Mayor Street Upper	Take Forward	
C: East Wall Yard	Take Forward	
F: Ferry Terminal	Discard	No better than C
G: Elevated over Spencer Dock Luas	Discard	Not technically feasible
H: North Wall Quay over Liffey	Discard	Planning and environmental issues
J: Royal Canal south of Sheriff Street Upper	Discard	Planning and environmental issues
K: Samuel Beckett Bridge	Discard	Planning and environmental issues
L: West of Spencer Dock, north of Mayor Street Upper	Discard	Planning issue, no better than M

Site	Verdict	Reason
M: New Wapping Street	Take Forward	
N: Mayor Street Upper and Castleforbes Road	Discard	No better than M
P: Combination of A and J	Discard	Planning and environmental issues

For **Site A**, the existing Docklands Station site the report notes the following:

'The existing station would be replaced or augmented by platforms in the area bounded by Sheriff Street Upper to the south, the Royal Canal to the west, and the limit of railway land to the east. The station footprint would be mainly or fully on railway land. To the east of the existing station is a coach park, which is considered to be a temporary facility. The western edge of the site is within a Conservation Area but it is considered feasible to avoid any works on this section.'

The track layout for this station is challenging, because of the limited space between the northern end of the platforms and the divergence of the three rail routes at differing gradients, and the need for freight connections across the passenger tracks. Initial development has identified a feasible design with two elevated platform tracks for the Northern Line and up to four more at ground level for the other two lines. This does however require land take to the west of the existing railway at Church Road Junction. Design refinement is proposed during Sift 2 to establish definitively whether an at-grade solution is possible, or whether the initial split-level solution can be refined with less land take and simpler structures. In any event freight to and from the Phoenix Park line would almost certainly have to access it via Drumcondra and the link at Glasnevin.'

Like the existing station, the passenger entrance to this site would be on Sheriff Street Upper, at the edge of the Docklands development. It currently feels remote from the centre of activity and the nearest Luas stops are about 5 min walk away on Mayor Street Upper. However, the transition from a station with a few peak-time trains to a busier all-day station would naturally increase footfall and activity. Improved access routes might include covered walkways, moving walkways or relocation of the Luas stop slightly nearer, and the development of the surrounding area.'

For **Site B**, the report notes:

'This site is similar to one developed in an earlier study for a terminus parallel to and east of Spencer Dock, with the buffer stops north of Mayor Street Upper. The likely entrance/exit would be located immediately alongside the Spencer Dock Luas stop and close to the centre of the north bank Docklands area. The platforms would extend below Sheriff Street Upper into the railway land beyond.'

The previous study developed a broadly viable concept which could link to all three routes and provide the necessary freight connections. It did however identify some engineering constraints and note the high cost of this solution. The bridge where Sheriff Street Upper passes over the platform area would need replacement to lengthen the span and providing electrification clearances here necessitates lowering the track bed below the water table. This creates a need for "tanking" to prevent water ingress, for a split-level station building, and for possible level changes at Church Road Junction. The previous study also considered only three platform faces where the current study seeks to provide four if possible. As designed the outer end of the platforms would have a radius of 350 m, below the absolute minimum of 500 m.'

Furthermore, the Spencer Dock DART Underground station and its cut-and-cover approaches – if built – would occupy the same footprint as Site B. If it was desired to keep a Site B station open during construction of the Underground, then much of the Underground structure might have to be built with the surface station.'

Although the previous design is not acceptable as it stands, particularly in respect of the curved platforms, it is considered that some further engineering development at Sift 2 might produce a viable option. Site M also presents the scope for reducing the curvature at the cost of increased land take on a site where development is planned.'

For **Site C, the East Wall Yard**, the report notes:

'Any or all the existing railway activity in East Wall Yard could be relocated, with the exception of a freight route along the northern boundary of the site to access Alexandra Road. This relocation would free up enough railway land for a Docklands station. Rail access would be found along the existing trackbed to Church Road Junction, where there is width for two passenger and two freight tracks if necessary. East Road overbridge might have to be replaced by a structure with no central pier.'

At Church Road a new track layout would be needed to link the passenger and freight tracks to the three routes onwards, but this area is considered to be less challenging than other sites where the platforms would be closer to the junction....

...Passenger access would be near the east end of Sheriff Street Upper or on East Wall Road itself. It is however rather remote from the western parts of Docklands. The south bank is accessible via Tom Clarke Bridge and the site is well placed should development extend eastwards into what is currently the port area.

In terms of connectivity, the walk from the Point Luas stop is not currently attractive to potential passengers but there is scope for improvement if this site becomes the access to a major station. A short extension of the Luas tramline into the site is likely to be feasible, though it would conflict with the intention to extend the Luas across the river instead.'

For **Site M: New Wapping Street**, the report notes:

'At Site M, the station would lie diagonally across the block south of Sheriff Street Upper and west of New Wapping Street. Site M differs from Site B, as it extends into the eastern part of this block, which is largely vacant though has planning permission for commercial/residential development. There is a terrace of houses in the south-east corner and a pumping station towards the northern edge....

...In engineering terms this site is similar to Site B, as they share the likely need to go below the water table in order to pass under Sheriff Street Upper. However, the curve on approach to Site M would be less than Site B, making it likely that the platforms would be straight or at least straighter.

The property impact of Site M is significantly greater than for Site B. Local access for Site M would be good, as the likely entrance on Mayor Street Upper is close to the centre of the north bank Docklands and a future bridge over the Liffey. The site is slightly further from the Luas than options B or G but is still easily accessible.'

Docklands Station Options Study: Options Sift 2 Report and DART+ Programme Docklands Station Options Study – Summary Report.

This report documents the Sift 2 of a process of identification of a preferred option for a DART station in the Docklands. It was carried out by AECOM on behalf of the NTA. The report lists the following objectives for the study:

- *'Identify the preferred location and layout of Docklands Station with the aim of achieving the minimum train capacity requirement, which would best serve the needs of the Docklands area and maximise interchange potential with the Luas;*
- *Carry out a comprehensive study for the Docklands Station and how it is accessed, including all connecting rail alignments from the DART radial routes bounded by and including Newcomen, North Strand and East Wall Junctions and freight traffic from East Wall Yard. This study will take consideration of the station's interface with a potential DART Underground Station and alignment.*

The four options advanced from Sift 1, reported above, underwent engineering development and an initial multi-criteria assessment by a panel of experienced subject experts within AECOM. Feedback on the initial assessment from the NTA and Irish Rail project team has resulted in further engineering development and the operational assessment of each option as detailed within this report.

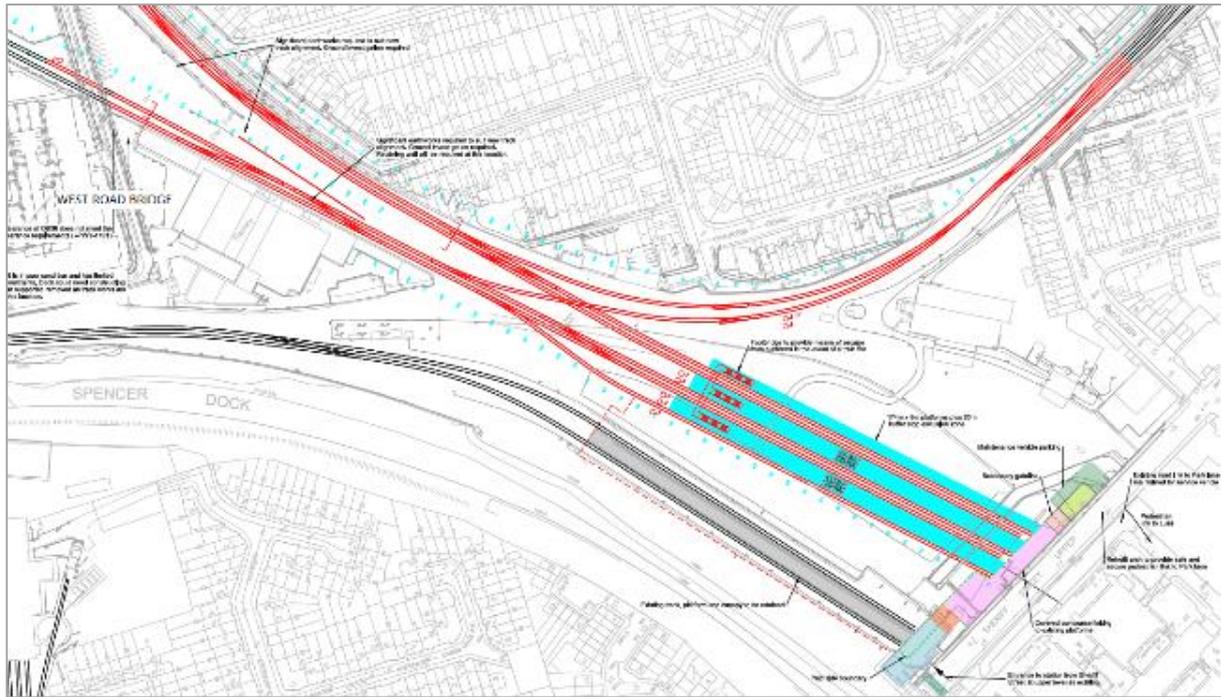


Figure 3-94 Option A plan layout

Options have been assessed against criterion which were agreed in advance with the NTA and which consist of three main criterion, economy, integration and environment and several sub criteria. The performance of each option was then ranked against this criterion. It is acknowledged that there is a degree of subjectivity within the multi-criteria assessment process which involves qualitative and some quantitative elements.'

The report concluded that 'Overall, Options A and B both have some advantages over the other options. While Option A benefits from the lower level of investment required to develop the site, the adjacent dedicated cycle routes and the presence of attractive walking routes along the canal, Option B performs strongly given its closer proximity to higher density employment zones on the south and western side of the study area.

Option C has some disadvantages, primarily driven by its location at the periphery of the higher density development area. Option M also has some disadvantages, primarily driven by the development currently taking place on the third party owned site and the costs associated with the purchase of non CIÉ lands.

In summary, Option A would cost less to develop whereas Option B would serve more people.'

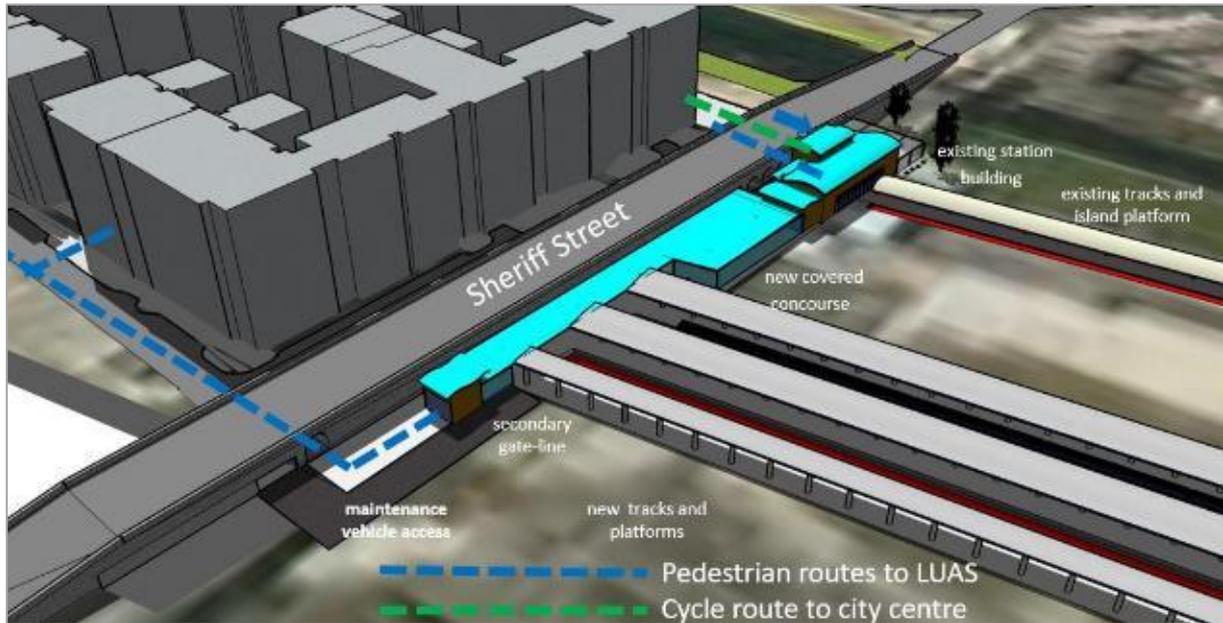


Figure 3-95 Option A graphic representation

The summary report notes that ‘*The track layout for this station is challenging, because of the limited space between the northern ends of the platforms, the divergence of the three rail routes at differing gradients and the need for freight connections across the passenger tracks. To facilitate the design for this option land take to the west of the existing railway at Church Road Junction is required.*

The existing platforms and approach tracks are retained without modification and continue to serve the route via Newcomen Junction, with the new platforms and canopies broadly replicating the existing. The existing station building is assumed to be modified with eastward extension to access the new platforms. The DART Underground portal would be in the same area, and if constructed may make this site inaccessible to and from the Northern route.

Like the existing station, the passenger entrance to this site would be on Sheriff Street Upper, at the edge of the Docklands development. It currently feels remote from the centre of activity and the nearest Luas stops are about 5 min walk away on Mayor Street Upper.’

Option B occupies a site south east of the existing Dockland Station, adjacent to the Spencer Dock Luas station.

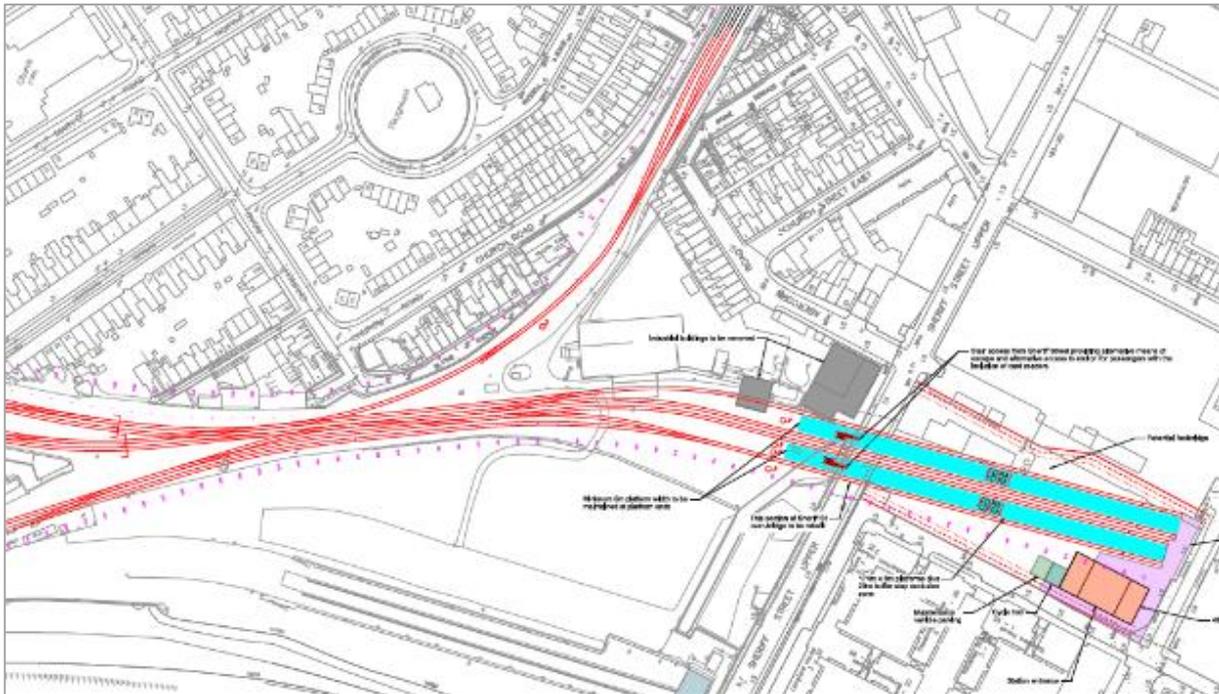


Figure 3-96 Option B Plan Layout



Figure 3-97 Option B graphic representation

The Summary Report notes that 'The entrance/exit is located adjacent the Spencer Dock Luas stop and close to the centre of the north bank Docklands area. The platforms extend below Sheriff Street Upper into the railway land beyond. The station entrance is on the northern platform of the Luas stop, level with the top of the Luas platform, with a ramp and stairs provided down to railway platform level.

A concept design has been developed which can link to all three routes from the Northern, Maynooth and Phoenix Park Tunnel lines with four parallel approach tracks that gives access between any platform and any of the three rail routes, as well as freight access via North Strand and East Wall junctions. The concept design highlights some engineering constraints and associated additional costs. The bridge where Sheriff Street Upper passes over the platform area would need replacement to lengthen the span. As a worst case, it has been assumed that providing clearance for electrification under the bridge necessitates lowering the track bed

approximately 1 m below grade and below the water table. This creates a need for “tanking” to prevent water ingress.’

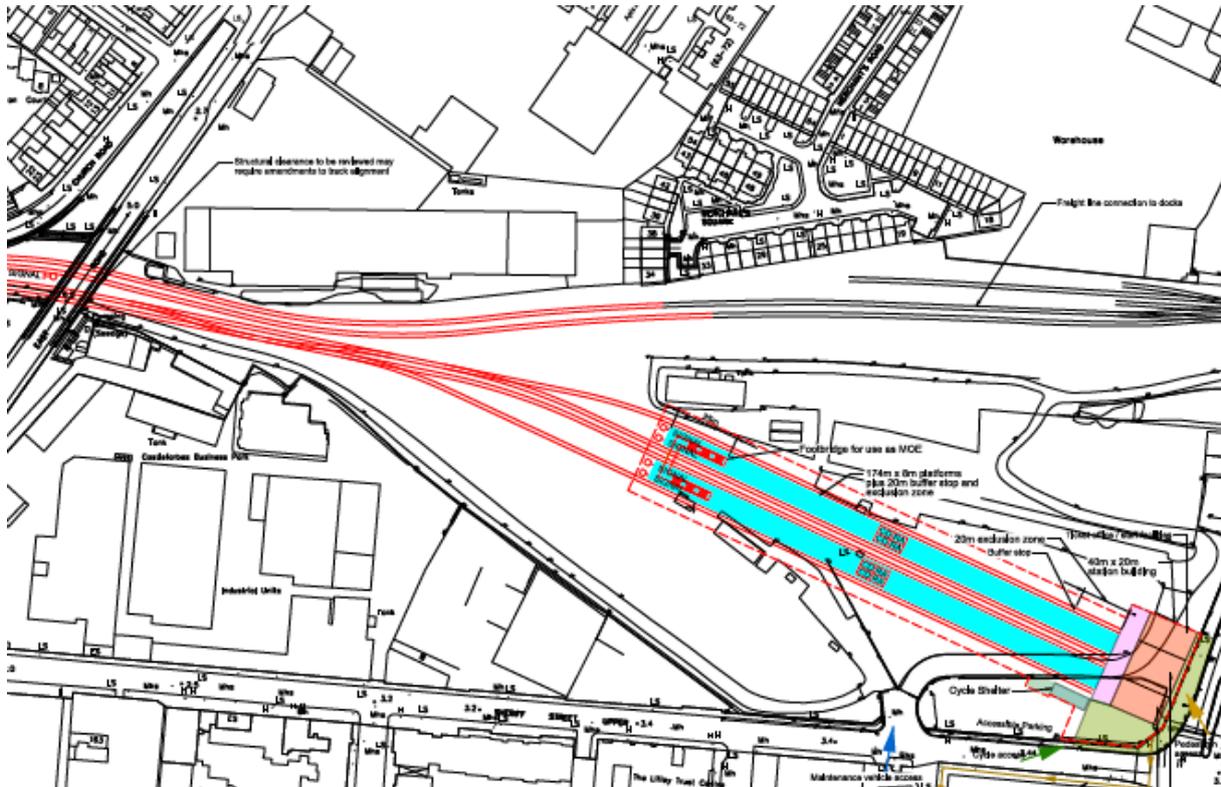


Figure 3-98 Option C plan layout

For this option, a configuration with the station towards the south of the site was adopted. This minimises the walking distance to the Luas and the destinations in the Docklands area, and also avoids conflict between passenger and freight operations. It was noted that ‘Two double junctions at Church Road allow trains on all three routes to access the link to the current East Wall Yard. This link is increased to four tracks, the southern pair serving the passenger station and the northern pair connecting to Alexandra Road. We assume that East Road overbridge could be modified to provide electrification clearance, or the tracks lowered beneath it, but this would require confirmation should this option go forward.

Journey times for Option C are expected to be approximately 90s longer than Option B and 120s longer than Option A in each direction. This will result in one extra train being required to operate the more intensive timetable scenarios.’

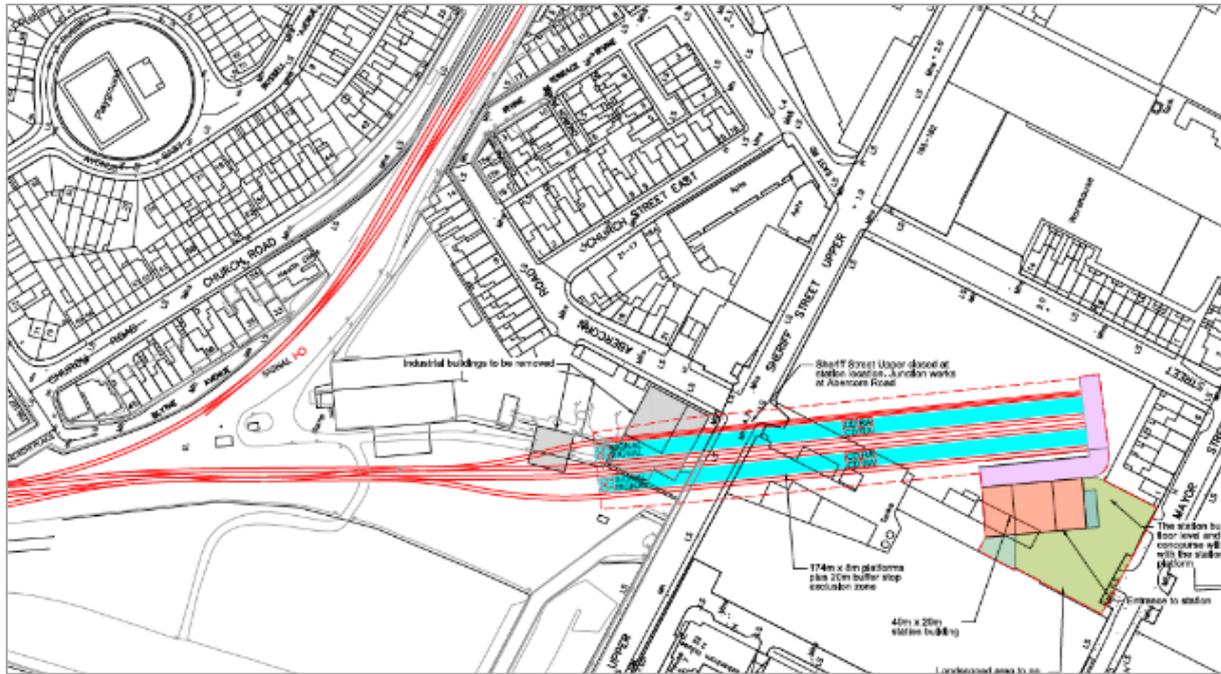


Figure 3-99 Option M Plan Layout

The report notes that ‘Re-grading of Sheriff Street Upper to pass over option M would affect Abercorn Street and would be highly disruptive to nearby properties, so is assessed not to be feasible. As the streets are lower where they pass over the option M tracks than the option B tracks, option M has to be at a lower elevation than option B. Although sub-options of option M vary in detail, all would require a concrete trough and pumped drainage. They also take up much of the eastern part of the block, which is not CIÉ land and where planning permission has been granted for development. Thus, they incur a large land purchase cost.’

The Sift 2 assessment by AECOM identified Options A and B as competing preferred options for further consideration. The summary report documented a multi-criteria assessment of Options A and B. The summary table clarifying the outcome of the assessment is presented below. It concluded that Option B was superior to Option A as a location for a proposed station in the Docklands area.

Table 3-39 Option A ‘v’ Option B

Criteria	Option A	Option B
Economy: Capital Cost	Some Advantages	Some Disadvantages
Economy: Operating Cost	Some Disadvantages	Some Advantages
Economy: Demand	Some Disadvantages	Some Advantages
Economy: Transport User Benefits	Some Disadvantages	Some Advantages
Integration: Land Use Policy/ Plan Integration	Some Disadvantages	Some Advantages
Integration: Public Transport Integration	Some Disadvantages	Some Advantages
Integration: Walking/ Cycling Integration	Some Advantages	Some Disadvantages
Environment: Cultural Heritage	Comparable	Comparable
Environment: Noise and Vibration	Comparable	Comparable
Environment: Landscape and Visual	Some Disadvantages	Some Advantages

3.6.5.2 Baseline Characterisation

The sections below present a baseline characterisation of the Docklands study area and of previous studies carried out in respect of the Docklands.

3.6.5.2.1 Docklands Capacity Enhancement Study Area

The study area for the assessment is the Docklands located to the east of Dublin city centre, north of the River Liffey and specifically the lands of the operational railway and those in the ownership of Córas Iompair Éireann (CIÉ) and adjacent lands which may be the subject of compulsory purchase as part of the project. The relevant area includes the following principal features:

- The terminal point for the existing MGWR line at the existing Docklands Station.
- A link between the GSWR and Dublin Port.
- A link between the Northern Line and Dublin Port.
- Sidings off the link to Dublin Port.
- Temporary parking facilities for HGVs
- Undeveloped plots to the south of Sheriff Street which are part of the North Lotts & Grand Canal Dock SDZ and have pre-existing permission for the development of multistorey development.

The study area is outlined in red in Figure 3-100. It is bound to the west by the Royal Canal and to the north west by the Northern line. Sheriff Street defines a southern boundary to the site. Sheriff Street is elevated over much of its length, but CIÉ property extends south into the Docklands Development Area, and a connection is currently available between the plots under the multiple span viaduct.

There are a number of constraints associated with the study area, including the following:

- The existing Docklands Station is connected to the Maynooth Line only. It is not practicable to connect the existing platforms to either the Phoenix Park Tunnel Line or the Northern Line. The proposed connection with these lines seeks to enable Connolly and Docklands Stations to work more effectively together and increase the overall rail capacity.
- Clearances under the existing Sheriff Street viaduct are low. To accommodate electrification under the structure, the existing ground level would need to be lowered by at least 1.0 m resulting in the need for any proposed development to be sealed against the ingress of groundwater.
- The study area is located within and to the north of the North Lotts & Grand Canal Dock SDZ. As a consequence, the location of a proposed station within the study area may be in varying proximity to the target customer base. This would need to be considered in the assessment of design options.
- Similarly, the potential for interchange with other modes of public transport needs to be considered in the selection of the preferred station configuration and location.
- Planning permission has been granted for multistorey development of sites B and M in Figure 3-100. Any proposed station development at these locations will need to take account of the pre-existing permission and will need to be developed in such a way as to permit the subsequent development of the sites above the proposed train station consistent with that permission.

