



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 Liffey Valley 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 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 contractor will involve the determination that the appointed contractor is competent to carry out the works, including the effective implementation of the mitigation measures. The appointed contractor 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 Contract 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 this 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. The division line between sections has been determined by grouping similar carriageway types together. These sections have been further subdivided into 12 sub-sections, according to the types of construction works required. The sections / sub-sections are:

- **Section 1:** Liffey Valley to Le Fanu Road:
 - **Section 1a:** Liffey Valley Shopping Centre to M50 Overbridge;
 - **Section 1b:** M50 Overbridge to Ballyfermot Road;
 - **Section 1c:** Ballyfermot Road to Cherry Orchard Service Station; and
 - **Section 1d:** Cherry Orchard Service Station to Le Fanu Road.
- **Section 2:** Le Fanu Road to Sarsfield Road:
 - **Section 2a:** Le Fanu Road to Kylemore Road;
 - **Section 2b:** Kylemore Road to St Laurence's Road; and
 - **Section 2c:** St Laurence's Road to Con Colbert Road.
- **Section 3:** Sarsfield Road to City Centre:
 - **Section 3a:** Con Colbert Road to Emmet Road;
 - **Section 3b:** Emmet Road to South Circular Road;
 - **Section 3c:** South Circular Road to Bow Lane West;
 - **Section 3d:** Bow Lane West to Cornmarket; and
 - **Section 3e:** Cornmarket to High Street.

The location of each section / sub-section along the Proposed Scheme 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 5.3.1.1 to Section 5.3.3.5. 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
BCIDB-JAC-SPW_ZZ-0007_XX_00-DR-CR-9001	Site Location Plan
BCIDB-JAC-GEO_GA-0007_XX_00-DR-CR-9001	General Arrangement
BCIDB-JAC-GEO_HV-0007_ML_00-DR-CR-9001	Mainline Plan and Profile
BCIDB-JAC-GEO_CS-0007_XX_00-DR-CR-9001	Typical Cross Sections
BCIDB-JAC-ENV_LA-0007_XX_00-DR-LL-9001	Landscaping General Arrangement
BCIDB-JAC-PAV_PV-0007_XX_00-DR-CR-9001	Pavement Treatment Plans
BCIDB-JAC-SPW_BW-0007_XX_00-DR-CR-9001	Fencing and Boundary Treatment
BCIDB-JAC-TSM_GA-0007_XX_00-DR-CR-9001	Traffic Signs and Road Markings
BCIDB-JAC-LHT_RL-0007_XX_00-DR-EO-9001	Street Lighting
BCIDB-JAC-TSM_SJ-0007_XX_00-DR-TR-9001	Junction System Design
BCIDB-JAC-DNG_RD-0007_XX_00-DR-CD-9001	Proposed Surface Water Drainage Works
BCIDB-JAC-UTL_UD-0007_XX_00-DR-CU-9001	IW Foul Sewer Asset Alterations
BCIDB-JAC-UTL_UE-0007_XX_00-DR-CU-9001	ESB Asset Alterations
BCIDB-JAC-UTL_UG-0007_XX_00-DR-CU-9001	GNI Asset Alterations
BCIDB-JAC-UTL_UW-0007_XX_00-DR-CU-9001	IW Water Asset Alterations
BCIDB-JAC-UTL_UX-0007_XX_00-DR-CU-9001	Telecommunications Asset Alterations
BCIDB-JAC-UTL_UC-0007_XX_00-DR-CU-9001	Combined Existing Utility Records

Further details on the design specifications, with regards to matters such as parking and loading bay widths, signalised junctions, priority junctions, roundabouts, 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: Liffey Valley to Le Fanu Road

5.3.1.1 Section 1a: Liffey Valley Shopping Centre to M50 Overbridge

Section 1a encompasses a length of approximately 760m (metres) along Fonthill Road and Coldcut Road, between Liffey Valley Shopping Centre and the M50 Overbridge. The construction activities at Section 1a will comprise the conversion of two roundabouts on the Fonthill Road to signalised junctions, pavement reconstruction, widening, and resurfacing of the roads, and construction of new footpaths, cycle tracks, and kerbs. Construction activities will also consist of additional signage, new road markings, new and amended traffic signal infrastructure, new street furniture (rubbish bins, seats, lighting, benches, planters, bollards, cycle racks, bus stops (including shelters and information displays etc.)) and landscaping works. The Construction Compound (LV1) will be located at Section 1a on Fonthill Road. Fencing will be erected along Fonthill Road. Some minor utility diversions and / or protections will be required. Vegetation will be removed along Coldcut Road, between the Coldcut Clubhouse and the M50 Overbridge. The expected construction duration will be approximately nine months.

5.3.1.2 Section 1b: M50 Overbridge to Ballyfermot Road

Section 1b encompasses a length of approximately 540m along Coldcut Road, between the M50 Overbridge and Ballyfermot Road. The construction activities at Section 1b will comprise pavement reconstruction, widening, and resurfacing of the roads, and construction of new footpaths, 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 (LV2) will be located on Coldcut Road. A minor retaining wall (MRW13) approximately 100m in length and maximum 1m in retained height will be constructed along the northern verge of Coldcut Road, adjacent to the M50 Overbridge. A boundary wall will be reconstructed, fencing will be erected, and gates will be relocated along the northern side of Coldcut Road, at Palmers Walk. Some minor utility diversions and / or protections will be required. Vegetation will be removed along the northern verge of Coldcut Road. The expected construction duration will be approximately six months.

