Chapter 05
Construction

Contents

5. Construction

5.1 Introduction

This Chapter of the Environmental Impact Assessment Report (EIAR) describes the construction activities associated with the Bray 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.

The Proposed Scheme includes the construction of a new bus interchange facility at the Stillorgan Road entrance of University College Dublin (UCD), known as the UCD Bus Interchange. 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.

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 National Roads Authority (NRA) (now Transport Infrastructure Ireland (TII)) Guidelines for the Creation, Implementation and Maintenance

of an Environmental Operating Plan (NRA 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 four primary sections. The division line between sections has been determined by grouping similar carriageway types together. These sections have been further subdivided into 10 sub-sections, according to the types of construction works required. The sections/sub-sections are:

- **Section 1:** Leeson Street to Donnybrook (Anglesea Road Junction):
  - **Section 1a:** Leeson Street to Wellington Place; and
  - **Section 1b:** Wellington Place to Donnybrook (Anglesea Road Junction).
- **Section 2:** Donnybrook (Anglesea Road Junction) to Loughlinstown Roundabout:
  - **Section 2a:** Donnybrook (Anglesea Road) to Whites Cross (Leopardstown Road); and
  - **Section 2b:** Whites Cross (Leopardstown Road) to Loughlinstown Roundabout.
- **Section 3:** Loughlinstown Roundabout to Bray North (Wilford Roundabout):
  - **Section 3a:** Loughlinstown Roundabout to Shanganagh Road;
  - **Section 3b:** Shanganagh Road to Quinn's Road; and
  - **Section 3c:** Quinn's Road to Bray North (Wilford Roundabout).
- **Section 4:** Bray North (Wilford Roundabout) to Bray South (Fran O'Toole Bridge):
  - **Section 4a:** Bray North (Wilford Roundabout) to Old Connaught Avenue;
  - **Section 4b:** Old Connaught Avenue to Upper Dargle Road; and
  - **Section 4c:** Upper Dargle Road to Bray South (Fran O'Toole Bridge).

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 to Section 5.3.4. 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-0013_XX_00-DR-CR-9001	Site Location Plan
BCIDB-JAC-GEO_GA-0013_XX_00-DR-CR-9001	General Arrangement
BCIDB-JAC-GEO_HV-0013_ML_00-DR-CR-9001	Mainline Plan and Profile
BCIDB-JAC-GEO_CS-0013_XX_00-DR-CR-9001	Typical Cross Sections
BCIDB-JAC-ENV_LA-0013_XX_00-DR-LL-9001	Landscaping General Arrangement
BCIDB-JAC-PAV_PV-0013_XX_00-DR-CR-9001	Pavement Treatment Plans
BCIDB-JAC-SPW_BW-0013_XX_00-DR-CR-9001	Fencing and Boundary Treatment
BCIDB-JAC-TSM_GA-0013_XX_00-DR-CR-9001	Traffic Signs and Road Markings
BCIDB-JAC-LHT_RL-0013_XX_00-DR-EO-9001	Street Lighting
BCIDB-JAC-TSM_SJ-0013_XX_00-DR-TR-9001	Junction System Design
BCIDB-JAC-DNG_RD-0013_XX_00-DR-CD-9001	Proposed Surface Water Drainage Works
BCIDB-JAC-UTL_UD-0013_XX_00-DR-CU-9001	IW Foul Sewer Asset Alterations
BCIDB-JAC-UTL_UE-0013_XX_00-DR-CU-9001	ESB Asset Alterations
BCIDB-JAC-UTL_UG-0013_XX_00-DR-CU-9001	GNI Asset Alterations
BCIDB-JAC-UTL_UW-0013_XX_00-DR-CU-9001	IW Water Asset Alterations
BCIDB-JAC-UTL_UX-0013_XX_00-DR-CU-9001	Telecommunications Asset Alterations
BCIDB-JAC-UTL_UC-0013_XX_00-DR-CU-9001	Combined Existing Utility Records
BCIDB-JAC-STR_GA-0013_XX_00-DR-SS-9001	Structures General Arrangement
BCIDB-JAC-ENV_LA-0013_IN_00-DR-LL-9001	UCD Bus Interchange General Arrangement
BCIDB-JAC-BLD_ZZ-0013_XX_01-DR-AA-0001	Woodbrook Side Lodge General Arrangement
BCIDB-JAC-BLD_ZZ-0013_XX_01-DR-AA-0001	Woodbrook Side Lodge General Arrangement (Plans & Elevations)
BCIDB_JAC_SPW_AW-0013_XX_00_DR_0001	Circle K General Arrangement