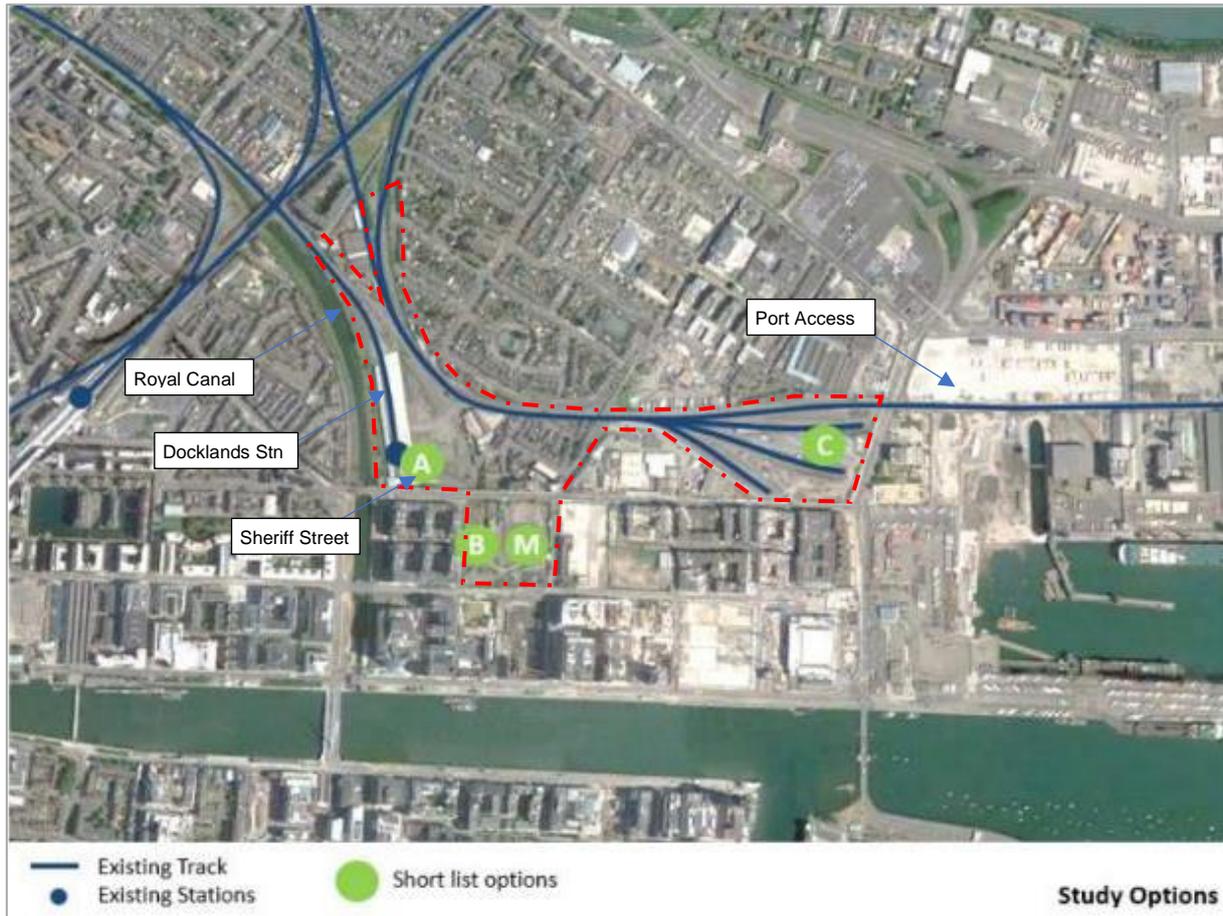


Figure 3-100 Docklands Study Area

Docklands Station plot is currently in the ownership of Córas Iompair Éireann. For many years the plot has served partly as the current Docklands Station with ancillary buildings and rail infrastructure including depots, workshops, etc. More recently part of the plot has been made available to the National Transport Authority (NTA) as a temporary coach park for the off-street layover of coaches. The current Docklands Station building was developed in 2006 as the terminus of Western Commuter Train line. Sample photographs and a graphical representation of the layout of the site is provided in Figure 3-101.



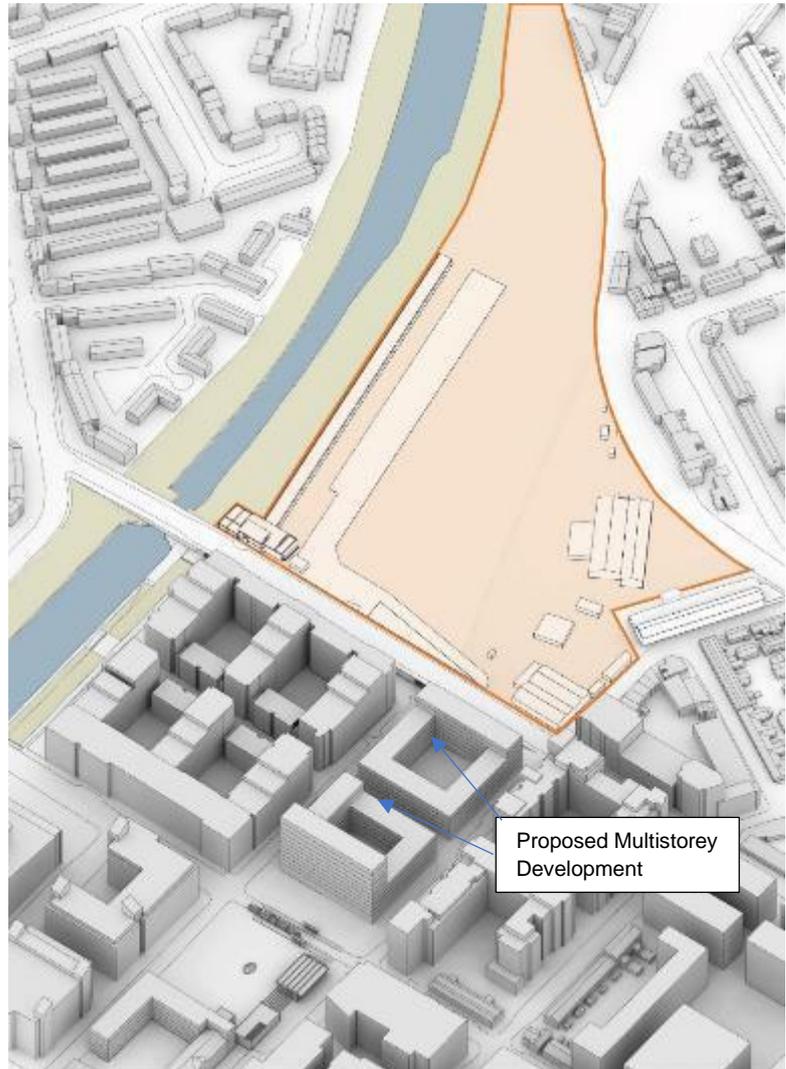
Plan Layout



Aerial View



Docklands Station Building



Docklands Plot Site Layout

Figure 3-101 Site layout

3.6.5.2.2 Dublin City Development Plan 2016- 2022

Proposals for capacity enhancement in the Docklands Area are aligned with the strategic approach of the Dublin City Development Plan (DCDP) 2016-2022.

One of the principles of the plan is to achieve a more sustainable and resilient city by creating a connected and legible city based on active streets and quality public spaces with a distinctive sense of place. Placemaking is particularly important in Strategic Development and Regeneration Areas (SDRAs).

The Docklands Area includes the North Lotts & Grand Canal Dock strategic development zone (SDZ) in SDRA-6 established in the Dublin City Development Plan 2016-2022.

The Docklands capacity enhancements at Sheriff Street, associated with DART+ West, will play a key role in improving citizens wellbeing and enhancing life, thus meeting the DCDP 2016-2022 vision goals. The project will reduce car use and traffic congestion, and it will also improve the quality of the city environment. These

improvements should encourage the use of the public transport network. The connection of DART+ West with the Luas system at Spencer Dock will provide a more equitable city.

Figure 3-102 provides illustration of the planning zones in the vicinity of the proposed study area.

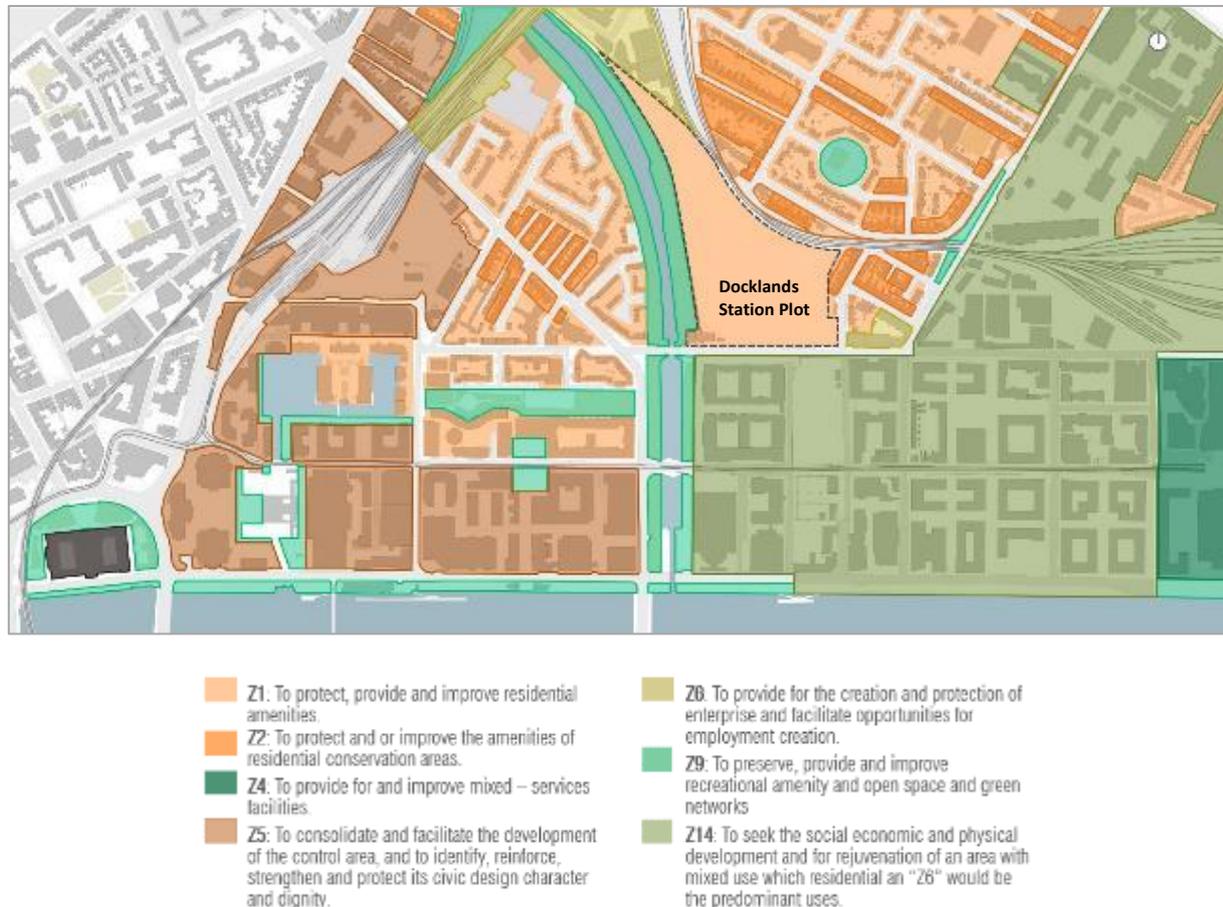


Figure 3-102 Dublin City Development Plan 2016-2022. Zoning Map

Much of the Existing Docklands Station area is Zoned Z1 – Sustainable Residential Neighbourhoods. DCDP provisions in respect of Z1 include the following:

To protect, provide and improve residential amenities: The vision for residential development in the city is one where a wide range of accommodation is available. Set within sustainable communities where residents are within easy reach of services, open space and facilities such as shops, education, leisure, community facilities and amenities. Available on foot and by public transport and where adequate public transport provides good access to employment for the city centre and the key district centres.

In both new and established residential areas there will be a range of uses that have the potential to foster the development of new residential communities. These are uses that benefit from a close relationship with the immediate community and have high standards of amenity, such as convenience shopping, crèches, schools, nursing homes, open space, recreation and amenity uses.

Permissible Uses: Buildings for the health, safety and welfare of the public, Childcare facility, Community facility, Cultural/recreational building and uses, Education, Embassy residential, Enterprise centre, Halting site, Homebased economic activity, Medical and related consultants, Open space, Park and ride facility, Place of public worship, Public service installation, Residential, Shop (local), Training centre.

Open for Consideration Uses include Bed and breakfast, Betting office, Car park, Civic and amenity/recycling centre, Garden centre, Golf course and clubhouse, Embassy office, Hostel, Hotel, Industry (light), Live-work

units, Media recording and general media associated uses, Petrol station, Pigeon lofts, Public house, Restaurant, Veterinary surgery.

Figure 3-103 provides a graphic of the surrounding neighbourhoods affected by the proposed enhancement.



Figure 3-103 Local neighbourhoods map

3.6.5.2.3 North Lotts and Grand Canal Dock Strategic Development Zone

The Dublin City Development Plan (DCDP) 2016-2022 sets the framework for all future developments in the city in order to meet the needs and aspirations of citizens. The approach is based on the principles of sustainability and resilience on social, economic and environmental fronts. The implementation of the measures in the city development plan is pursued by active land management.

The DCDP 2016-2022 defines a series of Strategic Development, and Regeneration Areas (SDRA). The Docklands area has been designated as one of these SDRAs, providing for the continued physical and social regeneration of that part of the city. The Docklands SDRA includes the North Lotts & Grand Canal Special Development Zone (SDZ) Planning Scheme.

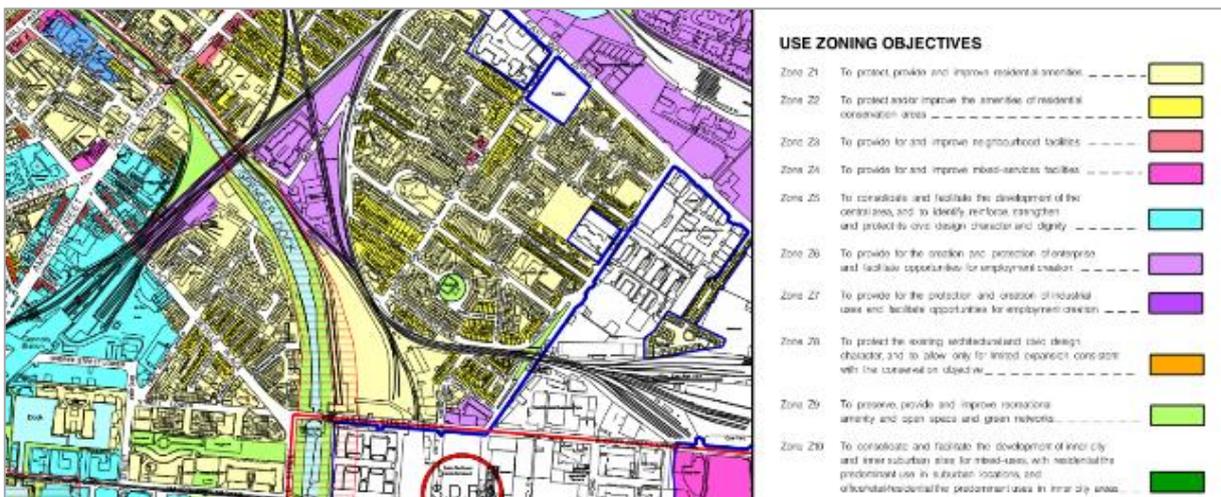


Figure 3-104 Dublin City Development Plan 2016-2022. Volume 3. Map E

Part IX of the Planning and Development Act 2000-2011 provides for the designation of a Strategic Development Zone (SDZ) to facilitate development which in the opinion of the Government is of economic or social importance to the State. Lands located at North Lotts and Grand Canal Dock in the Dublin Docklands were designated by the Government as a site for an SDZ on 18 December 2012 and a Planning Scheme was prepared.

Each block is subdivided by smaller local streets and spaces which bring permeability to the large City Blocks and divide each block into four or more robust urban blocks.

The study area for the Docklands Capacity Enhancement includes City Block N^o 2 of the planning scheme.

The documentation describes City Block N^o 2 as mostly undeveloped with a small terrace of 2 storey houses on Mayor Street frontage.

3.6.5.2.4 *Planned developments*

The vision for Docklands Strategic Development Zone (SDZ) is that it will be “a model of sustainable inner-city regeneration incorporating socially inclusive urban neighbourhoods, a diverse, green innovation economy contributing to the prosperity of the locality, the city and country, all supported by exemplary social and physical infrastructure”. The North Lotts & Grand Canal Dock Planning Scheme establishes five main hubs in the SDZ-6. Two of these are Spencer Dock and Point Village.

Docklands Station plot is identified as a planned additional city hub. Advancement of such plans will require the development of a Master Plan. This has not yet been put in place.

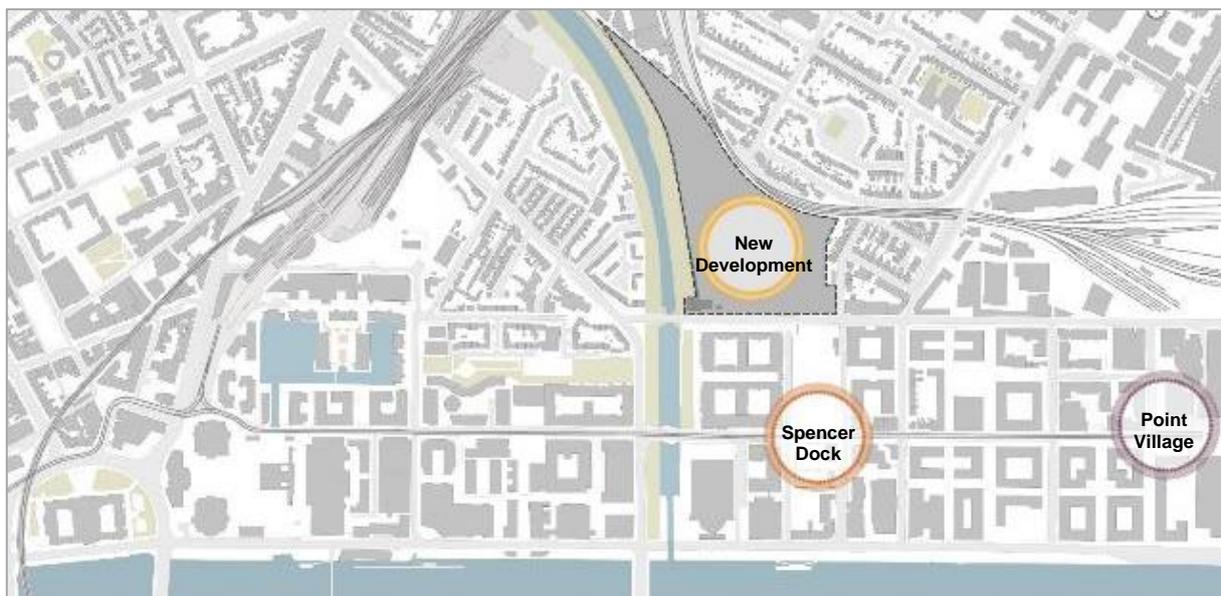


Figure 3-105 North Lotts & Grand Canal Dock Planning Scheme

3.6.5.2.5 *Royal Canal linear park*

In 2005 DCDP proposed the development of a Linear Park on the Royal Canal which will create a significant new public space for people and nature in the Dublin Docklands. The six-hectare garden – a green continuum where the banks and the canal become a single space stretching from North Strand Road to the River Liffey is intended to include spaces for relaxation, walks and sports, while making new connections to the surrounding neighbourhoods.

The design seeks to eliminate the actual separation between the banks and the canal itself and to make a singular park across the full width of the space. To achieve this, the distinction of land and water has been blurred by the introduction of some water basins on land and some planted land contained on floating pontoons

into the water basin. These pontoons allow a dramatic seasonal relocation of sections of the park. With the intention of activating the entire park, active and contemplative programme elements are distributed throughout as opposed to being concentrated in a single area. Active functions include children’s play areas, multi-sport platforms, a kayak club and a skate park. Contemplative functions include gardens, water basins and café pavilions. *Source: Linear Park. Henchion Reuter Architects 2005—2009.*

The park is illustrated in plan in Figure 3-106.



Figure 3-106 Royal Canal Linear Park

3.6.5.2.6 Public transportation integration

Figure 3-107 illustrates the potential for DART+ commuter and Luas tramway integration. The illustration serves to highlight the significance and potential value of maximising the potential for interchange between railway lines and modes of transport in the Docklands Development Area.

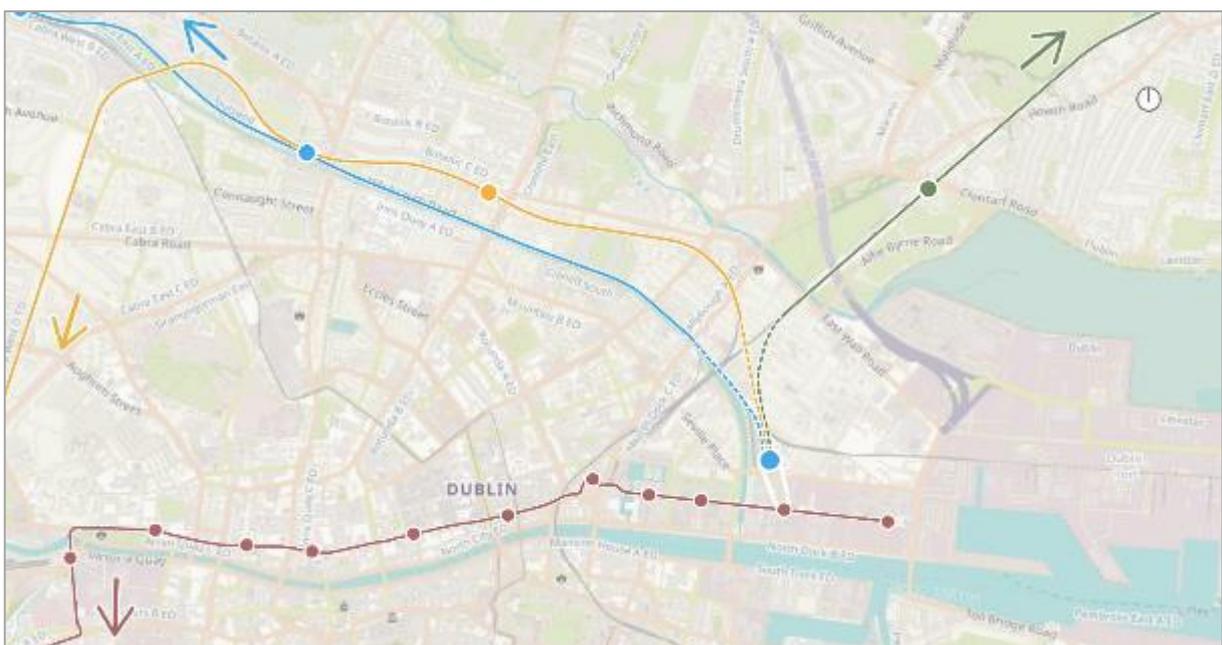


Figure 3-107 DART+ and Luas Integration in the Docklands

Figure 3-108 illustrates the existing train, Luas and Bus services in the Docklands Area. Given the scale of planned development of the area, the graphic confirms the potential for integration of services as part of DART+ West.

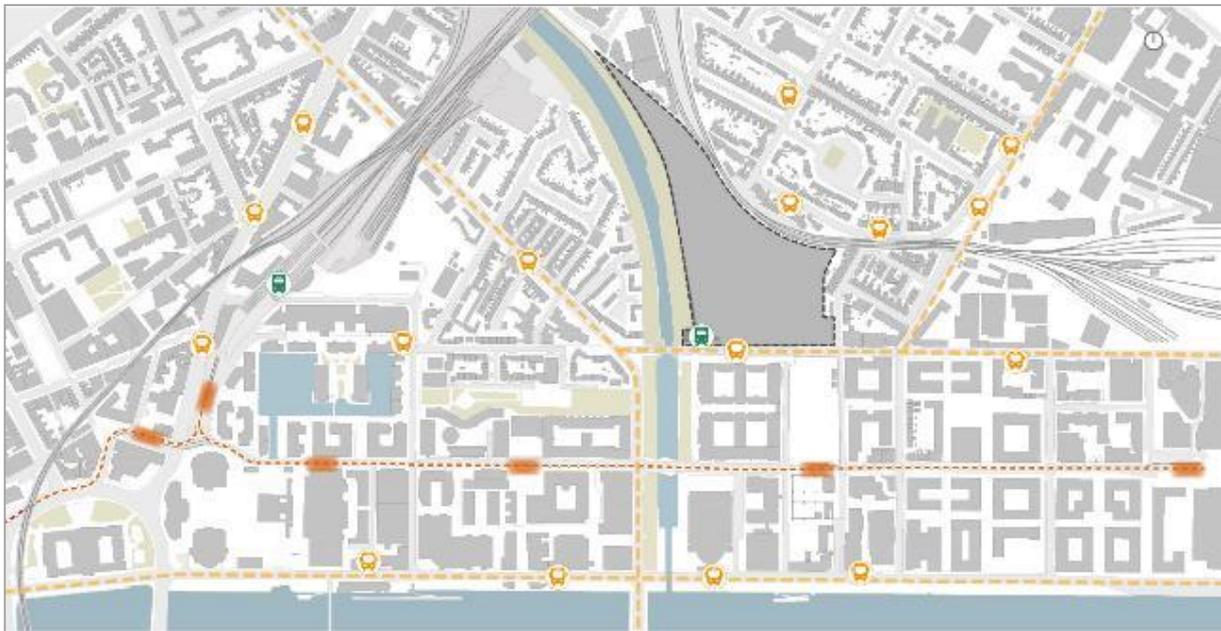


Figure 3-108 DART+, Luas and Bus Integration in the Docklands

3.6.5.2.7 Operational and alignment design criteria

The project objectives include for implementation of trackwork and platform capacity enhancement associated with the provision of terminating capacity for the Midlands Great Western Railway (MGWR), Great Southern & Western Railway (GSWR) and the Northern Line. The designs have been developed to meet this requirement on the basis of the Train Service Specifications while maintaining connectivity with the port and North Wall Yard.

3.6.5.3 Spencer Dock Station- options assessment

All previous studies carried out in respect of Docklands Capacity Enhancement were evaluated at the outset of project options assessment. Five of the original options were adopted for further development and consideration as part of the options assessment process for the project. The options assessment is described below.

Option A1

The first proposed option is to maintain the station at the current location, keeping the existing platforms and canopy. The existing platforms are the ones located closest to the Royal Canal (Westside). The upgraded demand and the connections with the above-described lines require enlarging the station building to allow access to four new platforms located to the east of the existing ones.

The current station is formed by an island platform covered with a canopy and a station building in the head of the platform. The existing accesses to the station from the Royal Canal, below Sheriff Street Upper overbridge and from the Sheriff Street Upper overbridge are maintained. The first entrance provides levelled access to the platforms, and the second one is 4.5 metres above the platform level, connecting with it through a two-way staircase and a lift. See Figure 3-109 for images of station access points.



Figure 3-109 Access from the Royal Canal / Access from Sheriff Street Upper Overbridge

The current station needs to be enlarged eastwards to receive the four new platforms and their respective tracks. It will also need to be extended northwards to provide the required amount of space between the beginning of the platforms and the turnstiles of the station in order to guarantee a fluid passengers flow.

The enlargement of the station is illustrated in Figure 3-110 in blue, showing the area that the station should occupy to accommodate the four additional platforms. They will be joined on two island platforms to optimise the land occupation. A third access point to the station could be provided from the eastern side to allow for a better connection towards the Luas station, to improve the accessibility of the station.