5.3.1.3 Section 1c: Ballyfermot Road to Cherry Orchard Service Station

Section 1c encompasses a length of approximately 660m along Ballyfermot Road, between Coldcut Road and Cherry Orchard Service Station. The construction activities at Section 1c will comprise pavement reconstruction, widening and resurfacing of the roads, and construction of new footpaths, 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. Sections of a boundary wall will be reconstructed along the northern side of Ballyfermot Road. The existing boundary wall and fence will be reconstructed at Cherry Orchard Hospital. Sections of a boundary wall will be reconstructed at Cherry Orchard Service Station. Some minor utility diversions and / or protections will be required. A number of trees will be removed along Ballyfermot Road, at the junction with Coldcut Road, and vegetation will be removed outside Cherry Orchard Hospital. The expected construction duration will be approximately six months.

5.3.1.4 Section 1d: Cherry Orchard Service Station to Le Fanu Road

Section 1d encompasses a length of approximately 920m along Ballyfermot Road, between Cherry Orchard Service Station and Le Fanu Road. The construction activities at Section 1d will comprise pavement reconstruction, widening, and resurfacing of the roads, and construction of new footpaths, 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. Some minor utility diversions and / or protections will be required. A number of trees will be removed along Ballyfermot Road. The expected construction duration will be approximately nine months.

5.3.2 Section 2: Le Fanu Road to Sarsfield Road

5.3.2.1 Section 2a: Le Fanu Road to Kylemore Road

Section 2a encompasses a length of approximately 590m along Ballyfermot Road, between Le Fanu Road and Kylemore Road, and approximately 400m along Kylemore Road, between Le Fanu Road and Ballyfermot Road. The construction activities at Section 2a will comprise conversion of Ballyfermot roundabout to a signalised junction, pavement reconstruction, widening, and resurfacing of the roads, and construction of new footpaths, 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. Cycle tracks and additional parking will be installed along Kylemore Road. Urban realm works will be carried out at Ballyfermot Road. Various utility diversions and / or protections will be required; including a 75m diversion of a trunk watermain. A number of trees will be removed along the northern verge of Ballyfermot Road. The expected construction duration will be approximately six months.

5.3.2.2 Section 2b: Kylemore Road to St Laurence's Road

Section 2b encompasses a length of approximately 930m along Ballyfermot Road, between Kylemore Road and St Laurence's Road. The construction activities at Section 2b will comprise pavement reconstruction, widening, and resurfacing of the roads, and construction of new footpaths, 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. A minor retaining wall (MRW8) approximately 60m in length and maximum 1m in retained height will be constructed at Markievicz Park, and a minor retaining wall (MRW9) approximately 20m in length and maximum 1m in retained height will be constructed at the Ballyfermot Road, St Laurence's Road junction. Boundary walls will be reconstructed along the northern verge of Ballyfermot Road, and gates will be relocated. Access between Ballyfermot Road and O'Hogan Road will be closed to vehicular traffic. Some minor utility diversions and / or protections will be required. A number of trees will be removed at Ballyfermot roundabout, and along the northern side of Ballyfermot Road. The expected construction duration will be approximately nine months.

5.3.2.3 Section 2c: St Laurence's Road to Con Colbert Road

Section 2c encompasses a length of approximately 685m along Sarsfield Road, between St Laurence's Road and Con Colbert Road. The construction activities at Section 2c will comprise of pavement reconstruction, widening, and resurfacing of the roads, and construction of new footpaths, 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. A reinforced concrete (RC) retaining wall (RW10), approximately 80m in length and maximum 3m in retained height, and a RC retaining wall (RW11) approximately 260m in length and maximum 2.5m in retained height will be constructed adjacent to Long Meadows Park, and gates will be relocated. A boundary wall will be reconstructed along Sarsfield Road, at Meadow View. Some minor utility diversions and / or protections will be required. Trees will be removed along the northern verge of Sarsfield Road, and along the central verge. The expected construction duration will be approximately six months.

5.3.3 Section 3: Sarsfield Road to City Centre

5.3.3.1 Section 3a: Con Colbert Road to Emmet Road

Section 3a encompasses a length of approximately 965m along Sarsfield Road, and Grattan Crescent, between Con Colbert Road and Emmet Road, including a section of Inchicore Road and Memorial Road. The construction activities at Section 3a will comprise of pavement reconstruction, widening, and resurfacing of the roads, and construction of new footpaths, 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 (LV3) will be located on Con Colbert Road. The expected construction duration will be approximately six months.

5.3.3.2 Section 3b: Emmet Road to South Circular Road

Section 3b encompasses a length of approximately 940m along Emmet Road, between Grattan Crescent and South Circular Road. The construction activities at Section 3b will comprise of pavement reconstruction, widening, and resurfacing of the roads and construction of new footpaths, 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. Some minor utility diversions and / or protections will be required. The expected construction duration will be approximately nine months.

5.3.3.3 Section 3c: South Circular Road to Bow Lane West

Section 3c encompasses a length of approximately 1,120m along Old Kilmainham, Mount Brown and James's Street, between South Circular Road and Bow Lane West, including a section along Ewington Lane, Basin View, St James's Avenue, Grand Canal Place and Echlin Street. The construction activities at Section 3c will be limited to the construction of the Bus Gate, minor footpath and pavement repairs and new road markings. The boundary wall will be reconstructed at St James's Hospital. Cellars along James's Street will not be impacted. A number of trees will be removed at the St James's Hospital Energy Centre to accommodate the Bus Gate. Quiet street treatment will be implemented along Ewington Lane, Basin View, St James's Avenue, Grand Canal Place and Echlin Street. The expected construction duration will be approximately three months.

