



Chapter 05
Construction

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5. Construction

5.1 Introduction

This Chapter of the Environmental Impact Assessment Report (EIAR) describes the construction activities associated with the Ringsend to City Centre Core Bus Corridor Scheme, hereafter referred to as the Proposed Scheme.

The design of the Proposed Scheme has been developed to a stage where all potential environmental impacts can be identified, and a fully informed environmental impact assessment can be carried out.

The Proposed Scheme includes the construction of a new public transport bridge at the confluence of the River Dodder and the River Liffey at the eastern end of Sir John Rogerson's Quay, known as the Dodder Public Transport Opening Bridge (DPTOB). It is envisaged that this element of the Proposed Scheme will be constructed under a separate Construction Contract from the remainder of the Proposed Scheme.

The National Transport Authority (NTA) (the Employer for the construction works) shall set out the Employer's Requirements in the Construction Contract including all applicable mitigation measures identified in this EIAR, as well as additional measures required pursuant to conditions attached to any decision to grant approval. Procurement of the contractors will involve the determination that the appointed contractors are competent to carry out the works, including the effective implementation of the mitigation measures. The appointed contractors will be required to plan and construct the Proposed Scheme construction works in accordance with the Employer's Requirements, and the NTA will employ an Employer's Representative team with appropriate competence to administer and monitor the Construction Contracts for compliance with the Employer's Requirements.

In order to allow an assessment of the Construction Phase impacts associated with the Proposed Scheme, this Chapter describes the construction phasing and programme as well as the construction activities necessary to undertake the works, including information on the Construction Compounds, construction plant and equipment. This Chapter includes the following information:

- An overview of how the Proposed Scheme has been divided into sections is presented in Section 5.2;
- An overview of the construction activities proposed at each section along the Proposed Scheme (i.e. a description of what is proposed to be constructed) is presented in Section 5.3;
- A programme for the Proposed Scheme (i.e. when the sections will be constructed) is presented in Section 5.4;
- A general description of the construction methodology to be carried out at each section (i.e. how the Proposed Scheme will be built) is presented in Section 5.5;
- Information on the plant and equipment (i.e. what machinery will be used to construct the Proposed Scheme) is presented in Section 5.6;
- Information on the Construction Compounds is presented in Section 5.7;
- The temporary traffic management measures, including the staging measures to be carried out (i.e. how the vehicles, cyclists and pedestrians will be impacted and safely catered for, during the works) are presented in Section 5.8; and
- Infrastructure projects and developments which are expected to interface with the construction of the Proposed Scheme are referenced in Section 5.9.

Details of mitigation measures proposed to address potential impacts arising from construction activities are described in Chapter 6 to Chapter 21 as appropriate and are summarised in Chapter 22 (Summary of Mitigation & Monitoring Measures) of the EIAR.

A Construction Environmental Management Plan (CEMP) has also been prepared and is included as Appendix A5.1 in Volume 4 of this EIAR. The CEMP will be updated by the NTA prior to the commencement of the Construction Phase, so as to include any additional measures required pursuant to conditions attached to any decision to grant approval. The CEMP has regard to the guidance contained in the Transport Infrastructure Ireland

(TII) (formerly the National Roads Authority (NRA)) Guidelines for the Creation, Implementation and Maintenance of an Environmental Operating Plan (TII 2007), and the handbook published by Construction Industry Research and Information Association (CIRIA) in the United Kingdom, Environmental Good Practice on Site Guide, 4th Edition (CIRIA 2015).

All of the measures set out in the CEMP appended to this EIAR will be implemented in full.

5.2 Construction Phasing

The Proposed Scheme has been divided into three primary sections. These sections have been further subdivided where necessary, according to the types of construction works required. The sections / sub-sections are:

- **Section 1:** Talbot Memorial Bridge to Tom Clarke East Link Bridge:
 - **Section 1a:** Talbot Memorial Bridge to Samuel Beckett Bridge – North Quays;
 - **Section 1b:** Talbot Memorial Bridge to Samuel Beckett Bridge – South Quays;
 - **Section 1c:** Samuel Beckett Bridge to Tom Clarke East Link Bridge – North Quays; and
 - **Section 1d:** Samuel Beckett Bridge to Tom Clarke East Link Bridge – South Quays.
- **Section 2:** Dodder Public Transport Opening Bridge (DPTOB); and
- **Section 3:** Tom Clarke East Link Bridge to Sean Moore Road.

The location of each section / sub-section is shown in Figure 5.1 in Volume 3 of this EIAR. The construction activities to be carried out at each section / sub-section are described in Section 5.3.

5.3 Overview of Construction Works

The construction activities to be undertaken, and the anticipated duration of the works, in each section / sub-section are described in Section 5.3.1 to Section 5.3.3. The location of each section / sub-section along the Proposed Scheme is shown in Figure 5.1 in Volume 3 of this EIAR. This Section should be read in conjunction with the drawings listed in Table 5.1. These drawings are contained in Volume 3 of this EIAR.

Table 5.1: List of Relevant Drawings

Drawing Series Number	Description
BCIDD-ROT-SPW_ZZ-0016_XX_00-DR-CR-9001	Site Location Plan
BCIDD-ROT-GEO_GA-0016_XX_00-DR-CR-9001	General Arrangement
BCIDD-ROT-GEO_HV-0016_ML_00-DR-CR-9001	Mainline Plan and Profile
BCIDD-ROT-GEO_CS-0016_XX_00-DR-CR-9001	Typical Cross Sections
BCIDD-ROT-ENV_LA-0016_ML_00-DR-LL-9001	Landscaping General Arrangement
BCIDD-ROT-PAV_SU-0016_XX_00-M2-CR-9001	Pavement Treatment Plans
BCIDD-ROT-SPW_BW-0016_XX_00-DR-CR-9001	Fencing and Boundary Treatment
BCIDD-ROT-TSM_GA-0016_XX_00-DR-CR-9001	Traffic Signs and Road Markings
BCIDD-ROT-LHT_RL-0016_XX_00-DR-EO-9001	Street Lighting
BCIDD-ROT-TSM_SJ-0016_XX_00-DR-TR-9001	Junction System Design
BCIDD-ROT-DNG_ZZ-0016_XX_00-DR-CD-9001	Proposed Surface Water Drainage Works
BCIDD-ROT-UTL_UD-0016_XX_00-DR-CU-9001	IW Foul Sewer Asset Alterations
BCIDD-ROT-UTL_UE-0016_XX_00-DR-CU-9001	ESB Asset Alterations
BCIDD-ROT-UTL_UG-0016_XX_00-DR-CU-9001	GNI Asset Alterations
BCIDD-ROT-UTL_UW-0016_XX_00-DR-CU-9001	IW Water Asset Alterations
BCIDD-ROT-UTL_UL-0016_XX_00-DR-CU-9001	Telecommunications Asset Alterations
BCIDD-ROT-UTL_UC-0016_XX_00-DR-CU-9001	Combined Existing Utility Records

Drawing Series Number	Description
BCIDD-ROT-STR_ZZ-0016_XX_00-DR-SS-9001	Structures Drawings

Further details on the design specifications, with regards to matters such as parking and loading bay widths, signalised junctions, priority junctions, bus stops, accessibility, traffic signals, lighting, utilities, drainage, pavement and landscape design, can be found in the Preliminary Design Guidance Booklet for BusConnects Core Bus Corridors, contained in Appendix A4.1 in Volume 4 of this EIAR.

5.3.1 Section 1: Talbot Memorial Bridge to Tom Clarke East Link Bridge

5.3.1.1 Section 1a: Talbot Bridge to Samuel Beckett Bridge – North Quays

Section 1a encompasses a length of approximately 640m (metres) along Custom House Quay and North Wall Quay, between Talbot Memorial Bridge and the Samuel Beckett Bridge. The construction activities at Section 1a will comprise pavement reconstruction, widening, and resurfacing of the roads, footpaths, and cycle tracks, and new kerbs. The Scherzer Bridges at George’s Dock will be deconstructed, relocated and reinstated, and the northern bridge will be restored for occasional opening. The pedestrian bridges adjacent to the Scherzer Bridges will be removed, and a new replacement carriageway bridge across the George’s Dock entry channel will be constructed. Further information on the construction methodology for the new and relocated bridges at George’s Dock is provided in Section 5.5.4.1.1. The Construction Compound (R1) will be located at George’s Dock. Pedestrian boardwalks at Custom House Quay (adjacent to the former Dublin City Council (DCC) Docklands Offices), and North Wall Quay (at the junction of North Wall Quay and Excise Walk) will be constructed. Further information on the construction methodology for the pedestrian boardwalks are provided in Section 5.5.4.1.2 and Section 5.5.4.1.3. Construction activities will also consist of additional signage, new road markings, new and amended traffic signal infrastructure, new street furniture (such as rubbish bins, seats, lighting, benches, planters, bollards, cycle racks, bus stops (including shelters and information displays etc.)). Trees will be removed along Section 1a however new trees are proposed to replace them as part of the Proposed Scheme. A boundary wall will be constructed, and an existing fence will be realigned at George’s Dock. Some minor utility diversions and / or protections will be required. No new drainage works are proposed at this section of the Proposed Scheme. The expected construction duration will be approximately 24 months.

5.3.1.2 Section 1b: Talbot Memorial Bridge to Samuel Beckett Bridge – South Quays

Section 1b encompasses a length of approximately 780m along City Quay and Sir Rogerson’s Quay, between Talbot Memorial Bridge and the Samuel Beckett Bridge. The construction activities at Section 1b will comprise pavement reconstruction, and resurfacing of the roads, footpaths, and cycle tracks, and new kerbs. Construction activities will also consist of additional signage, new road markings, new and amended traffic signal infrastructure, new street furniture and landscaping works. No new drainage works are proposed at this section of the Proposed Scheme. The expected construction duration will be approximately nine months.

5.3.1.3 Section 1c: Samuel Beckett Bridge to Tom Clarke East Link Bridge – North Quays

Section 1c encompasses a length of approximately 920m along the North Wall Quay between Samuel Beckett Bridge and the Tom Clarke East Link Bridge. The construction activities at Section 1c will comprise pavement reconstruction, widening, and resurfacing of the roads, footpaths, and cycle tracks, and new kerbs. Construction activities will also consist of additional signage, new road markings, new and amended traffic signal infrastructure, new street furniture. The Scherzer Bridges at the Royal Canal will be deconstructed, relocated and reinstated, with both Scherzer Bridges at this location restored for occasional opening. The pedestrian and cycle bridges adjacent to the Scherzer Bridges will be removed, and a new replacement carriageway bridge will be constructed. An existing boundary wall at either side of the mouth of the Royal Canal along North Wall Quay will be realigned. Further information on the construction methodology for the new and relocated bridges at the Royal Canal is provided in Section 5.5.4.1.4. The Construction Compound (R2) will be located at the Royal Canal. Trees will be removed along Section 1c however new trees are proposed to replace them as part of the Proposed Scheme. Some minor utility diversions and / or protections will be required. No new drainage works are proposed at this section of the Proposed Scheme. The expected construction duration will be approximately 24 months.

5.3.1.4 Section 1d: Samuel Beckett Bridge to Tom Clarke East Link Bridge – South Quays

Section 1d encompasses a length of approximately 680m along Sir Rogerson's Quay between Samuel Beckett Bridge and the Tom Clarke East Link Bridge. The construction activities at Section 1d will comprise pavement reconstruction, widening, and resurfacing of the roads, footpaths, and cycle tracks, and new kerbs. Construction activities will also consist of additional signage, new road markings, new and amended traffic signal infrastructure, new street furniture and landscaping works. The Construction Compound (R3a) will be located along Sir John Rogerson's Quay / Britain Quay. No new drainage works are proposed at this section of the Proposed Scheme. A minor retaining wall (MRW1) will be constructed along Sir John Rogerson's Quay on the south side of its junction with Samuel Beckett Bridge. Further information on the minor retaining wall construction methodology is provided in Section 5.5.4.2.1. To the immediate east of the Samuel Beckett Bridge, the existing flood defence wall to the north of the junction of Sir John Rogerson's Quay and Cardiff Lane will be realigned towards the River Liffey to facilitate the proposed two-way cycleway connection to the Samuel Beckett Bridge and additional space for pedestrians. The expected construction duration will be approximately 12 months.

5.3.2 Section 2: Dodder Public Transport Opening Bridge (DPTOB)

Section 2 is located at the DPTOB, which extends over the confluence of the River Dodder and the River Liffey, from Sir John Rogerson's Quay / Britain Quay to the junction of Thorncastle Street / York Road and the Tom Clarke East Link Bridge. The construction activities at Section 2 will comprise construction of the DPTOB, pavement reconstruction, widening, and resurfacing of the roads, footpaths, and cycle tracks, and new kerbs over the DPTOB, and tie in works either side of the DPTOB. The Construction Compound (R3b) will be located along Sir John Rogerson's Quay / Britain Quay. The rowing club facilities and building, and adjacent jetty at St Patrick's Rowing Club (SPRC) will be demolished and relocated however not until the alternative facilities are constructed and available. An ESB substation, 5m deep and 8m wide, north of the Thorncastle Street, York Road Junction, in the location of the demolished SPRC building will be constructed. Further information on the DPTOB construction methodology is provided in Section 5.5.4.1.5. Construction activities will also consist of additional signage, new road markings, new and amended traffic signal infrastructure, new street furniture and landscaping works. Trees will be removed along the eastern bank of the DPTOB however urban realm improvements are proposed at this location. Some minor utility diversions and / or protections will be required. The DPTOB will include the construction of permeable paving, swales / basins and oversized pipes to treat surface water runoff. The expected construction duration will be approximately 30 months.

5.3.3 Section 3: Tom Clarke East Link Bridge to Sean Moore Road

Section 3 of the Proposed Scheme encompasses a length of approximately 1,000m between Tom Clarke East Link Bridge and Sean Moore Road. The construction activities at Section 3 will comprise pavement reconstruction, widening, and resurfacing of the footpath, and cycle track, and new kerbs. Construction activities will also consist of additional signage, new road markings, new street furniture and landscaping works. A new cycle track complete with lighting will be constructed through Ringsend Park and along Strand Street, Pembroke Street, and Beach Road. This will be complemented by the implementation of quiet street treatment on York Road / Pigeon House Road, Pembroke Cottages, and Cambridge Park. To facilitate the Proposed Scheme, a number of trees will be removed along Section 3. Infiltration trenches will be installed along the widened path proposed through Ringsend Park. The expected construction duration will be approximately 12 months.

5.4 Construction Programme

An indicative programme for the Proposed Scheme is provided in Table 5.2. The total Construction Phase duration for the overall Proposed Scheme is estimated at approximately 30 months. However, construction activities in individual sections will have shorter durations as outlined in Section 5.3. The programme identifies the estimated duration of works at each section. The location of each section / sub-section along the Proposed Scheme is shown in Figure 5.1 in Volume 3 of this EIAR.

Table 5.2: Construction Programme

Section No.	Approximate Construction Duration	Approximate Length (m)	Year 1				Year 2				Year 3	
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
Section 1a	24 months	640										
Section 1b	9 months	780										
Section 1c	24 months	920										
Section 1d	12 months	680										
Section 2	30 months	Structure										
Section 3	12 months	1,000										

As mentioned in Section 5.1, it is envisaged that the DPTOB will be constructed under a separate Construction Contract from the remainder of the Proposed Scheme, therefore it is possible that the DPTOB construction could be undertaken in a different sequence (e.g. either independently of the other elements or overlapping with them) to that shown in the programme above. However, for the purposes of the EIA assessment the programme assumes that the construction of the DPTOB and the other elements of the Proposed Scheme will be constructed concurrently.

5.5 Construction Methodology

This Section provides an outline of how each element of the Proposed Scheme infrastructure will be constructed. It should be read in conjunction with the phasing set out in Section 5.3 and Section 5.4, and also with the traffic management stages set out in Section 5.8.

5.5.1 Pre-Construction

The NTA will prepare the Construction Contract documents, which will include all applicable mitigation measures identified in this EIAR, as well as any additional measures required in any conditions attached to An Bord Pleanála’s decision, should they grant approval.

The preparations will also include the need for additional investigative survey works (such as ground investigation and slit trenching to confirm the location of existing utilities) to supplement the information in the Construction Contract documents. Any such additional investigative survey works that could be deemed to be construction activities will follow the requirements of the CEMP, where necessary.

The NTA will also serve notices on impacted landowners in accordance with the requirements of the Compulsory Purchase Order (CPO) process to ensure necessary lands are process available for the construction works.

5.5.2 Preparatory and Site Clearance Works

Additional preparations will be required prior to commencing the road and street upgrade works, to confirm the construction methodology, such as additional investigative survey works (such as confirmatory invasive species surveys, ground investigation and slit trenching to confirm the location of existing utilities).

There will be elements of preparatory works, including establishing the Construction Compounds, the installation of fencing and signage, vegetation clearance and treatment of non-native invasive species, demolition works (e.g. such as boundary walls) etc. required in preparation for the main construction activities.

5.5.2.1 Land Acquisition and Boundary Treatment

Condition surveys of properties adjacent to the Proposed Scheme that the works have the potential to affect will be undertaken prior to works commencing. Liaison with impacted landowners will be carried out in advance of commencement of boundary works to properties.

Boundary works will be commenced where both permanent and temporary land acquisition is required to ensure that sufficient space is available to construct the Proposed Scheme. Boundary treatments will be carried out on a section-by-section basis (as defined in Section 5.2), and in line with the traffic management stages as set out in Section 5.8.3.