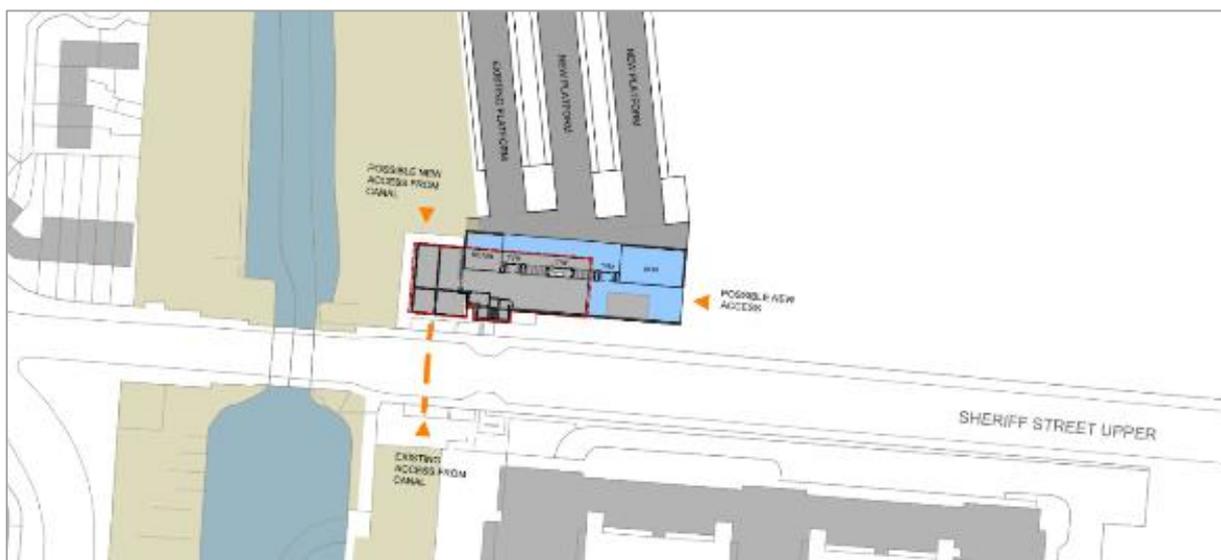


Figure 3-110 Spencer Dock - Option A1. Accesses to Existing Station

Spencer Dock Station Option A1 will be provided with six tracks and three island platforms. This layout allows this option to:

- Access four platform tracks from the MGWR line.
- Access three platform tracks from the GSWR line and the Northern line.
- Interconnect the MGWR, GSWR and Northern Lines.
- Preservation of the connection to East Wall Yard via Northern Line.

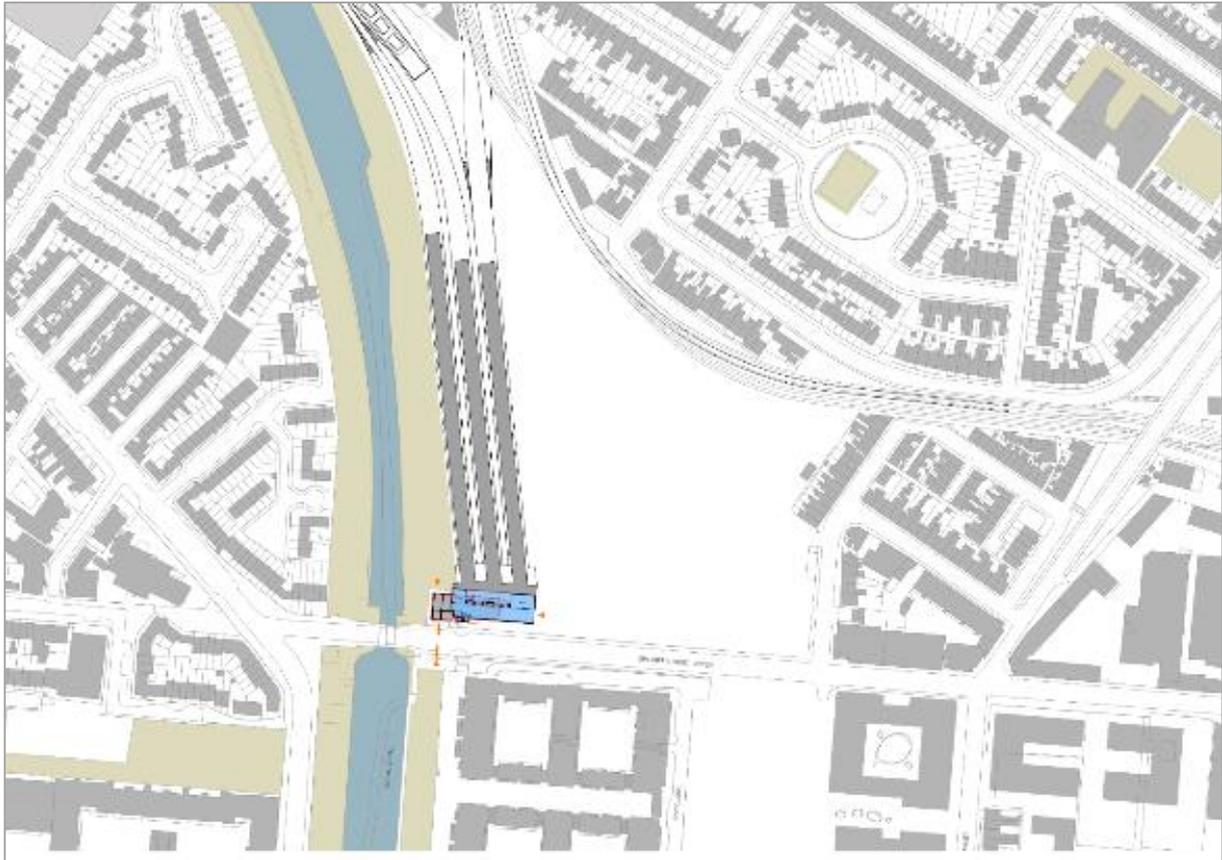


Figure 3-111 Spencer Dock Option A1 General Layout

The existing station building operation (entry and exit flow, means of egress location, fare collection systems, etc.) will be maintained as far as possible. However, some important modifications will be required as the number of trains and passengers will increase significantly.

Spencer Dock Station Option A2

Option A2 considers moving the station to the east, at the end of Park Lane. This would allow for an improved alignment solution and a better connection towards the Spencer Dock Luas station. This option avoids the short distance between the northern end of the platforms and the divergence of the three rail routes the station serves. See Figure 3-112 for the plan layout of option A2.

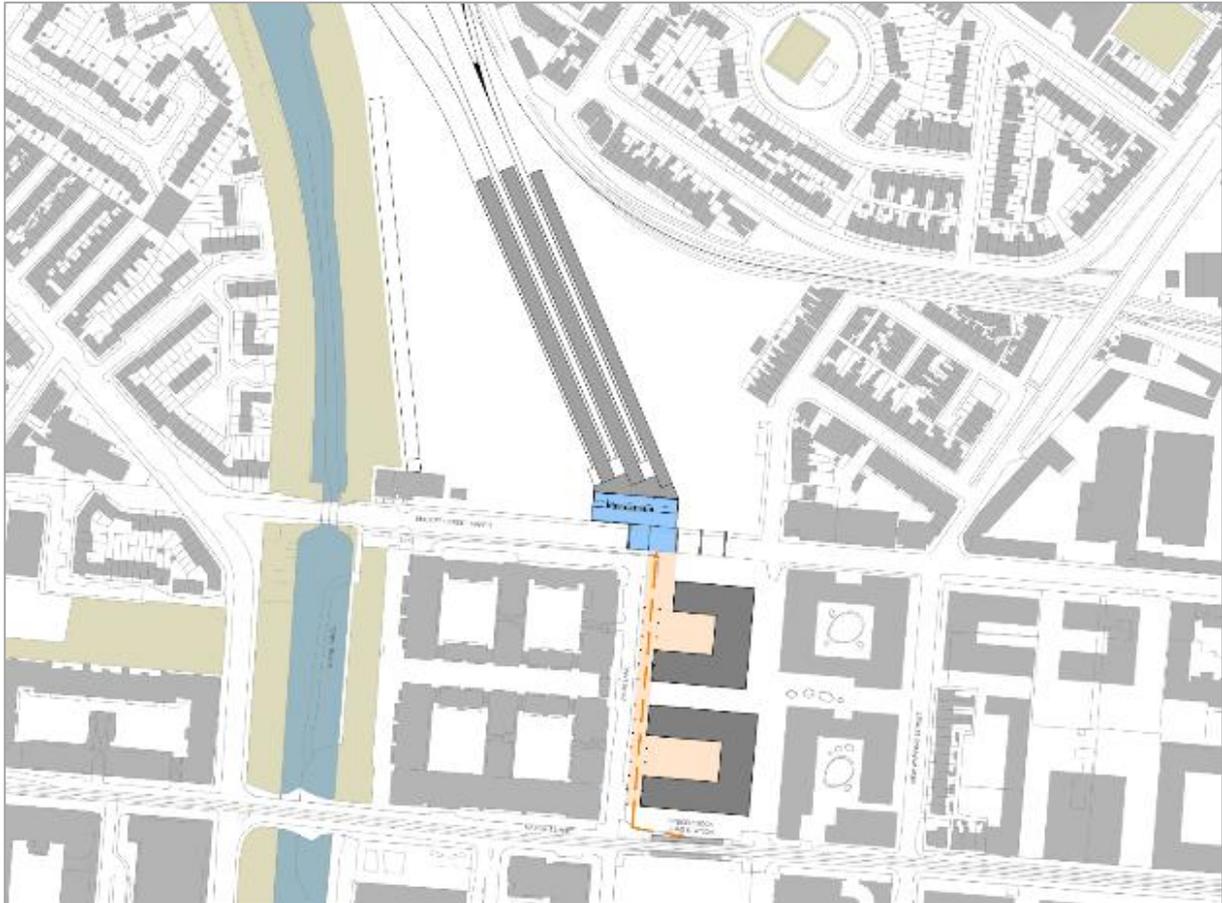


Figure 3-112 Spencer Dock: Option A2 General Layout

Platforms and tracks will be angled relative to the platforms of the existing Docklands Station. This will ensure:

- Smoother track alignment tie-ins with the three rail routes the station is to serve.
- Preservation of the connection to East Wall Yard via Northern Line.
- Spencer Dock Station Option A2 will be provided with five tracks, two island platforms, and one side platform. This layout allows this option to:
 - Access four platform tracks from the MGWR line.
 - Access two platform tracks from the GSWR line and the Northern line.
 - Interconnect the MGWR, GSWR and Northern Lines.
- Enhancement of the station capacity and operational flexibility.
- East Wall Yard connection with the MGWR and GSWR is not feasible without the use of a diamond crossing.

The station building will be located to the north of Sheriff Street Upper, adjacent to the overbridge. Access to the station will be provided under the bridge to allow a more direct connection to Spencer Dock Luas station approximately five minutes away. This link between the two stations offers the opportunity for the North Lotts masterplan to create a possible new commercial porched boulevard that would provide a covered link between the stations. Therefore, the Option A2 station location offers the opportunity to create a commercial axis in Park Lane.



Figure 3-113 Spencer Dock: Option A2 Station Access

Spencer Dock Station Option A3

Option A3 is also placed at the northern end of Park Lane. This solution enhances Option A2 by providing the possibility of a future link between the station and the East Wall neighbourhood via a pedestrian and cycle route. Although this pedestrian bridge is not included in the station project investment, this improvement would mean the removal of the existing barrier from East Wall to the city centre following the spirit of the Dublin Docklands Area Master Plan 2008.

This option, as in Option A2, avoids the short distance between the northern end of the platforms and the divergence of the three rail routes the station serves.



Figure 3-114 Spencer Dock: Option A3 General Layout

Platforms and tracks will be angled relative to the existing platforms of Docklands Station, similar to Option A2, but is shifted slightly west. This will facilitate:

- Smoother track alignment tie-ins with the three rail routes the station is to serve.
- Preservation of the connection to East Wall Yard via Northern Line.
- Creation of a pedestrian and cycling route connecting East Wall neighbourhood.

Docklands Station Option A3 will serve five tracks, two island platforms, and one side platform. The proposed track layout will secure the following characteristics with respect to the station:

- Access available to four platform tracks from the MGWR line.
- Access available to two platform tracks from the GSWR line and the Northern line.
- Interconnection available between the MGWR, GSWR and Northern Lines, fully compliant with operational requirements.
- East Wall Yard connection with the MGWR and GSWR is not feasible without the use of a fixed diamond crossing.

The station approach gives the possibility of creating a new interconnection node between the East Wall, Sheriff Street Upper and the new commercial boulevard that would provide a covered link to Spencer Dock Luas Station. This option also offers the regeneration of the Sheriff Street Upper underpass, including different uses that improve the passenger experience, such as bike parking or retail areas.

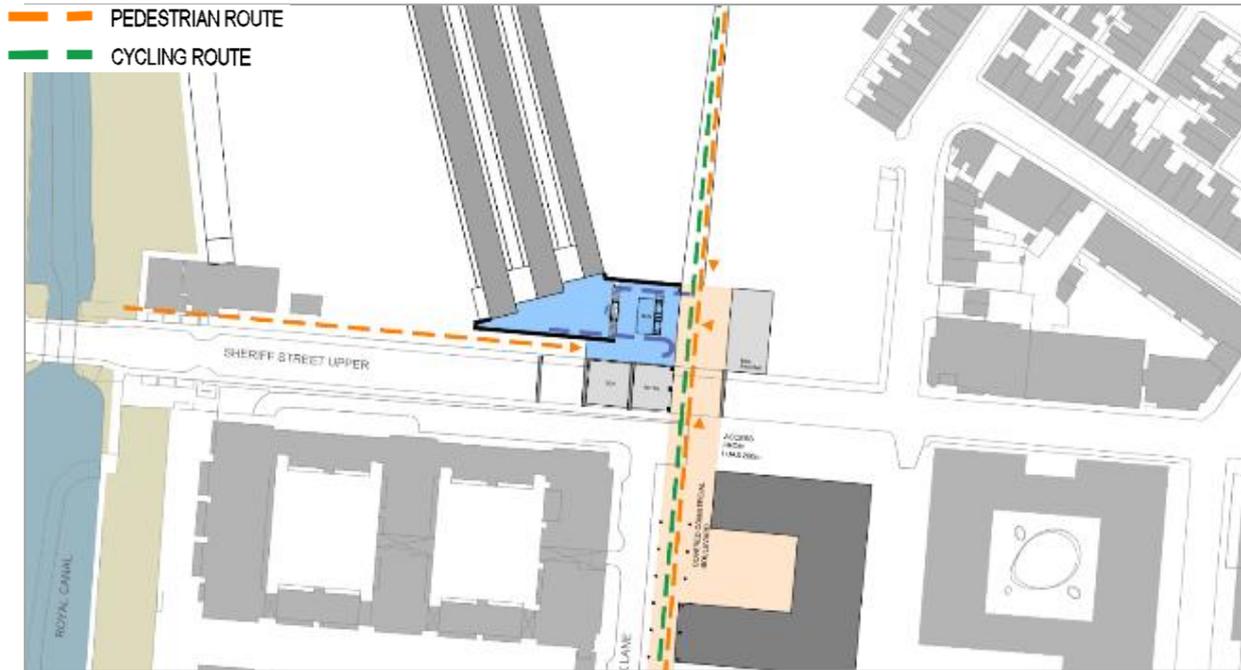


Figure 3-115 Spencer Dock Option A3 Station Access

The new Spencer Dock Station Option A3 aims to start a process of urban regeneration with a strong influence on the immediate surroundings, improving urban connectivity and creating a new residential development. This reflects the local objective to develop the Docklands Station plot as a future extension of the North Lotts.

Spencer Dock Option B1

The first option considered for the Site B location tries to minimise the excavation of the works needed to construct the tracks and platforms. The track level is placed at level -1.60 to permit the minimum height clearance below Sheriff Street Upper overbridge.

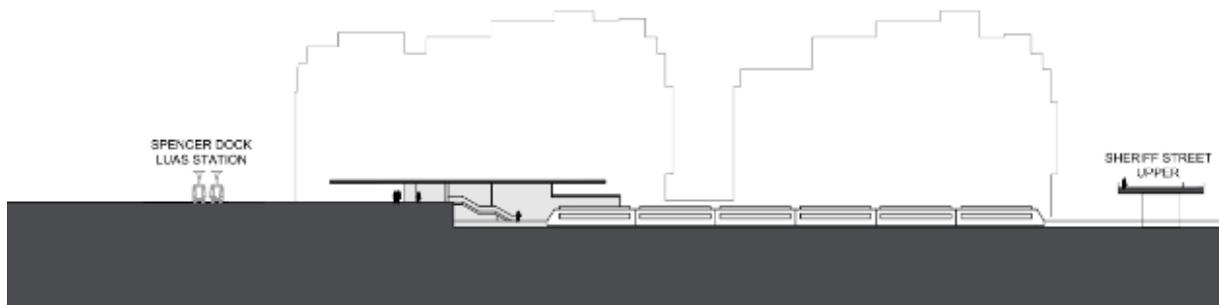


Figure 3-116 Spencer Dock Option B1 General Layout Section

Platforms and tracks will be angled relative to Park Lane. This will ensure:

- Smoother track alignment tie-ins with the three rail routes the station is to serve.
- Preservation of the connection to East Wall Yard via Northern Line.
- Spencer Dock Station Option B1 will be provided with four tracks, two island platforms, and one side platform.

This proposed layout allows this option to:

- Access four platform tracks from the MGWR line.
- Access three platform tracks from the GSWR line.
- Access two platform tracks from the Northern line.

- Interconnect the MGWR, GSWR and Northern Lines;
- Enhance the station capacity and operational flexibility.

It is noted that Sheriff Street Upper overbridge must be altered over the proposed station to accommodate the new track layout.



Figure 3-117 Spencer Dock Option B1 General Layout Plan

The proposed station access will coincide with the ground floor of any commercial building to be constructed subsequently under the pre-existing SDZ planning permission and is proposed to front the Luas station plaza, providing a direct interchange between the two means of transport.

The future overhead structure design will be developed around the station platforms maintaining the space of the platforms and their canopies open for ventilation purposes.



Figure 3-118 Spencer Dock Option B1. Ground Floor Including Overhead Structure Design

Spencer Dock Station Option B2

Option B2 solution provides better integration with the surrounding buildings by aligning the platform of the station to the North Lotts planning scheme gridlines. This alignment also makes the layout more compatible with the structure of the buildings above. The platforms need to be pushed south to ensure that the standards are met in respect of the proposed track alignment on the immediate approach to the station. The only practicable way to move the platforms southwards is by lowering the top of rail level so the tracks can pass under the Spencer Dock Plaza with sufficient structural and OHLE clearance. The resulting level for the platforms, for this option, is -2.38 metres. Refer to Figure 3-119.

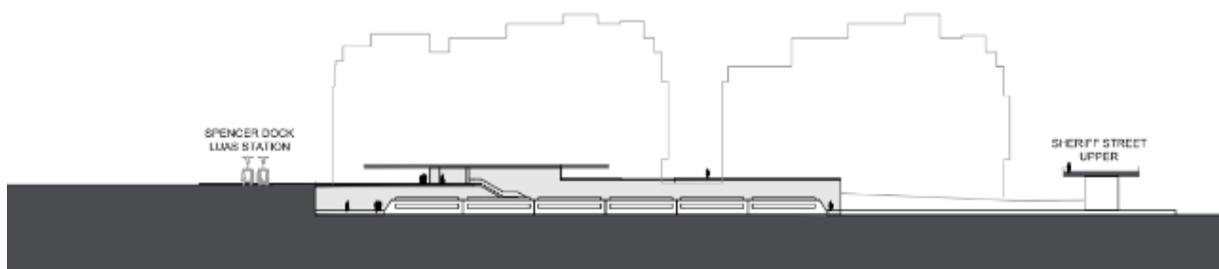


Figure 3-119 Option B2 General Layout Section

This proposed configuration of Option B2 will ensure:

- Platforms and tracks are aligned to the structural grid of the proposed overhead structure design buildings which have planning permission.
- Preservation of connection to East Wall Yard via Northern Line.
- Four tracks are served by two island platforms and one side platform.

The proposed layout allows Option B2 to:

- Access four platform tracks from the MGWR line.

- Access two platform tracks from the GSWR line and the Northern line.
- Interconnect the MGWR, GSWR and Northern Lines.
- Enhance station capacity and operational flexibility.

Sheriff Street Upper overbridge must be altered over the proposed station to accommodate the new track layout.



Figure 3-120 Spencer Dock Option B2 General Layout Plan

The proposed station access podium is in the same location as that of Option B1, the ground floor of the landmark building that is facing the Luas station plaza. It provides a direct interchange between the two means of transport.

The future overhead structure design can be found within the areas on either side of the proposed platforms, thus minimising the interference between the structure of the station and the structure of the overhead structure design buildings. With the overhead structures bridging the station, the open space above the platforms can be maintained to allow the ventilation of the station.



Figure 3-121 Spencer Dock Option B2 Ground Floor Including Overhead Structure Design

The impact of this solution on the DART Underground project, in this case, is also significant.

The proposed alignment has a minor impact on the tunnel boring machine (TBM) portal tunnel. A redesign of the TBM portal retaining walls in the areas affected by the new railway alignment will be needed. However, the general construction strategy of the DART Underground portal tunnel could be maintained as it is proposed. During the DART Underground construction, the speed of the train close to the works may be affected.

Options Assessment / Multi-Criteria Analysis Stage 1 (MCA1)

In the Stage 1 assessment, the MCA is called MCA1, and it is developed to facilitate a ranking of each option against a set of defined criteria. It comprises either a qualitative and/or quantitative assessment of the options developed. It is a comparative assessment of all options against each other. The MCA1 is undertaken on all options developed. It screens and assesses all options based on high-level design or baseline data collection in order to screen and assesses all options. All options are assessed against the defined criteria, and the significance of the impacts, in order to screen out options which are considered either not feasible or for which clear division emerges between them and superior options in respect of the defined criteria, leading to a short-listing of options.

The following Station Options were advanced for Multi-Criteria Assessment No. 1.

Table 3-40 Options Advanced for MCA1

Option	Location	Description
A1	Current Station Location	Retains existing platforms and canopy with additional platforms to east.
A2	At the end of Park Lane	New Station accessed off Sheriff Street.

Option	Location	Description
A3	At the end of Park Lane	New Station accessed off Sheriff Street with Pedestrian and Cycle link to East Wall.
B1	Mayor Street Lower	Platforms and tracks angled relative to Park Lane
B2	Mayor Street Lower	Platforms and tracks parallel to Park Lane

The table below summarised the outcome of the assessment.

Table 3-41 Summary of Assessment

Criteria	Option A1	Option A2	Option A3	Option B1	Option B2
Economy	Green	Light Green	Green	Brown	Brown
Integration	Brown	Brown	Brown	Brown	Light Green
Environment	Light Green	Light Green	Light Green	Brown	Brown
Accessibility & Social Inclusion	Brown	Brown	Brown	Light Green	Light Green
Safety	Brown	Brown	Light Green	Light Green	Light Green
Physical Activity	Yellow	Yellow	Yellow	Yellow	Yellow
Progress to MCA2	Yes	No	Yes	No	Yes

A statement of the primary factors resulting in the comparative outcome under each criterion is provided below:

Economy:

- The capital cost for Options A1, A2 and A3 is significantly lower than the costs of Options B1 and B2.
- Options A1 and A2 are located wholly within property owned by CIE whereas other options require land acquisition.
- Due to the partially embedded nature of Options B1 and B2, ongoing maintenance costs are elevated over those of other options.
- The longer distance between station options B1 and B2 and Newcomen Junction in comparison to other options provides better scope for hold capacity on the approach to the train station providing better scope for management of platform occupancy in the station.
- The options perform equivalently in respect of passenger demand.
- Options B1 and B2 are better located than other options in respect of the proximity to workplaces and residential development and other modes of public transport. The added walking time associated with locations A1, A2 and A3 results in them being rated some disadvantage in this regard.

Integration:

- They are more remote than other options and do not offer the same level of connection to other modes of transport than other options.
- Their remoteness also undermines their performance in respect of safety and social inclusion.

Although Option B1 performs equivalent to Option A3 and close to the level of performance of Option B2, it falls away for the following principal reasons:

- Option B1 is skewed to the street block into which it fits and consequently curtails to ease to which a multistorey commercial development can be built above it more so than does Option B2.
- Options A2, A3, B1 and B2 impact on the heritage Sheriff Street Upper Viaduct.
- Option B1 requires the top of rail level to be depressed below the existing ground level resulting in the need for tanking.

In conclusion to the MCA1 process, it was decided to develop the design of Options A1, A3 and B2 to a higher level of detail and to carry out a second stage multi-criteria assessment on them to determine the preferred option.

Description of Options – MCA2 Stage

MCA1 identified 3 No. options, A1, A3 and B2, for further development and advancement to MCA2. All options were examined in significant detail to further optimise them and to verify their feasibility for implementation as part of the design.

The following developments were made in respect of Option A1:

- Track alignment further developed to optimise connectivity and to optimise the approaches to the station. This includes the implementation of a fixed diamond crossing on the Northern Line.
- Architectural details for the station have been advanced to facilitate a visual impact assessment and to provide enhanced detail for costing purposes.
- Construction methodology considerations have been developed for the proposed station.

The following developments were made in respect of Option A3:

- Track alignment further developed to optimise connectivity and to optimise the approaches to the station. This includes the implementation of a fixed diamond crossing on the Northern Line.
- Architectural details for the station have been advanced to facilitate a visual impact assessment and to provide enhanced detail for costing purposes.
- Construction methodology considerations have been developed for the proposed station.

The following developments were made in respect of Option B2:

- Track alignment further developed to optimise connectivity and to optimise the approaches to the station. This includes refinement of the platform geometry to address the tight track geometry on the immediate approaches to the station. This update requires the relocation of an existing ESB substation and signalling building on the railway. Such relocation is not necessary for Option A1 or A3.
- Architectural details for the station have been advanced to facilitate a visual impact assessment and to provide enhanced detail for costing purposes.
- The station layout was modified to include four rather than five platforms to better accommodate the subsequent implementation of commercial multistorey development above the site.
- Conceptual ideas in respect of over station development have been put together to better characterise the potential for same for the proposed option.
- Construction methodology considerations have been developed for the proposed station.
- An updated Railsys Model with the station in this new location has been prepared and run to ensure that the selected TSS (Scenario 1b) fits also with this option.

Updated details of each of the schemes are presented on the subsequent pages.

Options Assessment / Multi-Criteria Analysis Stage 2 (MCA2)

The following options were advanced for Multi-Criteria Assessment No. 2.

Table 3-42 MCA2 Options Assessment

Option	Location	Description
A1	At the location of the existing Docklands Station	Existing Station, extended to six platforms
A3	At the end of Park Lane	New Station accessed off Sheriff Street with Pedestrian and Cycle link to East Wall
B2	Mayor Street Lower	Platforms and tracks parallel to Park Lane

The table below summarised the outcome of the assessment.

Table 3-43 Summary of Assessment

Criteria	Option A1	Option A3	Option B2
Economy	Green	Green	Brown
Integration	Brown	Brown	Light Green
Environment	Light Green	Light Green	Brown
Accessibility & Social Inclusion	Brown	Brown	Light Green
Safety	Brown	Brown	Light Green
Physical Activity	Yellow	Yellow	Yellow

A statement of the primary factors resulting in the comparative outcome under each criterion is provided below:

Economy:

- The capital cost for Options A1 and A3 is significantly lower than the costs of Option B2.
- Option A1 is located wholly within property owned by CIE whereas the other options require land acquisition largely.
- Due to the largely embedded nature of Option B2, ongoing maintenance costs are elevated over those of other options.
- The longer distance between station options B1 and B2 and Newcomen Junction in comparison to other options provides better scope for hold capacity on the approach to the train station providing better scope for management of platform occupancy in the station.
- The options perform equivalently in respect of passenger demand.
- Option B2 is better located than other options in respect of the proximity to workplaces and residential development and other modes of public transport. The added walking time associated with locations A1 and A3 results in them being rated some disadvantage in this regard.