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, please refer to 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: Leeson Street to Donnybrook (Anglesea Road Junction)

5.3.1.1 Section 1a: Leeson Street to Wellington Place

Section 1a encompasses a length of approximately 1,300m (metres) along Leeson Street Lower, Leeson Street Upper, and Sussex Road, between St. Stephen's Green and Wellington Place, including Earlsfort Terrace and Hatch Street Lower. The construction activities at Section 1a will comprise 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 (rubbish bins, seats, lighting, benches, planters, bollards, cycle racks, bus stops (including shelters and information displays), etc.) and landscaping works. A taxi rank will be relocated from Leeson Street Lower to Hatch Street Lower. Trees will be removed along Leeson Street Lower and Leeson Street Upper, and replanted along Sussex Road and Wellington Place. The expected construction duration will be approximately 15 months.

5.3.1.2 Section 1b: Wellington Place to Donnybrook (Anglesea Road Junction)

Section 1b encompasses a length of approximately 1,300m along Morehampton Road and Donnybrook Road, between Wellington Place and Anglesea Road. The construction activities at Section 1b will comprise 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. A minor retaining wall (RW034) will be constructed along Donnybrook Road opposite Donnybrook Stadium.

Construction works will be required at the Circle K property, in Donnybrook to facilitate the Proposed Scheme. These works will include potential alteration of the forecourt canopy to reduce its overhang over the footpath,

reconfiguration of the parking provision and landscaping works. In addition, one of the fuel pumps would be inoperable for the duration of works at Section 1b (15 months). However, the Circle K Donnybrook site has received planning permission to be redeveloped as apartments, and it is currently anticipated that construction of these is due to commence in 2024. In this eventuality (i.e. Circle K no longer in operation and the site redeveloped), the Proposed Scheme would then tie in to the proposed redevelopment.

Urban realm enhancement works will be carried out at 2 to 12 Donnybrook Road. Utility (gas mains) diversions and/or protections will be required. Trees will be removed and replanted along Morehampton Road and Donnybrook Road. The expected construction duration will be approximately 15 months.

5.3.2 Section 2: Donnybrook (Anglesea Road Junction) to Loughlinstown Roundabout

5.3.2.1 Section 2a: Donnybrook (Anglesea Road Junction) to Whites Cross (Leopardstown Road)

Section 2a encompasses a length of approximately 5,800m along Stillorgan Road, between Anglesea Road and Whites Cross (Leopardstown Road). The construction activities at Section 2a will comprise 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. The subway at St. Laurence's will be extended across the width of Stillorgan Road. Further information on the St. Laurence's Subway (ST01) construction methodology is provided in Section 5.5.4.1.1. A principal retaining wall (RW039) will be constructed along Stillorgan Road, west of the Priory Drive, Dublin Road Junction. A minor retaining wall (RW031) will be constructed along Stillorgan Road, east of the Priory Drive, Dublin Road Junction. At Coláiste Eoin/Coláiste Íosagáin, tie-in works will be carried out, including removal of a section of boundary wall, lowering of the boundary wall to 0.6m, relocation of a monument, and construction of an access gate. The Construction Compound (BR2) will be located at Fosterbrook. A two-way cycle track will be constructed along Stillorgan Road, between Belfield Bridge (UCD Campus) and Coláiste Eoin/Coláiste Íosagáin, and between Merville House (UCD Campus) and Fosters Avenue. Boundary walls will be relocated along Stillorgan Road, and accesses will be modified. The Hill slip road will be closed. Traffic calming treatment works will be carried out along Glenalbyn Road including implementation of speed ramps, uncontrolled crossings, upgrades to the existing footpath and replacement of the existing steps with ramps. These works will facilitate the diversion of the northbound cycle track through Glenalbyn Road. Various utility diversions and/or protections will be required; including electricity underground cables, water distribution, gas mains and telecommunications infrastructure. Vegetation and trees will be removed, and trees will be replanted along Stillorgan Road. The expected construction duration will be approximately 15 months.