This will be a mixture of boundary walls / fencing along industrial / commercial land, railings along parks and temporary boundaries, as required. Any land temporarily acquired from a landowner will only be utilised for the purposes of undertaking boundary works or accommodation works related to the land in question.

Any lands acquired temporarily to facilitate construction work will be returned to landowners on completion of the works. Existing boundary walls or fencing being relocated will be constructed to match the existing conditions, unless otherwise agreed. The removal of trees, vegetation, lawns, paving etc will be minimised in so far as practicable.

5.5.2.2 Fencing

Fencing will be erected on a section-by-section basis (as defined in Section 5.2), and in line with the traffic management stages as set out in Section 5.8.3.

5.5.2.3 Construction Traffic Management Measures and Signage

Prior to commencing the construction works described below within a sub-section of the Proposed Scheme, temporary traffic management measures will be installed. The temporary traffic management measures, including measures for pedestrians, cyclists, public transport users, general traffic, proposed lane closures, road closures and diversions are discussed in detail in Section 5.8. Temporary traffic management signage will be put in place in accordance with the requirements of the Department of Transport's Traffic Signs Manual, Chapter 8, Temporary Traffic Measures and Signs for Roadworks (hereafter referred to as the Traffic Signs Manual) (Department of Transport, Tourism and Sport 2019). Further information is also provided in the Construction Traffic Management Plan (CTMP) in Appendix A5.1 CEMP in Volume 4 of this EIAR.

5.5.2.4 Tree Protection

Trees to be retained within and adjoining the works areas will be suitably protected as necessary as per the British Standards Institution (BSI) British Standard (BS) 5837:2012 Trees in Relation to Design, Demolition, and Construction (BSI 2012). Trees identified for removal will be removed in accordance with 'BS 3998:2010 Tree Work. Recommendations' (BSI 2010). The location of trees to be retained, and trees to be removed is shown on the Landscaping General Arrangement Drawings (BCIDD-ROT-ENV_LA-0016_ML_00-DR-LL-9001).

A suitably qualified arborist will be appointed by the contractor to monitor tree protection, and tree removal related activities. The design has been developed to ensure removal of trees has been minimised in so far as practicable. Where necessary, protective fencing will be erected, and mitigation measures will be put in place, prior to construction works commencing in the immediate vicinity.

Works required within the root protection area of trees to be retained will follow the arboricultural methodology included in Appendix A17.1 Arboricultural Impact Assessment in Volume 4 of this EIAR. Further information on mitigation measures with regards to the removal, and protection of trees is provided in Chapter 12 (Biodiversity) and further information on the assessment of tree removal with regards to landscape and visual impact is provided in Chapter 17 (Landscape (Townscape) & Visual) of this EIAR.

5.5.2.5 Vegetation Clearance and Treatment of Non-Native Invasive Species

Vegetation (e.g. hedgerows, scrub, grassland) clearance and treatment of non-native invasive species (e.g. Japanese knotweed, Himalayan balsam, Giant hogweed) will be undertaken within the Proposed Scheme boundary, where necessary.

A suitably qualified specialist will be appointed by the contractor to monitor vegetation clearance, and treatment of non-native invasive species. Prior to construction, confirmatory invasive species surveys will be undertaken to re-confirm the presence and / or extent of species within the footprint of the Proposed Scheme. Further information

with regards to pre-construction ecological surveys and restrictions are provided in Chapter 12 (Biodiversity) of this EIAR. Vegetation identified for removal will be removed in accordance with 'BS 3998:2010 Tree Work. Recommendations' (BSI 2010) and best arboricultural practices as detailed and monitored by the specialist. The Invasive Species Management Plan (ISMP) for the control of invasive plant species on the Proposed Scheme is included in Appendix A5.1 CEMP in Volume 4 of this EIAR.

5.5.2.6 Archaeological Investigations

The NTA will procure the services of a suitably qualified archaeologist as part of its Employer's Representative team administering and monitoring the works. In addition, a suitably qualified archaeologist will be appointed by the contractor to monitor archaeological and cultural heritage matters during construction, to acquire any licences / consents required to conduct the work, and to supervise and direct the archaeological measures associated with the Proposed Scheme in accordance with the Employer's Requirements. In the event of archaeological features or material being uncovered during the Construction Phase, all machine work will cease in the immediate area to allow the archaeologist time to inspect and record any such material. Further information on archaeological management is included in Section 15.5 in Chapter 15 (Archaeological & Cultural Heritage) of this EIAR.

5.5.2.7 Ground Investigations

Prior to construction localised confirmatory ground investigations will be undertaken to verify the results of the assessments undertaken and reported in this EIAR. Information on the specific ground investigations conducted along the Proposed Scheme have been outlined in Chapter 14 (Land, Soils, Geology & Hydrogeology) of this EIAR.

5.5.2.8 Construction Compounds

As part of preparatory works, the Construction Compounds will be set up, which will include installation of the necessary facilities including the site office, welfare facilities, etc. Controlled access to the Construction Compounds will be implemented, fencing will be erected, and lighting will be installed. The Construction Compounds will be secured with Closed-Circuit Television (CCTV), to ensure safe storage of all material, plant and equipment. Further information on the Construction Compounds is included in Section 5.7.

5.5.2.9 Lighting

The majority of the Proposed Scheme is already artificially lit. However temporary lighting will be required at times along the Proposed Scheme at certain locations during the Construction Phase, as necessary. Where it is necessary to disconnect public lighting during the construction works or to undertake works outside of daylight hours, where existing lighting is low, appropriate temporary lighting will be provided. Temporary lighting will also be installed at the Construction Compounds for the duration of the Construction Phase.

The standard of temporary lighting installed during the Construction Phase will meet the standard of the existing carriageway and will be appropriate to the speed and volume of traffic during construction. Temporary construction lighting will generally be provided by tower mounted floodlights, which will be cowled and angled downwards to minimise spillage of light from the site.

New permanent lighting and upgrades to the existing lighting infrastructure are also proposed as part of the Proposed Scheme's lighting strategy, the details of which are addressed in Section 4.6 (Key Infrastructure Elements) in Chapter 4 (Proposed Scheme Description) of this EIAR.

5.5.2.10 Demolition

In some locations along the Proposed Scheme, items, such as walls, gates, fencing, lighting poles, bus stops, etc. will need to be removed or demolished. The impact of materials arising from the Proposed Scheme demolitions are assessed in Chapter 18 (Waste & Resources) of this EIAR. Measures for managing demolition materials are included in the Construction Demolition Resource Waste Management Plan (CDRWMP) in Appendix A5.1 CEMP in Volume 4 of this EIAR.

The demolition of structures (particularly the SPRC) will be carried out in a controlled manner, and under supervision. All plant and equipment will be maintained in good working order and inspected in accordance with manufacturers recommended intervals. Demolition works areas will be appropriately hoarded and signposted. Best practice industry standard working methods will be used to minimise the generation of dust, noise and other environmental effects resulting from the demolitions as described in Chapter 7 (Air Quality) and Chapter 9 (Noise & Vibration) of this EIAR.

5.5.3 Road and Street Upgrades

5.5.3.1 General

The Proposed Scheme will be constructed in a manner which will minimise, as much as practicable, any disturbance to residents, businesses and road users. Road and street upgrade works will be completed in a staged manner, as described in Section 5.8, whereby traffic of all modes will be managed to ensure construction can continue while ensuring the safety of all road users, and personnel, and maintaining flow of all modes of traffic wherever practicable.

5.5.3.2 Parking and Access

When roads and streets are being upgraded, there will be some temporary disruption / alterations to on-street and off-street parking provision, and access to premises in certain locations along the Proposed Scheme. Local arrangements will be made on a case-by-case basis to maintain continued access to homes and businesses affected by the works, at all times, where practicable. Details regarding temporary access provisions will be discussed with residents and business owners prior to construction starting in the area. The duration of the works will vary from property to property, but access and egress will be maintained at all times. The location of temporary land acquisition, proposed gates, and the relocation of existing gates are shown in the Fencing and Boundary Treatment Drawings (BCIDD-ROT-SPW_BW-0016_XX_00-DR-CR-9001) in Volume 3 of this EIAR.

Access will be maintained for emergency vehicles along the Proposed Scheme throughout the Construction Phase.

5.5.3.3 Earthworks

Topsoil and subsoil will be excavated as part of the Proposed Scheme; for foundations, bus stop shelters, signs, public lights, traffic signal poles, tree pits etc. This topsoil and subsoil will be temporarily stored at the Construction Compounds for reuse where practicable, in line with the principles of circular economy. The Proposed Scheme will aim to minimise the amount of materials brought onto the Proposed Scheme in so far as practicable. The acceptability of earthworks material for reuse will be determined, by testing and analysis, to determine if materials meet the specific engineering standards for their proposed end-use.

All earthworks will be managed having regard to the Guidelines for the Management of Waste from National Road Construction Projects (TII 2017), and Number 10 of 1996 – Waste Management Act, 1996, as amended (hereafter referred to as the Waste Management Act). The management of materials is discussed in Chapter 18 (Waste & Resources) of this EIAR. The overall estimated quantities of demolition, excavation, and reuse materials for the Proposed Scheme are outlined respectively in Table 18.9, Table 18.10 and Table 18.13 in Chapter 18 (Waste & Resources) of this EIAR. The overall estimated quantities of imported materials for the Proposed Scheme are outlined in Table 19.9 in Chapter 19 (Material Assets) of this EIAR.

5.5.3.4 Cellars

Excavations within the City Centre will be minimal, thereby reducing the risk of interference with existing cellars along the Proposed Scheme. At certain locations, cellars extend outwards from buildings into adjoining footpaths or streets. Cellars have been identified at Sections 1b and Section 1d. Building condition surveys will be completed immediately prior to any works. However, it is not anticipated that proposed works will impact directly on any cellars.

5.5.3.5 Drainage

Adjustment or upgrade works will be required to service chambers and manholes, gullies, etc. Access manholes located in the footpaths will be lowered or raised to match the proposed carriageway levels, where the carriageway will be widened into the existing footways.

Specific controls and mitigation measures will be put in place to manage runoff and minimise pollution to receiving water bodies during the Construction Phase of the Proposed Scheme. Further information with regards to drainage, and drainage design is included in Chapter 4 (Proposed Scheme Description), Chapter 13 (Water), Chapter 19 (Material Assets) and the Surface Water Management Plan (SWMP) in Appendix A5.1 CEMP in Volume 4 of this EIAR.

5.5.3.6 Utility Works

Realignment, upgrade or replacement of utilities and services will be required in conjunction with, or to accommodate the Proposed Scheme. Any such works to utilities and services will be along or immediately adjacent to the Proposed Scheme. A list of utility and service works along the Proposed Scheme is provided in Chapter 19 (Material Assets) of this EIAR.

Utilities and services, including overhead and underground, comprise amongst others:

- Water mains;
- Storm water and foul sewers;
- Fuel pipelines;
- Electricity ducts and cabling;
- Gas mains;
- Telecommunications and TV ducting and cabling; and
- Traffic signalling ducting and cabling.

The existing overhead utilities and services will be located and recorded prior to the commencement of works. Any relocation of existing overhead lines will be coordinated to ensure interruption to the existing network is minimised.

Proposed utility works are based on available records and preliminary site investigations. Prior to excavation works being commenced, localised confirmatory surveys will be undertaken to verify the results of the pre-construction assessments undertaken and reported in this EIAR.

Areas to be excavated for utility trenches will first be traced for live services using established scanning techniques. Where necessary, trenches excavated for utility diversions will be supported to ensure that the sides of the excavation are secure. Each of the different utilities will be re-laid at a location, depth and spacing in accordance with the appropriate standards, and the trench then backfilled.

5.5.3.7 Pavement and Carriageway Works

This Section describes the pavement and carriageway works to be completed along the Proposed Scheme, including construction, or alterations to the carriageway, kerbs, parking and loading bays, footpaths, cycle tracks cycle lanes, bus stops (island, inline, layby) etc. The following options outline the pavement construction / reconstruction scenarios required along the Proposed Scheme:

- Where the existing road surfacing is showing signs of deterioration, the existing pavement will be replaced (i.e. road pavement and surfacing will be removed and replaced to similar levels as existing);
- Where the quality of the existing road pavement is poor or where the existing road will be widened, full depth road foundation and pavement reconstruction will be carried out; and
- In some instances, road overlay (i.e. the addition of new pavement / road surfacing material), with no excavation, will be provided.

The proposed pavement treatment along the Proposed Scheme is provided in the Pavement Treatment Plans Drawings (BCIDD-ROT-PAV_SU-0016_XX_00-M2-CR-9001) in Volume 3 of this EIAR.

Existing asphalt / bituminous layers will be removed using road planers, with planings being recycled where possible, as is common practice. Following this, existing lower courses of road make-up or ground will be excavated in layers using mechanical excavators in order to segregate materials for reuse, recycling or disposal, as appropriate, with materials being transported using lorries. The new or rehabilitated pavement will then be constructed from formation level, in coordination with the installation of street furniture assets. Plant used in construction of the new road make-up will be excavators, rollers, dumpers, and lorries, as detailed in Section 5.6. Specialist road paving machines will be used to lay bituminous layers. Road markings and reflective road studs will also be installed.

The choice of materials will include unbound or hydraulically bound granular materials for the foundation, hydraulically bound materials, hot or cold bituminous mixtures for base and binder layers and natural stone or concrete paving units, bituminous mixtures or concrete materials for the surface. Specialist products such as high friction surfacing treatments will also be applied to the surface of the pavement where appropriate.

5.5.3.8 Traffic Signal Junctions

During the works, the existing traffic signals will remain in operation, supplemented as necessary by temporary traffic signals, until such time as the new signals become operational.

The existing signalised junctions along the Proposed Scheme will be upgraded to provide bus priority, enhanced pedestrian crossings and segregated cycling facilities. In general traffic signals will be replaced, and additional dedicated signals will be provided for buses, cyclists and pedestrians. Underground works will be required to provide additional ducts for traffic signal electrical and telecommunication cables, as described in Section 5.5.3.6, with associated chambers and control boxes above ground. Additional traffic monitoring equipment will be provided, including CCTV cameras and other detectors.

5.5.3.9 Ancillary Road Furnishings

Street furniture such as rubbish bins, signage, lighting, benches, planters, bollards, cycle racks and bus stops (including shelters and information displays etc.) will be installed.

5.5.3.10 Landscaping

Where vegetation, grassed areas and hedgerows are disturbed during the works, these will be reinstated, and replaced, where practicable. New trees will be planted in suitable tree pits where necessary, at various locations as shown in the Landscaping General Arrangement Drawings (BCIDD-ROT-ENV_LA-0016_ML_00-DR-LL-9001) in Volume 3 of this EIAR.

5.5.4 Structural Works

5.5.4.1 Principal Structures

The principal structural works which form part of the Proposed Scheme are summarised in Table 5.3. Further details are provided in Section 5.5.4.1.1 to Section 5.5.4.1.5. Further information on the structures along the Proposed Scheme is provided in the Structures Drawings (BCIDD-ROT-STR_ZZ-0016_XX_00-DR-SS-9001) in Volume 3 of this EIAR.

Table 5.3: Principal Structures

Structure Name	Structure Reference	Section Reference
New and Relocated Bridges at George's Dock	01	Section 1a
Custom House Quay Boardwalk (at DCC Docklands Offices)	02	Section 1a
Boardwalk at North Wall Quay	03	Section 1a

Structure Name	Structure Reference	Section Reference
New and Relocated Bridges at the Royal Canal	04	Section 1c
Dodder Public Transport Opening Bridge (DPTOB)	05	Section 2

An Underwater Archaeological Impact Assessment (UAIA) was undertaken at Custom House Quay and North Wall Quay – refer to Appendix A15.6 (UAIA BusConnects Dublin – BusConnects Project Proposed Boardwalks Custom House Quay and North Wall Quay, River Liffey (ADCO 2021)) in Volume 4 of this EIAR. The UAIA included a comprehensive underwater assessment, including a record of the riverbed topography and a detailed account of the riverine environment, a systematic inspection of the quay walls, campshires, and any associated quayside features present, and a detailed laser scan of the upper parts of the quay wall (Figure 9 to 12 of Appendix A15.6 in Volume 4 of this EIAR).

Any fixtures and fittings along the quay walls and campshires that need to be removed and reinstated as part of the Proposed Scheme works will be stored in a secure location and reinstated as appropriate by the appointed contractor having regard to the UAIA records. Archaeological monitoring will take place during the preparatory works to the quay walls and when any interventions are planned. This will allow an assessment and full recording of any internal fabric of the quay structures, should they be exposed during the course of the proposed works.

Refer to Chapter 15 (Archaeology & Cultural Heritage) and Chapter 16 (Architectural Heritage) of this EIAR for specific mitigation measures which will be implemented.

5.5.4.1.1 New and Relocated Bridges at George’s Dock (Structure Reference: 01)

The carriageway along the Custom House Quay, traversing the mouth of George’s Dock, will be widened to facilitate the proposed carriageway cross section (see Chapter 4 (Proposed Scheme Description) for details of the proposed carriageway cross section). A new bridge will be constructed to carry vehicular traffic, pedestrians and cyclists. The existing pedestrian bridges will be deconstructed prior to the construction of the new bridge, while the Scherzer Bridges will also be deconstructed and relocated to either side of the new bridge. The northern Scherzer Bridge will be restored so that it has the ability to be opened occasionally. The construction methodology broadly comprises the following activities (as described in Section 5.5.4.1.1.1 to Section 5.5.4.1.1.5):

- Pre-Construction;
- Deconstruction of the Existing Scherzer Bridges;
- Construction (of the Replacement Bridge);
- Relocation and Reconstruction (of the Restored Scherzer Bridges); and
- Finishing Works.