5.3.3.4 Section 3d: Bow Lane West to Cornmarket

Section 3d encompasses a length of approximately 1,120m along Thomas Street, between Bow Lane West and Cornmarket. The construction activities at Section 3d will be limited to urban realm enhancement at Bow Lane, new road markings, implementation of segregated cycle facilities and upgrades to the traffic signal infrastructure. Cellars along Thomas Street will not be impacted. A tree will be removed on approach to Cornmarket. The expected construction duration will be approximately three months.

5.3.3.5 Section 3e: Cornmarket to High Street

Section 3e encompasses a length of approximately 280m along High Street, between Cornmarket and Winetavern Street. The construction activities at Section 3e will comprise pavement reconstruction, widening, and resurfacing of the roads, and construction of new footpaths, 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 expected construction duration will be approximately six months.

5.4 Construction Programme

A 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 approximate 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: Proposed Scheme Construction Programme

Section Ref.	Approximate Construction Duration	Approximate Length (m)	Year 1				Year 2				Year 3	
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
Section 1a	9 months	760										
Section 1b	6 months	540										
Section 1c	6 months	660										
Section 1d	9 months	920										
Section 2a	6 months	990										
Section 2b	9 months	930										
Section 2c	6 months	685										
Section 3a	6 months	965										
Section 3b	9 months	940										
Section 3c	3 months	1,120										
Section 3d	3 months	1,120										
Section 3e	6 months	280										

In order to achieve the overall programme duration, it will for the most part, be necessary to work on more than one section / sub-section at any one time. The programme has been prepared with a view to providing as much separation as practicable between sections under construction at any given time. This has been done in order to minimise traffic disruption and facilitate the ease of movement of sustainable modes, bus services and goods along the Proposed Scheme.

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 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 (with sections / sub-sections defined in Section 5.2), and in line with the traffic management stages set out in Section 5.8.3. Boundary works will be a mixture of walls / fencing along industrial / commercial land, railings along parks and temporary boundaries, as required. Where land is temporarily acquired from a landowner for boundary works, it 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 (with sections / sub-sections defined in Section 5.2), and in line with the traffic management stages 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 (BCIDB-JAC-ENV_LA-0007_XX_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 Method Statement 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 by the specialist 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 Recommendations for Tree Work. 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 licenses / 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 of Chapter 15 (Archaeological & Cultural Heritage) of this EIAR.

5.5.2.7 Ground Investigations

Prior to construction, localised confirmatory ground investigation 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. Temporary fencing will be erected, and site security will be employed. 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 be adequate, and appropriate to the speed and volume of traffic during construction. Temporary construction lighting will generally be provided by tower mounted floodlights, which will be cowed 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 Project 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 impacts 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 three retaining walls along Sarsfield Road; MRW9, RW10 and RW11) will be carried out in a controlled manner, and under supervision. Demolition works areas will be appropriately hoarded and signposted. Appropriate mitigation measures will be used to minimise the generation of dust and noise from the demolitions – refer to 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 5.8.3, 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 (BCIDB-JAC-SPW_BW-0007_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 may 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 18.8, Table 18.9, 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 19.10 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, coal holes and light wells have been identified at Section 3c and Section 3d. 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.

In the unlikely event that works are required to a cellar, works would comprise of lowering the cellar roof, blocking up and backfilling a portion of the cellar or blocking up and backfilling the entire extent of the cellar. Such cellar works would generally commence with the excavation of the footpath. A concrete block wall would then be constructed within the cellar at the location of what is to be the new external wall of the cellar, before infilling.

5.5.3.5 Drainage

Adjustment or upgrade works will be required to service chambers and manholes, gullies, etc. Access manholes located in the footways 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 Project 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 by the appointed contractor 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 agreement 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 paths, cycle tracks, cycle lanes), bus stops (island, shared landing area, 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 (BCIDB-JAC-PAV_PV-0007_XX_00-DR-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. 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, seats, 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 (BCIDB-JAC-ENV_LA-0007_XX_00-DR-LL-9001) in Volume 3 of this EIAR.

5.5.4 Structural Works

5.5.4.1 Principal Structures

5.5.4.1.1 Retaining Walls

Retaining walls with a retained height greater than 1.5m are classed as principal structures. There are two principal retaining walls along the Proposed Scheme, as detailed in Table 5.3.

Table 5.3: (Principal) Retaining Walls along the Proposed Scheme

Structure Reference	Structure Type	Details	Chainage (m)	Length (m)	Max Retained Height (m)	Section Reference
RW10	Precast RC Cantilever Wall	Proposed on north side of Sarsfield Road. Existing wall to be demolished and ground excavated to accommodate proposed attenuation pond.	B3840 to B3910	80	3.0	Section 2c
RW11	Precast RC Cantilever Wall	Proposed on north side of Sarsfield Road. Existing wall to be demolished and ground excavated up to wall.	B3920 to B4180	260	2.5	Section 2c

Retaining walls are typically installed to cater for level differences between the road and adjoining lands. The existing retaining walls will be demolished and replaced by new walls. The retained area behind the existing retaining walls will be dug out first and the wall will then be demolished with a hydraulic breaker mounted to an excavator.

Retaining walls will generally be constructed of reinforced concrete, with railing and clad as required, with suitable materials depending on the local environs. Retaining walls will generally be constructed by first isolating the site of the retaining wall using fencing, as appropriate, to the location. 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. Formwork and reinforcing steel for the wall will be fixed in place. Then concrete will be poured in sections and formwork removed after initial curing of concrete. After a sufficient curing period the area behind the wall will be backfilled.