Integration:

- Options A1 and A3 are between 300 and 400 m remote from the centre of the Docklands Development Area and from other public transport facilities. They are also located in lands zoned for development and will constrain the potential for such development to varying degrees. Both Options can facilitate enhancement of access to East Wall. They do not impact on the planning scheme in place for the Dublin Docklands Development area.
- Option B2 is better integrated with local public transport than the other options but impacts on the planning scheme in place for the Dublin Docklands Development Area. The largely embedded configuration of option B2 will cause difficulty for the accommodation of diesel trains at the station. It is intended these will be phased out over time but if they are to be accommodated in the short term, specific measures to address noise, fuel leakage and fumes. Alternatively, measures can be considered in respect of prioritisation of the Maynooth line for the implementation of electric trains from the outset.

Environment:

- Options A1 and A3 are constructed largely at grade and incorporate significantly curtailed construction activity in comparison to Option B2. The proposed configurations mitigate drainage and earthworks activities and manifest reduced concrete works.
- Option B2 is rated Some Disadvantage relative to other options as it is embedded to a maximum depth of 7.0 m (track) with associated partially embedded approach structures, earthworks, pumped drainage systems all below ground level. In addition the option requires significant enabling works associated with the proposed over station development.

Accessibility and Social Inclusion:

- Option A1 is rated Some Disadvantage as non-motorised users must walk over 400 m to access other public transport in the area. It does not support enhanced access to local deprived areas. Option A3 is more central and consequently performs better in this regard.
- Option B2 is rated Some Advantage as it provides a transport interchange central to the docklands enhancing access for non-motorised users.

Safety:

- In respect of vulnerable road users, cyclists and pedestrians, Options A1 and A3 are rated Some Disadvantage as they are located more remotely from the centre of the Docklands Development Area than is Option B2.
- Option B2 is rated Some advantage as it provides the opportunity for an integrated public transport interchange. The security of vulnerable road users, pedestrians and cyclists would be well served by an integrated facility.

Summary Comparison:

- Option A1 is rated Significant Advantage under one criterion, Some Advantage in respect of one criterion and Some Disadvantage under three criteria.
- Option A3 is rated Significant Advantage under one criterion, Some Advantage in respect of one criterion and Some Disadvantage under three criteria.
- Option B2 is rated Some Advantage under three criteria, Some Disadvantage in respect of one criterion and Significant Disadvantage under one criterion.

The MCA process does not identify an option which is clearly superior to other options which have advanced to MCA2 stage of the process.

3.6.5.4 Spencer Dock selected option

As the results of the MCA process did not identify an option that clearly outperformed all other options, the option to be taken forward was selected by the NTA on a strategic basis. The option selected to be taken forward is Option B2.

In documenting the decision, the NTA made a number of observations including the following:

- Assessment work to date indicates that the additional economic benefits obtained in the Spencer Dock location exceed the additional costs.
- While recognising that there are additional costs required to locate the station at Spencer Dock, the NTA considers that the Spencer Dock option is the better location from a passenger movement perspective, positioning the station in the heart of the Docklands, as opposed to its periphery, and allowing better connectivity to the wider public transport network, in particular to the Luas system.
- The more central location better serves the North Docklands catchment area, which is a major employment centre that is continuing to expand. In addition, with the separate development of an additional pedestrian/cycling bridge over the River Liffey (which is planned for separate delivery with funding provided by the NTA), the relocated station will enable access to significant parts of the South Docklands area. It is worth noting that the ability of the station in the Docklands area to serve the South Docklands was a significant issue during the advancement of the previous DART Underground proposal, with the Dublin Docklands Development Authority and An Bord Pleanála both placing heavy reliance on this linkage.
- Of significant importance, the Spencer Dock location provides greater train scheduling options and opportunities, and ultimately greater overall train system capacity, through its better integration with the wider city's transport network. For instance, running more trains on the Maynooth Line and/or on the Phoenix Park Tunnel link through to the Spencer Dock location, frees up Connolly Station and Loop Line capacity for other services, and still allows people who want to go to central city areas,

such as the Henry Street shopping area, the option of changing onto a Red Line tram to access those areas.

The NTA concluded that, in summary, there are two locational options available for the terminal station on the DART+ West project with different costs and benefits associated with each alternative. Overall, it is the NTA's view that, while recognising the additional costs involved, the benefits of achieving a fully integrated rail network in the Docklands area by locating the station at Spencer Dock, outweigh those costs and ultimately deliver a better public transport arrangement for passengers. In addition, the Spencer Dock location also provides some additional train timetabling options which may ameliorate some of the future pressures on train paths at Connolly Station. But we acknowledge that this is a complex decision and that there are alternative valid viewpoints.

3.6.5.5 Connolly station

3.6.5.5.1 Previous studies

Connolly Station Enhancement Options Study – Options Selection Report March 2019

This report outlined a shortlisted number of options extracted from a list of over twenty feasible options and identified Option 6B as the emerging preferred option, rejecting Option 3 “Do-minimum” because it cannot achieve the target trains per hour per direction.

“Further Do-Minimum” (Do-minimum) options were developed, and these have been advanced as part of the study for this project.

The first Option 3 “Do-Minimum” developed in the Option Selection Report document did not require structural works to the historical arches and kept concourse and platform canopies unaffected. However, it included a revision to the alignment, length and width of the northern end of all platforms.

The proposed solution for improvement of the Newcomen chord required the demolition of the new cycle bridge next to the North Strand Road. Further options/studies would be necessary to avoid, if possible, the demolition of this recently built structure.

The “Further Do-Minimum” Options do not consider the revision of the alignment and length of the northern end of all platforms and the partial demolition of the maintenance depot to the east, envisaged in earlier options.

Instead, the study focuses only on the increase of train services and does not take into consideration the resulting increase in passengers using the platforms, underpass or gate lines. Therefore, it will be necessary to assess the length and width of the platforms to check their ability to cope with the increase of the number of passengers, both in operation and evacuation.

3.6.5.5.2 Baseline Characterisation

Passenger capacity and train service frequency will be significantly increased as a result of the DART+ West Project. Currently, all passengers access and leave the station through the station's main concourse facing Amiens St, having numerous cross flows at peak hours. All passengers using platforms 5, 6 & 7 need to go through Platform 4 to get to the station concourse. The options developed for Connolly station will significantly reduce the number of passengers using Platform 4 to reach Platforms 5, 6 and 7.

3.6.5.5.3 Connolly Station Context

Connolly Railway Station is located at Amiens Street, to the south Oriel Street Upper, to the east Oriel Hall, to the north-east the Irish Rail Control Centre (IRCC), to the north-east Seville Place. Connolly Station provides access to a variety of rail services, including DART, Commuter and intercity routes.

To the east, there is an area of inner-city housing bounded within the environments of the subject site by the Royal Canal, St Laurence O’Toole’s Catholic Church and railway infrastructure servicing Connolly Station and

Dublin Port. The north and north west area is mainly residential with commercial and retail uses along the main thoroughfare of Amiens Street.



Figure 3-122 Connolly Station

At the adjacent south-east plot, an urban brownfield site is currently used for ancillary facilities related to Connolly Station's functions, including car park, railway sidings, maintenance facilities, administration facilities, telecommunication masts, and ancillary storage containers. Most of the site consists of surface car parking (approximately 390 spaces) for Iarnród Éireann customers and staff. On this plot, it is intended to build a new high-rise residential building and office development called The Connolly Quarter.



Figure 3-123 First Phase of the Connolly Quarter Development Next to Connolly Station

3.6.5.5.4 Connolly Station Capacity Analysis

The analysis of the station evacuation requirements is based on the increased capacity of the trains that will serve Connolly Station as part of the DART+ West Project. It is limited to the platforms that are being impacted by the increased number of passengers: platforms 5, 6 & 7. The analysis focuses on the means of egress and evacuation routes of those platforms.

The above-mentioned egress elements will ensure comfortable passengers flows for AM and PM peak periods and a safe evacuation of the platforms in case of fire according to local and international guidelines. The width of the staircases is the minimum width for any staircase established by the “technical specifications for interoperability relating to accessibility of the Union's rail system for persons with disabilities and persons with reduced mobility”.

Option 1. New Entrance at Sheriff Street Lower

This option locates the egress elements on platform level directing the passengers to the south west direction. They are placed almost in the middle of the platforms, reducing the dead-ends distances.

The exact position of the stairwells and lifts will leave 2.60 metres of platform width at both sides of the stairs, allowing for passenger entrance and exit to the trains. The lifts are located in the centre of the platform width.

The staircases and escalators are located below the existing canopies giving access to the platform protected from the weather conditions, thus not requiring their extension. The lifts will need to provide their own shelters for weather protection.

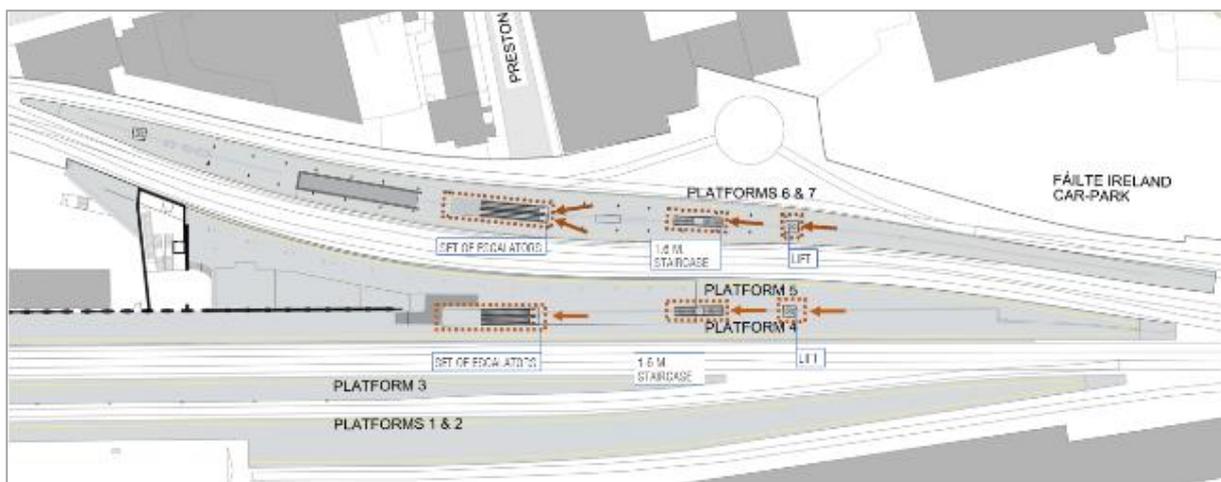


Figure 3-125 Connolly Station Option 1. Platform Level

The new station entrance will be placed within the Rotunda building, 165 metres away from the current access to Connolly Station and adjacent to the office building proposed at Sheriff Street Lower as part of the Connolly Quarter development, providing a connection to this new part of the city. The new entrance located adjacent to the new development will potentially increase the demand catchment.

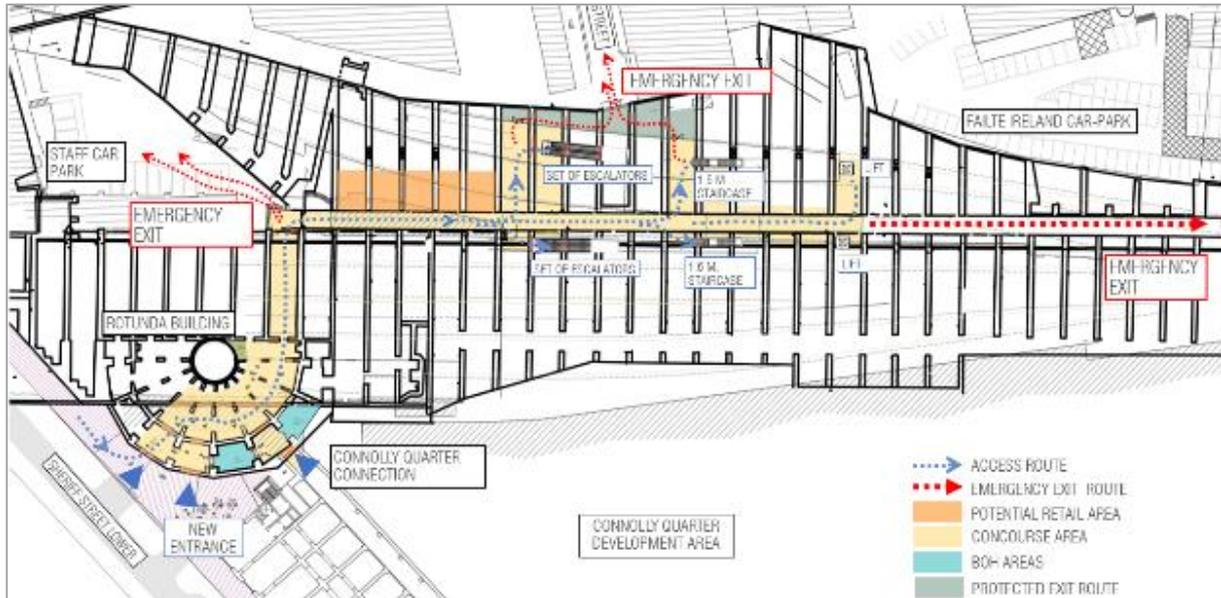


Figure 3-126 Connolly Station Option 1. Street Level

The escalators to Platform 6 & 7 and the staircases to Platform 5 are approximately 180 metres away from the proposed new entrance. Therefore, two intermediate emergency exits are needed to ensure the safe performance of the entrance. One of the emergency exits leads to Preston Street and the other one to the Iarnród Éireann Staff car-park as illustrated in Figure 3-126. A third emergency exit is needed to be provided to the north east of the station, towards Seville Place¹.

Option 1 proposes to connect the new egress elements with the arches on the Rotunda building at Sheriff Street Lower. Those arches lead to a public space that is currently limited by the western wall of the Luggage store building. In the Connolly Quarter development masterplan, the Luggage store western wall is proposed to be replaced by an office building façade with an emergency staircase just in front of the Rotunda building.



Figure 3-127 View of the Rotunda Building from Sheriff Street Lower

¹ The location of the emergency exits are currently under revision. They might be moved towards the rights of ways that exist parallel to the western façade of the vaults.



Figure 3-128 View and Plan of the Public Space Between the Rotunda and the Office Building (Connolly Quarter)

This new entrance to the station will require to relocate the maintenance stores that currently occupy one of the vaults. It would also be required to relocate the gas installation and the electrical substation to carry out the temporary structural support of the building, to increase the access points and to provide a better look and feel to the new station entrance.

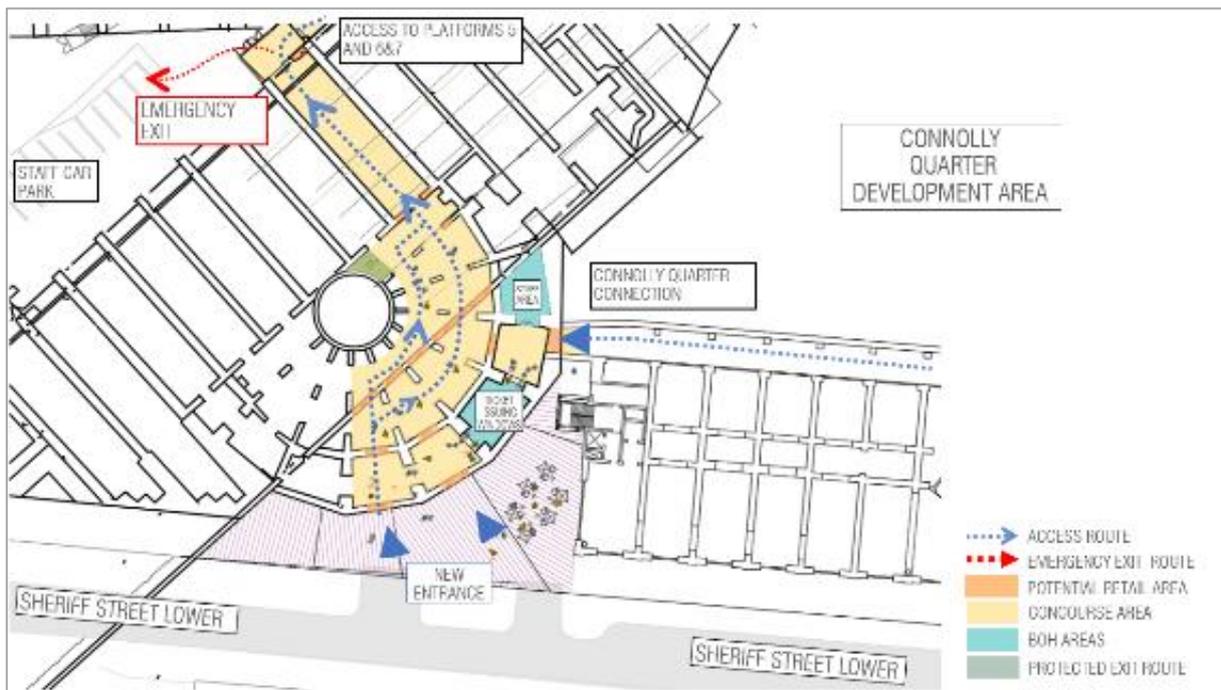


Figure 3-129 Connolly Station Option 1. Street Level Entrance

In order to allow the entrance paths to the interior of the vaults, significant structural demolitions are required in the building interior. The image below shows all the required demolitions or structural modifications that will consist of: temporary supports on the vaults, modifications to existing foundations (underpinning) and structural strengthening of the vaults.



Figure 3-130 Rotunda Building Structural Modifications Requirements

The construction of this option would be challenging due to the structural constraints of the entrance area. The Driver's facilities building structure is supported in the vaults and arches of the Rotunda building and will condition the layout of the new entrance. These are also part of the Protected Structure designation of Connolly Station.

The station access control system is conditioned by the vaults' geometry, making it impossible to include the number of ticket validation gates required by the passenger demand calculations. Therefore, a smart card reader poles system is proposed for this option.

Option 2. New Entrance at Preston Street

The aim of Option 2 is providing access to Platforms 5, 6 and 7 from Preston Street. This option is the one that requires less area of the vaults to be refurbished.



Figure 3-131 View of the Possible Access to the Station from Preston Street and from the Interior of the Vault.

This option maintains the same platform proposal as Option 1. The stairwells and lifts will leave a distance of 2.60 metres to the platform edge, allowing for passenger entrance and exit to the trains.

The staircases and escalators are located below the existing canopies giving access to the platform protected from the weather conditions, thus not requiring their extension. The lifts will need to provide their own shelters for weather protection.

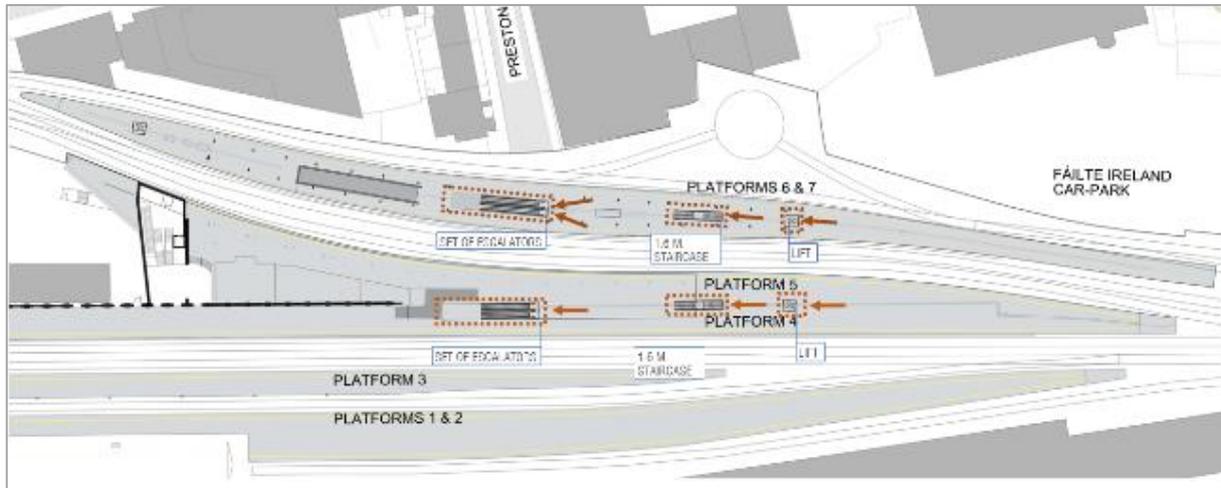


Figure 3-132 Connolly Station Option 2. Platform Level



Option 2 Proposed Preston Street Entrance



Option 2 Alterations at Platform Level



Option 2 Undercroft Reinstatement



Option 2 Preston Street Enhancements

Figure 3-133 Connolly Station Option 2. Artistic Impressions

Once those egress elements reach the street level, passengers will be conducted to Preston Street through one of the station vaults. The floor of that vault will have a slope of 4.9% due to the difference of level between the central vault corridor and Preston Street level.

The station access control system of Option 2 is also conditioned by the geometry of the vaults, making it impossible to include the number of ticket validation gates required by the passenger demand calculations. Therefore, a smart card reader poles system is proposed for this option.

This proposal requires two emergency exits. One of them is located in continuity with the vault that links to the escalators of Platform 6&7. The exit route of that vault leads to a 'right of way' that runs parallel to the vaults' façade and connects with Amiens Street. Another emergency exit will be provided towards the Fáilte Ireland car-park, where there is also a 'right of way' that connects with Seville Place.

In the future, the central corridor could be extended to the Rotunda building at Sheriff Street Lower to provide a connection with the Connolly Quarter development as per the design proposed by the Connolly Quarter masterplan.

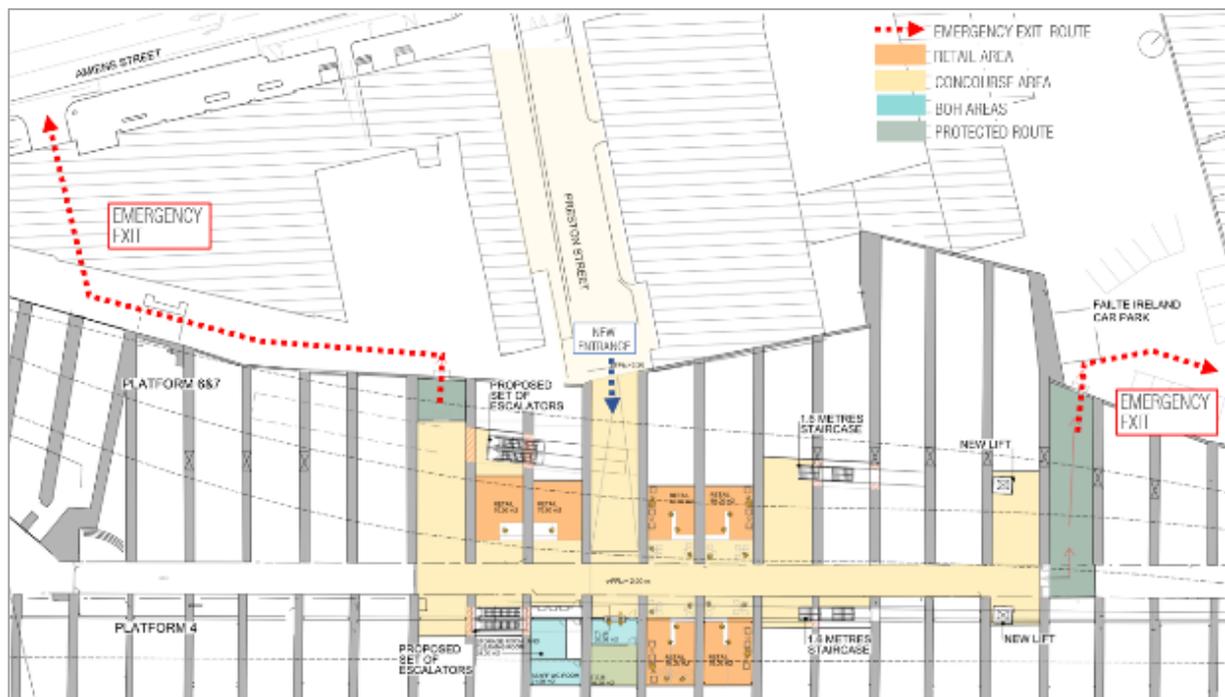


Figure 3-134 Connolly Station Option 2. Street level

The Preston Street entrance provides a good intermodally with bus lines at Amiens Street, but the connection with the Luas is very limited as this new entrance is placed 330 metres away from the Luas stop.

Option 3. New Entrance at Seville Place

Option 3 proposes to solve the increased station occupancy by creating a new entrance at Seville Place.

The staircases and escalators are located almost in the middle of the platform, running towards the north east direction, taking the passengers closer to the station new entrance. They will reduce the dead-end distances. The exact position of the stairwells, escalators and lifts will leave 2.60 metres at both sides, allowing for passenger entrance and exit to the trains and permitting full effective use of the platform area for passenger services.

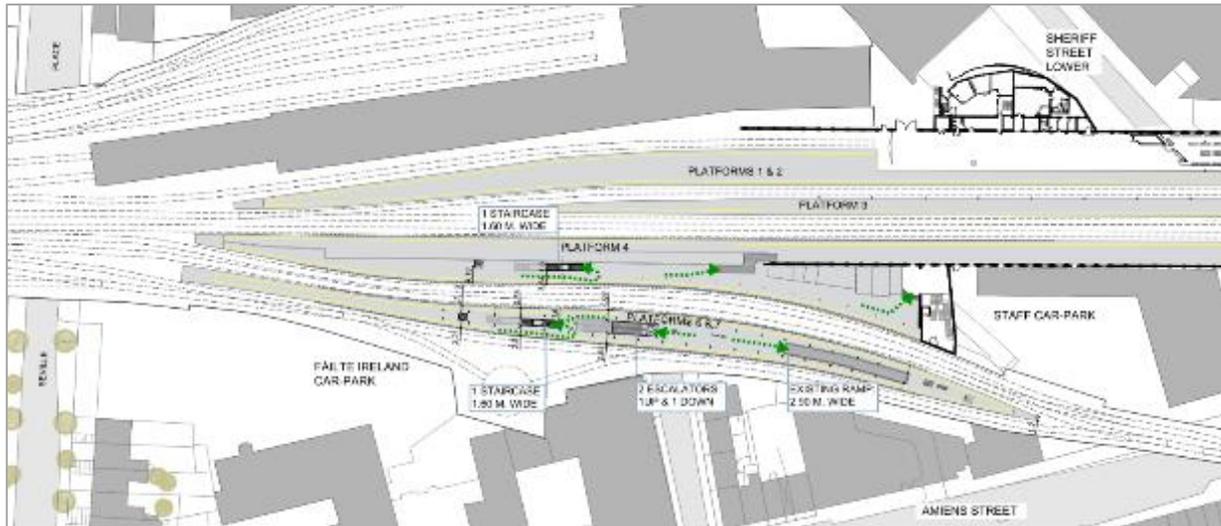


Figure 3-135 Connolly Station Option 3. Platform Level

The new egress elements are located below the existing canopies giving access to the platform protected from the weather conditions, thus not requiring their extension.

On the one hand, this access is proposed to be located 125 metres away from the entrance to the Connolly Quarter development from Seville Place, thus providing an easy connection to this new part of the city. However, this entrance does not provide an attractive location in relation to the connectivity with other key points of the city.

On the other hand, the new access is proposed on the opposite side of the current station entrance. This will provide to the passengers coming from the east a reduction of time in their journey from the station entrance to their desire platform. Furthermore, the new access is well connected with Bike lanes but not as well connected with the Luas, since its stop is placed 560 metres away.