As noted in Chapter 3 (Consideration of Reasonable Alternatives) of this EIAR, a number of construction phasing options were considered and the option that has been adopted is that which best balanced criteria such as constructability, traffic impact and environmental considerations.

A programme for the works associated with the proposed new and relocated bridges is provided in Table 5.4. The programme describes how the above activities could be sequenced to maintain some traffic flow throughout the construction programme.

Table 5.4: Scherzer Bridge Replacement Programme

Construction Activity	Year 1												Year 2											
	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
	Traffic Management: traffic through southern Scherzer Bridge, one lane of traffic in each direction, controlled by a stop / go system of temporary traffic lights										Traffic Management: Traffic across northern half of new bridge, one lane of traffic in each direction, controlled by a stop / go system of temporary traffic lights								Traffic Management: Traffic across new bridge, one lane of traffic in each direction					
Pre-Construction (and site preparation, inc. installation of traffic management to divert traffic onto southern Scherzer Bridge, and divert westbound traffic onto Sheriff Street Upper)	█																							
Deconstruction – northern Scherzer Bridge (including service diversions)	█	█	█	█																				
Reconstruction – Workshop Repairs northern Scherzer Bridge					█	█	█	█	█															
Construction – northern half of new replacement bridge					█	█	█	█	█															
Traffic Management – traffic diversion onto northern half of replacement bridge										█														
Deconstruction – southern Scherzer Bridge (including service diversions)										█	█	█												
Reconstruction – Workshop Repairs southern Scherzer Bridge														█	█	█	█	█	█					
Construction – southern half of new replacement bridge														█	█	█	█	█	█					
Traffic Management - Two lanes of traffic operating across new bridge																				█				
Construction – foundations for relocated northern Scherzer Bridge								█	█	█														
Relocation and Reconstruction – northern Scherzer Bridge											█	█	█	█	█									
Construction – foundations for relocated southern Scherzer Bridge																█	█	█						
Relocation and Reconstruction – southern Scherzer Bridge																				█	█	█	█	█
Finishing Works																							█	█

5.5.4.1.1.1 Pre-Construction

A full and complete photographic and detailed industrial heritage record will be undertaken of the Scherzer Bridges, and any affected kerbs, winches, and historic masonry. Refer to Chapter 15 (Archaeology & Cultural Heritage) and Chapter 16 (Architectural Heritage) of this EIAR for the specific measures which will be implemented. Traffic management measures, as described in section 5.8.4.1.1, will be installed prior to deconstruction / construction works commencing.

5.5.4.1.1.2 Deconstruction of the Existing Scherzer Bridges

Ancillary elements associated with the Scherzer Bridges, such as railings, gateposts, kerbs will be dismantled and stored securely at an agreed location for repair and subsequent reinstatement / reconstruction in their specified new position(s), as appropriate. Services will be diverted, and measures will be implemented to avoid accidental discharges entering the River Liffey, including the use of silt screens and / or temporary coffer-damming of the entry channel.

The pedestrian boardwalk structure at the mouth of the George's Dock, north of the Scherzer Bridges, will be dismantled and removed. Temporary bridges will be provided to maintain pedestrian connectivity during construction, as required.

Under archaeological supervision, groundworks will be undertaken for the relocation of the Scherzer Bridges, including the construction of new foundations for the relocated bridges, including pile caps and ground beams, as required. The programme will accommodate any unexpected archaeological find and the full recording and where necessary the full excavation of that find.

The above ground elements of the Scherzer Bridges will be decommissioned and carefully dismantled and / or moved for repair and restoration. This will principally include the rolling bridge structures together with the pairs of supporting racks, including the careful excavation of the underground portion of the supporting stanchions.

Deep foundation elements of the Scherzer Bridges, including track beams and cross bracings, concrete beams and timber piles, will remain in-situ and will be documented and recorded where exposed. Missing sections of the quay wall and cappings that were removed during the original installation of the Scherzer Bridges will be replaced with suitable / similar material to reinstate the quay walls.

5.5.4.1.1.3 Construction (of the Replacement Bridge)

The new bridge will be a single span, fully integral portal bridge, approximately 17.5m in length, and 15.7m in width. The new bridge will consist of 13 precast prestressed concrete beams, and a cast in-situ reinforced concrete slab. The proposed beams will be approximately 0.7m in depth, and the slab will be approximately 0.2m in depth, therefore the total depth of the deck will be approximately 0.9m.

The new bridge will be supported on piled foundations. The bridge foundation will consist of seven reinforced concrete piles approximately 0.5m in diameter per abutment; a reinforced concrete pile cap at the top of the piles (for load transfer from the bridge deck to the piles), and a ballast wall to retain the ground. The piles will be approximately 11.5m in length. The integral connection between the deck and the substructure will be made at the pile cap during construction. Due to the bridge being integral, expansion joints are not needed. The piled foundation will be located at the back of the existing quay walls.

Following the deconstruction of the first Scherzer Bridge (as described in Section 5.5.4.1.1.2), the foundations (i.e. piles and pile caps) will be installed, under archaeological supervision, to carry the first half of the new concrete bridge structure on each side of the entry channel.

Once the pile caps are installed and set on each side, the superstructure (i.e. precast beams, poured deck slab, parapets and finishes) will be installed. Beams will be installed for the first half of the concrete deck of the new bridge. Formwork will be installed, and half of the new deck will be poured. A temporary parapet will be installed. Once the concrete has cured, surfaces and finishes (temporary or permanent) will be installed to allow traffic to use the new concrete bridge. At this point, a single lane of traffic in each direction, operating under signal control,

will be switched onto the new concrete bridge, as described in Section 5.8.4.1.1.1. The process will be repeated for the second concrete bridge, with a temporary edge treatment on both bridges. Once both halves of the new bridge have been completed, the two halves will be stitched together, combining to form the new bridge. At this point, two lanes of traffic will operate across the new bridge.

Construction works will also include piled foundations for the relocated Scherzer Bridges. Under archaeological supervision, groundworks will be undertaken for the relocation of the Scherzer Bridges, including the construction of new foundations for the relocated bridges, including pile caps and ground beams, as required. The programme will accommodate any unexpected archaeological find and the full recording and where necessary the full excavation of that find.

5.5.4.1.1.4 Relocation and Reconstruction (of the Restored Scherzer Bridges)

The Scherzer Bridges, having undergone careful dismantling and restoration, will be reconstructed and reassembled at their new locations.

The opening mechanisms are not functional and various elements are missing or broken. Replacement parts will be procured, so as to refurbish the bridges, and to include the full motor mechanism at the northern Scherzer Bridge. The opening mechanisms of the northern Scherzer Bridge will be restored, so that the bridge is capable of being opened occasionally. Associated restoration works will include reinstatement of the ancillary railings, gateposts, and stone wall.

5.5.4.1.1.5 Finishing Works

New high-quality pavement will be established, to tie in the new structures with the adjoining carriageway, campshires, quays and open spaces.

5.5.4.1.2 Custom House Quay Boardwalk (at DCC Docklands Offices) (Structure Reference: 02)

Along Custom House Quay, adjacent to the former DCC Docklands offices, east of Sean O'Casey Bridge, the cross section between buildings is too narrow to comfortably accommodate the required carriageway configuration (see Chapter 4 (Proposed Scheme Description) for details of the proposed carriageway cross section), and therefore a new pedestrian boardwalk is proposed over the River Liffey. DCC has secured planning permission to redevelop the former DCC Docklands offices, and the proposed pedestrian boardwalk will be constructed in tandem with the development of these offices by DCC. The construction methodology broadly comprises the following activities (as described in Section 5.5.4.1.2.1 to Section 5.5.4.1.2.3):

- Pre-Construction;
- Construction; and
- Finishing Works.

5.5.4.1.2.1 Pre-Construction

Site hoarding will be erected around the works area, and landside environmental protection measures will be installed, including any noise or dust suppression systems. Site clearance works will be completed, and railings etc. will be removed. Associated riverside environmental protection measures will be installed, including silt screens etc. Barges will be anchored adjacent to the quay wall to facilitate construction activities. Preparatory works will also be carried out on the quay walls, including repairing any damaged elements.

A short section of the existing pontoon located to the south-east of the former DCC Docklands offices may need to be temporarily relocated, to facilitate the boardwalk construction. This will be implemented in consultation with DCC, along with any temporary diversions that may be required to maintain access to the Jeanie Johnston docked at Custom House Quay.

5.5.4.1.2.2 Construction

The new pedestrian boardwalk will be cantilevered from the DCC Docklands offices, while also resting on the existing quay wall. The pedestrian boardwalk will facilitate pedestrians only, in turn allowing for a two-way cycle route (and narrow footpath) to be provided along the carriageway. The pedestrian boardwalk will be approximately 111m in length, and 4.2m in width, measured from the edge of the existing quay wall. The primary support for the structure will be from the proposed building itself, with an ancillary longitudinal support sitting atop the capping stones of the quay walls. It is not possible to cantilever the structure at the eastern end, therefore this area will be free-standing, supported by three hollow piles inserted into the riverbed.

Following the pre-construction works, three hollow steel piles will be installed to carry the eastern freestanding part of the structure. These will be driven from a landside or barge mounted vibratory piling machine depending on the appointed contractor's equipment availability and / or preference. Coring through the quay walls will also be carried out, to facilitate the installation of ground anchors. Holes will be drilled from the surface to allow for the injection of grout, and grout monitoring equipment will be installed. Ground anchors will be installed from the barge side through the core holes in the quay wall. Grout will be installed from the landside, with appropriate seals at the riverside, to prevent overtopping of surplus grout towards the riverside. Fixings for the diagonal bracing will be installed in the quay wall. This will require drilling and steelwork to fix the brackets in place. This will be done from the barge in suitable tide conditions.

The substructure will be installed for the landside support. Once the above has been completed, the steel structure can be assembled in situ from the barge side. When the steel structure has been assembled, the deck can be installed, over-spanning the capping stones to meet the landside support.

5.5.4.1.2.3 Finishing Works

Fixtures and finishes, including parapets, lighting, and ancillary landscaping will be installed to tie in the pedestrian boardwalk with the adjoining campshires, and quays. Finally, the barge(s) will be decommissioned and removed.

5.5.4.1.3 Boardwalk at North Wall Quay (Structure Reference: 03)

Along North Wall Quay, at the junction of Excise Walk, the available cross section between buildings is too narrow to facilitate the required carriageway configuration (see Chapter 4 (Proposed Scheme Description) for details of the proposed carriageway cross section). A new pedestrian boardwalk is proposed adjacent to the commercial units / restaurants over the River Liffey. The construction methodology broadly comprises the following activities (as described in Section 5.5.4.1.3.1 to Section 5.5.4.1.3.3):

- Pre-Construction;
- Construction; and
- Finishing Works.

5.5.4.1.3.1 Pre-Construction

Site hoarding will be erected around the works area, and landside environmental protection measures will be installed, including any noise or dust suppression systems. Site clearance works will be completed, and railings etc. will be removed. Associated riverside environmental protection measures will be installed, including silt screens etc. Barge(s) will be anchored adjacent to the quay wall to facilitate construction activities. Preparatory works will also be carried out on the quay walls, including repairing any damaged elements.

5.5.4.1.3.2 Construction

The new pedestrian boardwalk will be cantilevered from the existing quay wall, supported by a compression steel beam anchored to the front face of the existing quay wall, with a reinforced concrete back-span counterweight block with tension micropiles at the back of the quay wall. The pedestrian boardwalk will facilitate a widened pedestrian route along the riverside. The pedestrian boardwalk will be approximately 58.3m in length, and 3.2m in width, measured from the edge of the existing quay wall. The surface materials of the pedestrian boardwalk will continue across the capping stones of the quay walls to create a continuous wide walking area.

Following the pre-construction works, coring through the quay walls will be carried out, to facilitate the installation of ground anchors. Holes will be drilled from the surface to allow for the injection of grout, and grout monitoring equipment will be installed. Ground anchors will be installed from the barge side through the core holes in the quay wall. Grout will be installed from the landside, with appropriate seals at the riverside, to prevent overtopping of surplus grout towards the riverside. Fixings for the diagonal bracing will be installed in the quay wall. This will require drilling and steelwork to fix the brackets in place. This will be done from the barge in suitable tide conditions.

Once the above has been completed, the steel structure can be assembled in situ from a combination of the landside and the barge side. When the steel structure has been assembled, the deck can be installed.

5.5.4.1.3.3 Finishing Works

Fixtures and finishes, including parapets, lighting, and ancillary landscaping will be installed to tie in the boardwalk with the adjoining campshires, and quays. Finally, the barge(s) will be decommissioned and removed.

5.5.4.1.4 New and Relocated Bridges at the Royal Canal (Structure Reference: 04)

The carriageway along the North Wall Quay, traversing the mouth of the Royal Canal, will be widened to facilitate the proposed carriageway cross section (see Chapter 4 (Proposed Scheme Description) for details of the proposed carriageway cross section). A new bridge will be constructed, to carry vehicular traffic, pedestrians and cyclists. The existing pedestrian and cycle bridges will be deconstructed prior to the construction of the new bridge, while the Scherzer Bridges will also be deconstructed and relocated to either side of the new bridge and restored for occasional opening. The construction methodology broadly comprises the following activities (as described in Section 5.5.4.1.4.1 to Section 5.5.4.1.4.5):

- Pre-Construction;
- Deconstruction of the Existing Scherzer Bridges;
- Construction (of the Replacement Bridge);
- Relocation and Reconstruction (of the Restored Scherzer Bridges); and
- Finishing Works.

As the construction methodology and programme for these structures is the same as that for the structures at George's Dock (Structure Reference: 01), the programme for the works is as provided in Table 5.2 for the structures at George's Dock. The options assessed for George's Dock structures phasing are also applicable to the Royal Canal structures. The programme describes how the above activities could be sequenced to maintain some traffic flow throughout the programme.

5.5.4.1.4.1 Pre-Construction

A full and complete photographic and detailed industrial heritage record will be undertaken of the Scherzer Bridges, and any affected kerbs, winches, and historic masonry. Refer to Chapter 15 (Archaeology & Cultural Heritage) and Chapter 16 (Architectural Heritage) of this EIAR for the specific measures which will be implemented.

5.5.4.1.4.2 Deconstruction of the Existing Scherzer Bridges

Ancillary elements associated with the Scherzer Bridges, such as railings, gateposts, kerbs, and the stone wall will be dismantled and stored securely at an agreed location for repair and subsequent reinstatement / reconstruction in their specified new position(s), as appropriate. Services will be diverted, and measures will be implemented to avoid accidental discharges entering the River Liffey, including the use of silt screens and / or temporary coffer-damming of the entry channel.

The pedestrian and cycle bridges at the mouth of the Royal Canal will be lifted and stored securely at an agreed location for reuse elsewhere. Temporary bridges will be provided to maintain pedestrian connectivity during construction, as required.

Under archaeological supervision, groundworks will be undertaken for the relocation of the Scherzer Bridges, including the construction of new foundations for the relocated bridges, including pile caps and ground beams, as required. It is proposed to lift the soffit levels of all structures at this location by c. 1m in order to provide climate change resilience and maintain the existing level of canal accessibility for the foreseeable future. The programme will accommodate any unexpected archaeological find and the full recording and where necessary the full excavation of that find.

The pair of canal winch housings at the Royal Canal will be modified to reduce their overall height to avoid conflict with the relocated inner Scherzer Bridge.

The above ground elements of the Scherzer Bridges will be decommissioned and carefully dismantled and / or moved for repair and restoration. This will principally include the rolling bridge structures together with the pairs of supporting racks, including the careful excavation of the underground portion of the supporting stanchions. The remaining above ground elements will be carefully dismantled and / or moved to an agreed secure location for repair and restoration.

Deep foundation elements of the Scherzer Bridges, including track beams and cross bracings, concrete beams and timber piles, will remain in-situ and will be documented and recorded where exposed. Missing sections of the quay wall and cappings that were removed during the original installation of the Scherzer Bridges will be replaced with suitable / similar material to reinstate the quay walls.

5.5.4.1.4.3 Construction (of the Replacement Bridge)

The new bridge will be a single span, fully integral portal bridge, approximately 13.5m in length, and 14.2m in width. The new bridge will consist of 12 precast prestressed concrete beams, and a cast in-situ reinforced concrete slab. The proposed beams will be approximately 0.5m in depth, and the slab will be approximately 0.2m in depth, therefore the total depth of the deck will be approximately 0.7m.

The new bridge will be supported on piled foundations. The bridge foundation will consist of six reinforced concrete piles approximately 0.5m in diameter per abutment; a reinforced concrete pile cap at the top of the piles (for load transfer from the bridge deck to the piles), and a ballast wall to retain the ground. The piles will be approximately 16.5m in length. The integral connection between the deck and the substructure will be made at the pile cap during construction. Due to the bridge being integral, expansion joints are not needed. The piled foundation will be located at the back of the existing quay walls.

Following the deconstruction of the first Scherzer Bridge (as described in Section 5.5.4.1.4.2), the foundations (i.e. piles and pile caps) will be installed, under archaeological supervision, to carry the first half of the new concrete bridge structure on each side of the entry channel.