In addition to the above, at the UCD Campus a new UCD Bus Interchange will be constructed. As outlined in Section 5.1, 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. Further information on the UCD Bus Interchange construction methodology is provided in Section 5.5.4.2.1. In order to assess the worst-case for the EIAR, it has been assumed that the UCD Bus Interchange will be constructed within the same timeframe as the rest of Section 2a.

5.3.2.2 Section 2b: Whites Cross (Leopardstown Road) to Loughlinstown Roundabout

Section 2b encompasses a length of approximately 5,700m along Stillorgan Road and Bray Road, between Whites Cross (Leopardstown Road) and Loughlinstown Roundabout. The construction activities at Section 2b will comprise conversion of the Loughlinstown Roundabout to a signalised roundabout (on three of the four arms), 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. An existing principal retaining wall (RW043) will be structurally strengthened through ground improvement works along the north bend of the Loughlinstown Roundabout. Minor retaining walls (RW044a and RW044b) will be constructed along Stillorgan Road, in the central median, at Knocksinna. Boundary walls will be relocated along Stillorgan Road and Bray Road, and accesses will be modified. A pedestrian path will be constructed linking Bray Road and South Park. A two-way cycle track will be constructed between Wyattville Road and Loughlinstown Roundabout along the east side of Bray Road. The existing service road between Loughlinstown Roundabout and Cherrywood Road, and beyond Cherrywood Road will be retained with two-way traffic facilitated for general traffic and cyclists. Quiet Street Treatment works will be

implemented. Various utility diversions and/or protections will be required; including electricity underground cables, water distribution, gas mains and telecommunications infrastructure. Vegetation and trees will be removed, and trees will be replanted along Stillorgan Road and Bray Road. The expected construction duration will be approximately 12 months.

5.3.3 Section 3: Loughlinstown Roundabout to Bray North (Wilford Roundabout)

5.3.3.1 Section 3a: Loughlinstown Roundabout to Shanganagh Road

Section 3a encompasses a length of approximately 1,270m along Dublin Road, between Loughlinstown Roundabout and Shanganagh Road, including a section of Stonebridge Road, Shanganagh Road, Beechfield Manor and Corbawn Lane. The construction activities at Section 3a will comprise conversion of the Dublin Road, Shanganagh Road, Corbawn Lane Roundabout to a signalised junction, 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. The following retaining walls will be constructed at Section 3a:

- A principal retaining wall (RW041) will be constructed along Dublin Road, opposite Rathmichael Park;
- A principal retaining wall (RW023) will be constructed at the Dublin Road, Stonebridge Road Junction;
- An existing principal retaining wall (RW046) will be structurally strengthened along the east side of the Dublin Road, Shanganagh Road, Corbawn Lane Junction. This area will require protection to all tree trunks, and ground matting to avoid soil compaction;
- A minor retaining wall (RW022) will be constructed along the Dublin Road, along the front of Woodbank;
- A principal retaining wall (RW024) will be constructed along Dublin Road, between the Rathmichael Park and Stonebridge Road junctions; and
- A minor retaining wall (RW036) will be constructed along the Dublin Road, on the east side of the road, north of the Dublin Road, Shanganagh Road, Corbawn Lane Junction.