- ⋯▶ ROUTE TO EMERGENCY EXIT
- ⋯▶ ROUTE TO NEW ACCESS / EXIT
- STATION CONDUITS' AREA
- EMERGENCY EXIT AREA
- POTENTIAL AREA FOR RETAIL

Figure 3-136 Connolly Station Option 3. Street Level

Option 3 will require the land acquisition of Fáilte Ireland car-park, to provide entrance to the station and allow for a small building where the ticket validation gates and other station facilities will be placed. This building will connect with the vaults where the staircases and lifts are located.



Figure 3-137 View of the New Access Plaza Proposed for Option 3.

The access to the staircases is done through the vaults below the platforms of Connolly Station, parallel to Seville Place. As the distance to the exits (point of safety) is larger than the one required by the Fire Authorities, protected corridors will be proposed towards Fáilte Ireland Car park, below the railway bridge.

3.6.5.5.6 Options assessment/ Multi Criteria Analysis

The above-explained station options were advanced for Multi-Criteria Assessment. In respect of Connolly Station, a single stage MCA has been implemented. The options considered are summarised below.

Table 3-44 MCA Options Assessment

Option	Location	Description
1	Access from Sheriff Street Lower (Rotunda building)	New Station entrance through the Rotunda building at Sheriff Street Lower
2	Access from Preston Street	New Station entrance from Preston Street
3	Access from Seville Place (Fáilte Ireland Car park)	New Station entrance from the Fáilte Ireland Car park

The outcome of the assessment is presented below:

Table 3-45 MCA Summary

Criteria	Option 1	Option 2	Option 3
Economy			
Integration			
Environment			
Accessibility & Social Inclusion			
Safety			

Criteria	Option 1	Option 2	Option 3
Physical Activity			
Preferred Option	No	Yes	No

A statement of the primary factors resulting in the comparative outcome under each criterion is provided below:

Economy:

- The inversion needed for the construction of Option 1 would be higher than for the other two options since the connection with Sheriff Street Lower is longer than the others, and the construction within the Rotunda building will be more challenging.
- The land acquisition required in Option 3 makes this option less attractive than Option 2 in economic terms.
- Options 1 and 2 have the constraint of only being operated with a tag-on poles system since the numbers of gates required cannot be placed in the station due to the lack of space.

Integration:

- Option 1 is better than the other two options in terms of integration because its entrance has a better connection with the Connolly Station Luas stop. It is also better located in the city regarding urban integration, mainly due to the proximity to the Connolly Quarter future development.
- Option 2 is also well integrated. It is close to the 'bunker' building location, which has been identified within the Dublin City Development Plan objectives as a potential DART entrance location.

Environment:

- Options 1 and 2 have a significant comparative advantage over Option 3, as landtake is not required.
- The impact of Option 1 on Cultural, Archaeological and Architectural Heritage is comparably disadvantageous over the other options. Option 2 is superior to all other options in this respect.

Accessibility and Social Inclusion:

- The three solutions increase the station accessibility by providing new accessible means to access platforms 5, 6 & 7.
- Options 1 and 2 provide a better connection with relevant areas of the city.

Safety:

- The three options allow the passengers' evacuation from the station platforms considering the agreed passenger demand figures for the station.
- Also, the three options are similar from a vehicular traffic, pedestrian and cyclist perspective.

Physical Activity:

- Option 3 is less attractive than the other options regarding the connection with cycle routes and other key attractions.

Option 2 emerges as the preferred option. Its main advantages compared to the other options are:

- It does not require the acquisition of lands.
- The proposal is consistent with Dublin City Development Plan objective to reinstate access in the vicinity of the 'Bunker Building' on Amiens Street.
- This option exhibits limited impact on Cultural, Archaeological and Architectural Heritage in comparison to the other options.

3.6.5.6 In station accessibility

3.6.5.6.1 Ashtown Station

The accessibility enhancement of Ashtown Station presented at PC2 concerned several parts of the station. The most critical were:

- The station entrance, which needed to be adapted to comply with the accessibility requirements.
- The need to provide lifts to cross from one platform to the other one. At Ashtown Station, mobility-impaired currently use the level crossing as a means of access to opposing platforms.
- The general width of Platform 1 (north platform) is 10 cm narrower than required by the TSI standards. This could be solved by the replacement of the existing fence.
- Some shelters and benches encroach the circulation width on the platforms. They needed to be removed or replaced.



Figure 3-138 Ashtown Station Current Layout

Removal of the Level Crossing at Ashtown alters the existing access arrangements between platforms. Consequently, it is necessary to provide for connection for mobility impaired persons between the platforms. The proposal for Ashtown Station at PC2 included a new pedestrian bridge replacing the existing one at the station. The new footbridge provided staircases and lifts to ensure accessibility between platforms. It was placed at the entrance of the station, close to the end of the platforms. This proposal effectively represented a like for like replacement of an existing structure with an equivalent to current design standards and consequently did not warrant further optioneering. Figure 3-139 to Figure 3-141 illustrate the location and general layout of the proposed pedestrian bridge and a schematic view of the bridge at PC2.



Figure 3-139 Ashtown Station Pedestrian Bridge Layout

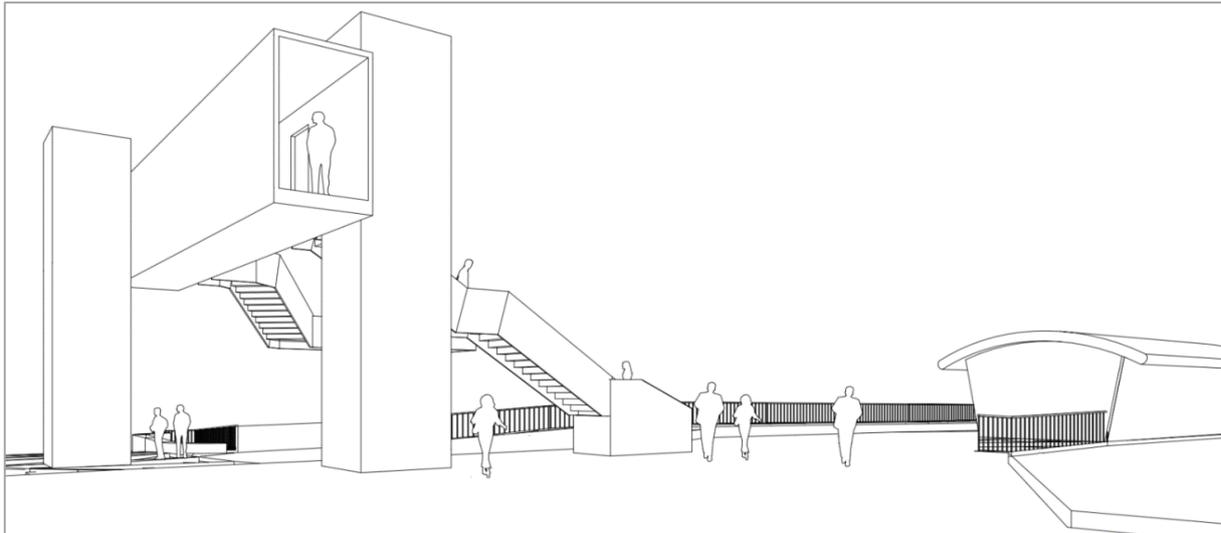


Figure 3-140 View of the Pedestrian Bridge at Ashtown Station

Figure 3-141 shows that part of the pedestrian bridge north access is placed out of the CIÉ property boundary.

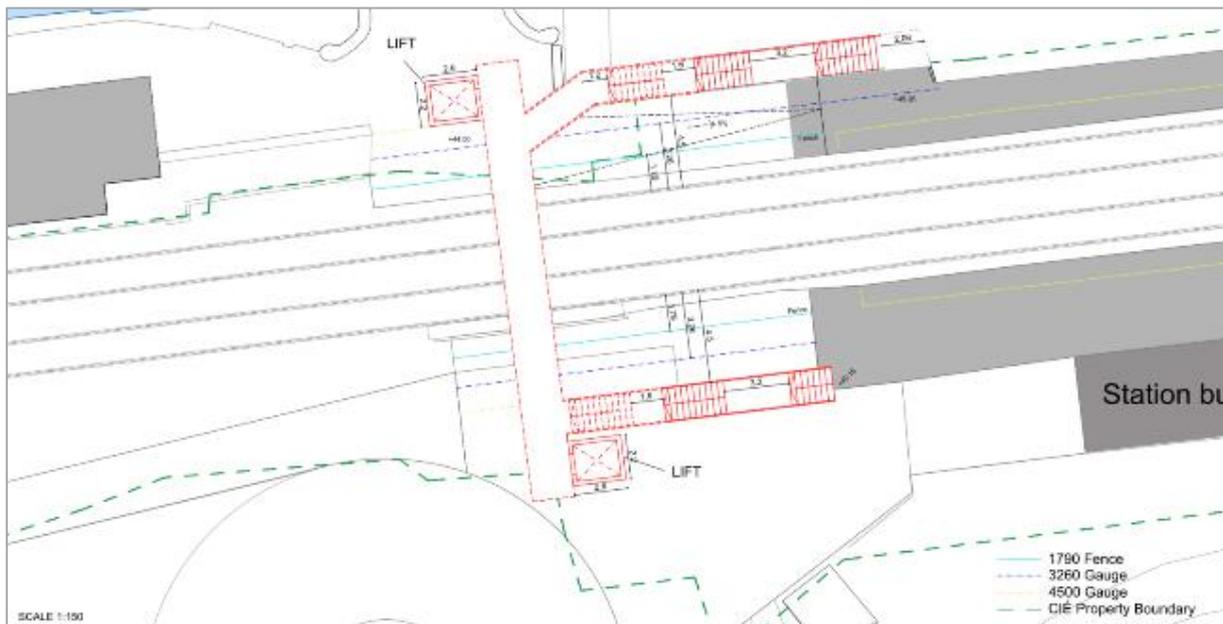


Figure 3-141 Ashtown Station Pedestrian Bridge Plan

3.6.5.6.2 Revised Preferred Option at Ashtown Station

Following feedback during the public consultation process, the Ashtown Station footbridge design has been revised. Given the revised Ashtown Preferred Option (reference Section 3.6.4.4.2) and the movement of the underpass further west, this resulted in a longer journey time for pedestrians and cyclists if they were to use this route to cross the railway and the canal. Also, continuing with one lift at the station was raised as a significant issue if it failed. Therefore, a bridge crossing with steps & ramps, with provision for cyclists to cross as well, was brought into the design.

The revised bridge proposal for the Ashtown Station considers the construction of a new steel structure bridge/ramp, suitable for pedestrians, bicycles and PMRs that will serve for the passengers of the station to cross from the North Platform to the South Platform and vice versa and also for residents to connect both sides segregated by the canal and the DART railway.

Since the Ashtown Road level crossing will be permanently closed, the historic bridge, currently used for vehicular traffic, will be converted into a pedestrian and cycle bridge to cross the canal. The new scenario led IDOM to propose the removal of the existing footbridge, firstly to avoid unnecessary redundancies, but at the same time because it gives advantage to give prominence to the historic bridge improving the vision and its integration to the landscape.

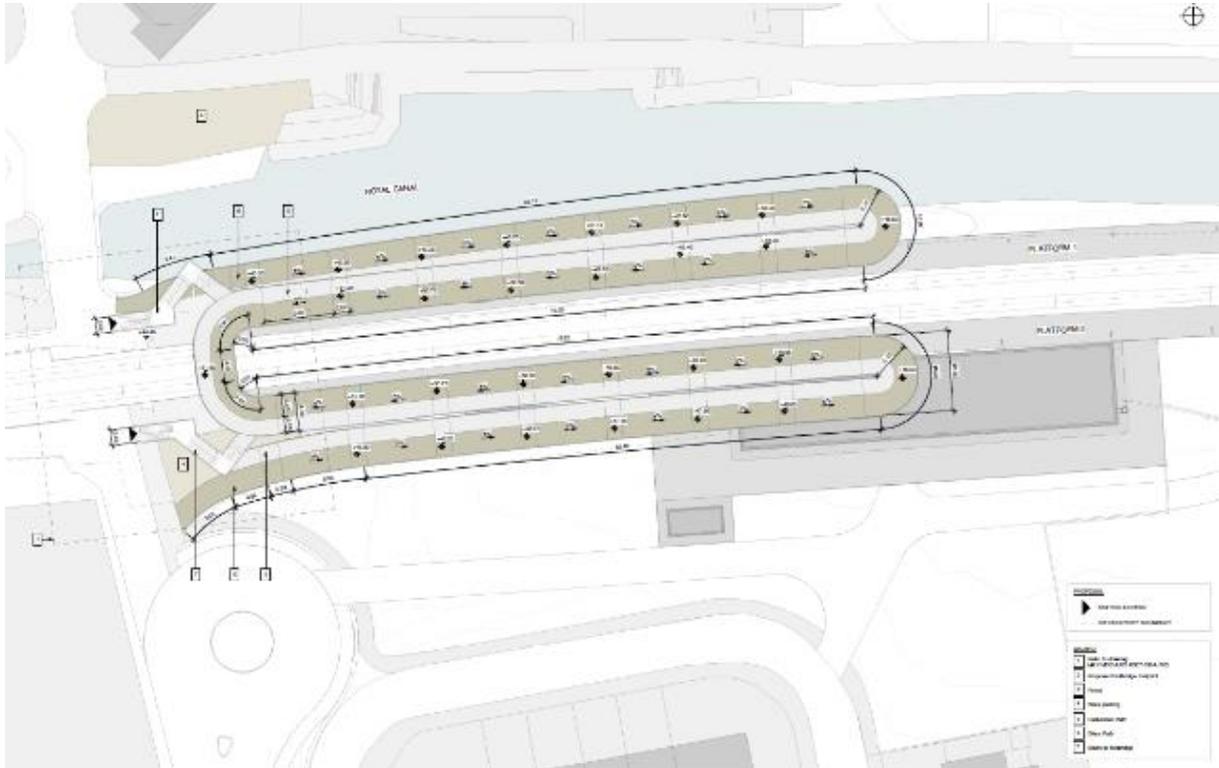


Figure 3-142 Revised Ashtown Pedestrian and Cyclist Bridge

Two stairs at both sides of track connect with the bridge for crossing from Platform 1 and Platform 2 and vice versa.

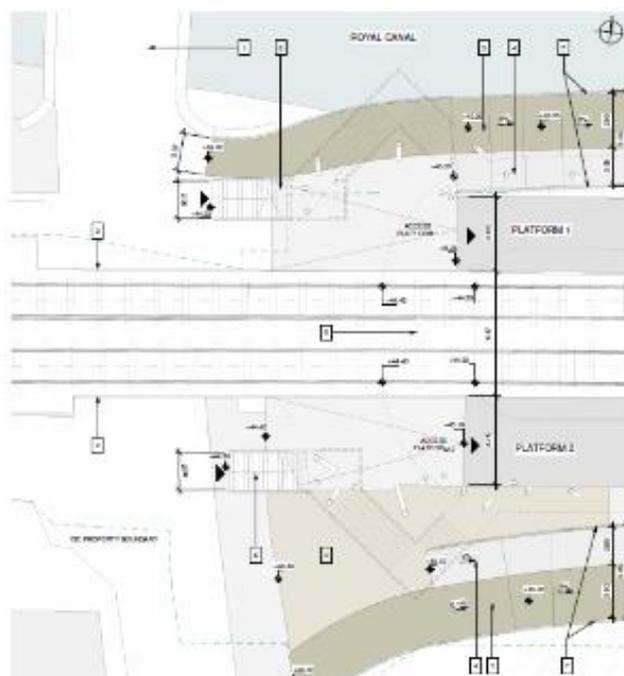


Figure 3-143 Ashtown Bridge/Ramp Entrance Details



Figure 3-144 3D Front View from North

Considerations related safety has been taken into account. The ramps parapets are designed with variable height, being the minimal 1.40m and the highest 1.80m when passing over the Substation and over the track.

The material proposed consists in structural weathered steel subjected to an oxidation process, as shown the image below Figure 3-145. The finishes treatment provides a suitable contrast with the landscape and almost null maintenance.



Figure 3-145 Image from Southwest

The structural set are composed by a ramp system developed in two sections above both Platforms 1 and 2. The Northern ramp partially overlaps the Canal which will receive the piles to support the structure as shown the Figure 3-145 for which will required an enhancement of the green area over the embankment.



Figure 3-146 Image from the Royal Canal

3.6.5.6.3 Coolmine Station

The accessibility enhancement of Coolmine Station presented at PC2 affects several parts of the station. The most critical are:

- The station entrance to Platform 1 (north platform), which needed to be widened to comply with the accessibility requirements.
- The need to provide stairs and ramps to allow crossing from one platform to the other.
- Some shelters and benches encroached the circulation width on the platforms. These needed to be removed or replaced.

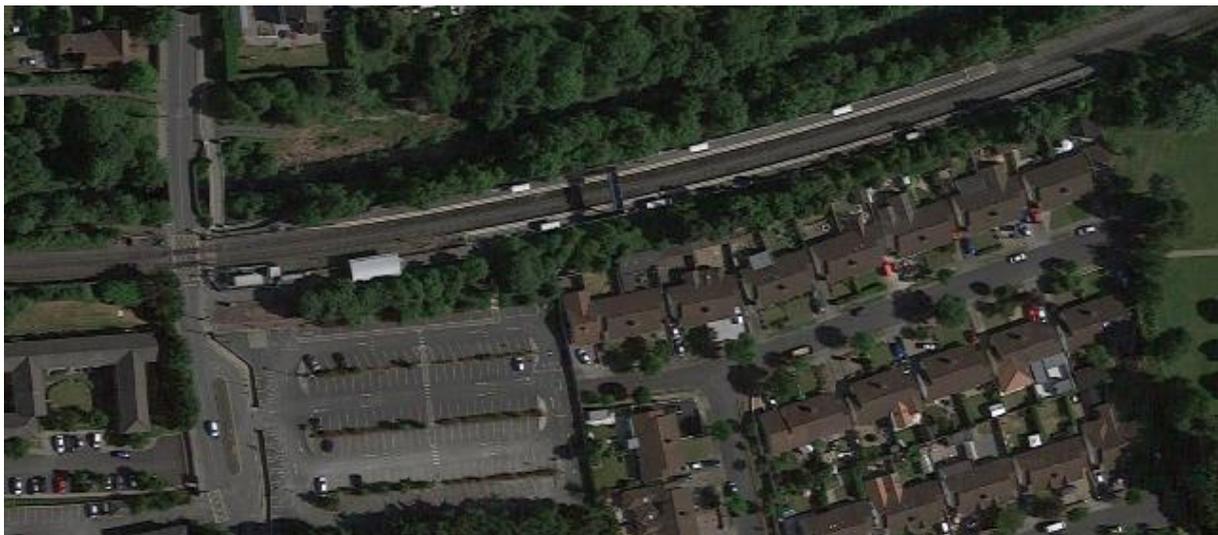


Figure 3-147 Coolmine Station Current Layout

The northern entrance to the station (to Platform 1) is currently very constrained. The width of the access will need to be widened up to 1.6 metres. Minor land acquisition will be required at this location.

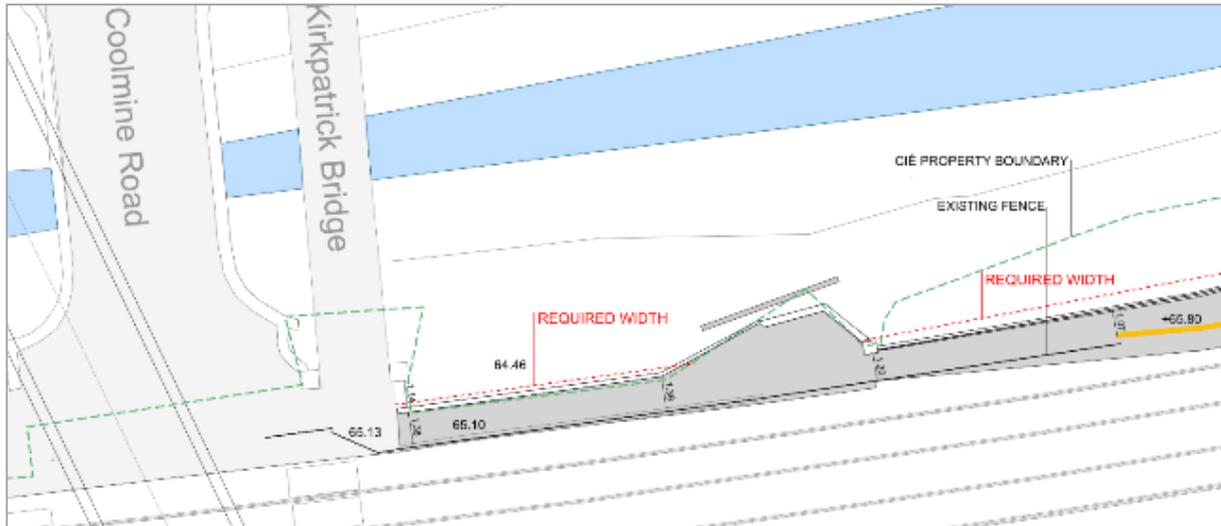


Figure 3-148 Coolmine Station Access to Platform 1

As part of the DART+ West project, the Coolmine level crossing will be removed. A new standalone pedestrian and cycle bridge presented at PC2 provided over the railway line and Royal Canal immediately adjacent to Coolmine Station. Figure 3-149 illustrates the proposed pedestrian and cycle bridge at PC2:



Figure 3-149 Proposed Pedestrian and Cyclist Bridge Close to Coolmine Station

Removal of the Level Crossing at Coolmine alters the existing access arrangements between platforms. Consequently, it is necessary to provide for connection for mobility impaired persons between the platforms. Currently, a pedestrian bridge with steps connects both platforms and is not suitable for persons with reduced mobility. Three options were considered prior to PC2 to address the accessibility requirements between platforms. They are described in the options assessment below.

Description of Options

Option 1

Option 1 consists of a new pedestrian bridge, with staircases and lifts, to replace the existing. It is placed at the same location as the current one. The new pedestrian bridge's footprint is located out of the clearance of

the platforms to enhance the operation of the station. It is however placed within the CIÉ property limits. Figure 3-150 illustrates the proposed layout for Option 1.



Figure 3-150 Coolmine Station's Footbridge, Option 1

Option 2

Option 2 keeps the same design for the pedestrian bridge as in Option 1. However, in this proposal, the pedestrian bridge is located 25 metres west of the current bridge's location in order to ease the passenger flows since it is closer to the station entrance. It is also placed within the CIÉ property limits.

This solution would allow keeping the existing footbridge during the construction of the new one, thus retaining the current passenger operation of the station.

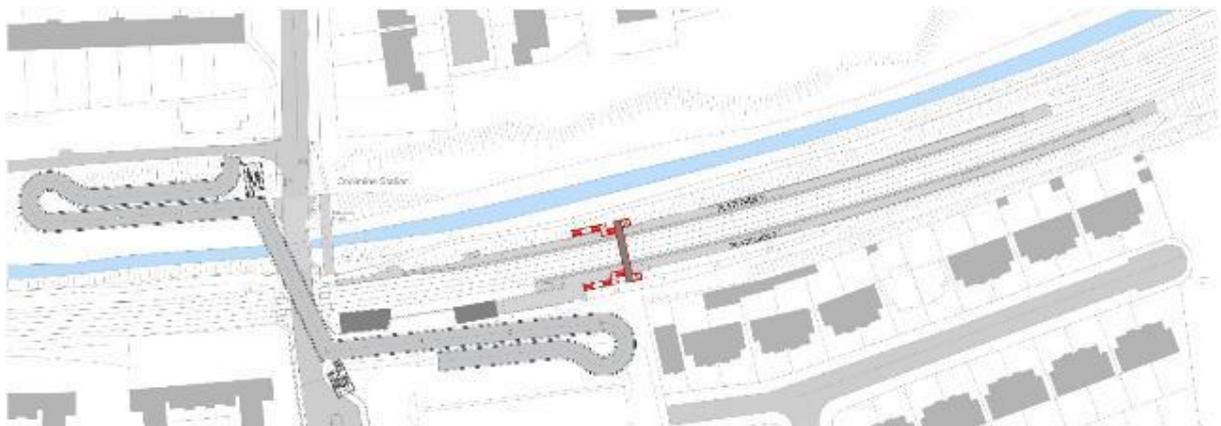


Figure 3-151 Coolmine Station's Footbridge, Option 2

Option 3

Option 3 proposal keeps the existing pedestrian bridge within the station and adds two new lifts to the proposed pedestrian and cycle bridge outside the station. The proposed lifts would be located at the western end of platforms immediately adjacent to the proposed bridge. It may also be necessary to widen the proposed bridge deck between the lifts should it be decided that such access should be secured within the curtilage of the train station. The option as presented, does not include for this provision and the lifts are consequently proposed outside the curtilage of the train station.

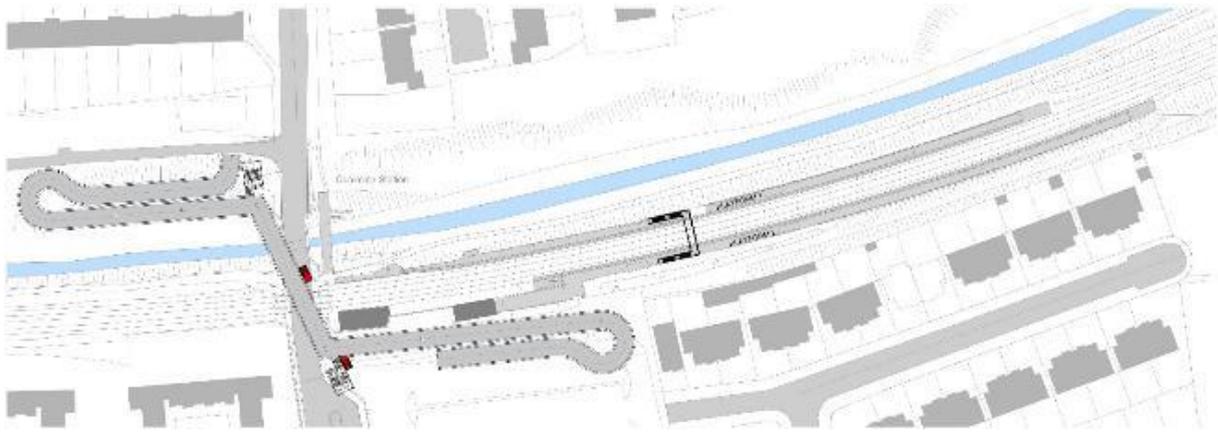


Figure 3-152 Coolmine Station's Footbridge, Option 3

Options Assessment / Multi-Criteria Analysis

It is important to note that the MCA process only assesses the location of the accessible connection between platforms and not the solution for accessing Platform 1.

The above-explained options were advanced for Multi-Criteria Assessment.

Table 3-46 Options Advanced for the MCA

Option	Description
1	New pedestrian footbridge with stairs and lifts in the position of the current pedestrian footbridge
2	New pedestrian footbridge with stairs and lifts moved closer to the entrance of the station
3	Lifts added to the proposed pedestrian and cycle bridge

The following table summarised the outcome of the assessment.

Table 3-47 Summary of Outcome

Criteria	Option 1	Option 2	Option 3
Economy			
Integration			
Environment			
Accessibility & Social Inclusion			
Safety			
Physical Activity			
Preferred Option	No	Yes	No

Economy:

- No land acquisition is required for any of the options.
- The construction costs of Option 3 would be limited since it only requires the addition of the lifts to the proposed pedestrian and cyclist bridge, while the other options require the provision of the entire pedestrian connections that include the bridge, the staircases and the lifts.
- The maintenance cost of Option 3 would be higher as the use of the lifts is not limited to railway users.
- Option 3 would allow the retention of the operation of the station but would also imply that passengers need to exit the station in order to make use of the lifts, open to anyone using the proposed pedestrian and cycle bridge. These lifts would also have a higher maintenance cost.