Formwork will be installed, and half of the new deck will be poured. A temporary parapet will be installed. Once the concrete has cured, surfaces and finishes (temporary or permanent) will be installed to allow traffic to use the new concrete bridge. At this point, a single lane of traffic in each direction, operating under signal control, will be switched onto the new concrete bridge, as described in Section 5.8.4.1.3.1. The process will be repeated for the second concrete bridge, with a temporary edge treatment on both bridges. Once both halves of the new bridge have been completed, the two halves will be stitched together, combining to form the new bridge. At this point, two lanes of traffic will operate across the new bridge. Construction works will also include piled foundations for the relocated Scherzer Bridges. Under archaeological supervision, groundworks will be undertaken for the relocation of the Scherzer Bridges, including the construction of new foundations for the relocated bridges, including pile caps and ground beams, as required. The programme will accommodate any unexpected archaeological find and the full recording and where necessary the full excavation of that find.

5.5.4.1.4.4 Relocation and Reconstruction (of the Restored Scherzer Bridges)

The Scherzer Bridges, having undergone careful dismantling and restoration, will be reconstructed and reassembled at their new locations, with the control gantry remaining as part of the outer bridge, while there is the potential to re-build the original control room as part of the restoration.

The opening mechanisms are largely intact, and will be reinstated, so that the bridges are capable of being opened occasionally. Associated restoration works will include reinstatement of the ancillary railings, gateposts, and stone wall.

5.5.4.1.4.5 Finishing Works

New high-quality pavement will be established, to tie in the new structures with the adjoining carriageway, campshires, quays and open spaces.

5.5.4.1.5 Dodder Public Transport Opening Bridge (DPTOB) (Structure Reference: 05)

The most significant structure proposed as part of the Proposed Scheme will be the DPTOB, which is to be constructed across the confluence of the River Dodder and the River Liffey. This multi-span structure will include an opening span to maintain navigation into the Grand Canal Basin via the River Dodder. The DPTOB also requires land reclamation and construction of a new quay wall to facilitate its eastern abutment as well as the relocation of SPRC at Thorncastle Street / York Road. The DPTOB construction methodology broadly comprises the following activities:

- Sir John Rogerson's Quay Works;
- East of River Dodder Works;
- River Dodder Works: Bridge Piers;
- River Dodder Works: Deck Construction; and
- Bridge Finishing Works.

These activities are described in the Section 5.5.4.1.5.2 to Section 5.5.4.1.5.6, along with details of the proposed piling methods in Section 5.5.4.1.5.1.

5.5.4.1.5.1 Piling Methods

Because of the presence of a GNI gas main traversing the location of the proposed DPTOB, piling methodology has been identified to reflect the presence of this sensitive utility. In general, there will be two types of piling. It is anticipated that bored piling will be required to facilitate the construction of the abutments, bridge piers, and the area of reclaimed land, whilst sheet piling, installed using a vibratory hammer, will be used to retain the perimeter of the area of land reclamation. These techniques have been adopted as they cause minimal ground disturbance as well as vibration and noise during installation. Minimal ground disturbance is markedly important where piling, in the vicinity of the GNI gas main. All piles and sheet piles will be installed down to a level of approximately -16m to -18m OD.

Piles to the bridge will be in-situ reinforced concrete piles, bored, 800mm (millimetres) in diameter and socketed into bedrock. Piles for the reclaimed land will be bored, cast-in place, and socketed into bedrock. The installation technique will include a temporary steel casing which will be necessary to provide stability of the bore during drilling, given the presence of groundwater within the superficial deposits.

The reclaimed land edges will be retained by permanent embedded sheet pile retaining walls. The sheet pile toes will be at bedrock level. Visible areas of sheet piles will be clad with stone of similar appearance to the Liffey Quay Walls.

Piling activities will occur over a three-month period for the new quay wall construction. Piling activity for the bridge piers will occur over a two-to-three-month period. Intermittent piling activities for the infill section behind the quay wall will also occur.

5.5.4.1.5.2 Sir John Rogerson's Quay Works

Works for the DPTOB will commence with the set-up of a Construction Compound (R3b) at Sir John Rogerson's Quay / Britain Quay to facilitate the bridge's west substructure and approach construction. Traffic management measures, as set out in Section 5.8.4 will be implemented to facilitate construction traffic. Utility diversions will be completed as necessary. The existing pavement behind the western quay wall will be broken out and the ground excavated to facilitate bridge substructure construction. Bored piling will then be carried out behind the quay wall,

with the pilecap and abutment wall being constructed. From this, the western approach to the bridge will be constructed.

5.5.4.1.5.3 East of River Dodder Works

Works on the eastern side of the River Dodder comprises initially of the set-up of a Construction Compound (R4) at Thorncastle Street / York Road to facilitate works. Traffic management measures, as set out in Section 5.8.4 will be installed to facilitate construction traffic. Once the new jetty and associated ramps for SPRC have been constructed, the existing jetty and associated ramps will be demolished so that permanent and temporary sheet pile walls can be constructed. Approximately 3950m² (metres squared) of land will be reclaimed from the River Liffey at the north end of the site. Excavation for the bridge's east abutment construction will be completed. Bored piling will be carried out, with the pile cap and abutment wall being constructed also. Construction of a new SPRC building, bridge control building, access road between SPRC and Thorncastle Street, and slipway will all be completed. The bridge's approach embankments will be constructed, and the new jetty constructed in its final position. The existing old SPRC will then be demolished. Demolition of the existing SPRC premises will not be undertaken until the new accommodation is completed, or alternative interim accommodation is agreed with and provided for the SPRC. Refer to Chapter 12 (Biodiversity) for a description of the bat mitigation measures to be adopted prior to demolition of the SPRC, the structures will then be demolished by conventional means and the demolished materials removed from site by truck. Appropriate precautions will be taken to avoid excessive dust generation or any discharges to the River Liffey.

5.5.4.1.5.4 River Dodder Works: Bridge Piers

The bridge piers will be constructed in the following sequence. Construction of temporary works will be completed, comprising braced sheet pile cofferdams installed from jack-up barge or temporary access bridge to facilitate construction of the two piers. The pier steel-cased reinforced concrete bored piles will then be installed within the confines of the cofferdams. Dewatering of cofferdams and excavation to the underside of pier pilecaps will be completed. Temporary working platforms will be constructed to allow pilecap construction, while steel casings and concrete piles will be cut down to the underside of each pilecap level. Pilecaps and pier walls will be constructed in situ.

5.5.4.1.5.5 River Dodder Works – Deck Construction

Deck Construction as part of the DPTOB will be constructed in the following sequence. Using a crane located on a jack-up barge or temporary access bridge, each deck section will be lifted onto supporting jacking points located on the permanent piers. It is anticipated that storage and assembly of the structural elements will be undertaken in the lands north of the existing SPRC. The deck site splice (butt welded) connection for the fixed bridge span will be completed. Permanent bearings will be installed. The lifting electro-hydraulic machinery and control mechanism for the opening bridge will be installed, tested and commissioned. Vehicular safety barriers will be installed.

5.5.4.1.5.6 Bridge Finishing Works

The bridge finishing works will include local painting at connections, installation of handrail lighting and feature lighting, deck plate installation combined with waterproofing and surfacing, and abutment end movement joint completion. The campshires will be reinstated with suitable cobble – refer to the Landscaping General Arrangement Drawings (BCIDD-ROT-ENV_LA-0016_ML_00-DR-LL-9001) in Volume 3 of this EIAR for further information. The approach roads and junction tie in points and landscaping will be completed. Finally, the temporary works cofferdams will be removed.

5.5.4.2 **Miscellaneous Structures**

5.5.4.2.1 Retaining Wall (Structure Reference: MRW1)

Retaining walls with a retained height less than 1.5m are classed as minor structures. There is one minor retaining wall along the Proposed Scheme, as detailed in Table 5.5.

Table 5.5: (Minor) Retaining Walls along the Proposed Scheme

Structure Reference	Chainage (m)	Length (m)	Max Retained Height (m)	Section Reference
MRW1	B10675 to B10695	20	1.0	Section 1d

A minor retaining wall (MRW1) will be provided to facilitate the cyclist right turn, and enhanced pedestrian crossing arrangement onto the Samuel Beckett Bridge, from Sir John Rogerson's Quay.

Construction will commence by firstly isolating the site of the retaining wall using fencing, as appropriate. The existing ground will then be stripped to formation level. Existing services will be diverted as required to enable wall construction. A side slope will be battered back to enable construction. Blinding will be installed at formation level. The retaining wall will most likely be constructed of blockwork on a concrete foundation.

5.5.5 Construction Site Decommissioning

On completion of construction, all construction facilities and equipment such as plant, materials, temporary signage, laydown areas, and the Construction Compounds, etc. will be removed. All areas which were occupied by the Construction Compounds will be reinstated, please refer to the Landscaping General Arrangement Drawings (BCIDD-ROT-ENV_LA-0016_ML_00-DR-LL-9001) in Volume 3 of this EIAR.

5.6 Construction Plant and Equipment

In order to assess a reasonable worst case Construction Phase impact scenario, with regards to air quality and noise and vibration, an estimate of the construction plant and equipment that will be necessary to construct the Proposed Scheme has been prepared. The estimated peak daily numbers of principal items of plant and equipment working within a section is indicated in Table 5.6. It should be noted that these are peak daily numbers.

The appointed contractor will select and utilise plant and equipment in a manner that ensures Construction Noise Thresholds, as defined in Chapter 9 (Noise & Vibration) of this EIAR, are not exceeded. Refer to Chapter 7 (Air Quality) and Chapter 9 (Noise & Vibration) of this EIAR for the Construction Phase air quality and noise and vibration assessments, and associated mitigation measures.

Table 5.6: Estimated Peak Daily Plant and Equipment Numbers

Plant / Equipment Type	Section					
	1a	1b	1c	1d	2	3
Lorry (including Concrete Truck)	4	8	5	6	21	17
Backhoe Mounted Hydraulic Breaker	4	5	6	5	2	1
8t (tonne) Excavator	1	2	1	1	1	2
13t (Rubber Wheeled) Excavator	4	5	6	5	1	4
16t (Rubber Wheeled) Excavator	4	5	6	5	1	-
6t Dumper	1	2	1	1	3	2
Road Planer	4	5	6	5	1	1
Road Sweeper	1	2	1	1	2	2
Asphalt Paver	2	2	2	2	2	1
Asphalt Roller	2	2	2	2	2	2
Crawler Crane	1	-	1	-	2	-
Mobile Crane	-	-	-	-	1	-
Piling Rig	1	-	1	-	3	-
Pile Driver	1	-	-	-	-	-
Breaker mounted on Excavator	-	-	-	-	3	-
360 Excavator	-	-	-	-	4	-
Concrete Compactor	-	-	-	-	1	-
Tracked Crusher	-	-	-	-	1	-

Plant / Equipment	Section					
Dozer	-	-	-	-	1	-
Vibratory Roller	-	-	-	-	2	-
Generator	-	-	-	-	4	-

5.7 Construction Compounds

In order to construct the Proposed Scheme, the appointed contractor will require Construction Compounds from which they can manage the delivery of the Proposed Scheme.

5.7.1 Construction Compound Locations

The location of the Construction Compounds in relation to the Proposed Scheme are shown in Figure 5.1 in Volume 3 of this EIAR. The Construction Compound locations have been selected due to the amount of available space, their relative locations near to the majority of the Proposed Scheme major works and access to the National and Regional Road network. Refer to Chapter 6 (Traffic & Transport) of this EIAR for an assessment of the construction traffic.

Construction Compound R1 will be located along Custom House Quay, at George's Dock, north of the existing Scherzer Bridges, either side of the George's Dock culvert, and across the culvert. During construction, the existing Scherzer Bridges will be removed, a new bridge constructed in their place, and the Scherzer Bridges brought back and reintroduced either side of the new bridge (Refer to Section 5.5.4.1.1 for more details). There will be two layouts required for Construction Compound R1, before and after the removal of the Scherzer Bridges, as shown in Image 5.1 and Image 5.2 respectively. The area of Construction Compound R1 before and after the relocation of the Scherzer Bridges will be approximately 860m² and 770m².

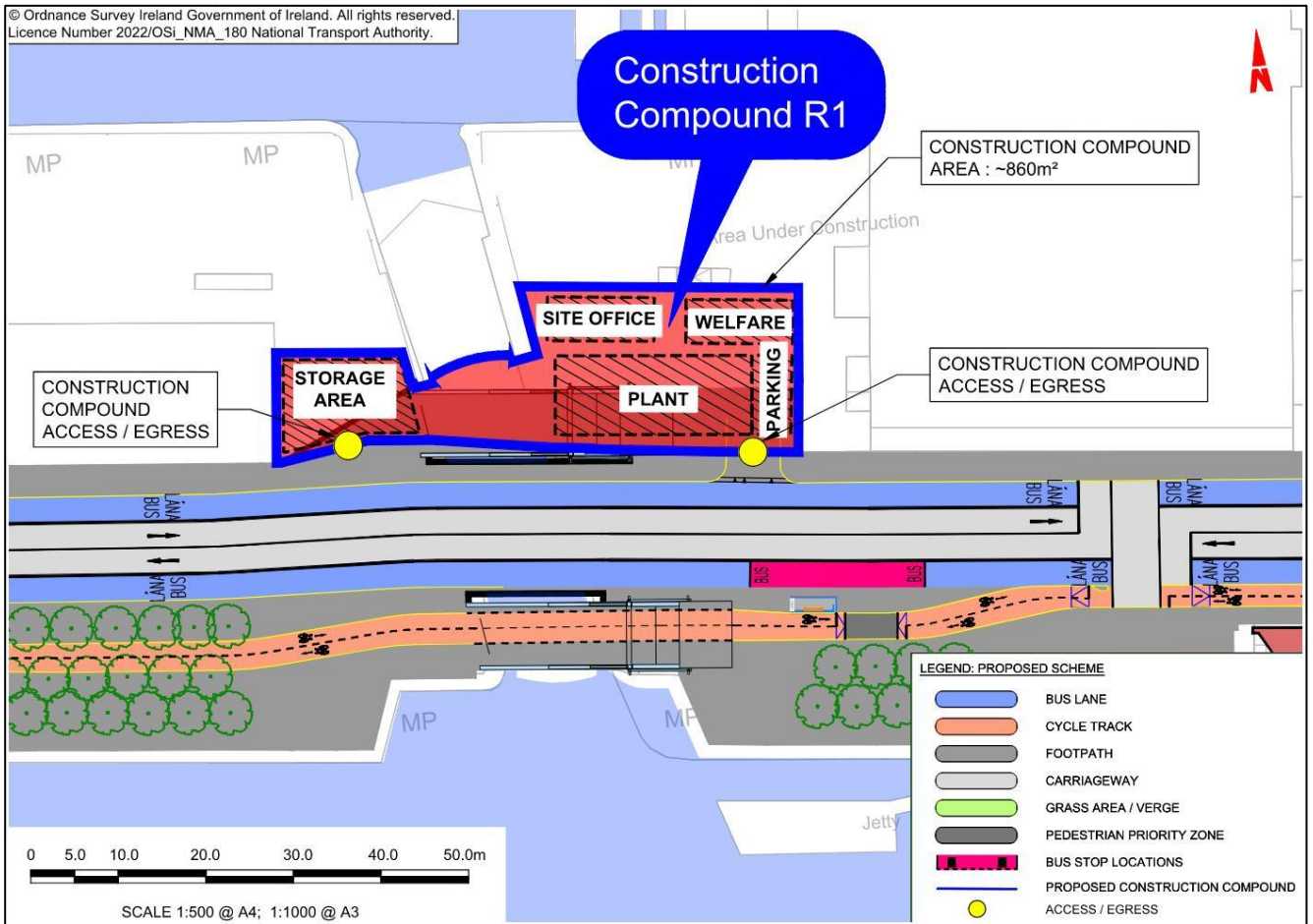


Image 5.1: Location and Extent of Construction Compound R1

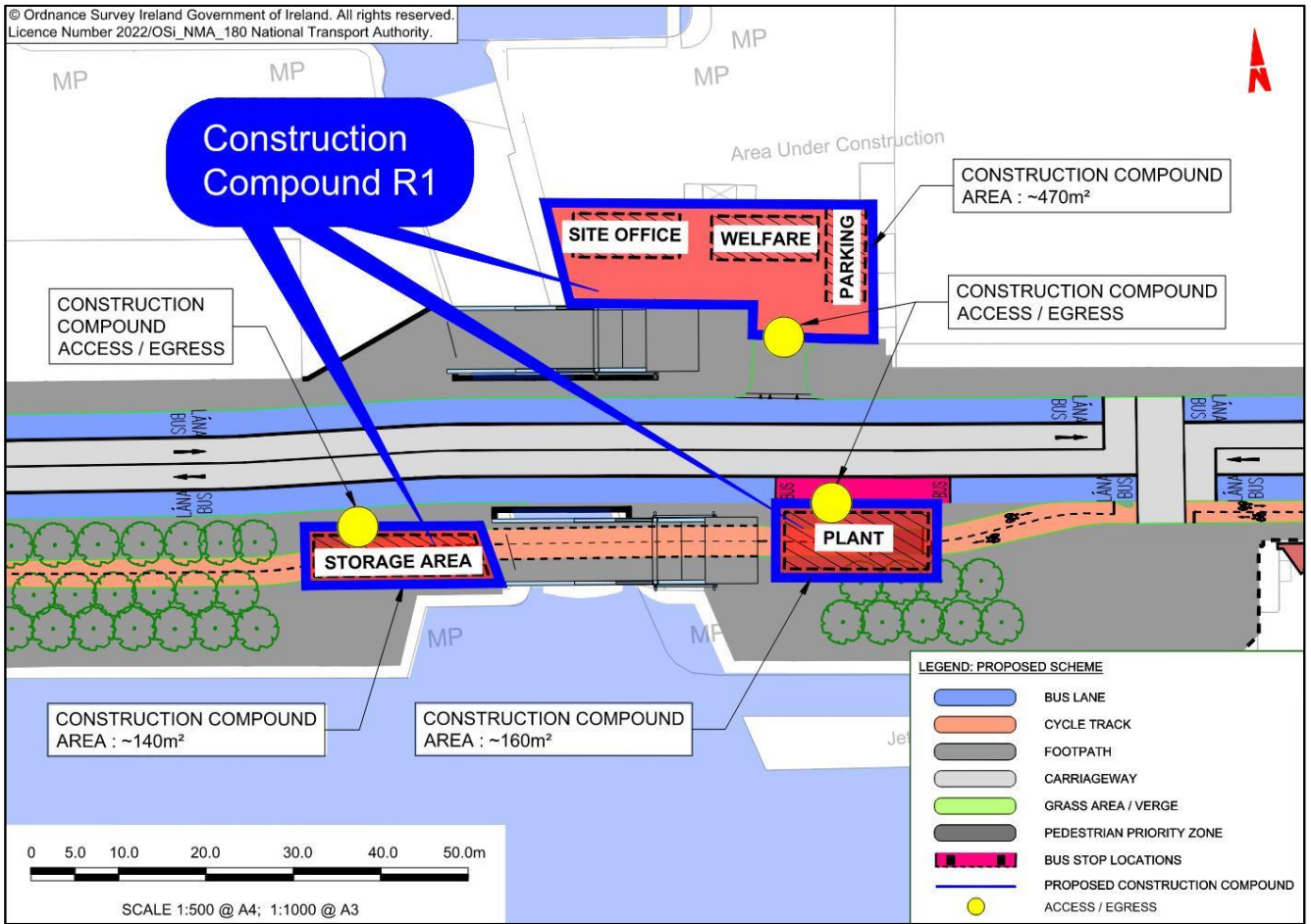


Image 5.2: Location and Extent of Construction Compound R1 After Relocation of Scherzer Bridges