5.5.4.2 Minor Structural Works

5.5.4.2.1 Retaining Walls

Retaining walls with a retained height less than 1.5m are classed as minor structures. There are three minor retaining walls along the Proposed Scheme, as detailed in Table 5.4. Retaining walls are typically installed to cater for level differences between the road and adjoining lands. Retaining walls will be constructed as described in Section 5.5.4.1.1.

Table 5.4: (Minor) Retaining Walls along the Proposed Scheme

Structure Reference	Chainage (m)	Length (m)	Max Retained Height (m)	Section Reference
MRW13	B295 to B395	100	1.0	Section 1b
MRW8	B3495 to B3555	60	1.0	Section 2b
MRW9	B3800 to B3820	20	1.0	Section 2b

5.5.5 Construction Site Decommissioning

On completion of construction, all construction facilities and equipment such as plant, materials, temporary signage, and laydown areas, Construction Compounds, etc. will be removed. The area which was occupied by the Construction Compound will be reinstated – refer to the Landscaping General Arrangement Drawings (BCIDB-JAC-ENV_LA-0007_XX_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 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 5.5. 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 5.5: Estimated Peak Daily Plant and Equipment Numbers

Plant / Equipment Type	Section												
	1a	1b	1c	1d	2a	2b	2c	3a	3b	3c	3d	3e	
Lorry	10	10	10	10	10	10	14	8	8	6	6	8	
Backhoe Mounted Hydraulic Breaker	2	2	2	2	2	2	3	2	2	2	2	2	
8t (tonne) Excavator	2	2	2	2	2	2	3	2	2	1	1	1	
13t (Rubber Wheeled) Excavator	4	4	4	4	4	4	5	4	4	2	2	2	
16t (Rubber Wheeled) Excavator	2	2	2	2	2	2	3	2	2	1	1	1	
6t Dumper	3	3	3	3	3	3	4	3	3	2	2	2	
Road Planer	1	1	1	1	1	1	1	1	1	1	2	1	
Road Sweeper	2	2	2	2	2	2	3	2	2	1	1	1	
Asphalt Paver	1	1	1	1	1	1	1	1	1	1	1	1	
Asphalt Roller	3	3	3	3	3	3	3	2	2	1	1	1	
3t Roller	2	2	2	2	2	2	2	2	2	1	1	1	
Vacuum Excavator	1	1	1	1	1	1	1	1	1	1	1	1	

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 LV1 will be located along the Fonthill Road, within the grounds of the Liffey Valley Shopping Centre, as shown in Image 5.1. The area of Construction Compound LV1 is approximately 3,150m² (metres squared).