- Option 2 is more advantageous than Option 1 since the existing pedestrian bridge can be maintained during the construction stage, thus facilitating the station operation during the new pedestrian bridge's works.

Integration:

- Options 1 and 2 provide shorter walking times between platforms than Option 3.

Environment:

- All options are comparable in Noise & Vibration, Biodiversity and Water Resources sections.
- Option 3 shows some comparative disadvantage over other options in Landscape and Visual section. This is because the provision of isolated lifts introduces a degree of clutter to the layout which is not necessary for other options. In addition, it may be necessary to locally widen the bridge between the lifts should it be decided confine this access within the curtilage of the station.

Accessibility and Social Inclusion:

- All options provide accessibility to the station for persons with reduced mobility. However, Option 3 secures an enhancement to access across the railway should it be decided to provide public access to the proposed lifts external to the curtilage of the train station.

Safety:

- All options are comparable from a safety point of view.

Physical Activity:

- All options are comparable from a physical activity point of view.

Summary and Recommendations

Option 1 main disadvantage is the difficulty of retaining the current station operation while building the new pedestrian bridge and closing the level crossing.

Option 3 would allow the existing bridge in the station but would also require passengers to exit the station to make use of the lifts in the event that the proposed bridge is not widened to provide dedicated access for passengers. The lifts would also have a higher maintenance cost.

Option 2 was the preferred option at PC2. Its main advantages in comparison to the other options are as follows:

- It provides for more direct connection between platforms than the other two options as it is located closer to the station entrance. Passengers travel a shorter distance to get to the stairs or lifts.
- The existing pedestrian bridge can be retained during the construction of the new one, and therefore allowing normal operation of the station.
- The use of the pedestrian bridge and lifts will be limited to the railway users. Maintenance costs will be limited in comparison to other options.

3.6.5.6.4 Revised Preferred Option at Coolmine Station

As with Ashtown, following feedback during the public consultation process, the Coolmine Station footbridge design has been revised from what was presented at PC2. At Coolmine, the project was originally looking at providing a public pedestrian and cycle bridge crossing (stairs & ramps) and an in-station platform bridge crossing (stairs & lift) – Option 2 as explained above. Using the information gained from the Ashtown redesign, it was determined that a single combined bridge crossing was more advantageous. Therefore, a single bridge crossing with steps & ramps, with provision for cyclists to cross as well, was brought into the design.

The proposal includes the provision of a new steel structure bridge with ramps, suitable for pedestrians, bicycles and PMRs that will serve for the passengers of the station to cross from the North Platform to the South Platform and vice versa and also for residents to connect both sides segregated by the canal and the trackway. The station will be adapted to the new bridge introducing refurbishments and new provisions.

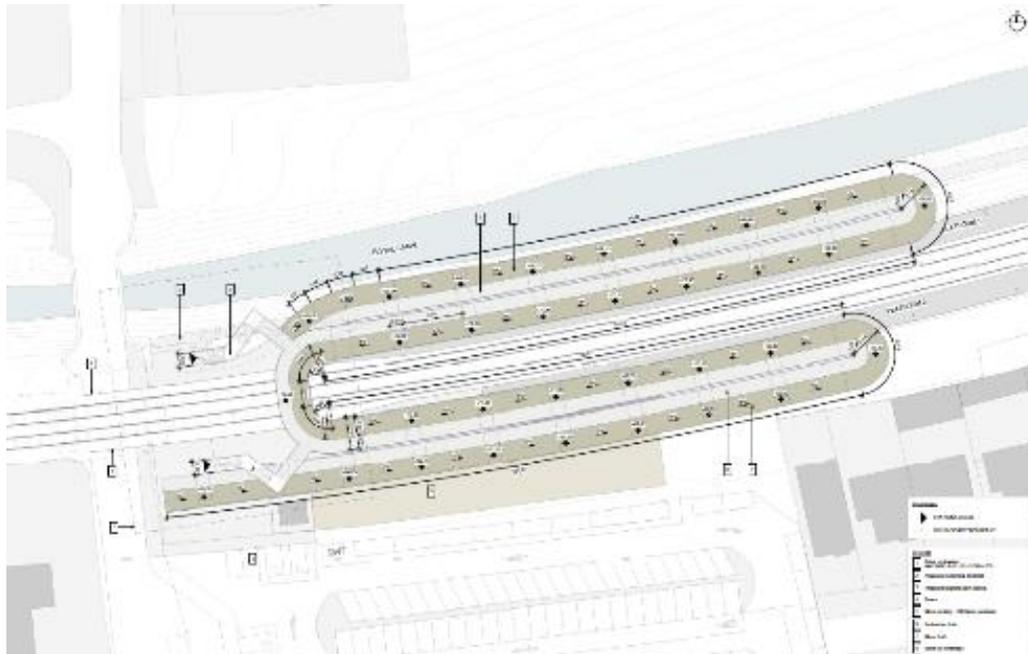


Figure 3-153 Shared bridge_Plan view

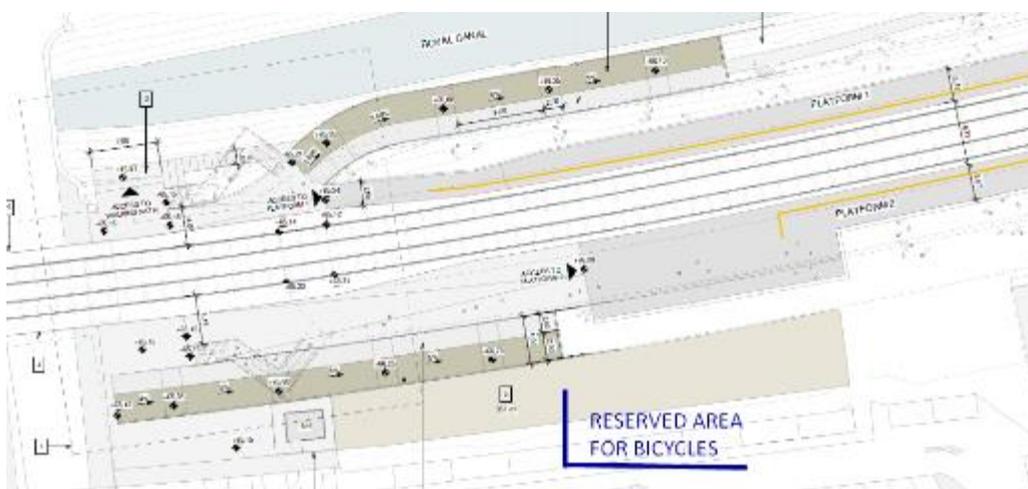


Figure 3-154 Access detail-Plan View

Given that Carpenterstown Road level crossing will be permanently closed, the historic bridge, currently used for vehicular traffic, will be converted into a pedestrian and cycle bridge to cross the canal. The new scenario led the project to propose the removal of the existing footbridge, in principle to avoid unnecessary redundancy of uses, but at the same time to give more prominence to the historic bridge and improve its view by seeking the integration into the landscape.

Based in the *National Cycle Manual Section 5.5.7 “How much parking – Cycle parking Guidance”*, which states a guidance of minimum number of spaces that should be provided initially at new private and public facilities in urban areas as shown the Figure 3-154.

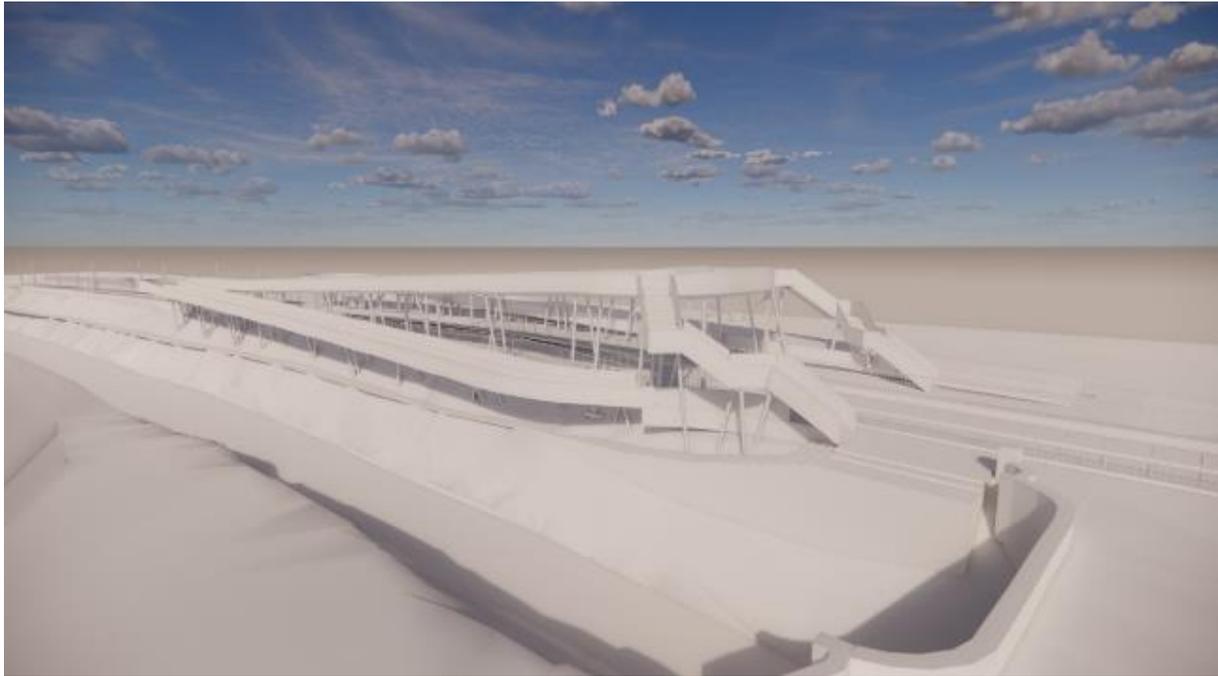


Figure 3-155 3D Image Royal Canal



Figure 3-156 Northeast Image Royal Canal

The ramp adds value to the existing footway along the Royal Canal as can be seen in Figure 3-156.

3.6.6 Depot

3.6.6.1 Previous studies

The Depot Location Assessment was an extensive study to establish a recommendation for the most suitable location for the EMU depot. The study considered the plots of land and facilities that could be suitable to contain the depot. The analysis comprised the first stage of preliminary pre-appraisal for the location (13 alternatives), based largely on the capacity of the site to contain a depot with all the necessary facilities, and a second stage (4 environ alternatives) of a MCA. The criteria used in the MCA are bespoke for the management and movement of rolling stock across the IE network.

The main conclusion from this document is the selection of the location west of Maynooth as the emerging preferred location for the new DART+ maintenance depot.

The location assessment contains two stages:

- The first stage of preliminary appraisal for the 13 alternative locations was based on the capacity of the area to hold the depot.
- The second stage of MCA for the chosen options considered criteria such as access, operation, availability of the land, neighbouring environment, and the impact on the DART+.

The considered locations in the first stage were:

- | | |
|--|--------------------------------------|
| • Fairview depot & immediate environs. | • Drogheda Station/depot & environs. |
| • Connolly Station & immediate environs. | • Maynooth Station & environs. |
| • Heuston Station & immediate environs. | • M3 Parkway Station & environs. |
| • Pearse Station & immediate environs. | • Hazelhatch Station & environs. |
| • North Wall Railway Yard & environs. | • Greystones Station & environs. |
| • East Wall Railway Yard & environs. | • Bray Station & environs. |
| • Inchicore Railway Works & environs. | |

The second stage of the analysis comprised the assessment of the following options:

Option 1 Drogheda Environs

This option is approximately 50 km north of Connolly and is split into Drogheda South and Drogheda North.



Figure 3-157 Option 1. EMU Depot Location Assessment 2019 (Copyright Ordnance Survey Ireland – 0039720)

Option 2 Maynooth Environs

This option is approximately 25 km west of Connolly and is split into Maynooth East and Maynooth West.



Figure 3-158 Option 2. EMU Depot Location Assessment 2019 (Copyright Ordnance Survey Ireland – 0039720)

Option 3 M3 Parkway Environs

This option is approximately 18 km west of Connolly and is split into M3 Parkway South and M3 Parkway North.



Figure 3-159 Option 3. EMU Depot Location Assessment 2019 (Copyright Ordnance Survey Ireland – 0039720)

Option 4 Hazelhatch Environs

This option is approximately 16 km west of Heuston Station and is split into Hazelhatch East and Hazelhatch West.



Figure 3-160 Option 4. EMU Depot Location Assessment 2019 (Copyright Ordnance Survey Ireland – 0039720)

The following is a summary of the Multi-Criteria Analysis carried out.

Table 3-48 Aggregated Summary of Site Appraisal

2019 Location Assessment	Option 1		Option 2		Option 3		Option 4	
	Drogheda South	Drogheda North	Maynooth East	Maynooth West	M3 Parkway South	M3 Parkway North	Hazelhatch East	Hazelhatch West
Minimised empty running	Dark Green	Dark Green	Light Green	Light Green	Light Green	Light Green	Light Green	Light Green
Maximise track access	Light Green	Light Green	Light Green	Light Green	Light Green	Light Green	Light Green	Light Green
Complexity of access and egress	Dark Green	Light Green	Dark Green	Light Green	Dark Green	Dark Green	Light Green	Light Green
Availability of suitable lands	Light Green	Light Green	Light Green	Light Green	Light Green	Light Green	Light Green	Light Green
Adjacent environment	Light Green	Light Green	Light Green	Light Green	Light Green	Light Green	Light Green	Light Green

2019 Location Assessment	Option 1		Option 2		Option 3		Option 4	
	Drogheda South	Drogheda North	Maynooth East	Maynooth West	M3 Parkway South	M3 Parkway North	Hazelhatch East	Hazelhatch West
Road vehicle access	Green	Green	Brown	Green	Brown	Green	Green	Brown
Transport and Land-Use Compliance	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Short term impact on DART+	Brown	Brown	Green	Green	Green	Green	Brown	Brown

EMU Depot Location Feasibility Study Report

The main objective of the report is to undertake a feasibility study to review the proposed locations for the new depot and recommend the best site. This study reviewed and analysed three proposed sites that were considered most suitable to contain the depot. The assessment considered the stakeholders involved, the preliminary layouts provided for the depot in the different locations, a risk assessment, and a cost estimation.

The options selected and assessed are the following:

Option 1 McLoughlin Canal Bridge at 21 ¼ M.P.: this option is placed west of Kilcock in a plot of land mostly occupied by agricultural fields. The site has an area of 46 acres. Refer to Figure 3-161.



Figure 3-161 Option 1. EMU Depot, Western Line – Location Feasibility Study (Copyright Ordnance Survey Ireland – 0039720)

Option 2 Bailey Bridge at 16 ¾ M.P.: this option is placed west of Maynooth in a plot of land mostly occupied by agricultural fields. The site has an area of 83.1 acres.



Figure 3-162 Option 2. EMU Depot, Western Line – Location Feasibility Study (Copyright Ordnance Survey Ireland – 0039720)

Option 3 Collins Bridge at 9 ¼ M.P.: this option is placed west of Clonsilla in a park plot of land. The site has an area of 47.5 acres. Refer to Figure 3-163 for an aerial photograph of the prospective site. The lands of the site are zoned ‘Conservation, amenity or buffer space, corridor/belt, landscape’.



Figure 3-163 Option 3. EMU Depot, Western Line – Location Feasibility Study (Copyright Ordnance Survey Ireland – 0039720)

The report concluded that is that Option 2: Maynooth West, Bailey’s Bridge at 16 ¼ M.P is the preferred option for the site of a proposed depot for DART+ West. The site emerges as preferred exhibits the following principal advantages and dis-advantages;

Advantages associated with the proposed site:

- The site at the western extremity of the proposed DART+ Programme, a location well positioned to serve the whole of the proposed DART+ network.

- The site is located west of the proposed terminal station on the Maynooth Line. Train movements between the depot and proposed railway network are best facilitated by a terminal configuration. A depot west of Maynooth is at the end of line and will only interface with one train/hour passenger service. The access/egress from the operational line to the depot is not considered complex. This will result in significant advantages in comparison to other prospective sites.
- The railway alignment is straight on plan for a length of 2.5 km adjacent to the site. The site is large enough to accommodate all the requirements of the depot. The layout of the site has significant advantages over other prospective sites.
- The land is generally flat over the extent of the site.
- There is no residential development on the site. Other prospective sites have houses on them.
- The land of the site is zoned for agricultural purposes. Significant portions of other sites are zoned for development or as amenity space.
- There is no evidence of fluvial flooding on the proposed site based on examination of publicly available mapping although there is some historical evidence of localised pluvial flooding. Some other prospective sites exhibit the presence fluvial flooding and OPW managed watercourses which represent a significant obstacle to development of the sites.
- The R148 runs parallel to the railway, north of the proposed site and the M4 is located to the south of the site. The site is well located for staff access from Maynooth or Kilcock.
- With a single centre of excellence maintenance depot, a number of trains at commencement and termination of daily passenger timetable will run empty between city centre and depot. By virtue of the distance, a depot in the Maynooth environs has some advantages over other prospective sites.
- Maximise track access time for maintenance: A site in the vicinity of Maynooth offers advantages over other prospective sites in this regard.
- The delivery of DART+ West exhibits the strongest passenger growth characteristics of projects on the DART+ Programme and consequently the best return for investment. There is advantage to delivery of the DART+ West project first. To provide the train services to DART+ West it is necessary to construct a depot. A depot on the Maynooth line, consequently, best suits the effective delivery of the proposed train service specification.

Disadvantages associated with the proposed depot site:

- There are two recorded archaeologically recorded features within this area. They comprise two small ring ditches (diameters of 13-15 m) KD005-033 and the Barrow KD005-003. These are likely to represent Bronze Age burial monuments and are relatively common archaeological features within the Irish landscape.
- Farmlands on the site will see significant impact consequent on the delivery of a depot on this site. Other prospective sites would exhibit similar impacts.
- There is evidence of historical localised pluvial flooding on the site. In addition, there is evidence of significant downstream pre-existing fluvial flooding associated with the Lyreen river and its tributary which flow into the Rye Carton SAC downstream. The presence of flooding issues is common along the railway as they have historically been constructed in low lying flat areas along rivers or canals. Many of the potential sites manifest this issue.

Having selected the preferred option for the location of the site and deciding on the preferred option for the layout of the depot it was necessary to carry out a detailed flood risk assessment of the site to predict extent of fluvial flooding accurately. Given the critical importance of railway infrastructure a 1 in 1,000 year return period was used in advancement of the assessment for the depot site.

It is necessary to ensure that the proposed works do not result in additional flooding due to displacement of water under the footprint of the proposed works. Any displaced flood water must be accommodated by the provision of a corresponding quantity of compensatory storage. This is typically achieved by lowering the ground level of land immediately contiguous with the outfall watercourse so the contiguous land floods in a controlled way rather than cause uncontrolled flooding elsewhere.

The matter of fluvial flooding needs to be addressed downstream of this site due to concurrent issues at Jackson's Bridge where the railway currently floods on occasion. The railway requires realignment immediately east of the proposed site and compensatory storage is needed due to the realignment within the floodplain.

The detailed flood risk assessment examined the full extent of the site of Jackson's Bridge and the proposed depot and confirmed that although the proposed site of the depot is higher than that at Jackson's Bridge some fluvial flooding is evident along the alignment of an historic watercourse. Historically the watercourse flowed through the area of the proposed depot. At some point in the past the watercourse was realigned to the south of its natural flow path. Detailed flood modelling indicates that during extreme flood events, flood waters return to the historic channel and are conveyed through the proposed depot location. The study identified the need for compensatory storage at the proposed location of the depot and the design of the depot was developed to take account of this. The depth of ground level reduction within compensatory storage areas associated with the depot are of the order of 600 mm.

Following the detailed flood risk assessment, a further review was undertaken of the site selection process to account for the new information on flood risk and the local environment to confirm the choice of preferred site. For this review, a multi criteria analysis consistent with the CAF criteria was undertaken and it was concluded that Option 2 Maynooth West is the preferred site for the proposed depot. Refer to Volume 4, Appendix A3.4. for the Depot Site Selection Supplementary Report.

3.6.6.2 Description of Depot Layout Options

The options consist of different layouts of track and facilities according to the identified depot requirements. The six layouts considered are shown in Figure 3-164 to Figure 3-169.

Option 1

This option is illustrated in Figure 3-164.

- Stabling (with track access at one end) and main building are adjacent and located to the west of the proposed site.
- Area: 329,000 m².
- Length along main line: 2.25 km.
- Earthworks: 20,000 m³ cut / 186,000 m³ fill.
- Track length: 16.6 km.
- Turnouts: 62 units.



Figure 3-164 Depot Layout Option 1

Option 2

- Stabling (with track access at one end) is located to the west of the proposed site, and the main building east of the proposed stabling.
- Area: 331,000 m².
- Length along main line: 2.25 km.
- Earthworks: 8,000 m³ cut / 127,000 m³ fill.
- Track length: 18.1 km.

- Turnouts: 64 units.

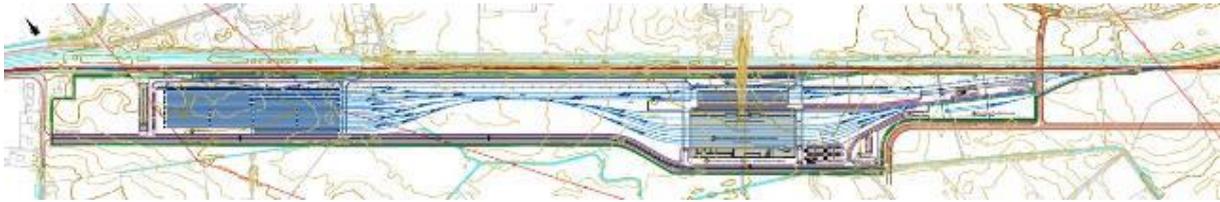


Figure 3-165 Depot Layout Option 2

Option 3

- Stabling (with track access at both ends) and main building are adjacent and are located in the centrally on the proposed site.
- Area: 326,000 m².
- Length along main line: 2.58 km.
- Earthworks: 27,000 m³ cut / 315,000 m³ fill.
- Track length: 18.7 km.
- Turnouts: 76 units.

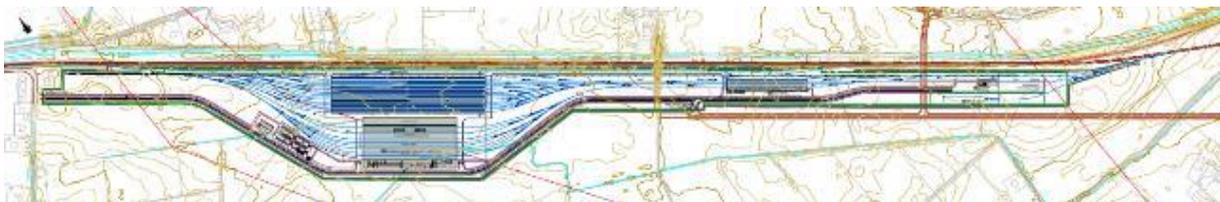


Figure 3-166 Depot Layout Option 3

Option 4

- Stabling (with track access at one end) is located to the west of the proposed site and the main building central on the site.
- Area: 317,000 m².
- Length along main line: 2.58 km.
- Earthworks: 1,000 m³ cut / 201,000 m³ fill.
- Track length: 17.0 km.
- Turnouts: 63 units.



Figure 3-167 Depot Layout Option 4

Option 5

- Stabling (with track access at both ends) and the main building are located central to the proposed site, avoiding clashes with overhead electrical power lines to the greatest degree.
- Area: 310,000 m².
- Length along main line: 2.58 km.
- Earthworks: 1,000 m³ cut / 387,000 m³ fill.
- Track length: 17.4 km.

- Turnouts: 64 units.



Figure 3-168 Depot Layout Option 5

Option 6

- Stabling (with track access at one end) and the main building are adjacent and to the west of the proposed site. The proposed reception area is located central on the site.
- Area: 369,000 m².
- Length along main line: 2.58 km.
- Earthworks: 14,000 m³ cut / 203,000 m³ fill.
- Track length: 17.6 km.
- Turnouts: 64 units.

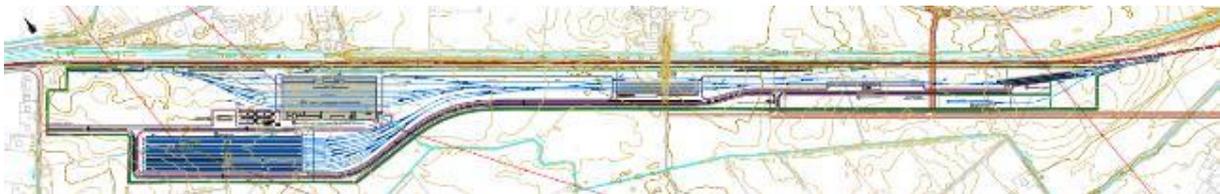


Figure 3-169 Depot Layout Option 6

Summary and Recommendations

The summary of the results of the multicriteria analysis is shown in Table 3-49.

Table 3-49 Summary of MCA

Assessment Criteria	Options					
	1	2	3	4	5	6
Economy	Green	Brown	Green	Brown	Brown	Brown
Integration	Green	Brown	Green	Green	Green	Green
Environment	Brown	Green	Brown	Green	Green	Brown
Social inclusion	Brown	Brown	Green	Brown	Green	Brown
Safety	Green	Brown	Green	Brown	Green	Green
Physical Activity	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Preferred Option	No	No	Yes	No	No	No

It is evident from the summary table that Options 3 and 5 perform better than other options. Option 1 does not perform as well but is superior to Options 2, 4 and 6 which embed significant environmental or social inclusion disadvantages relative to other options.

On completion of the multi criteria analysis, Layout Option 3 was identified as the preferred option. The principal reasons Option 3 emerged as preferred are as follows:

- Option 3 requires the diversion of overhead medium and high voltage lines. The extent of diversions, however, less than for other options.

- The capital cost of Option 3 is less than that Options 3 to 6 but higher than Options 1 and 2;
- Access from the railway mainline for this option is significantly superior to that of other options.
- Option 3 facilitates direct access between stabling and the maintenance workshop. Options 4 and 5 do not facilitate this access.
- For Option 3, when the wash is in use access to the service slab remains available. Other options to not meet this need.
- It is easier access the test track facilities for this option than for Options 2 and 4. Options 1, 5 and 6 have equivalent quality of access.
- The area of site required to house Option 3 is less than that for Options 1 and 2 and significantly less than required for Option 6. Options 4 and require marginally less space than Option 3.
- Stabling and Workshop facilities are collocated for Options 3 and 5 and are remote from housing. Other options are less well layout out in this regard.
- Option 3 is better configured than other options to ensure the security of the depot site.

3.6.7 Depot Access

The road access to the depot site has been studied to determine a suitable route for access for depot staff, delivery of stock or equipment and HGV routing. This is required due to the variety of access routes that have needed to be considered, the constraints on access through Maynooth and Kilcock as well as the limited interfaces the site has with national, regional and local roads. Four different access options have been proposed, which are described in Section 3.4.7.1

3.6.7.1 Description of Options

The road network of the area is characterised by the following main features:

- The Royal Canal and the Maynooth Line railway impose a barrier to north south movement.
- The primary national route is the M4 Motorway to the south of the plot with interchanges at Maynooth and Kilcock.
- There is a regional road R148 to the north of the proposed depot site which passes east west between Maynooth and Kilcock.
- The local roads in the surrounding area are narrow in nature.
- There are bridges with insufficient width for two lanes over the main line.
- There are residential areas to the west in Kilcock and to the east in Maynooth.