Construction Compound R2 will be located along North Wall Quay, at Spencer Dock, north of the existing Scherzer Bridges, either side of the Royal Canal. During construction, the existing Scherzer Bridges will be removed, a new bridge constructed in their place, and the Scherzer Bridges brought back and reintroduced either side of the new bridge (Refer to Section 5.5.4.1.1 for more details). There will be two layouts required for Construction Compound R2, before and after the removal of the Scherzer Bridges, as shown in Image 5.3 and Image 5.4 respectively. The area of Construction Compound R2 before and after the relocation of the Scherzer Bridges will be approximately 400m² and 360m².

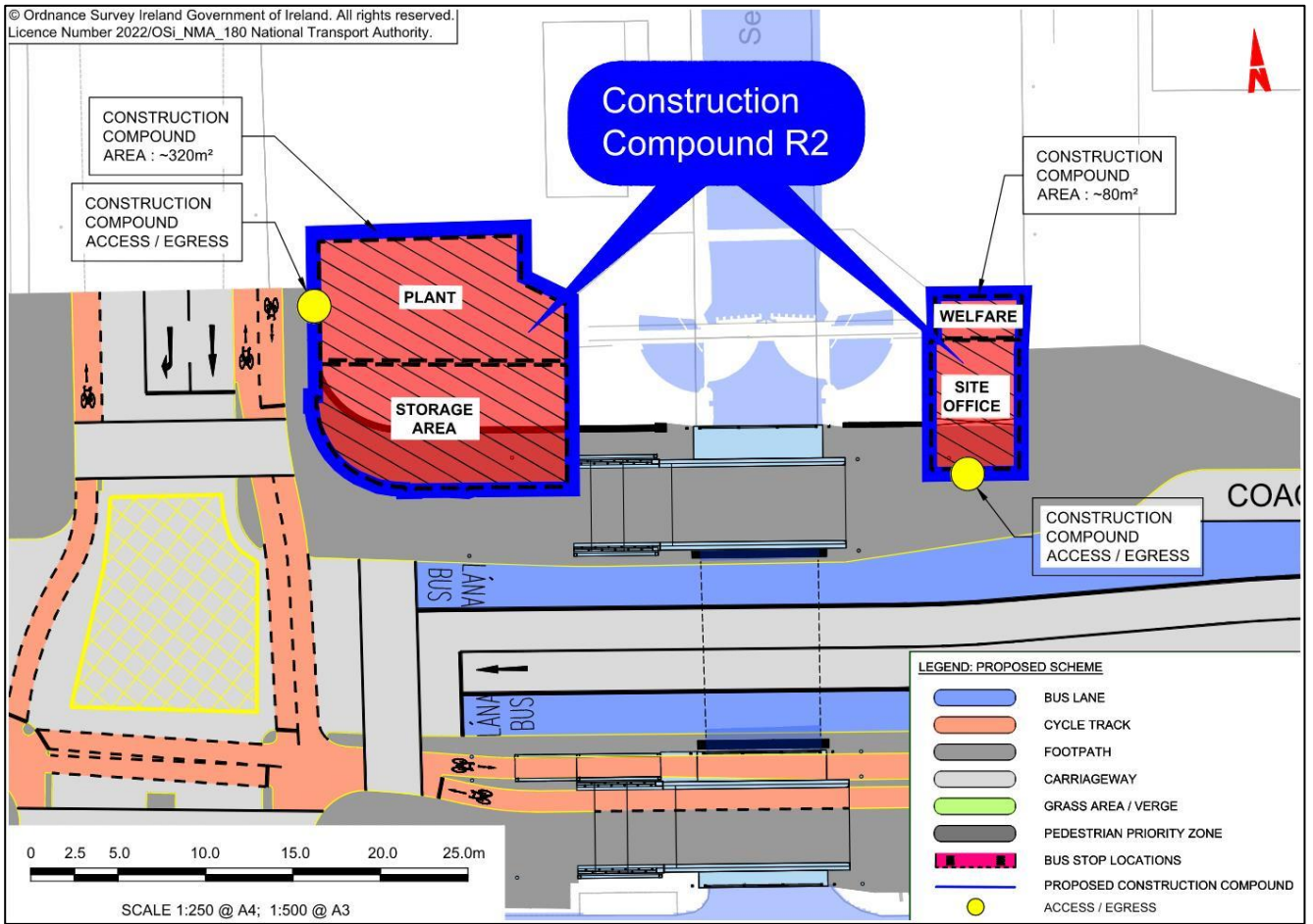


Image 5.3 Location and Extent of Construction Compound R2

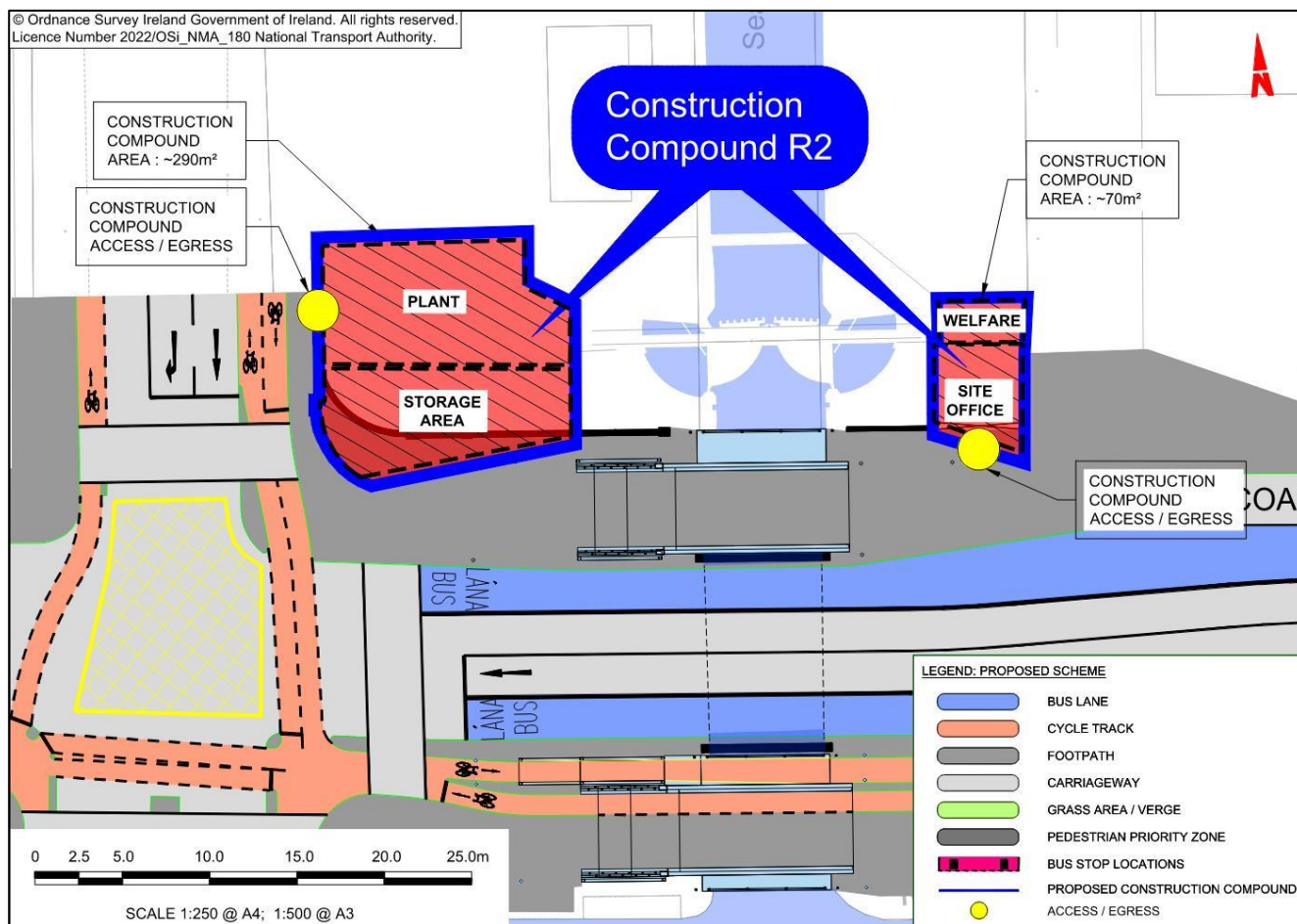


Image 5.4 Location and Extent of Construction Compound R2 After Relocation of Scherzer Bridges

Construction Compound R3 will be located at the end of Sir John Rogerson’s Quay, as shown in Image 5.5. Construction Compound R3 has been split into two separate construction compounds (Construction Compound R3a and Construction Compound R3b) as it is envisaged that the DPTOB will be constructed under a separate Construction Contract from the remainder of the Proposed Scheme. Construction Compound R3a will be used to complete the works along the south quays; City Quay and Sir John Rogerson’s Quay. Construction Compound R3b will be used to complete the works at DPTOB. The area of Construction Compound R3a is approximately 1,940m², while the area of Construction Compound R3b is approximately 1,750m².

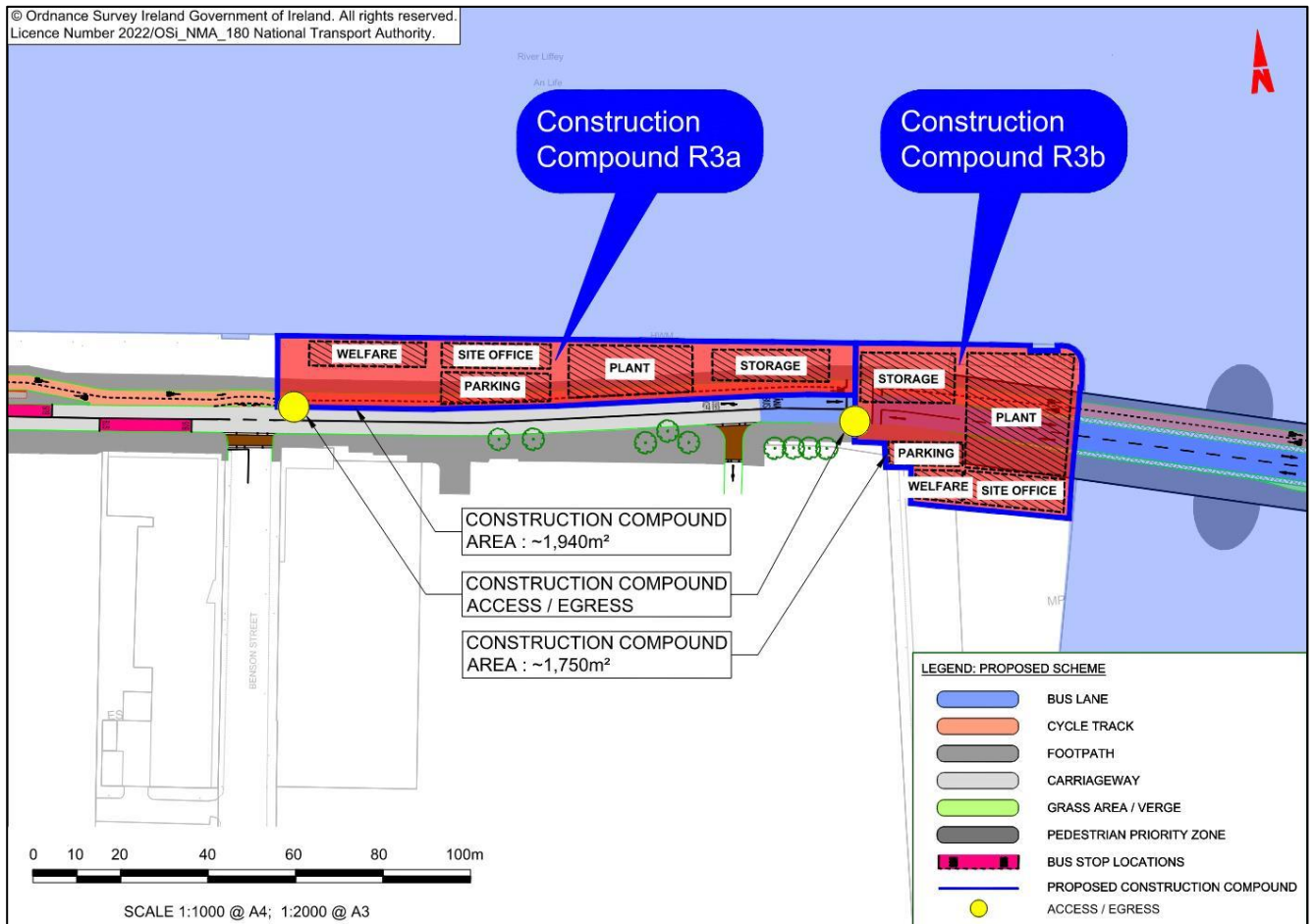


Image 5.5 Location and Extent of Construction Compound R3a and Construction Compound R3b

Construction Compound R4 will be located southwest of the Tom Clarke East Link Bridge. The Construction Compound R4 layout and boundary will change throughout the construction programme of the DPTOB (Structure Reference: 05). Whilst reclamation works, construction of the new SPRC building, and demolition of the old SPRC building are underway, a smaller Construction Compound (approximately 850m²) will be established, as shown in Image 5.6. Once these works are complete, the Construction Compound size will increase to approximately 2,490m², as shown in Image 5.7.