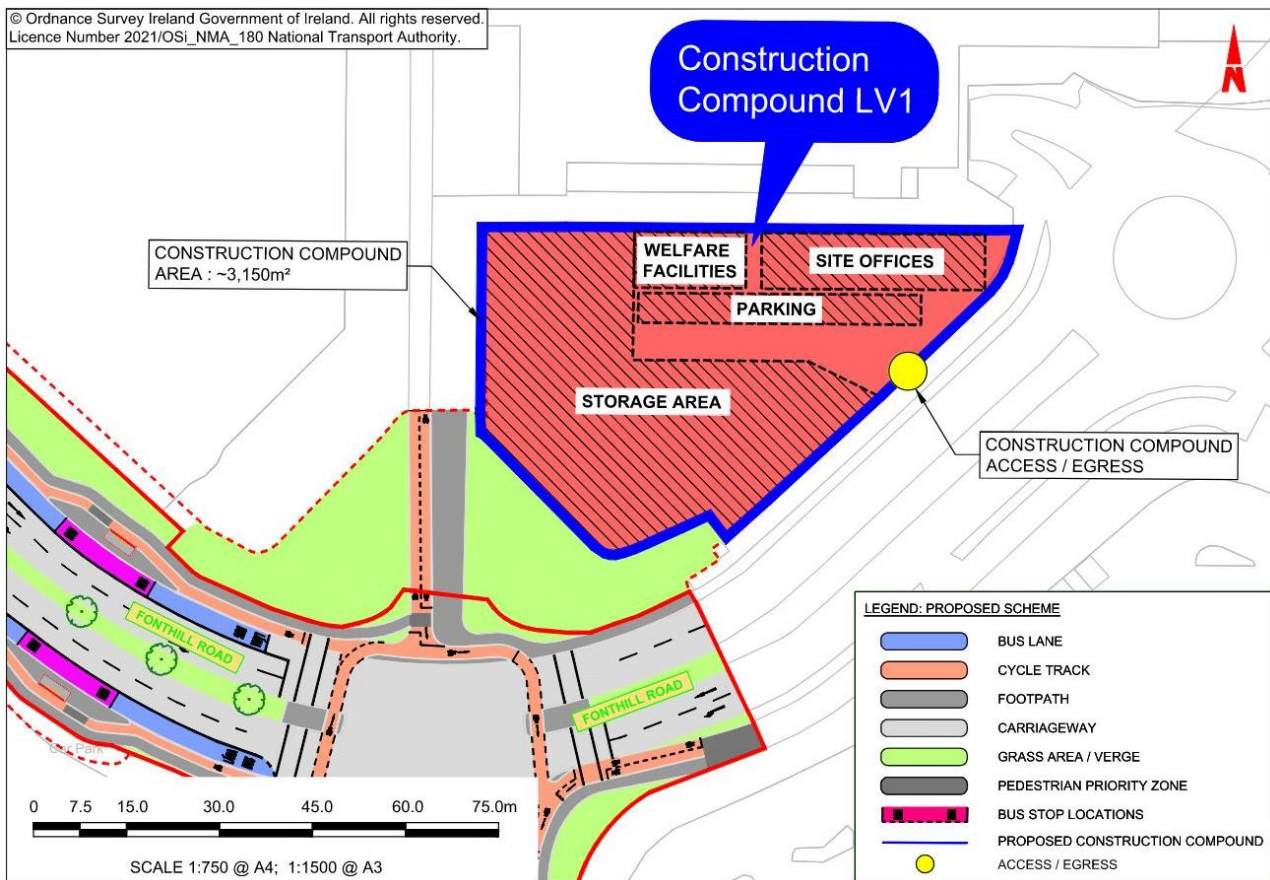


Image 5.1: Location and Extent of Construction Compound LV1

Construction Compound LV2 will be located at lands adjacent to the Eir exchange building on the Coldcut Road, between Cloverhill Road and Ballyfermot Road, as shown in Image 5.2. The area of Construction Compound LV2 is approximately 1010m².

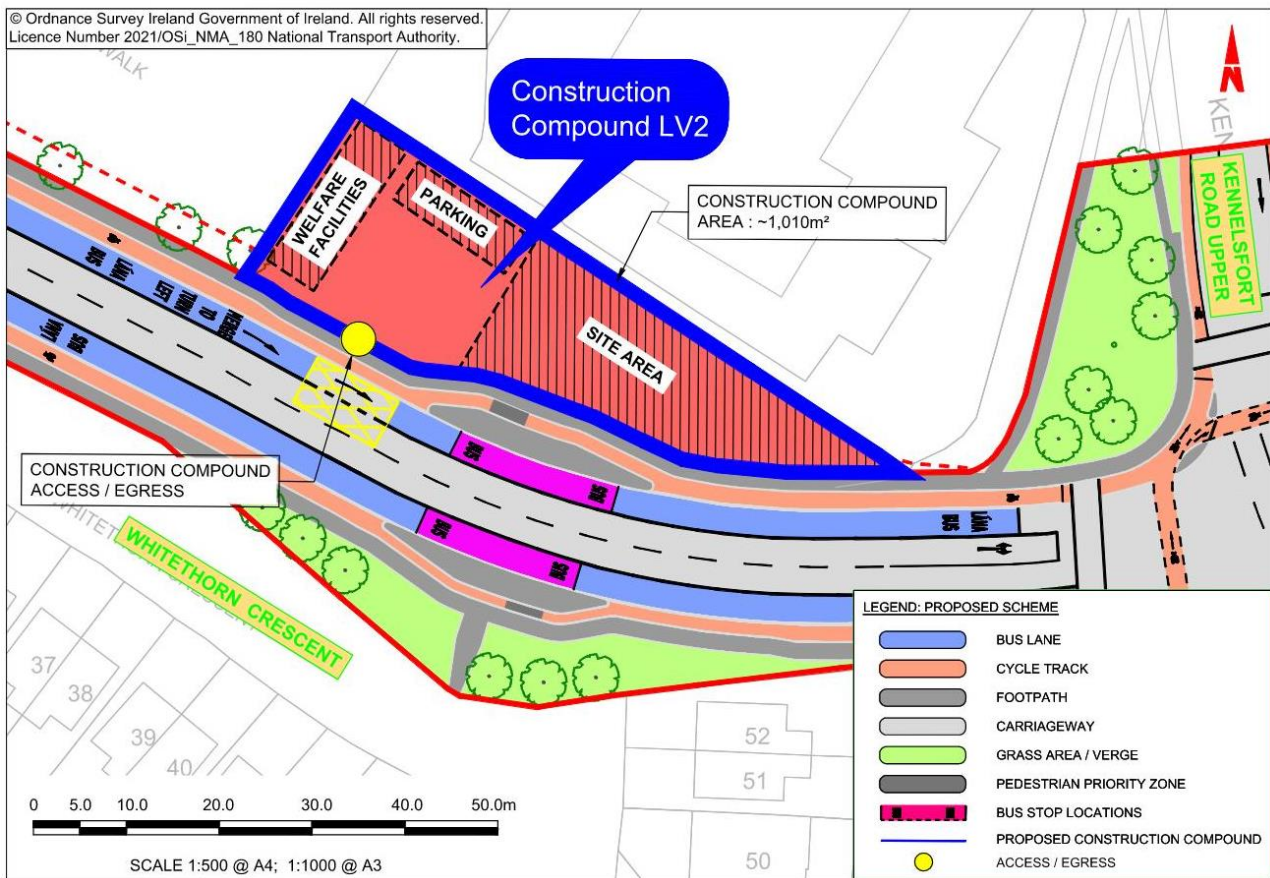


Image 5.2: Location and Extent of Construction Compound LV2

Construction Compound LV3 will be located between Con Colbert Road, and Chapelizod Bypass, within Liffey Gaels Park, as shown in Image 5.3. The area of Construction Compound LV2 is 4,520m².