The road access to the depot site has been studied to determine a suitable route for depot staff to access the site, delivery of stock or equipment and HGV routing. The following routes have been examined:

- 2 western accesses originating at Exit 8 of the M4 from Kilcock
- 1 eastern access originating at Exit 7 of the M4 from Maynooth
- 1 northern access linked to R148 that requires the construction of a new bridge

Option 1 is an access from Kilcock interchange via the existing road network where one-way travel may be required due to the narrow width of these roads. No new infrastructure is necessary, but a rearrangement of traffic would be required.

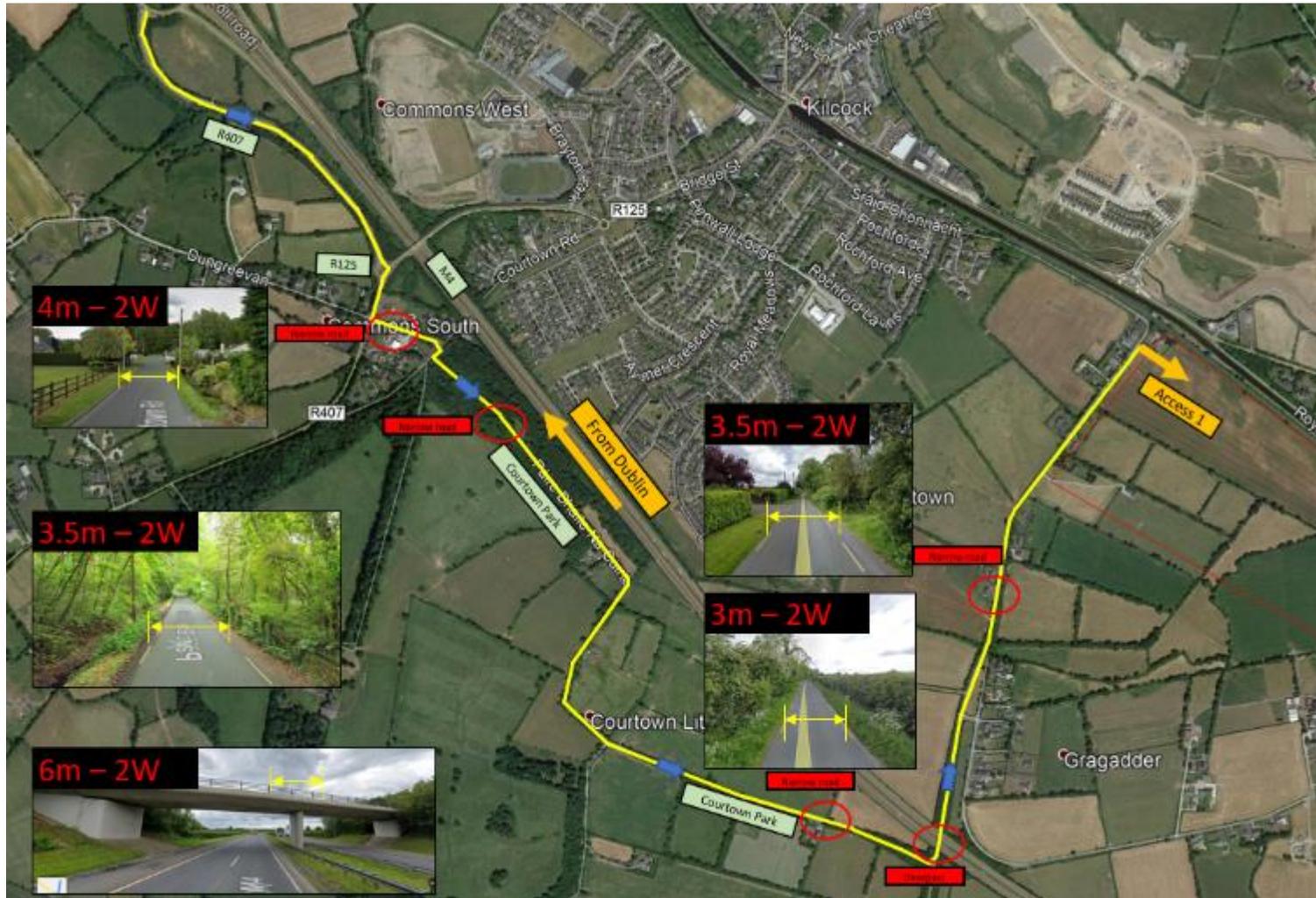


Figure 3-170 Depot Access Option 1a



Figure 3-171 Depot Access Option 1b

Option 2 is an access from Kilcock interchange through a residential area with the final section to the depot a new 670 m long road (indicated by a dotted line in Figure 3-172).

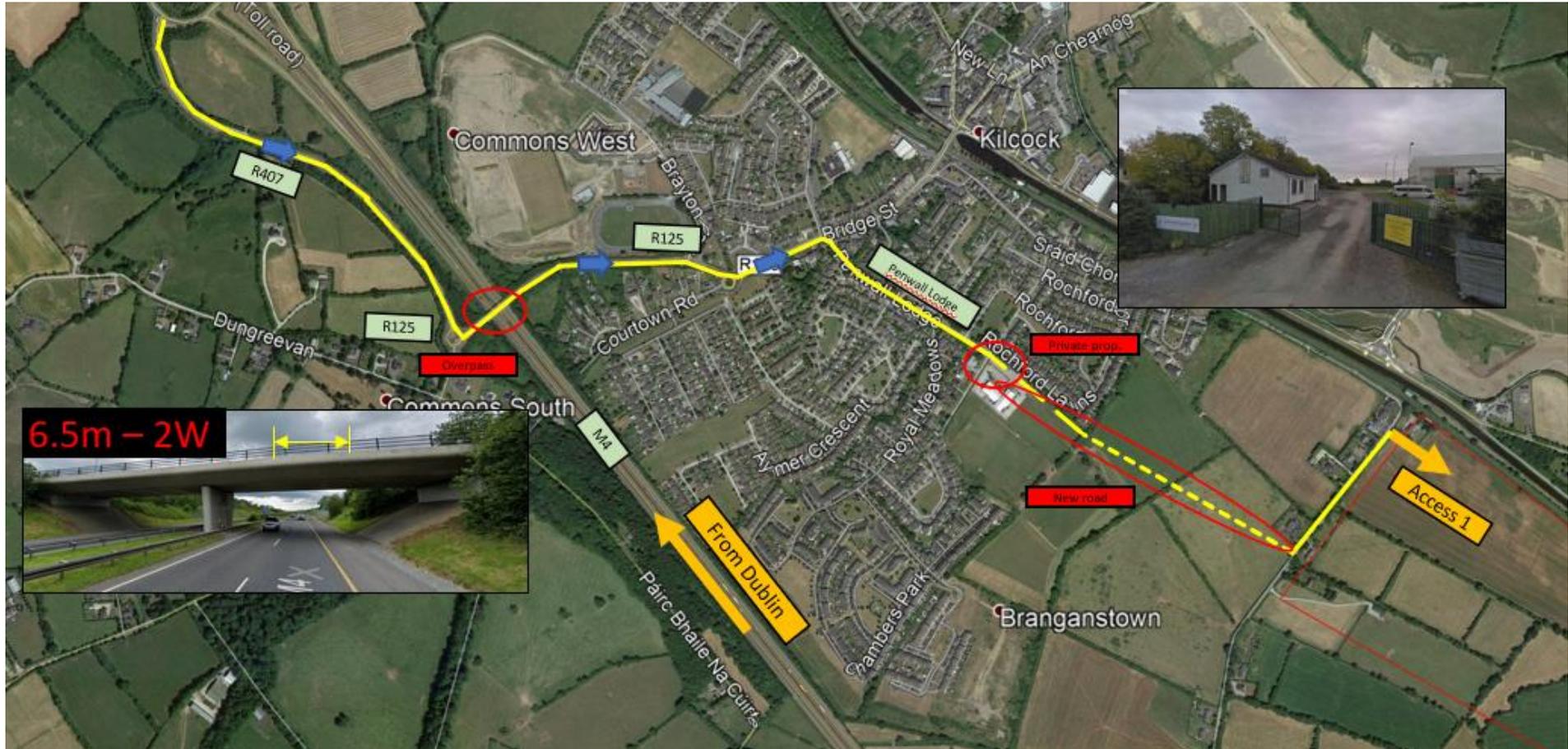


Figure 3-172 Depot Access Option 2

Option 3 is a road access from Maynooth interchange. This route goes through a large residential area with narrow meandering roads and the final stretch to the depot is a new road 850 m long (indicated by a dotted line in Figure 3-173).



Figure 3-173 Depot Access Option 3

Option 4 is a road access connected to road R148 (connecting traffic to Maynooth and Kilcock interchanges) that requires the construction of a new bridge OBG23A. This new bridge would be an alternative to crossing the main line and the Royal Canal to the existing bridge OBG23, which has a clearance issue related to the required OHLE when doubling the track. OBG23 - Jackson’s Bridge is a protected structure (Categories of Special Interest: Architectural Historical Social Technical) that dates from 1793.

The new OBG23A would provide a connection to the R148 to the north, cross the canal, rail line and depot and to the south provide access to the depot and connect to the existing road network including the L5041.



Figure 3-174 Depot Access Option 4

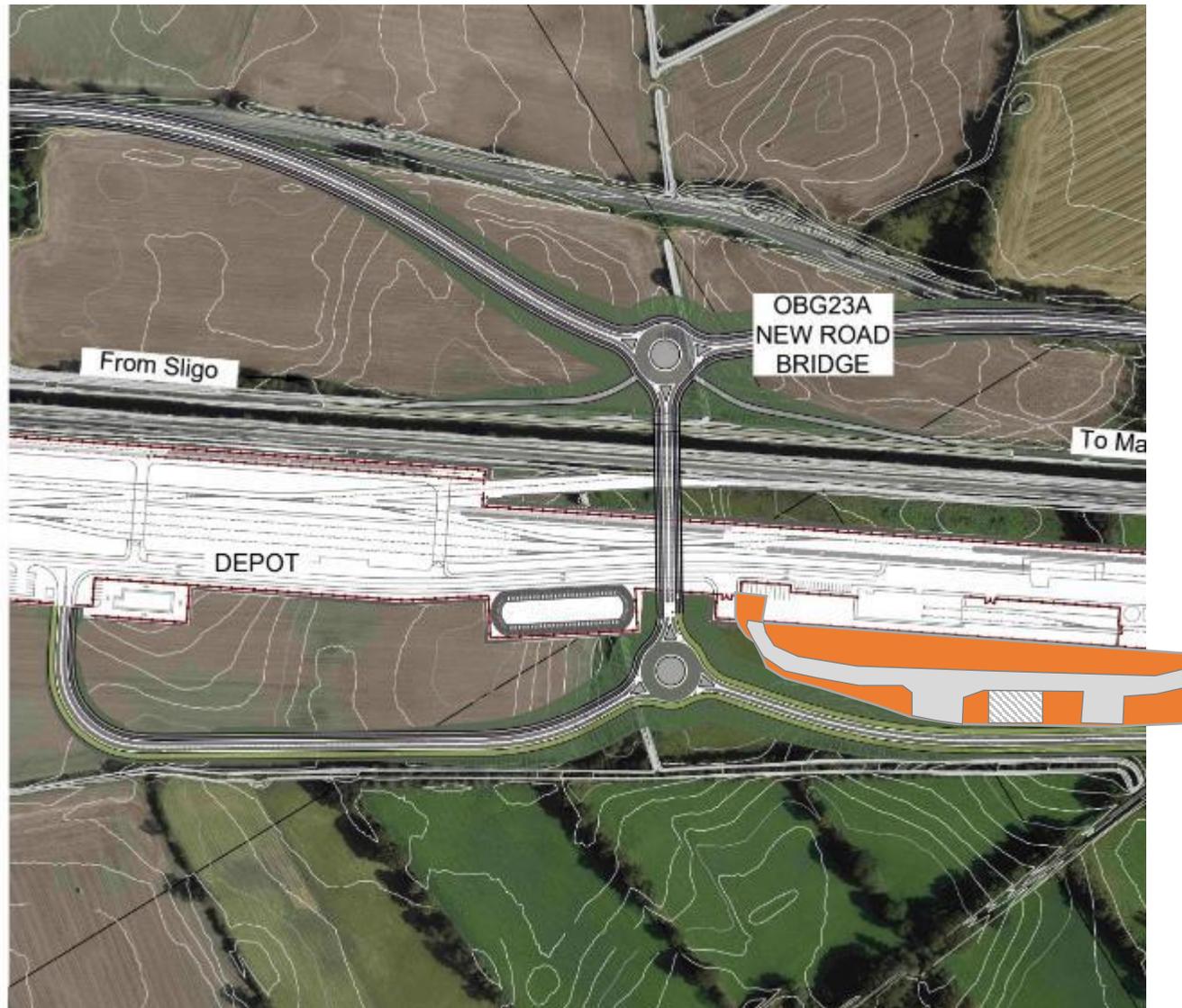


Figure 3-175 Depot Access Option 4 (Focus on Access)

The summary of the results is shown in the table below.

Table 3-50 Summary

Assessment Criteria	Options			
	Option 1	Option 2	Option 3	Option 4
Economy				
Integration				
Environment				
Social inclusion				
Safety				
Physical Activity				
Preferred Option	No	No	No	Yes

By virtue of the MCA results Option 4 has been selected as the preferred option.

The benefits of this option are economic (providing clear improvements in journey time), integration with the existing road network, accessibility & social inclusion, safety and physical activity.

The disbenefits are related to construction and long-term maintenance costs and environment where excavations and works required for the new bridge pose a higher potential risk to groundwater quality and soils, but some mitigation measures minimise this issue.

Figure 3-176 shows the selected option for the depot road access:



Figure 3-176 Main Road Access from R148

3.6.8 Main Storage Distribution Centre (MSDC)

The objective of this MSDC is to support the SET works for the DART+ West project, providing a main storage area to act as a buffer between material imports and delivery to SET compounds, as well as an area to pre-assemble, test and pack the materials to be delivered to the local area compounds as required. Before proceeding with the MCA, four areas of interest were analysed where it would be appropriate to place the preferred MSDC plot.

These are listed below.

1. Depot

- No suitable HGV Access is available until OBG23A is completed.
 - Kilcock / Maynooth will be already exposed to a heavy work traffic due to the Depot and Pway works.
 - Location could clash with the Depot construction works.
2. Profile Park
 - Technological, food and pharmaceutical industries already located in the area.
 - Limited plot availability
 3. Park West – Ballymount Industrial area
 - Very limited plot availability.
 4. Airport West
 - Plot availability high.
 - Good access through M50 & N2.

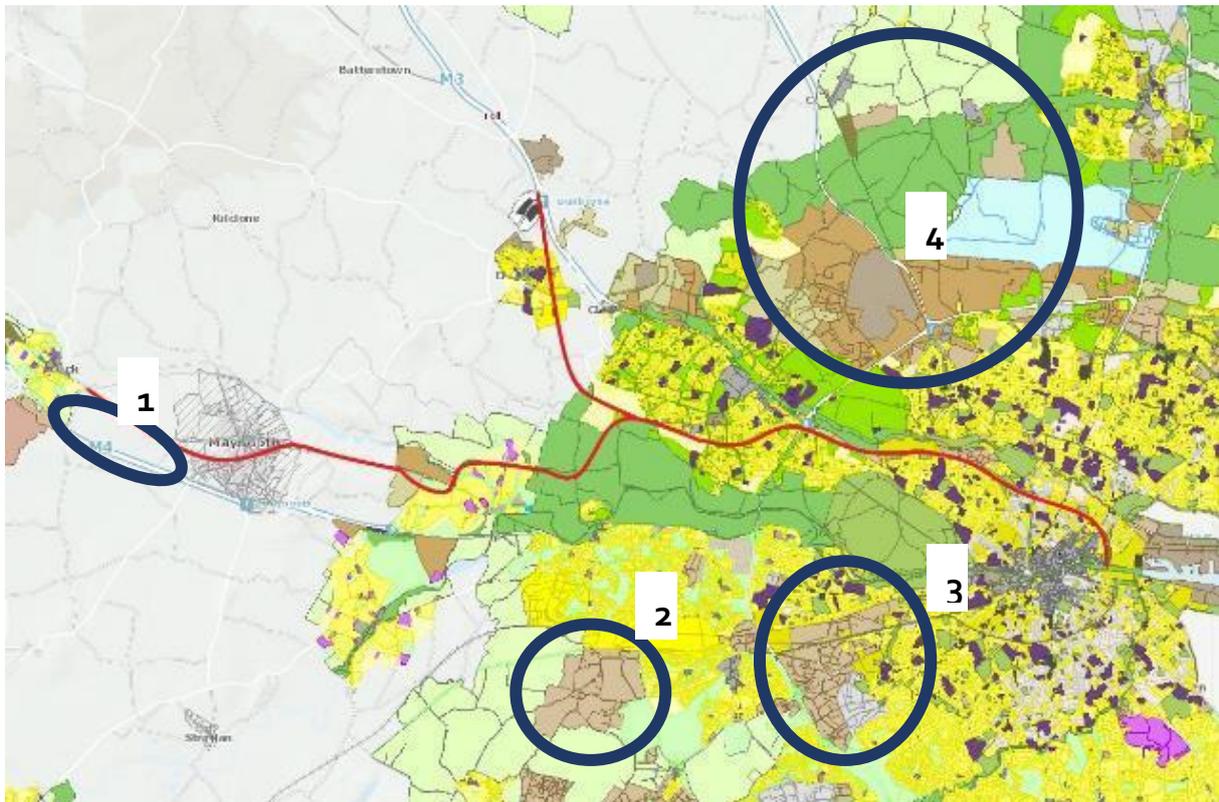


Figure 3-177 MSDC areas of interest

Therefore, the MCA was carried out with plots analysed in zone 4 because these plots were deemed to be better connected and because availability of plots is higher in this zone.

Below is a drawing of all the plots that have been analysed in the area. Plots marked in red have been discarded due to existing approved planning applications or insufficient space and those marked in blue are the options of plots assessed in the MCA.

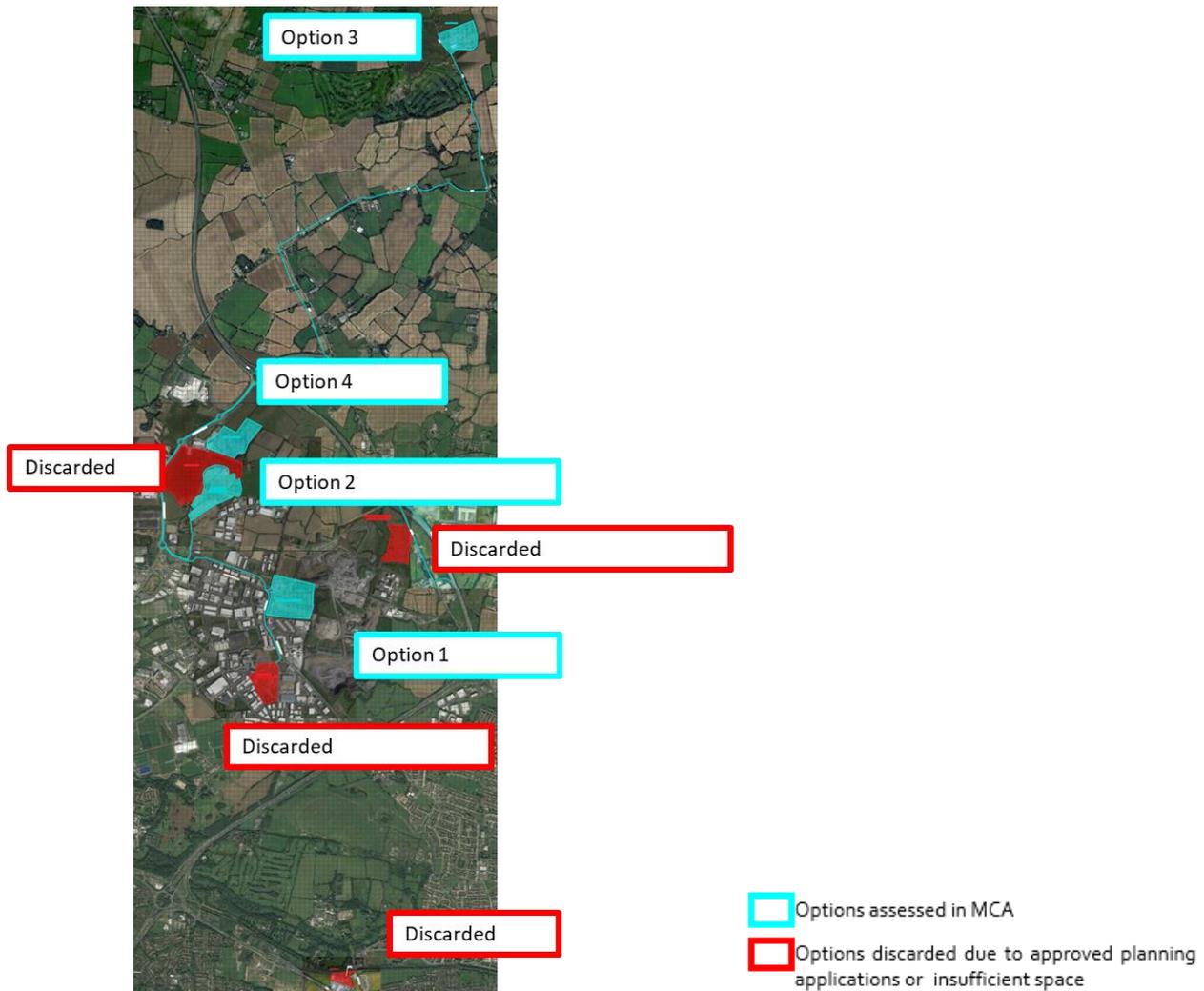


Figure 3-178 MSDC options

The following is a summary of some relevant comments arising from the comparative analysis between the proposed alternatives:

- Land cost rental in Option 3 lower than to Option 1, 2 & 4 due to zoning of area along with lower establishment cost as services in place.
- Option 1 has no residential properties in its vicinity that could be affected due to the operation of the site. Option 2 is currently being used for agriculture.
- Options 1, 2 and 4 have better quality road access that option 3.
- Options 1, 2 and 4 are located on roads with segregated pedestrian and cycling lanes which increases the road safety, however it is not expected that option 3 has significant pedestrian and cycle users therefore this criteria is not a significant differentiator.

The MCA has determined that the Option 3 has significant economic advantage over other options. It is noted that Option 3 scores less advantageous under the accessibility and safety criteria when compared with other options however this is due to being compared to sites that have more developed road infrastructure (dual carriageway with walking & cycling infrastructure over single carriageway regional road), however Option 3 is currently being used for similar activities to that proposed by the MSDC. Therefore, these criteria are not considered to be significant differentiators. Option 3 is deemed to be the preferred option.

The summary of the results of the multicriteria analysis is shown:

Table 3-51 Aggregated Summary of MCA of the MSDC

MCA Summary - Main Storage and Distribution Centre (MSDC)					
	Parameter	Option 1	Option 2	Option 3	Option 4
1	Economy				
2	Integration				
3	Environment				
4	Accessibility & Social Inclusion				
5	Safety				
6	Physical Activity				
	Preferred Option	No	No	Yes	No

3.6.9 Construction compounds

This section aims to describe the options for compound location in groups. It includes five MCAs, of which four correspond to construction compounds, and one (Navan Road Parkway) relates simultaneously to a construction compound and an operational phase maintenance facility. The order of exposition follows the rail line from east (the Docklands) to (the depot) and then the line to M3 Parkway from south to north.

3.6.9.1 Navan Road Parkway Temporary SET and permanent maintenance facility

The MCA addresses two options situated in the vicinity of Navan Road Parkway. This area hosts two potential construction compounds. The preferred one will facilitate Signalling, Electrification and Telecommunication (SET) works. The study evaluates the same locations as permanent operational phase maintenance facilities also. The selected location will operate as a permanent maintenance facility servicing the OHLE (Overhead Line Equipment).

Description of options

Each compound option requires direct access to the railway for road rail vehicles (RRV). Option 1 is located on private lands adjacent to the railway, station parking and an interchange on the R147 Navan Road, dual carriageway. Option 2 is situated next to an industrial area further east along the R147. Option 2 is also adjacent to the railway and can be accessed off the R147.



Figure 3-179 Navan Road Parkway Options

Options Assessment

The evaluation for all the criteria included in each parameter provides the following table:

Table 3-52 Navan Road Parkway MCA

MCA Summary - Navan Road Parkway Construction and Permanent Compound			
	Parameter	Option 1	Option 2
1	Economy		
2	Integration		
3	Environment		
4	Accessibility & Social Inclusion		
5	Safety		
6	Physical Activity		
	Preferred Option	Yes	No

In respect to environment, Option 1 has some comparative advantage over Option 2. This option is partially located on undeveloped lands and made ground, requiring removal of less vegetation. Additionally, Option 1 is located further from sensitive noise and visual receptors when compared to Option 2 and is therefore advantageous.

In regard to safety, Option 1 offers an advantage over Option 2, as the first provides a shorter access route to the compound and avoids construction traffic gaining access to the compound at the R147 level. Therefore Option 1 offers better safety conditions for the construction traffic.

Option 1 has been selected as preferred option for both the SET construction compound and operational phase maintenance facility at Navan Road Parkway.

3.6.9.2 *Clonsilla temporary railway civil engineering works compound*

Clonsilla is the proposed location of a temporary construction compound associated with railway civil engineering works (permanent way works). It is proposed to lower the railway under overbridge OBG7A, located under the M50 / N3 Interchange, east. Clonsilla Station is the nearest location to the proposed works with a railway siding. The siding is necessary to stable the On-Track Machines between possessions of the railway necessary to construct the works. This is a significant aspect of the choice of Clonsilla for a temporary compound. The extent of track lowering determines the size of the construction compound necessary for the works at OBG7A. The selected compound will also serve the proposed siding extension works, which require a smaller area due to lower quantities involved.



Figure 3-180 Clonsilla Options

Description of options

Option 1 is located to the east of the level crossing and next to the rail line, allowing direct access to road rail vehicles. The site lies within private agricultural lands. Unlike the other side of the line, an urban area, the southern side is rural in character, designated amenity space. The lands east of the R121 are identified for development in the associated Local Area Plan. In addition, the site is located outside of CIÉ property. Option 2 is to the west of the level crossing includes sufficient compound space to accommodate construction of the proposed footbridge that replaces the existing level crossing. The compound can accommodate direct road rail vehicle access to the adjoining tracks. The site is external located outside of CIÉ property. The lands at the site of the proposed compound are zoned amenity lands.

Options Assessment

The table below indicates the MCA summary once all the evaluations under each parameter are integrated:

Table 3-53 Clonsilla MCA

MCA Summary. Clonsilla PW Construction Compound			
	Parameter	Option 1	Option 2
1	Economy		
2	Integration		
3	Environment		
4	Accessibility & Social Inclusion		
5	Safety		
6	Physical Activity		
	Preferred Option	Yes	No

As for Land Use Integration Criterion, Option 2 goes against Land Use Zoning Objective, which is established as 'Objective NH51 "Protect High Amenity areas from inappropriate development and reinforce their character, distinctiveness and sense of place". Therefore, this factor confers some advantage to Option 1 regarding the parameter Integration.

Option 1 has some comparative advantage over Option 2 under the Environment criteria. Option 1 will only have a potential impact on a set of one protected structure, the Royal Canal (RPS), compared to Option 2, which will potentially cause an indirect impact on the setting of four cultural heritage sites.

Therefore, the preferred location is Option 1.

3.6.9.3 Barberstown temporary SET construction compound

Barberstown is located where the M3 Parkway Line spurs off the Maynooth Line which continues to the west. Three optional locations have been identified for a temporary construction compound in Barberstown. The compound will be used for signalling, electrical and telecommunications works.