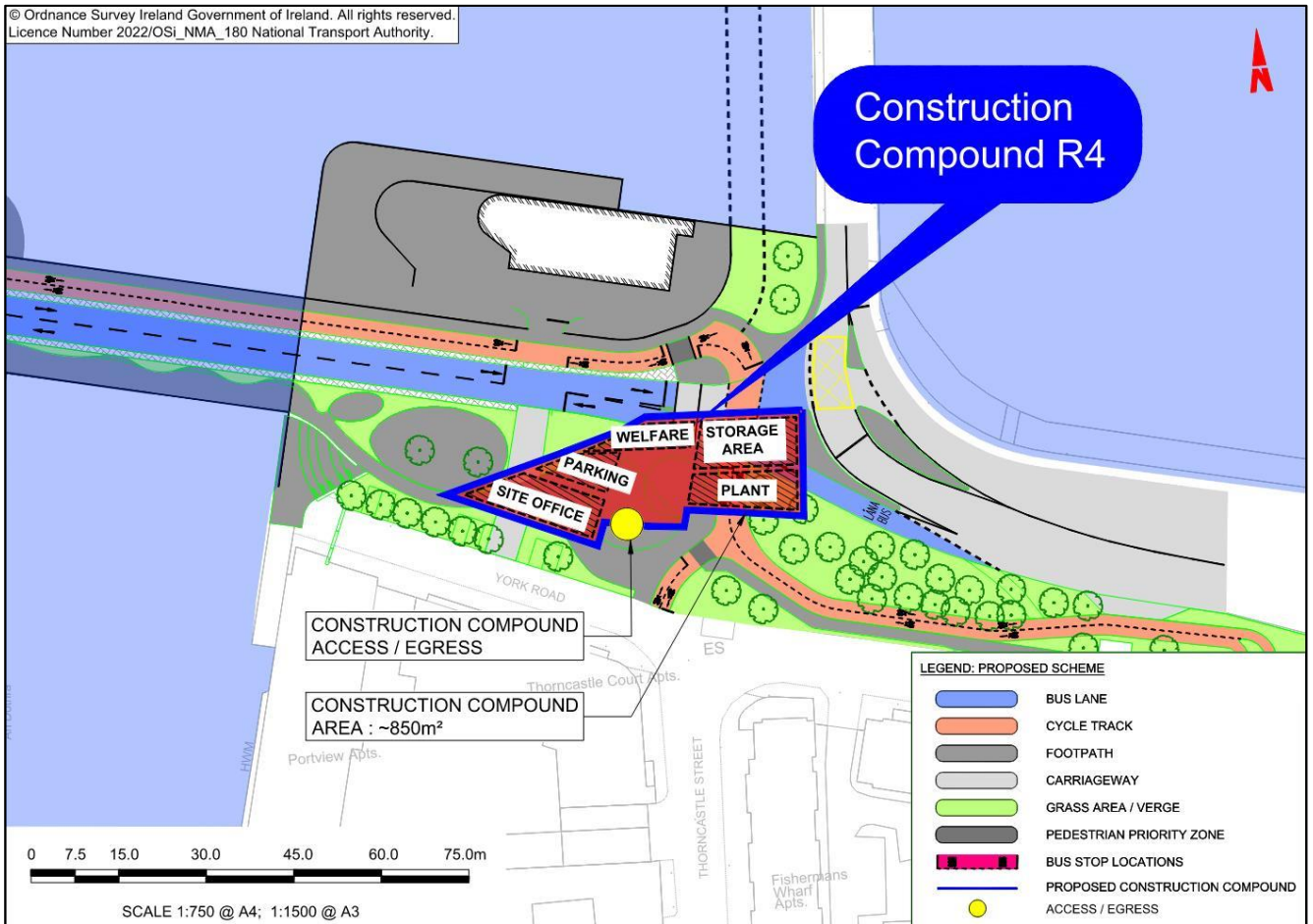


Image 5.6 Location and Extent of Construction Compound R4 (start of DPTOB construction programme)

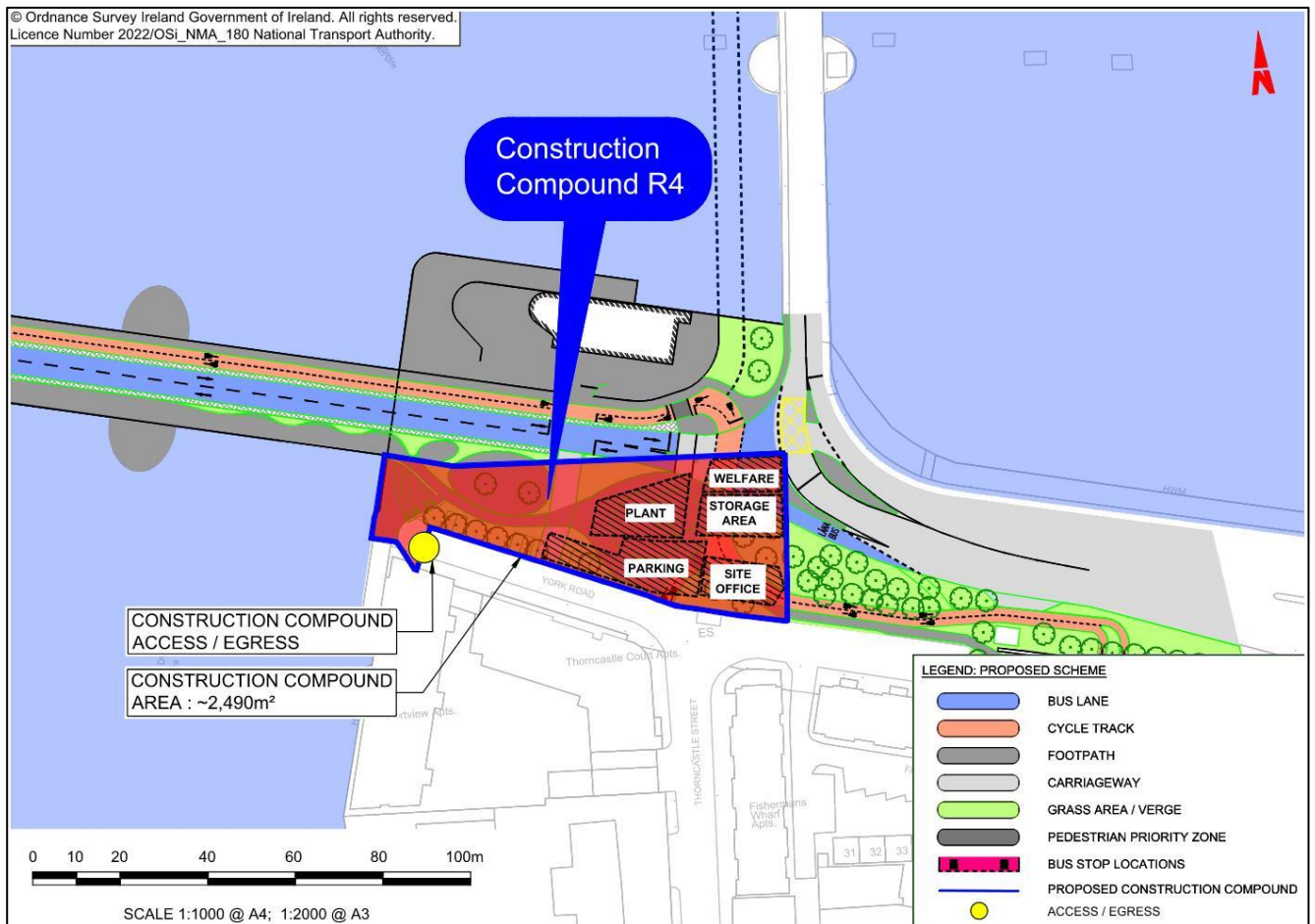


Image 5.7 Location and Extent of Construction Compound R4 (end of DPTOB construction programme)

5.7.2 Construction Compound Activities

As shown in Image 5.1 to Image 5.7, the Construction Compounds will contain a site office and welfare facilities for NTA personnel and contractor personnel. Limited car parking will generally be provided for at the Construction Compounds, in line with the principles of the Construction Stage Mobility Management Plan (CSMMP), as described in Appendix A5.1 CEMP in Volume 4 of this EIAR, which will be prepared by the appointed contractor. Materials such as topsoil, subsoil, concrete, rock etc., will be stored at the Construction Compounds for reuse, as necessary. Items of plant and equipment, described in Section 5.6, will also be stored within the Construction Compounds.

All necessary authorisations, under the Waste Management Act, as amended, will be obtained prior to undertaking temporary storage. Certain materials will be reused where practicable, primarily excavated material. Further information on the reuse of material within the Proposed Scheme is included in Chapter 18 (Waste & Resources) of this EIAR. Further information on the air quality and noise and vibration assessments, and associated mitigation measures at the Construction Compound is included in Chapter 7 (Air Quality) and Chapter 9 (Noise & Vibration) of this EIAR.

5.7.3 Construction Compound Services

The Construction Compounds will be fenced off, lit (during working hours) and secured with CCTV, as described in Section 5.5.2.8. Temporary lighting, including security lighting will be required at the Construction Compound, as described in Section 5.5.2.9. Access to the Construction Compounds will be restricted to site personnel and authorised visitors only.

The Construction Compounds will be engineered with appropriate services. Water, wastewater, power, and communications connections will be organised by the appointed contractor. At work areas along the Proposed Scheme, where permanent provisions (for the duration of the construction programme) are not practicable, appropriate temporary provisions will be made, including the use of generators if required. Temporary welfare facilities will need to be used, for example, portable toilets in the vicinity of works. Wastewater from temporary welfare facilities will be collected and disposed of to a suitably licensed facility.

Appropriate environmental management measures will be implemented at the Construction Compounds, for example, to minimise the risk of fuel spillage, and to ensure that the Construction Compounds and the approaches to it are appropriately maintained. Further information on the air quality, noise and vibration and water related mitigation measures that will be implemented is included in Chapter 7 (Air Quality), Chapter 9 (Noise & Vibration) and Chapter 13 (Water) of this EIAR.

Following completion of the construction works, the Construction Compound areas will be cleared and reinstated to match pre-existing conditions.

5.8 Construction Traffic Management

A CTMP has been prepared to facilitate the assessment of the potential impacts on traffic and transport along the Proposed Scheme. The CTMP includes details of the temporary traffic management measures that will be implemented during the construction of the Proposed Scheme.

The staging of construction and associated temporary traffic management measures has considered the receiving environment when developing the schedule of works.

The CTMP has given due consideration to facilitate the maximum practicable movement of people during the Construction Phase through implementing the following hierarchy of transport mode users:

- Pedestrians;
- Cyclists;
- Public Transport; and
- General Traffic.

Access will be maintained for emergency vehicles along the Proposed Scheme, throughout the Construction Phase.

The construction traffic management measures have been developed in accordance with the Traffic Signs Manual (Department of Transport, Tourism and Sport 2019). Construction traffic management measures are summarised in Section 5.8.1 to Section 5.8.4, with further details (such as routing of construction vehicles, timings of material deliveries, etc.) included in the CTMP in Appendix A5.1 CEMP in Volume 4 of this EIAR.

5.8.1 Pedestrian and Cyclist Provisions

The measures set out in Section 8.2.8 of the Traffic Signs Manual (Department of Transport Tourism and Sport 2019) will be implemented, wherever practicable, to ensure the safety of all road users, in particular pedestrians (including able-bodied pedestrians, wheel-chair users, mobility impaired pedestrians, pushchair users) and cyclists. Therefore, where footpaths are affected by construction, a safe route will be provided past the works area, and where practicable, provisions for matching existing facilities for pedestrians will be made. Where cycle tracks are affected by construction, a safe alternative route will be provided past the works area if practicable, although these facilities may not be of the same standard as those temporarily lost. Lengths without such provisions will be minimised so far as practicable and along which cyclists may be required to share the carriageway with vehicles.

5.8.2 Public Transport Provisions

Existing public transport routes will be maintained throughout the duration of the Construction Phase of the Proposed Scheme (notwithstanding potential for occasional road closures / diversions as discussed in Section

5.8.4). Wherever practicable, bus services will be prioritised over general traffic. However, the temporary closure of sections of existing dedicated bus lanes will be required to facilitate the construction of new bus priority infrastructure that is being developed as part of the Proposed Scheme. Some existing bus stop locations will need to be temporarily relocated to accommodate the works. In such cases, bus stops will be safely accessible to all users and all temporary impacts on bus services will be determined in consultation with the NTA and the service providers.

5.8.3 General Traffic Provisions

The roads and streets along the Proposed Scheme, will remain open to general traffic wherever practicable during the Construction Phase. However, lane closures, road closures and diversions will be necessary to facilitate construction. Where construction work areas are active, construction traffic management measures will be implemented to control the flow of traffic along the Proposed Scheme.

The following general traffic management provisions will be employed along the Proposed Scheme, depending on the existing cross section of carriageway:

- Where there are two lanes of traffic in each direction, the carriageway will be reduced to one lane of traffic in each direction, with works phased to accommodate this;
- Where there are two lanes of traffic in one direction, the carriageway will be reduced to one lane of traffic in one direction, with works phased to accommodate this;
- Where there is one lane of traffic in each direction (e.g. Section 1b, between Lombard Street and Lime Street, and Section 1d, along Sir John Rogerson's Quay, between Cardiff Lane and the DPTOB), carriageway will be reduced to a single lane, with traffic able to travel in each direction, but controlled by temporary traffic lights; and
- Where there is one lane of traffic in one direction (e.g. Section 1b, between Samuel Beckett Bridge and Lime Street), the carriageway will be closed off to traffic, and a temporary local traffic diversion will be put in place for the duration of the road works.

5.8.4 Road Closures and Diversions

Road closures and diversions will need to be carried out during the Construction Phase of the Proposed Scheme. Where necessary, road closures and diversions will take into consideration the impact on road users, residents, businesses etc. Road closures and diversions will be carried out with regard to the Traffic Signs Manual (Department of Transport, Tourism and Sport 2019). All road closures and diversions will be determined by the NTA, in consultation with the local authority and An Garda Síochána, as necessary. Road closures and diversions proposed, are described in further detail in Section 5.8.4.1 to Section 5.8.4.3. As mentioned previously, access will be maintained for emergency vehicles along the Proposed Scheme, throughout the Construction Phase.

5.8.4.1 Section 1: Talbot Memorial Bridge to Tom Clarke East Link Bridge

5.8.4.1.1 Section 1a: Talbot Memorial Bridge to Samuel Beckett Bridge – North Quays

During the Construction Phase at Section 1a, works will be carried out in short sections along the north quays. The works will be carried out on one side of the carriageway, with traffic reduced to a single lane in each direction and realigned to the other side of the carriageway.

As shown in the construction programme in Section 5.4, Section 1a and Section 1c will run concurrently, over a 24-month period. In order to manage traffic, it is necessary to implement a diversion that encompasses Section 1a and Section 1c. General traffic inbound to the City Centre will be diverted from East Wall Road, along Sheriff Street Upper (Section 1c), onto Seville Place, and Amiens Street (Section 1a), to facilitate public transport priority inbound along the north quays, as shown in Image 5.8. While this diversion will be used by general traffic inbound, a 7.5t weight restriction on the western end of Sheriff Street (between Abercorn Road and Guild Street) will restrict Heavy Goods Vehicle (HGV) use of the diversion. Instead, HGVs will use the various other designated HGV routes, as permitted, to reach their destination. Further information on the HGV weight limit and designated HGV routes is provided in Chapter 6 (Traffic & Transport) of this EIAR. General traffic and public transport traffic outbound from the City Centre will be reduced to a shared single lane along the north quays.

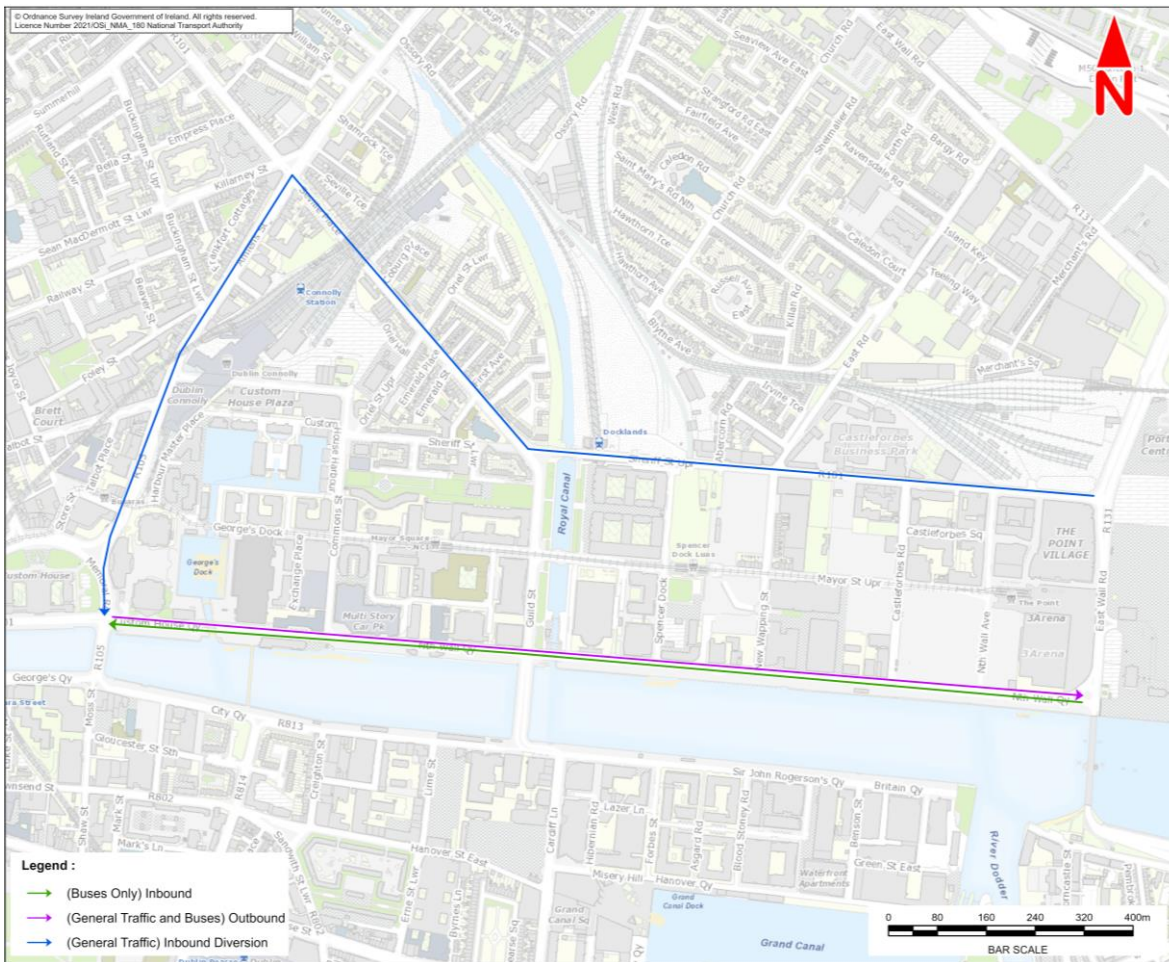


Image 5.8: Traffic Management Diversion, Section 1a and Section 1c

5.8.4.1.1.1 New and Relocated Bridges at George's Dock (Structure Reference: 01)

General traffic and public transport traffic outbound from the City Centre, and public transport traffic inbound to the City Centre will be reduced to a single lane in each direction along Section 1a, as described in Section 5.8.4.1.1. The works at the new and relocated bridges at George's Dock (Structure Reference: 01) will be undertaken in three traffic management stages:

- Stage 1 – Structural works on the northern Scherzer Bridge, traffic reduced to single lane shuttle working through the southern Scherzer Bridge, controlled by a stop / go system of temporary traffic lights, as shown in Image 5.9. It is anticipated that this stage will last approximately 10 months;
- Stage 2 – Following completion of the northern half of the new bridge, and re-erection of the northern Scherzer Bridge deck, traffic will be diverted through the northern half of the new bridge, controlled by a stop / go system of temporary traffic lights, as shown in Image 5.8. It is anticipated that this stage will last approximately 10 months; and
- Stage 3 – Once the new bridge has been completed, two lanes of traffic will operate across the new bridge, one in each direction. It is anticipated that this stage will last approximately 4 months.