It is intended that this area will also be used as a Construction Compound on the Lucan to City Centre Core Bus Corridor Scheme (Construction Compound LU3), pursuant to conditions imposed by An Bord Pleanála, should they grant approval. It is envisaged that the Construction Phases of the Proposed Scheme, and the Lucan to City Centre Scheme will not overlap. Depending on the respective timing of the proposed schemes, the area may continue to be used uninterrupted as a Construction Compound if the second scheme commences construction within a relatively short period of time after the first scheme finishing construction. Alternatively, in the eventuality that there is likely to be a substantial time period (e.g. greater than one year) between the Construction Phases of the two schemes, the NTA in discussion with the Local Authority will identify the most appropriate interim use of the area. When the area has ceased to be used as a construction compound it will be returned to its original condition by the appointed contractor for the second scheme.

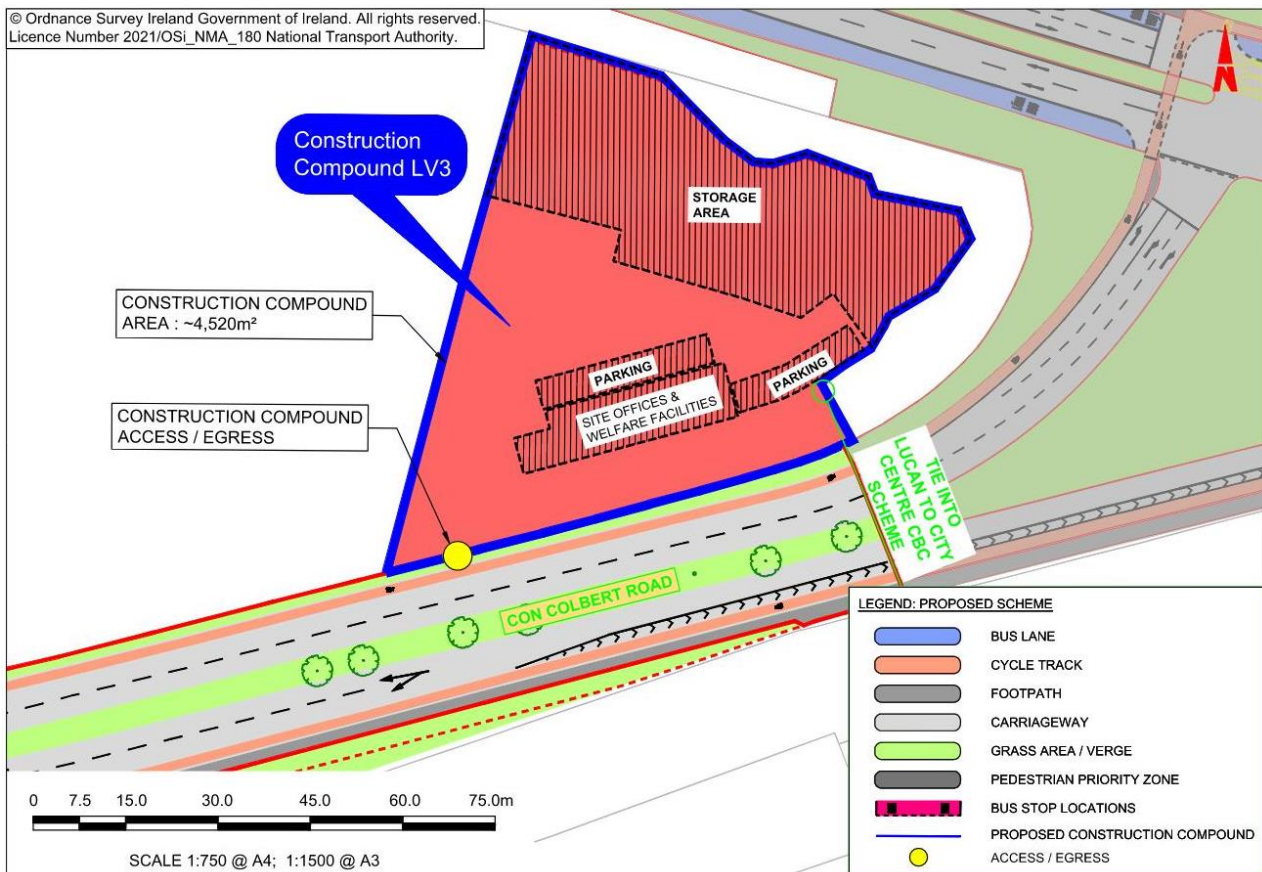


Image 5.3: Location and Extent of Construction Compound LV3

5.7.2 Construction Compound Activities

As shown in Image 5.1 to Image 5.3, the Construction Compounds will contain a site office and welfare facilities for NTA personnel and contractor personnel. Limited car parking will be allowed 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 Compounds, 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 licenced 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

The 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 5.8.3, 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 or cycle facilities are affected by construction, a safe route will be provided past the works area, and where practicable, provisions for matching existing facilities for pedestrians and cyclists will be made. Controlled crossing points will need to be temporarily relocated (by up to 100m) to accommodate works.

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 5.8.3). 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 (by up to 100m) to accommodate works.

This will be done in discussion with the NTA, and service providers. In such cases, temporary bus stops will be safely accessible to all users. The Bus Gate at Mount Brown will be implemented prior to the commencement of

construction works. It is not envisaged that there will be disruption to the Luas services, during the Construction Phase.

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, in some instances, lane closures, road closures and diversions will be necessary to facilitate construction.

Any Operational Phase modifications to general traffic will be implemented at the start of the Construction Phase e.g. the Bus Gate at Mount Brown, the closure of Grattan Crescent to northbound general traffic, the closure of Ballyfermot Road to eastbound general traffic between Le Fanu Road and Kylemore Road.