Figure 3-181 Barberstown Options

Description of Options

Option 1 is adjacent to both railway lines, the Royal Canal and Barberstown level crossing. The lands at this site are partially in private ownership, partially owned by CIÉ. This location represents a proposal for construction compound which can serve both railway lines. Option 2 is next to the Maynooth line. The site is on privately owned lands and is considered suitable for use as a construction compound, for SET works. A new access road will be necessary to link the site to the nearest public road. Compound Option 3 is beside the M3 Parkway line and on the opposite side of the canal from the Maynooth line. The lands at the site are entirely privately owned. The site is considered suitable for use in support of SET construction works.

Options Assessment

The MCA summary for Barberstown is as follows:

Table 3-54 Barberstown MCA

MCA Summary - Barberstown Set Construction Compound				
	Parameter	Option 1	Option 2	Option 3
1	Economy			
2	Integration			

MCA Summary - Barberstown Set Construction Compound				
	Parameter	Option 1	Option 2	Option 3
3	Environment			
4	Accessibility & Social Inclusion			
5	Safety			
6	Physical Activity			
	Preferred Option	Yes	No	No

According to the MCA summary, Option 1 and Option 3 perform equivalently on a cumulative basis. They are both preferable to Option 2. However, the Option 3 performs weakest under Economy and Safety criteria, resulting in a lower score despite the environmental advantages of Option 2.

Option 1 has an advantage over Option 3 relating to the Economy parameter since it involves lower land acquisition costs.

Having completed the assessment, Option 1 has been chosen as preferred option for construction compound at Barberstown to serve SET works for DART+ West.

3.6.9.4 Revised Preferred Option Barberstown temporary SET construction compound

Following further environmental investigations, concerns were raised relating to the ecological impacts of Option 1 as presented above. Five options were reviewed as shown in the figure below.



Figure 3-182 Revised options for Barberstown SET compound

The results of the revised MCA are as below:

Table 3-55 Revised Barberstown MCA

MCA Summary - Barberstown Set Construction Compound						
	Parameter	Option 1	Option 2	Option 3	Option 4	Option 5
1	Economy	Green	Brown	Green	Green	Brown
2	Integration	Green	Brown	Green	Green	Brown
3	Environment	Brown	Green	Green	Green	Green
4	Accessibility & Social Inclusion	Yellow	Yellow	Yellow	Yellow	Yellow
5	Safety	Green	Brown	Green	Green	Brown
6	Physical Activity	Yellow	Yellow	Yellow	Yellow	Yellow
	Preferred Option	No	No	No	Yes	No

Option 4 was the chosen option for the Barberstown SET compound because of the following:

- Land acquisition: Most of compound is on lands owned by Irish Rail / CIE only a portion of private lands required on zoned Open Space lands for temporary access to rail.
- Compound location:
 - The compound is located on the north-side of the Royal Canal. The pedestrian footway that connects from Pakenham Bridge to Pipers Court will be directly adjacent to the construction compound. The construction compound will be located next to Hansfield Station but no direct pedestrian infrastructure to access. It is C.1150 m from Clonsilla Station. Pedestrian access to and from the compound may be developed to improve access.
 - The Option 4 is located near a strategic node of the scheme, where the line splits in two (one line towards M3 Parkway, another line leading to Maynooth). Consequently, this location offers an advantage, as it allows the site to serve the two mentioned lines.
 - This compound is located within agricultural grassland, 200m from the canal. Loss of hedgerow and treeline habitat along field boundaries is anticipated to accommodate road access, but no major impact on biodiversity.
 - Options 1, 3, 4 & 5 share the access route. The construction traffic does not need to pass through the Barberstown level crossing to arrive at the compound, which involves an advantage. Option 4 has direct access to the M3 Parkway line. Construction vehicles are required to drive 400 m through Barberstown Ln N. to access Maynooth line via Barberstown level crossing.

3.6.9.5 Millfarm temporary railway civil engineering works compound and permanent maintenance facility

Millfarm temporary railway civil engineering works compound (permanent way compound) serves the works in Maynooth Station, including the proposed electrified siding, and the proposed twin track works from Maynooth to the proposed depot. Two locations have been identified for consideration for this construction compound. The selection of locations is based on the preference for sites south of the railway. The adjoining Royal Canal would constitute an obstacle for a compound situated north of the railway. Furthermore, the proposal intends to avoid the residential areas of Maynooth and Kilcock.



Figure 3-183 Millfarm Compound Options

Description of Options

Option 1 (Millfarm-PW1) is situated west of Jackson’s Bridge (OBG23) on lands that are entirely in private ownership. Along its northern boundary, the location is adjacent to the track that will connect the east end of the depot to the railway. The southern limit is next to the new road that will improve the local connectivity in the area and provide an access route to the construction compound. Option 2 (Millfarm-PW2) is located to the south of Jackson’s Bridge OBG23 and east of the L5041 local road. The plot at the compound site is in private ownership. The new local road will allow access to the site.

Options Assessment

The integration of evaluations under each parameter provides the following summary:

Table 3-56 Millfarm MCA

MCA Summary - Millfarm PW Construction Compound			
	Parameter	Option 1	Option 2
1	Economy	Green	Brown
2	Integration	Yellow	Yellow
3	Environment	Green	Brown
4	Accessibility & Social Inclusion	Yellow	Yellow
5	Safety	Yellow	Yellow
6	Physical Activity	Yellow	Yellow
	Preferred Option	Yes	No

According to the summary above, Option 1 offers some comparative Economic advantage because of better proximity to the railway and compatibility with other depot facilities. It is also better located for security purposes.

Option 1 has some Environmental advantage over Option 2. While Option 2 impacts on just one agricultural property, whilst Option 1 lies on two, Option 1 is located on higher ground and will consequently require a smaller quantity of compensatory storage than will Option 2.

The option selection process concluded that Option 1 is the preferred option for the proposed compound at Millfarm.

3.6.9.6 M3 Parkway line

The approach for executing the SET works on the M3 Parkway line (from Clonsilla Junction to the northern end of the line) consists of five construction compounds: Barberstown 1, Barberstown 3, Stirling, Dunboyne and M3 Parkway.

The objective of the MCA is to identify the best two options since none of these compounds alone is sufficient to serve the whole length of the line.

Description of Options

Option 1: Barberstown 1: This site is adjacent to both railway lines, the Royal Canal and Barberstown level crossing. The lands at this site are partially in private ownership, partially owned by CIÉ. This location represents a proposal for construction compound which can serve both railway lines.



Figure 3-184 M3 Parkway Line Option 1

Option 2: Barberstown 3: Option 2 is next to the Maynooth line. The site is on privately owned lands and is considered suitable for use as a construction compound, for SET works. A new access road will be necessary to link the site to the nearest public road.



Figure 3-185 M3 Parkway Line Option 3

Option 3: Stirling: Option 3 is located beside the M3 Parkway line, at an intermediate point between Barberstown 3 and Dunboyne. The site is situated in a rural area to the east of Stirling. Private landowners possess the land at this site. If selected, the construction compound would support SET works on the M3 Parkway line.

Option 4: Dunboyne: The construction compound is located on the southern side of the parking of Dunboyne station, near the existing track access point. The entire area lies inside Iarnród Éireann lands. If selected, the compound would service SET works on the M3 Parkway line.



Figure 3-186 M3 Parkway Line Option 4

Option 5: M3 Parkway (on the existing carpark): If this compound is one of the two selected, it will support SET, and PW works on the M3 Parkway line. The PW works correspond to the second track at the northern

end of the line, with both tracks developing the function of a siding. The site is located on the southern third of the parking of M3 Parkway station, near the existing access point to tracks. The land at the location belongs to both private landowners and Iarnród Éireann.



Figure 3-187 M3 Parkway Line Option 5 (On Parking)

Option 6: M3 Parkway (off parking): This site represents a proposal for SET and PW construction compounds. Consequently, it would serve both SET and PW works on the M3 Parkway line if this option were chosen. The PW works consist of constructing the second track at the north ending of the line, with both tracks acting as sidings.

The land where the compound is located, to the northwest of the M3 roundabout, is owned by private landowners.



Figure 3-188 M3 Parkway Line Option 6 (Off Parking)

Options Assessment

The outcomes, integrated for each parameter, provide the following summary:

Table 3-57 M3 Parkway Line MCA

MCA Summary - M3 Parkway Line Construction Compound							
	Parameter	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6
1	Economy	Green	Green	Brown	Light Green	Brown	Brown
2	Integration	Brown	Brown	Brown	Green	Green	Light Green
3	Environment	Brown	Brown	Brown	Light Green	Green	Brown
4	Accessibility & Social Inclusion	Brown	Brown	Light Green	Light Green	Green	Brown
5	Safety	Brown	Brown	Green	Brown	Green	Brown
6	Physical Activity	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
	Preferred Option	No	No	No	No	Yes	No

The table shows that Option 5: M3 Parkway is preferred, as this solution is the best in terms of Integration, Environment, Accessibility, Social Inclusion and Safety parameters. Other solutions surpass Option 5 principally in respect of economy.

One site is insufficient to service the SET works on the whole line to M3 Parkway (approximately 7 km). Therefore, the second-best option must also be established to support construction activities.

Analysing the remaining options, the favourite location would be Option 4: Dunboyne, as per the global evaluation. However, Option 4 is located near Option 5 (only 2 km distant along the rail line).

This means that having previously selected Option 5, Option 4 is not a cost-efficient investment for two reasons:

- Option 5, the optimal location, would serve only 2 km of the line (plus a small distance to the north of M3 Parkway until the end of the line).
- Option 4 would service about 5 km of line, involving more significant movement of machinery, material and staff (greater cost) compared to a location at the opposite end of the line (Actually, a compound in Barberstown (Options 1 and 2) means a distance of about 3.5 km to be supported from its location. And other 3.5 km to be assisted from M3 Parkway (Option 5)).

The third best score corresponds to Option 3: Stirling, but Option 1 is the best to service the west line to Maynooth, as per the prior MCA. That is Option 1: Barberstown 1 would be installed anyway. So, the logical decision is that Barberstown 1 serves the SET works on the M3 line, avoiding installing the Stirling compound, which results in a saving. Option 2, which has an equivalent score to Option 1, involves a greater land take than Option 1. Together with the compulsory installation of Option 1, this fact constitutes a reason to rule out Option 2. The same applies to Option 6, which obtains a global score equivalent to Option 1 and Option 2. Moreover, Option 6 is located in the proximity of Option 5, which represents a prior selection (The installation of two adjacent compounds does not represent a cost-effective investment).

Therefore, **Option 5** and **Option 1** represent the proposal for M3 Parkway line SET works. Option 5 also constitutes the proposal for a PW compound related to the siding works to the north of M3 Parkway (Option 5 preferable to Option 6).

3.6.9.7 Other Temporary and Permanent Compounds

This section describes compound locations which did not require MCA as there were no alternative site locations evident for each of the elements discussed. Each of the following sections is related to a specific

discipline, except for the multidisciplinary compounds and permanent way operational maintenance compounds, which correspond to compounds involving two or more disciplines, as explained below. A given section follows the rail line from the east (Docklands) to the west (depot), then along the M3 Parkway line from south to north.

3.6.9.7.1 *Multi-Disciplinary Compounds*

Docklands (PWay/SET/Station/Substation)

The Docklands compound is actually a set of three adjacent construction compounds, each corresponding to a speciality: permanent way, SET and Station, from north to south. In addition, a substation compound is also proposed at a separate site. For more details on the preferred option refer to Vol 3A of this EIA for drawing MAY-MDC-GEN-ROUT-DR-Z-0001-D.

Two factors determine the location. On the one hand, this space is the only one available in this city centre area. On the other hand, the compound must serve the localised works of the station and the substation, which involves a location near these buildings.

Castleknock (Structure/Substation/Level Crossing)

Castleknock compound consists of three spaces that will serve the works related to the reconstruction of the OBG11, the building of a new substation and the upgrade of Castleknock Road / Park Lodge junction (the proposed junction improvements which are components of the preferred option for access replacement consequent on removal of Coolmine level crossing. For more details on the preferred option refer to Vol 3A of this EIA for drawing MAY-MDC-GEN-ROUT-DR-Z-0001-D.

OBG11 modification and Castleknock substation are localised interventions, which require construction compound spaces adjacent to the works site. This feature justifies their locations. As for the compound servicing the junction upgrade, its location coincides with that of the overbridge compound to minimise the impact on the green area that hosts these construction sites. That is, the compound serving the junction upgrade works does not involve additional land take.

Leixlip Confey (Structure/ Substation)

Leixlip Confey construction compound integrates a structure compound (comprising two spaces), which will support the OBG14 (Cope bridge) reconstruction works; and a substation compound, to serve the building of the proposed Leixlip Confey substation. Refer to Vol 3A of this EIA for drawing MAY-MDC-GEN-ROUT-DR-Z-0001-D for more details on the preferred option.

The overbridge compound is a space located adjacent to the structure to be reconstructed, due to the nature of these works. The new substation is placed on Captain's Hill carpark, just to the west of the existing Leixlip Confey station and to the northeast of a residential district, in a tight area that lacks enough space to locate a construction site. The proposed substation compound lays on the nearest empty space, a green area immediately to the east of the R149, having a direct access point to the mentioned road. This access is situated just opposite the station road access point, on the other side of the R149, providing a direct link from the compound to the substation works site. This connection avoids Glendale as compound access road, which reduces impact on the residential area to the east of the cited street.

Blakestown (SET/ Substation)

Blakestown compound comprises two adjacent spaces serving SET installation on an adjacent railway section and the new substation construction. Refer to Vol 3A of this EIA for drawing MAY-MDC-GEN-ROUT-DR-Z-0001-D for more details on the preferred option.

The substation compound space must be located next to the new substation (as these are localised works), which justifies the proposed site.

As for the SET compound, following the Maynooth line from east to west, the proposal anticipates three succeeding SET construction compounds: Barberstown, Blakestown and Millfarm, with the second approximately centred between the other two.

The criteria for selection of Blakestown as a compound location are to keep sufficient distance from Barberstown's and to avoid the urban area of Leixlip. According to the first criterion, a location to the east of the Leixlip area is unsuitable. Thus, the potential location shifts immediately to the west of the Leixlip urban area, setting up the construction compound on a rural plot that benefits from an adjoining level crossing. The level crossing and the existing roads that surround the plot facilitate access to the site. This location is distant from residential areas. Refer to Vol 3A of this EIAR for drawing MAY-MDC-GEN-ROUT-DR-Z-0001-D for more details on the preferred option.

Dunboyne (Pway/ Substation)

Dunboyne multi-disciplinary construction compound comprises a permanent way and a substation compound. Refer to Vol 3A of this EIAR for drawing MAY-MDC-GEN-ROUT-DR-Z-0001-D for more details on the preferred option.

The permanent way construction site is intended to service the track lowering works to be executed at the OBCN290, which are necessary to obtain enough vertical clearance for the catenary installation. Three reasons justify the location on the car park of Dunboyne station: proximity, accessibility and availability of land. This site is adjacent to the track lowering section. Second, the car park is provided with a gated track access point, located immediately to the structure's north. It allows direct access to the works sites from the compound. Third, the site benefits from land ownership by Irish Rail, avoiding impact on third parties. The road L2228 provides access to the car park, thus to the construction compound.

The substation compound is proposed in the vicinity of the new substation since the new building represents localised works that require a construction site in its proximity. Also, this location lies on IÉ land, which means that no third parties land needs to be occupied.

M3 Parkway (Substation)

Compound space at the M3 Parkway is needed to support the electrical substation works. Refer to Vol 3A of this EIAR for drawing MAY-MDC-GEN-ROUT-DR-Z-0001-D for more details on the preferred option.

The localised works corresponding to the new substation will be supported from a compound in its vicinity, which justifies the proposed site. Additionally, the substation compound is located inside the IÉ boundary, thus avoiding land take from third parties.

3.6.9.7.2 Station Compounds

Connolly

Connolly station construction compound relates to the refurbishment works of the current station and consists of two sites, one external and one internal. Refer to Vol 3A of this EIAR for drawing MAY-MDC-GEN-ROUT-DR-Z-0001-D for more details on the preferred option.

Its location depends on the station site since the compound must support these localised works. The proposal consists of an outdoor site coincident with the staff car park adjacent to Amiens Street. This site would function as construction staff parking, keeping the needed clearance to maintain the existing stair operationally. A gate at this location provides access to the internal station space, where the main construction compound would be installed. The indoor compound would host storage areas, on-site offices and welfare facilities set up under the vaults.

Ashtown

Ashtown station works, related to impaired people accessibility improvement, will benefit from the substation construction compound installed in this area. A new substation is proposed to the east of the station. Both interventions will share the same construction site, whose location is determined by the proposed substation. Refer to Vol 3A of this EIAR for drawing MAY-MDC-GEN-ROUT-DR-Z-0001-D for more details on the preferred option.

Coolmine

The works to be executed at Coolmine station are related to improving the accessibility conditions for impaired people. On the basis of minimal property acquisition and proximity to the works site, and due to the lack of alternative sites, the construction compound is proposed on the existing station carpark. This site is near the existing level crossing, which allows rapid track access. Additionally, the land at this location is owned by IÉ, which avoids land take from third parties. Refer to Vol 3A of this EIAR for drawing MAY-MDC-GEN-ROUT-DR-Z-0001-D for more details on the preferred option.

3.6.9.7.3 SET Compounds

Cabra Road

Section S3 of the line (Connolly-Glasnevin junction) is part of the GSWR and runs through Dublin. Thus, it is not feasible to locate a construction compound along the line, as there is insufficient space. The Docklands and Connolly do not offer the necessary space either. Therefore, Cabra Road is the proposed site to serve the SET works on Section S3. Refer to Vol 3A of this EIAR for drawing MAY-MDC-GEN-ROUT-DR-Z-0001-D for more details on the preferred option.

A permanent compound dedicated to track maintenance works exists at this location and is currently operational. The proposed construction compound is partially coincident with the existing permanent compound, meaning the operation of a compound does not constitute a new activity at this site. However, the proposed compound is larger in area than the existing maintenance compound.

Reilly's and Reilly's Complementary

Section S4 of the line, which will connect the new Spencer Dock Station to Glasnevin junction, belongs to MGWR and runs through the city centre. There is a lack of space to install construction compounds along the line. Docklands SET compound will support the SET works on the southeast half of this section. However, Docklands cannot service the entirety of Section D3 since the available lands are insufficient (Docklands compound must also service permanent way and station construction works). Thus, another location is necessary near the west end of the section to assist the SET in the northwest half of Section S4. The proposed location is Reilly's, coinciding with an existing permanent compound that currently supports track maintenance works. Refer to Vol 3A of this EIAR for drawing MAY-MDC-GEN-ROUT-DR-Z-0001-D for more details on the preferred option.

Additionally, the suggested site is immediate to the east of the Pelletstown station construction compound. There is, therefore, an existing precedent of compound activity at this location. Refer to Vol 3A of this EIAR for drawing MAY-MDC-GEN-ROUT-DR-Z-0001-D for more details on the preferred option.

However, the site of Reilly's does not provide sufficient land to host all facilities and storage areas that Section S4 SET works require. The complement to this compound must be located in its vicinity with a convenient size so that the two combined sites provide the required area. A plot in an industrial area to the east of Reilly's construction compound has been identified as a location for the complementary compound. More accurately, Reilly's complimentary is sited on the northern side of Broombridge. The mentioned sheets show the proximity of the two locations, with the second avoiding residential areas

3.6.9.7.4 Permanent Way Compounds

Connolly

Connolly permanent way temporary compound (comprising two spaces) in the Newcomen area is intended to facilitate the Newcomen chord track lowering and the installing a new crossover on the northeast throat of Connolly station. Refer to Vol 3A of this EIAR for drawing MAY-MDC-GEN-ROUT-DR-Z-0001-D for more details on the preferred option.

The surroundings of the station are urban areas that leave only two tight spaces to install the compound: the southeast site, defined by the main rail line (MGWR), Newcomen chord and the cycleway recently built, and the northwest side, which is situated among Newcomen chord, surrounding industrial buildings, Shamrock Place, North Strand Road and the cycleway. The lack of alternative sites and the proximity to the works sites justify the proposed location.

Glasnevin

A location for a construction compound has been identified near the MGWR & GSWR intersection. This compound's purpose is to facilitate the track lowering works at the Cross Guns Bridge (OBO11, on Prospect Road and OBD222, Westmorland bridge) and the OBD221 Bridge. These works aim to increase the vertical clearance, which is necessary to install the catenary. This compound is secondary, depending on Docklands permanent way compound as the main site serving these works. The compound will be split into two locations: one on the north side of the OBD222, hosting the on-site offices, welfare facilities and staff car park, and a second location next to the track allowing for limited on-site storage. Due to the difficult road access to the compounds for HGV, the vehicles should not access them. Therefore, most of the material will be stored at the Docklands compound and transported to the site along the railway. Road access is only foreseen for staff cars entering the first site from the Royal Canal Way. Refer to Vol 3A of this EIAR for drawing MAY-MDC-GEN-ROUT-DR-Z-0001-D for more details on the preferred option.

OBG13 Collins Bridge

A construction compound is proposed near Collins Bridge, to the southwest of it. The site must be adjacent to the railway to allow track access. Thus, the plot selected is the only feasible location due to a residential area on the other side of the adjoining road. The compound will serve the track lowering works to be carried out both to the northeast and the southwest of the bridge. These works intend to provide enough vertical clearance to install the overhead electrical lines. As for the accessibility, it is also a viable location since the existing road links the compound to the motorway N4, through R136, R835 and R109. Refer to Vol 3A of this EIAR for drawing MAY-MDC-GEN-ROUT-DR-Z-0001-D for more details on the preferred option.

OBG18 (Pike Bridge)

A potential location for a construction compound has been identified southeast of Pike's Bridge. The function of the compound is to facilitate the track lowering works to be conducted around the bridge. These works aim to increase the vertical clearance, which is necessary to install the overhead electrical lines. This site represents a convenient location adjacent to the track lowering section and can be provided with a track access point. In addition, the proximity of the motorway M4 and the existence of a proper access road infrastructure facilitate accessibility to the plot. Refer to Vol 3A of this EIAR for drawing MAY-MDC-GEN-ROUT-DR-Z-0001-D for more details on the preferred option.

OBCN286 Barnhill Bridge

Track lowering works are foreseen around this structure to achieve the necessary vertical clearance allowing the catenary installation. A construction compound serving these works is proposed adjacent to the Barnhill Bridge to its southeast side. This location is the preferred one due to a residential area on the other side of the R149. To the northeast of the railway, an urban area spreads, with the nearest empty pieces of land being the object of granted planning applications, which justifies ruling out northeast locations. As for the plot

immediately to the northwest of the bridge, a vegetation area advises against its selection. Other plots to the northwest lack a good access road. So, they are also ruled out. This site is adjacent to the track lowering section, making it a feasible location that can be provided with a track access point. The R149 provides access to the compound from the N3 motorway, completing the viability of the proposed option. Refer to Vol 3A of this EIAR for drawing MAY-MDC-GEN-ROUT-DR-Z-0001-D for more details on the preferred option.

Structure Compounds

DART+ West Project includes the modification of four existing bridges: Broome Bridge (OBG5), Old Navan Road Bridge (OBG9), Leixlip Confey Bridge (OBG14) and Louisa Bridge (OBG16). The modification aims to provide the tracks below with sufficient clearance to install the catenary. Refer to Vol 3A of this EIAR for drawing MAY-MDC-GEN-ROUT-DR-Z-0001-D for more details on the preferred option.

The project also includes the erection of a new bridge over the tracks and the Royal Canal in the depot area (OBG23A). Additionally, three new underbridges are foreseen near Jackson's bridge (UBG22A, UBG22B and UBG22C).

Cope bridge reconstruction compound is integrated in Leixlip Confey multi-disciplinary compound. The construction site related to the new UBG22 is included for in the Millfarm multi-disciplinary compound.

Unlike the linear works of the project (that is, development taking place along the line), such as permanent way or SET activities, these structural interventions are localised at the existing/new bridges. This feature means that the corresponding construction compounds are localised at the works sites, which justifies their locations.

3.6.9.7.5 Level Crossing Compounds

DART+ West project includes the closure of six level crossings along the line: Ashtown, Coolmine, Porterstown, Clonsilla, Barberstown and Blakestown. Their elimination required the construction of new roads and/or footpaths crossing the tracks at a different level through bridges and/or footbridges (except in the case of Blakestown, in which the intervention consists exclusively in its closure). The execution of these elements requires the installation of construction compounds. Unlike many other construction works of the project, which are linear, these works are localised works. So, the construction compounds do not admit movement along the line but are linked to the works site they serve. This characteristic distinguishing the level crossing replacement works explains the compound locations that are recommended. Refer to Vol 3A of this EIAR for drawing MAY-MDC-GEN-ROUT-DR-Z-0001-D for more details on the preferred option.

Substation Compounds

The scheme also includes new substations, which are necessary for the electrification of the line. The erection of these buildings requires the support provided by construction compounds whose location is dictated by the substation location (except in the case of Leixlip Confey substation). In some cases, the substation compound is integrated next to another compound. It occurs in Docklands, Castleknock, Leixlip Confey, Blakestown, Dunboyne and M3 Parkway. In other cases: Glasnevin, Ashtown, Coolmine, Maynooth and Hansfield, the proposal requires specific substation compounds. Refer to Vol 3A of this EIAR for drawing MAY-MDC-GEN-ROUT-DR-Z-0001-D for more details on the preferred option.

3.6.9.7.6 Permanent Operational Phase Maintenance Compounds

The permanent operational phase maintenance facilities are compounds that serve the maintenance works corresponding to each discipline. There are a number of these facilities along the existing railway, which are already operational. These compounds are not part of the report's scope, as they do not represent new works proposals. Refer to Vol 3A of this EIAR for drawing MAY-MDC-GEN-ROUT-DR-Z-0001-D for more details on the preferred option.

DART+ West proposes three new permanent facilities, which are described below:

Docklands

Currently, several maintenance buildings are operational in North Wall. These buildings host the departments include IM CCE, IM SET, IM Safety and IM Emergency Response Team (“IM” standing for Infrastructure Managers). The track alignment corresponding to Spencer Dock Station involves the demolition of these buildings. However, before demolition, these facilities must be relocated to be operational again before the beginning of the works. The proposal consists of relocating these permanent facilities in East Wall Yard.

The Docklands site will also host a permanent operational phase maintenance facility on completion of the works. The site will host three temporary construction spaces as described previously. The maintenance facility will be provided with an access ramp descending from Sheriff Street Upper. Its objective is to preserve accessibility after completion of the track layout serving the proposed Spencer Dock Station. During construction, the ramp will allow access to the construction compounds.

Navan Road Parkway

Two potential locations for an OHLE permanent facility in the area of Navan Road Parkway. It develops the comparative assessment and justifies Option 1 (located near the station) as preferred. The purpose of the new permanent facility is to serve the OHLE maintenance works. The permanent compound consists mainly of a new maintenance building (Refer to Vol 3A of this EIAR for drawing MAY-MDC-GEN-ROUT-DR-Z-0001-D for more details on the preferred option.) The compound located in the vicinity of the M50 node will allow appropriate access from Navan Road (R147). A track access point will also be implemented.

Millfarm (Adjacent to the depot)

Additionally, the proposed scheme includes a permanent facility on the southeast side of the depot. This facility is intended to serve the permanent way maintenance activities on the mainline. To do so, it will be provided with a new track access point (Refer to Vol 3A of this EIAR for drawing MAY-MDC-GEN-ROUT-DR-Z-0001-D for more details on the preferred option). In addition, the proposed local road and the OBG23A will link the maintenance compound to the R148, facilitating a suitable access route.

3.7 References

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