Further information on the programme for the works associated with the proposed new and relocated bridges at George's Dock is provided in Table 5.2.

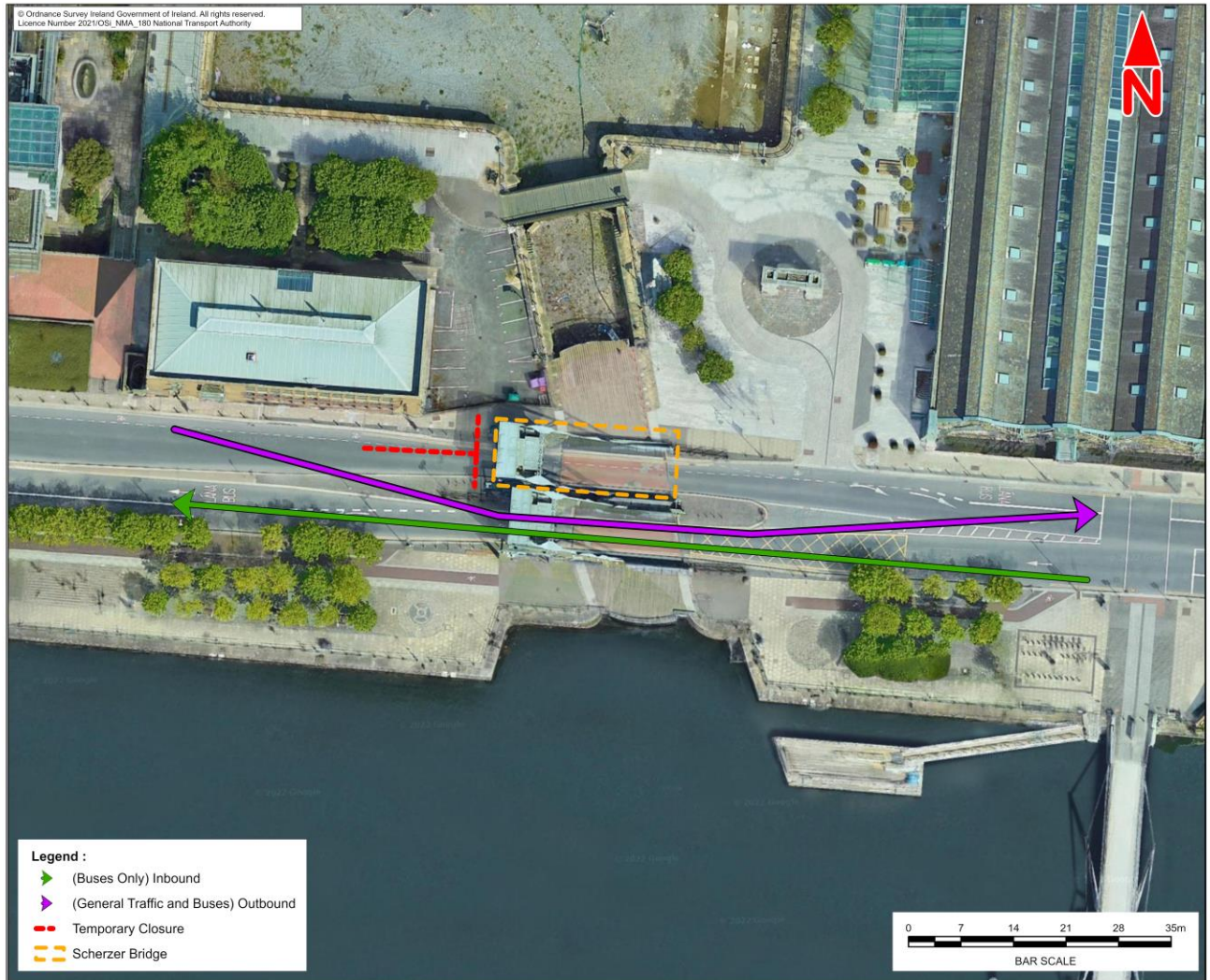


Image 5.9: Traffic Management Diversion, Section 1a, George's Dock – Stage 1

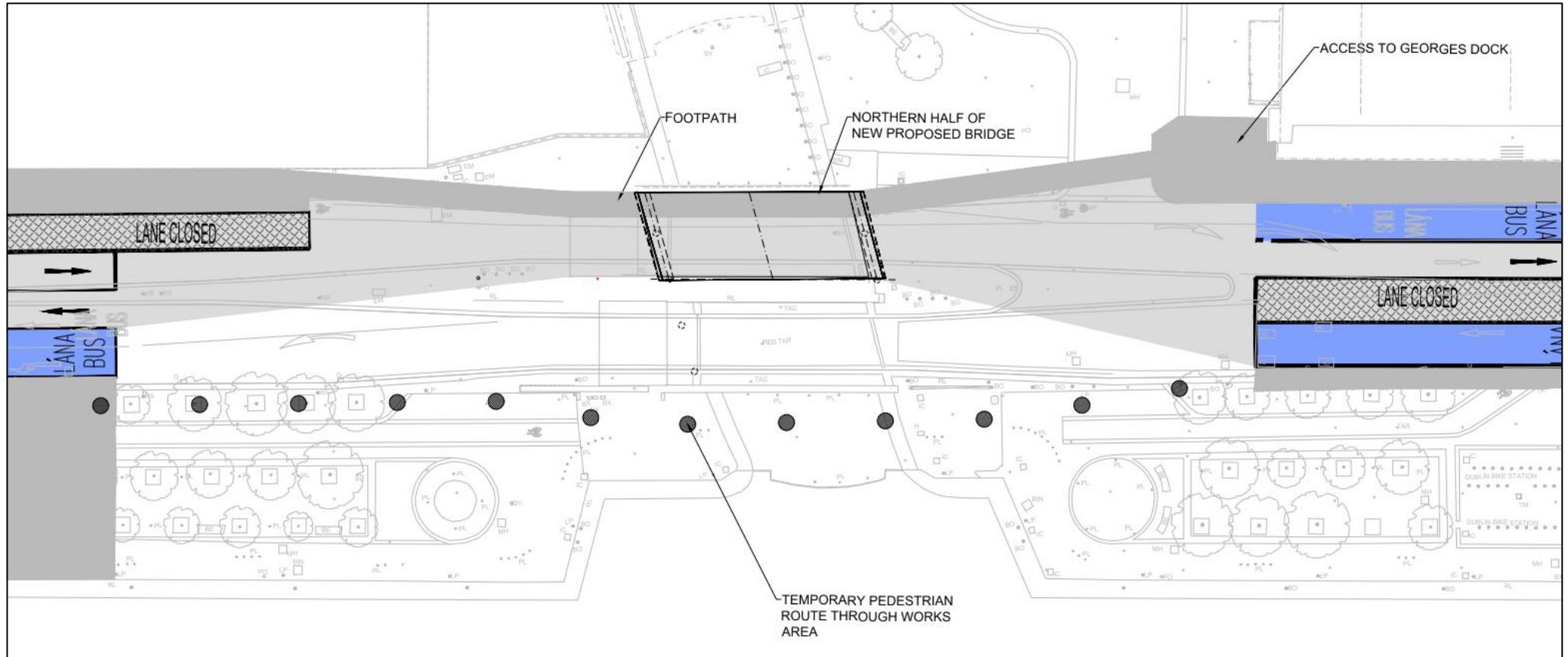


Image 5.10: Traffic Management Diversion, Section 1a, George's Dock – Stage 2

Pedestrians and cyclists will be managed through the works using the bridge decks available at the various points during construction, whether existing or new.

5.8.4.1.1.2 Custom House Quay Boardwalk (at DCC Docklands Offices) (Structure Reference: 02) and Boardwalk at North Wall Quay (Structure Reference: 03)

During the construction of the Custom House Quay Boardwalk (at DCC Docklands Offices) (Structure Reference: 02) and the pedestrian boardwalk at North Wall Quay (Structure Reference: 03), pedestrian and cycle traffic will be diverted around the works.

5.8.4.1.2 Section 1b: Talbot Memorial Bridge to Samuel Beckett Bridge – South Quays

During the Construction Phase at Section 1b, works will be carried out in short sections along the south quays.

5.8.4.1.2.1 Talbot Memorial Bridge to Lombard Street

As there are two lanes of traffic in one direction, the works will be carried out on one side of the carriageway, with traffic reduced to a single lane outbound from the City Centre. Short term local diversions may be required along Moss Street and Townsend Street, as shown in Image 5.11. Such diversions will be agreed between the appointed contractor, and the NTA on a case-by-case basis.

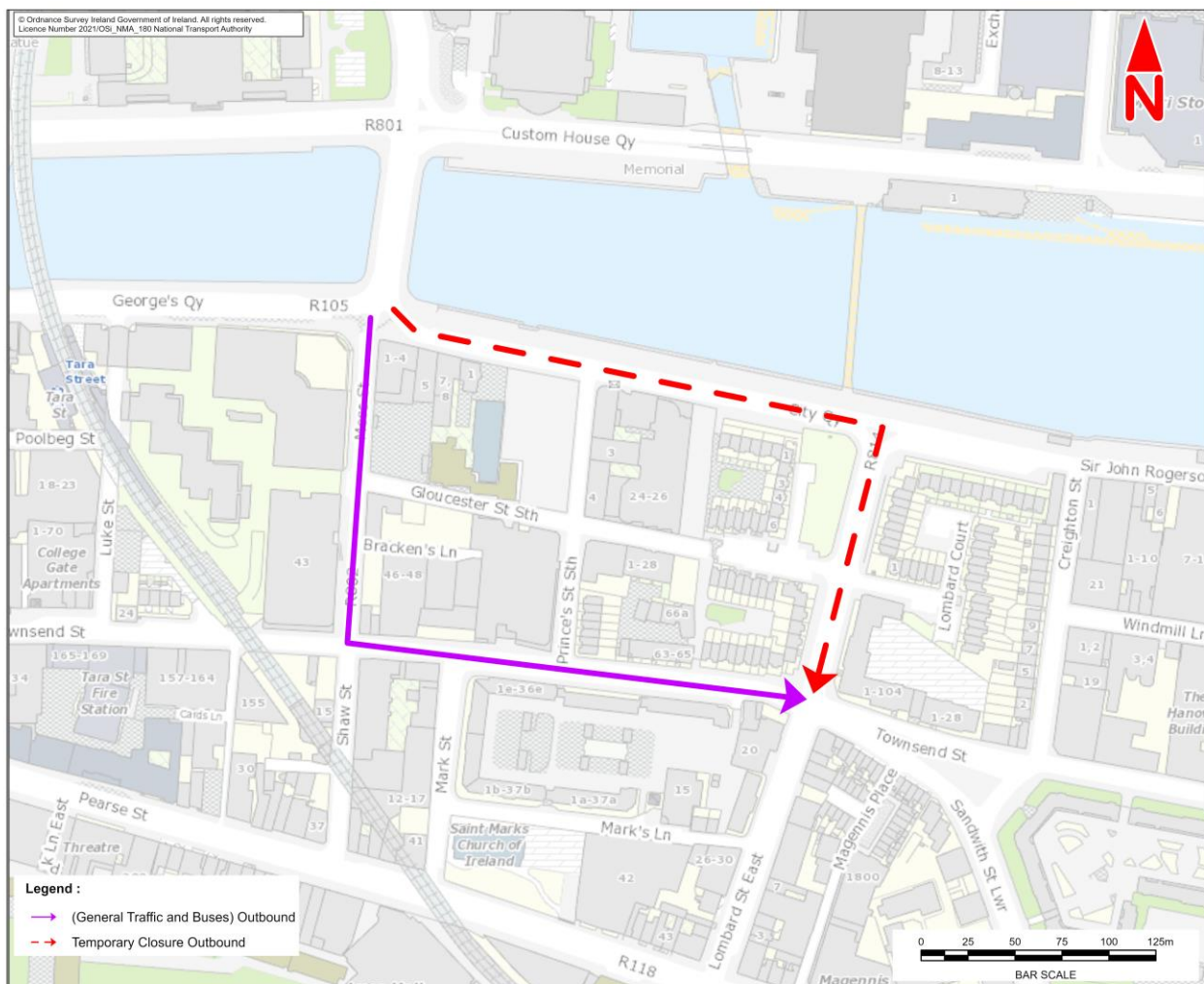


Image 5.11: Traffic Management Diversion, Section 1b, Talbot Memorial Bridge to Lombard Street

5.8.4.1.2.2 Lombard Street to Lime Street

As there is one lane of traffic in each direction, the works will be carried out on one side of the carriageway, with the carriageway reduced to a single lane. Traffic will travel in each direction, controlled by temporary traffic lights. At pinch points, short-term local diversions may be required. Any local diversions will be implemented for short periods of time, the specific details of which will be agreed between the appointed contractor, and the NTA on a case-by-case basis.

5.8.4.1.2.3 Lime Street to Samuel Beckett Bridge

As there is one lane of traffic in one direction, the carriageway will be closed off to traffic, and a temporary diversion will be put in place for the duration of road works, as shown in Image 5.10. As works in this area are minimal, it is anticipated that this closure will be for a very short period of time. Any local diversions will be implemented for short periods of time, the specific details of which will be agreed between the appointed contractor, and the NTA on a case-by-case basis.

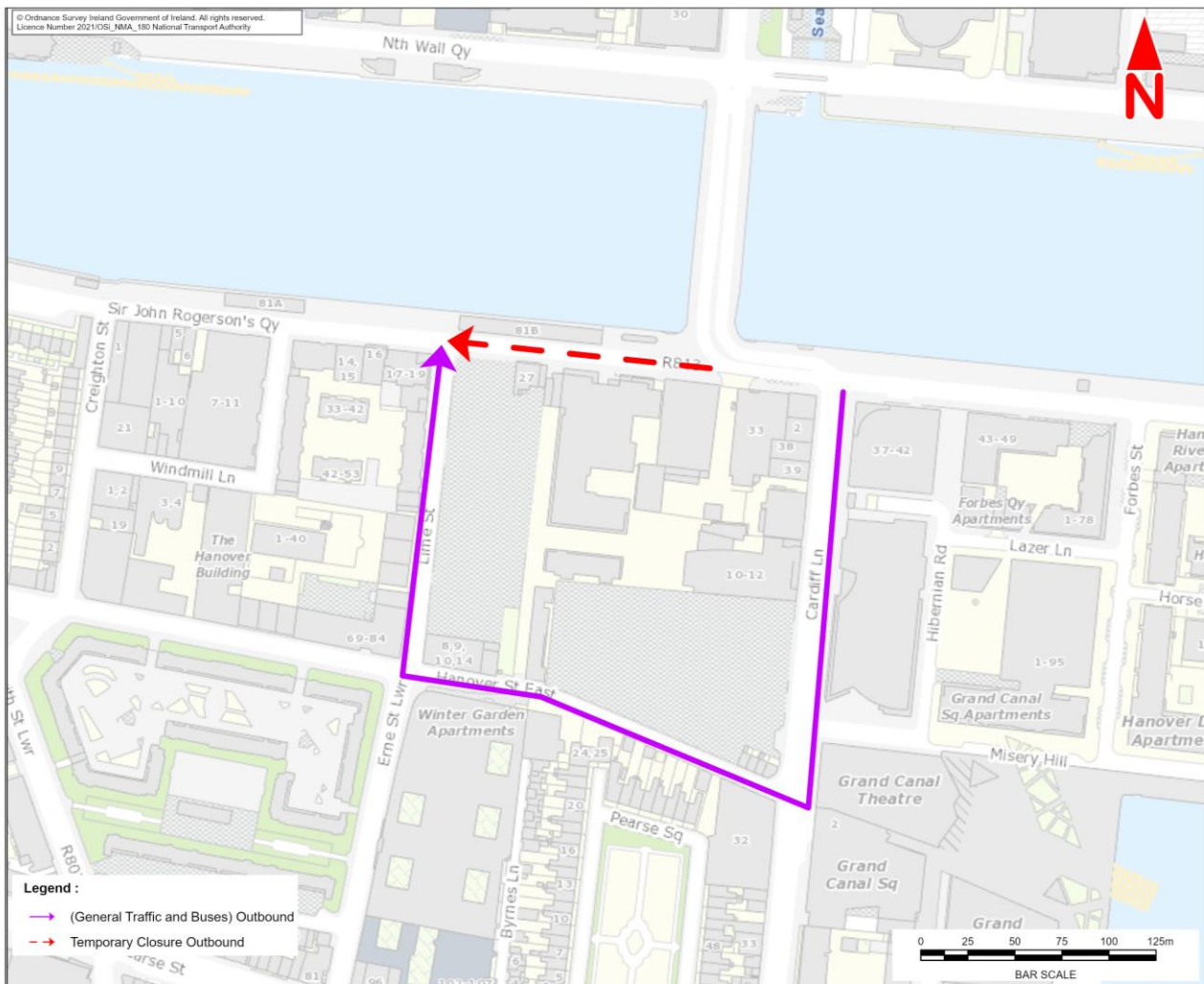


Image 5.10: Traffic Management Diversion, Section 1b, Lime Street to Samuel Beckett Bridge

5.8.4.1.3 Section 1c: Samuel Beckett Bridge to Tom Clarke East Link Bridge – North Quays

During the Construction Phase at Section 1c, works will be carried out in short sections along the north quays. The works will be carried out on one side of the carriageway, with traffic reduced to a single lane in each direction and realigned to the other side of the carriageway.