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. All road closures and diversions will be determined by the NTA, in consultation with the local authority and An Garda Síochána, as necessary. Access will be maintained for emergency vehicles along the Proposed Scheme, throughout the Construction Phase.

The anticipated lane closures, road closures, and diversions that may be required during the Construction Phase of the Proposed Scheme, includes those identified in Table 5.6.

Table 5.6: Lane Closures / Modifications, Road Closures and Diversions

Section Ref.	Lane Closures / Modifications				Diversions
	Minimum One Lane of Traffic in Each Direction	Temporary Lane Closures	Temporary Road Closures (Night-time)	Short Sections of Stop / Go System	
Section 1a	Yes	Yes (Footway, Cycle Track and General Traffic (Each Direction, Staged))	Yes (when converting the roundabouts on Fonthill Road to signalised junctions)	Yes	No
Section 1b	Yes	Yes (Public Transport (Eastbound))	No	Yes	No
Section 1c	Yes	Yes (Footway, Public Transport)	No	Yes	No
Section 1d	Yes	Yes (Footway, Cycle Track, Public Transport (Each Direction, Staged))	No	Yes	No
Section 2a	No (Citybound General Traffic on Ballyfermot Road will be diverted)	Yes (General Traffic (Kylemore roundabout arms reduced to one lane))	Yes (when converting the roundabout on Ballyfermot Road to signalised junction)	Yes	Yes (Le Fanu Road, Kylemore Road, or Le Fanu Road, Chapelizod Bypass)
Section 2b	Yes	Yes (Footway, Cycle Track, Public Transport (Westbound))	No	Yes (Ballyfermot Road, at Markievicz Park)	No
Section 2c	Yes	Yes (Footway (Each Direction, Staged))	No	Yes	No
Section 3a	No	Yes (Footway and Public Transport (Each Direction, Staged))	No	Yes	Yes (Emmet Road, South Circular Road, Con Colbert Road)
Section 3b	Yes	Yes (Footway and Public Transport (Each Direction, Staged))	No	Yes	No
Section 3c	Yes	Yes (Footway (Each Direction, Staged))	No	Yes	No
Section 3d	Yes	Yes (Footway (Each Direction, Staged))	No	Yes	No
Section 3e	Yes	Yes (Public Transport (High Street), General Traffic (Thomas Street and Bridge Street on approach to Cornmarket))	No	Yes	No

The existing carriageway layout will be maintained along the Proposed Scheme to facilitate existing traffic flows, where practicable, however at active construction works areas, the carriageway layout will be modified to provide sufficient space for construction works to be undertaken. The active construction works areas will be dictated by the construction programme in Section 5.4.

In the first instance, where the carriageway width is constrained, the lane widths will be reduced to a minimum of 3.0m. In circumstances where lane width reductions are not sufficient to facilitate the existing layout, the carriageway will be reduced by one lane of traffic in one direction, or one lane of traffic in each direction. Over the majority of the Proposed Scheme, the existing carriageway layout consists of two lanes of traffic in each direction. Along these sections, when construction works areas are active, the carriageway will be reduced to one lane of traffic in each direction. The traffic will be split into three traffic management stages (Stage A to Stage C) as described in Section 5.8.3.1 to Section 5.8.3.3.

Where there is one lane of traffic in each direction, single lane traffic will be controlled by a stop / go system of temporary traffic lights with priority provided to traffic travelling towards the City Centre during the morning peak period and this will be reversed during the afternoon, where appropriate. Where necessary, the appointed contractor will implement lane closures and / or traffic diversions to supplement the stop / go system. The traffic management measures may give rise to some traffic delays outside of the morning peak period and afternoon peak period; however it is anticipated that these would be of a short duration.

5.8.3.1 Stage A

To carry out Stage A works safely, traffic management will be implemented as shown in Image 5.4, by means of narrowing the existing lanes carrying public transport and general traffic to 3.0m. A lateral safety zone will be implemented between the carriageway and the works area, with an appropriate safe distance as per Table 8.2.2.2 of the Traffic Signs Manual.

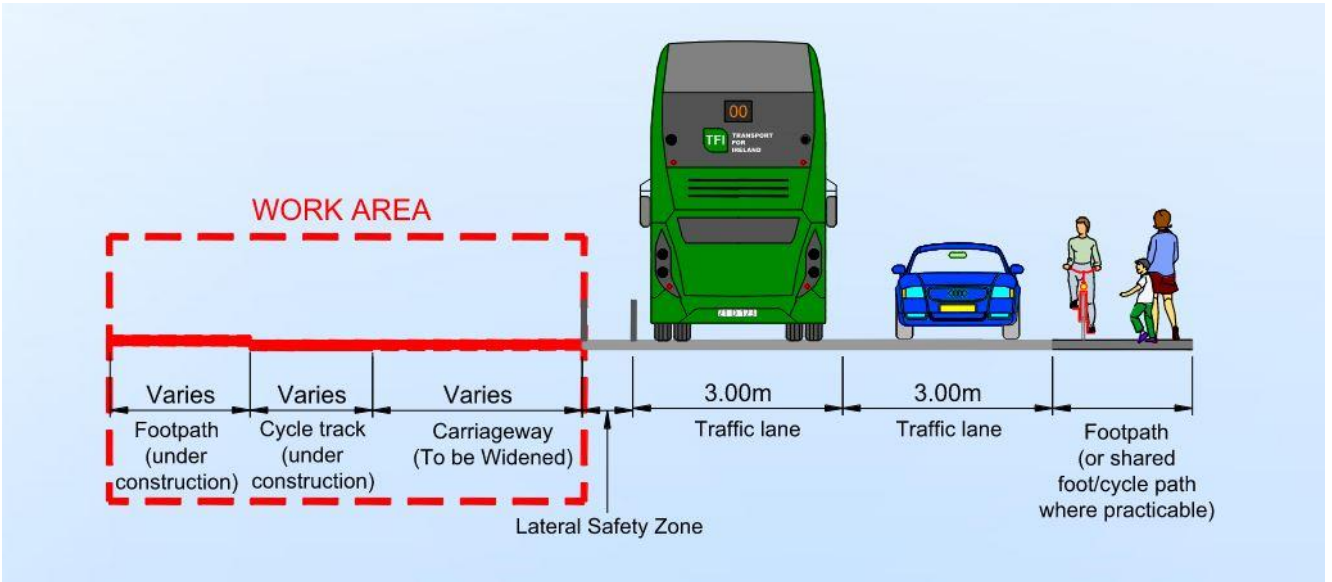


Image 5.4: Work Area - Stage A

5.8.3.2 Stage B

Stage B commences following the completion of Stage A. Public transport, general traffic, pedestrians and cyclists will be transferred to the opposite side of the carriageway to facilitate Stage B works. This stage will include the same methodology as outlined in Stage A, however carried out on the opposite side of the carriageway, as shown in Image 5.5.

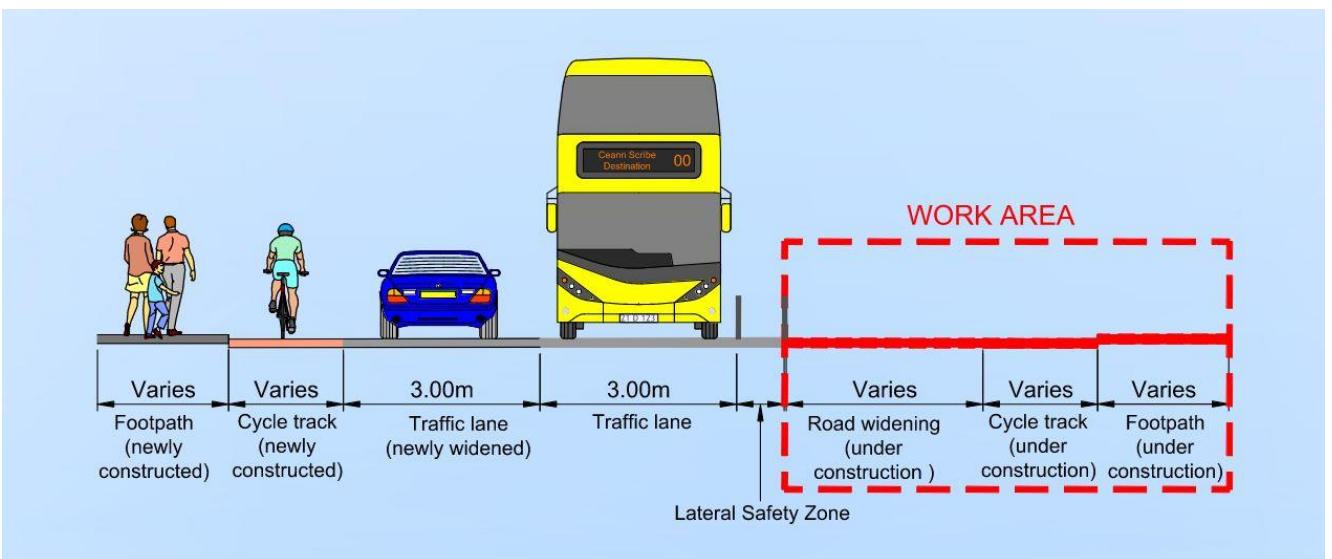


Image 5.5: Work Area - Stage B

5.8.3.3 Stage C

Once Stage B is complete, Stage C will entail completion of the proposed final road surfacing. To maintain traffic movement at this stage, lane closures, road closures, or diversions will be implemented, as appropriate.

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, as will be set out in the Construction Contract, to ensure that there is coordination between projects, that construction access locations remain unobstructed by the Proposed Scheme works and that any additional construction traffic mitigation measures required to deal with cumulative impacts are managed appropriately.

5.10 Construction Environmental Management

5.10.1 Construction Environmental Management Plan

As stated in Section 5.1, 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 2007), 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 the non-native invasive plant species. Non-native invasive plant species were identified in close proximity to the Proposed Scheme during ecological surveys. 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 licence, or other such risks that could lead to a pollution incident, including flood risks. It will be a condition of the Employers 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 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 are summarised in Chapter 22 (Summary of Mitigation & Monitoring Measures) of this EIAR.

5.10.3 Construction 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 time 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 250 to 270 personnel directly employed across the Proposed Scheme, rising to 300 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 Monitoring Measures

All monitoring measures relating to the Construction Phase of the Proposed Scheme have been set out in various chapters of the EIAR and are summarised in Chapter 22 (Summary of Mitigation & Monitoring Measures) of this EIAR.

5.12 References

British Standards institute (2010). BS 3998:2010 Tree Work

British Standards Institute (2012). BS 5837:2012 Trees in Relation to Design, Demolition and Construction

Construction Industry Research & Information Association (CIRIA) (2015). Environmental Good Practice on Site Guide

Department of Transport (DoT) (2019). Traffic Signs Manual. [Online] <https://www.trafficsigns.ie/current-traffic-signs-manual>

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

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

Guidance and Legislation

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

Waste Management Act 1996 (as amended)