As noted in Section 5.8.4.1.1, Section 1a and Section 1c will run concurrently, over a 24-month period. In order to manage traffic it is necessary to implement a diversion that encompasses Section 1a and Section 1c. General traffic inbound to the City Centre will be diverted from East Wall Road onto Sheriff Street Upper (Section 1c), and along Seville Place, and Amiens Street (Section 1a), to facilitate public transport priority inbound, along the north quays, as shown in Image 5.6. While this diversion will be used by general traffic inbound, a 7.5t weight restriction on the western end of Sheriff Street (between Abercorn Road and Guild Street) will restrict Heavy Goods Vehicle (HGV) use of the diversion. Instead, HGVs will use the various other designated HGV routes, as permitted, to reach their destination. Further information on the HGV weight limit and designated HGV routes is provided in Chapter 6 (Traffic & Transport) of this EIAR. General traffic inbound will continue to be diverted along Amiens Street in Section 1c. General traffic and public transport traffic outbound from the City Centre will be reduced to a shared single lane along the north quays.

5.8.4.1.3.1 New and Relocated Bridges at the Royal Canal (Structure Reference: 04)

General traffic and public transport traffic outbound from the City Centre, and public transport traffic inbound to the City Centre will be reduced to a single lane in each direction along Section 1c, as described in Section 5.8.4.1.3. The works at the new and relocated bridges at the Royal Canal (Structure Reference: 04) will be undertaken in three traffic management stages:

- Stage 1 – Structural works on the northern Scherzer Bridge, traffic reduced to single lane shuttle working through the southern Scherzer Bridge, controlled by a stop / go system of temporary traffic lights, as shown in Image 5.11. It is anticipated that this stage will last approximately 10 months;
- Stage 2 – Following completion of the northern half of the new bridge, and re-erection of the northern Scherzer Bridge deck, traffic will be diverted through the northern half of the new bridge, controlled by a stop / go system of temporary traffic lights, in a similar manner to that shown in Image 5.8. It is anticipated that this stage will last approximately 10 months; and
- Stage 3 – Once the new bridge has been completed, two lanes of traffic will operate across the new bridge, one in each direction. It is anticipated that this stage will last approximately 4 months.

Further information on the programme for the works associated with the proposed new and relocated bridges at the Royal Canal is provided in Table 5.2.

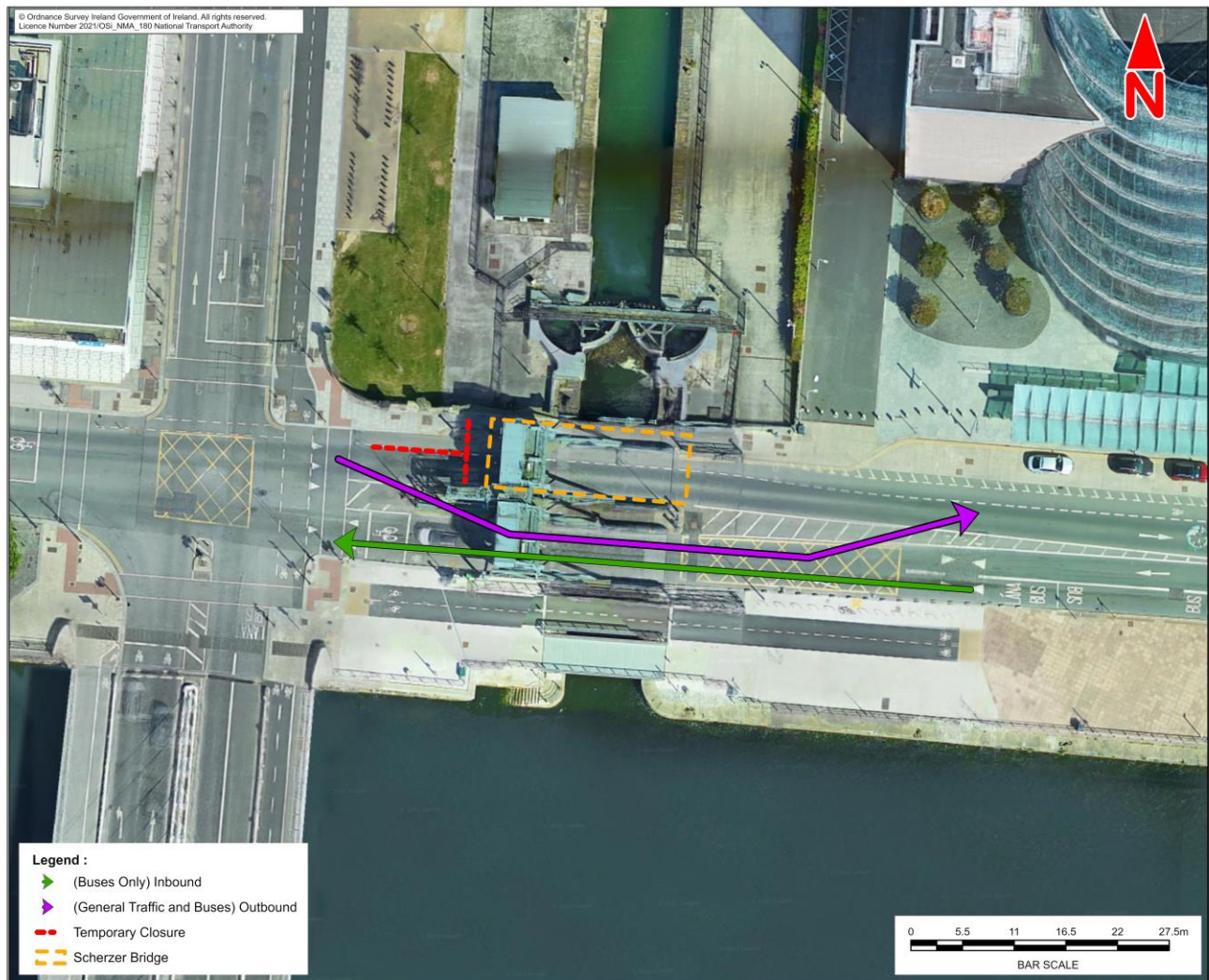


Image 5.11: Traffic Management Diversion, Section 1c, Royal Canal – Stage 1

Pedestrians and cyclists will be managed through the works using the bridge decks available at the various points during construction, whether existing or new.

5.8.4.1.4 Section 1d: Samuel Beckett Bridge to Tom Clarke East Link Bridge – South Quays

During the Construction Phase at Section 1d, works will be carried out in short sections along the south quays.

5.8.4.1.4.1 Samuel Beckett Bridge to Cardiff Lane

As there are two lanes of traffic in each direction, the works will be carried out on one side of the carriageway, with traffic reduced to a single lane in each direction. Local diversions may be required. However, any local diversions will be implemented for short periods of time, the specific details of which will be agreed between the appointed contractor, and the NTA on a case-by-case basis.

5.8.4.1.4.2 Cardiff Lane to DPTOB

As there is one lane of traffic in each direction, the works will be carried out on one side of the carriageway, with the carriageway reduced to a single lane. Traffic will travel in each direction, controlled by temporary traffic lights, or short-term local diversions may be required. Any local diversions will be implemented for short periods of time, the specific details of which will be agreed between the appointed contractor, and the NTA on a case-by-case basis.

5.8.4.2 Section 2: Dodder Public Transport Opening Bridge (DPTOB)

Works in Section 2 of the Proposed Scheme will be carried out behind Varioguard barriers (or similar), without the need for construction traffic management provisions. Access to the existing facilities and jetty will be maintained for SPRC club members throughout the Construction Phase.

During the junction tie-in works between the DPTOB and Tom Clarke East Link Bridge / East Link Toll Plaza, construction traffic management measures will be required. Works will be undertaken out-of-hours and / or with the implementation of road closures. Any road closures will be implemented for short periods of time only, the specific details of which will be agreed between the appointed contractor, and the NTA on a case-by-case basis.

The appointed contractor will liaise with Waterways Ireland to ensure essential navigation to Grand Canal Dock is maintained during the works.

5.8.4.3 Section 3: Tom Clarke East Link Bridge to Sean Moore Road

Short term construction traffic management measures will be required at Section 3 for general traffic, pedestrian and cyclists. No disruption to transport services is expected.

5.9 Interface with Other Projects

The likely timelines of the Proposed Scheme construction works have considered the potential for simultaneous construction of, and cumulative impacts with other infrastructure projects and developments which are proposed along, or in the vicinity of the Proposed Scheme. The likely significant cumulative impacts caused by the Proposed Scheme in combination with other existing or planned projects were identified and assessed in Chapter 21 (Cumulative Impacts & Environmental Interactions) of this EIAR.

Interface liaison will take place on a case-by-case basis through the NTA, and will be set out in the Construction Contract, to ensure that there is coordination between projects, that Construction Access Routes remain unobstructed by the Proposed Scheme works and that any additional construction traffic mitigation measures required to deal with cumulative impacts are managed appropriately. As mentioned previously with regard to interaction with the DART+ West project specifically and the Proposed Scheme, the NTA recognises the potential for cumulative impacts to occur should the construction phase of Sherriff Street and Custom Wall Quay / North Wall Quay works coincide. Consequently, the NTA will programme the construction of the Proposed Scheme so as to ensure that the works on the Custom Wall Quay / North Wall Quay (excluding the construction of the DPTOB), do not coincide with the DART+ West works at Sheriff Street Bridge.

5.10 Construction Environmental Management

5.10.1 Construction Environmental Management Plan

As stated in Section 5.6, a CEMP has been prepared for the Proposed Scheme and is included as Appendix A5.1 in Volume 4 of this EIAR. The CEMP will be updated by the NTA prior to finalising the Construction Contract documents for tender, so as to include any additional measures required pursuant to conditions attached to An Bord Pleanála's decision. It will be a condition of the Employer's Requirements that the successful appointed contractor, immediately following appointment, must detail in the CEMP the manner in which it is intended to effectively implement all the applicable mitigation measures identified in this EIAR. The CEMP has regard to the guidance contained in the Guidelines for the Creation, Implementation and Maintenance of an Environmental Operating Plan (TII 2017), and the handbook published by CIRIA in the UK, Environmental Good Practice on Site Guide, 4th Edition (CIRIA 2015).

Details of mitigation measures proposed to address potential impacts arising from construction activities are described in Chapter 6 to Chapter 21, as appropriate and are summarised in Chapter 22 (Summary of Mitigation & Monitoring Measures) of this EIAR.

A number of sub-plans have also been prepared as part of the CEMP and these are summarised in the following sections. For the avoidance of doubt, all of the measures set out in the CEMP and the sub-plans appended to this EIAR will be implemented in full by the appointed contractor to the satisfaction of the NTA.

5.10.1.1 Construction Traffic Management Plan

The CTMP has been prepared to demonstrate the manner in which the interface between the public and construction-related traffic will be managed and how vehicular movement will be controlled. It will be a condition of the Employer's Requirements that the successful appointed contractor, immediately following appointment, must detail in the CTMP the manner in which it is intended to effectively implement all the applicable mitigation measures identified in this EIAR and any additional measures required pursuant to conditions imposed by An Bord Pleanála, should they grant approval. Further details on the assessment of construction traffic, and traffic related mitigation measures are provided in Chapter 6 (Traffic & Transport) of this EIAR.

5.10.1.2 Invasive Species Management Plan

The Invasive Species Management Plan (ISMP) has been prepared which provides the strategy to be adopted in order to manage and prevent the spread of non-native invasive plant species. No non-native invasive plant species were identified in close proximity to the Proposed Scheme during ecological surveys, however a number of non-native invasive species are known to occur in the wider area. It will be a condition of the Employer's Requirements that the successful appointed contractor, immediately following appointment, must detail in the ISMP how it is intended to complete the works in accordance with the Employer's Requirements, and will be subject to the NTA's approval. Further details on the assessment of non-native invasive species, and associated mitigation measures are provided in Chapter 12 (Biodiversity) of this EIAR.

5.10.1.3 Surface Water Management Plan

The SWMP has been prepared which details control and management measures for avoiding, preventing, or reducing any significant adverse impacts on the surface water environment during the Construction Phase of the Proposed Scheme. It will be a condition of the Employer's Requirements that the successful appointed contractor, immediately following appointment, must detail in the SWMP how it is intended to effectively implement all the applicable measures identified in this EIAR and any additional measures required pursuant to conditions imposed by An Bord Pleanála to any grant of approval.

5.10.1.4 Construction and Demolition Resource and Waste Management Plan

The Construction and Demolition Resource and Waste Management Plan (CDRWMP) has been prepared which provides the strategy that will be adopted in order to ensure that optimum levels of reduction, reuse and recycling are achieved. It will be a condition of the Employer's Requirements that the successful appointed contractor, immediately following appointment, must detail in the CDRWMP the manner in which it is intended to effectively implement all the applicable mitigation measures identified in this EIAR and any additional measures required pursuant to conditions imposed by An Bord Pleanála to any grant of approval. Further details on waste management are provided in Chapter 18 (Waste & Resources) of this EIAR.

5.10.1.5 Environmental Incident Response Plan

The Environmental Incident Response Plan (EIRP) has been prepared to ensure that in the unlikely event of an incident (environmental, or non-environmental), response efforts are prompt, efficient, and suitable for the particular circumstances. The EIRP details the procedures to be undertaken in the event of a significant release of sediment into a watercourse, or a significant spillage of chemical, fuel or other hazardous substances (e.g. concrete), non-compliance incident with any permit or license, or other such risks that could lead to a pollution incident, including flood risks. It will be a condition of the Employer's Requirements that the successful appointed contractor, immediately following appointment must detail in the EIRP, the manner in which it is intended to effectively implement all the applicable mitigation measures identified in this EIAR and any additional measures required pursuant to conditions imposed by An Bord Pleanála to any grant of approval.

5.10.2 Mitigation Measures

Mitigation and monitoring measures have been identified as environmental commitments and overarching requirements which shall avoid, reduce or offset potential significant impacts which could arise throughout the Construction Phase of the Proposed Scheme. These mitigation and monitoring measures which are relevant to the Construction Phase of the Proposed Scheme are detailed in Chapter 6 to Chapter 21 and summarised in Chapter 22 (Summary of Mitigation & Monitoring Measures) of this EIAR.

5.10.3 Working Hours

It is generally envisaged that construction working hours will be between 07:00hrs and 23:00hrs on weekdays, and between 08:00hrs and 16:30hrs on Saturdays. Night-time and Sunday working will be required to facilitate street works that cannot be undertaken during day time / evening conditions. The planning of such works will take consideration of sensitive receptors, in particular any nearby residential areas.

5.10.4 Personnel Numbers

Throughout the Construction Phase there will be some variation in the numbers of personnel working on-site. It is anticipated there will be approximately 20 to 30 personnel directly employed across the Proposed Scheme, rising to 50 personnel at peak construction.

5.10.5 Construction Health and Safety

The requirements of Number 10 of 2005 – Safety, Health and Welfare at Work Act 2005, S.I. No. 291-2013 Safety, Health and Welfare at Work (Construction) Regulations, 2013 (hereafter referred to as the Regulations), and other relevant Irish and European Union safety legislation will be complied with at all times. As required by the Regulations, a Health and Safety Plan will be formulated which will address health and safety issues from the design stages through to the completion of the Construction Phase. This plan will be reviewed as the Proposed Scheme progresses. The contents of the Health and Safety Plan will follow the requirements of the Regulations. In accordance with the Regulations, a ‘Project Supervisor Design Process’ has been appointed and ‘Project Supervisor Construction Stage’ will be appointed, as appropriate.

5.11 References

ADCO (2021). UAIA BusConnects Dublin – BusConnects Project Proposed Boardwalks Custom House Quay and North Wall Quay, River Liffey

BSI (2010). BS 3998:2010 Tree Work – Recommendations

BSI (2012). 5837:2012 Trees in Relation to Design, Demolition, and Construction – Recommendations

CIRIA (2015). Environmental Good Practice on Site Guide, 4th Edition

Department of Transport (2019). Traffic Signs Manual. Chapter 8 Temporary Traffic Measures and Signs for Roadworks

TII (2007). Guideline for the Creation, Implementation and Maintenance of an Environmental Operating Plan

TII (2017). Guidelines for the Management of Waste from National Road Construction Projects

Directives and Legislation

Number 10 of 1996 - Waste Management Act, 1996, as amended

S.I. No 291/2013 Safety, Health and Welfare at Work (Construction) Regulations 2013