Boundary walls and fencing will be relocated along Dublin Road and Stonebridge Road, and accesses will be modified. A medium voltage (MV) substation will be constructed at Rathmichael Park. A two-way cycle track will be constructed along Stonebridge Road, Dublin Road and Corbawn Lane. Various utility diversions and/or protections will be required; including electricity overhead lines and underground cables, water distribution, gas mains and telecommunications infrastructure. Vegetation and trees will be removed, and trees will be replanted along Dublin Road and Stonebridge Road. Urban realm enhancement works will be carried out at St. Anne's Church including reconfiguration of the car park.

All works associated with the Proposed Scheme in this location are confined to the existing carriageway, apart from minor widening into the existing St. Anne's Church car park on the southbound side of the carriageway and reconfiguration of the St. Anne's Church car park which includes re-surfacing and lining works. The construction works will be carried out in a phased manner to keep the car park operational. The expected construction duration will be approximately 12 months.

5.3.3.2 Section 3b: Shanganagh Road to Quinn's Road

Section 3b encompasses a length of approximately 500m along Dublin Road, between Shanganagh Road and Quinn's Road. The construction activities at Section 3b will comprise reconstruction and resurfacing of the roads, and 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. Utility (gas mains) diversions and/or protections will be required. Trees will be removed and replanted along Dublin Road. The expected construction duration will be approximately 6 months.

5.3.3.3 Section 3c: Quinn's Road to Bray North (Wilford Roundabout)

Section 3c encompasses a length of approximately 1,800m along Dublin Road, between Quinn's Road and Wilford Roundabout. The construction activities at Section 3c will comprise conversion of the Dublin Road, Quinn's

Road, Cherrington Road roundabout to a signalised junction, 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. The following retaining walls will be constructed at Section 3c:

- A principal retaining wall (RW038) will be constructed along the Dublin Road, north of the entrance road to Woodbrook Golf Club;
- A principal retaining wall (RW013) will be constructed along the east side of the Dublin Road, north of Wilford Roundabout;
- A minor retaining wall (RW042) will be constructed along the Dublin Road, at the front of Beech Road;
- A minor retaining wall (RW027) will be constructed along the Dublin Road, opposite Shanganagh Park; and
- A minor retaining wall (RW029) will be constructed along the Dublin Road, north of Woodbrook Downs.

Extensive modifications will be made to boundary walls, fencing, and accesses along Dublin Road. The footpath will be realigned at Castle Farm to retain prominent trees. The existing wall adjacent to the road will be removed and reinstated as a low wall to the back of the realigned footpath. A no dig construction method will be carried out at this location within the root protection area. A two-way cycle track will be constructed along Shanganagh Park and Shanganagh Cemetery. Various utility diversions and/or protections will be required; including electricity overhead lines and underground cables, water distribution, gas mains and telecommunications infrastructure. Vegetation and trees will be removed, and trees will be replanted along Dublin Road. The expected construction duration will be approximately 18 months.

5.3.4 Section 4: Bray North (Wilford Roundabout) to Bray South (Fran O'Toole Bridge)

5.3.4.1 Section 4a: Bray North (Wilford Roundabout) to Old Connaught Avenue

Section 4a encompasses a length of approximately 300m along Dublin Road, between Wilford Roundabout and Old Connaught Avenue. The construction activities at Section 4a will comprise conversion of the Wilford Roundabout to a signalised junction, 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. Accommodation works will be carried out at Woodbrook Estate Side Lodge, including demolition and reconstruction of the building. Further information on the Woodbrook Estate Side Lodge demolition methodology is provided in Section 5.5.2.10. The Construction Compound (BR1) will be located at the Wilford Junction. Boundary walls, fencing, and bollards will be relocated along Dublin Road, and accesses will be modified. An MV Sub Station will be constructed at the Wilford Junction. Various utility diversions and/or protections will be required, including electricity overhead lines and underground cables, water distribution, gas mains and telecommunications infrastructure. Vegetation and trees will be removed, and trees will be replanted along Dublin Road. The expected construction duration will be approximately 12 months.

5.3.4.2 Section 4b: Old Connaught Avenue to Upper Dargle Road

Section 4b encompasses a length of approximately 400m along Dublin Road, between Old Connaught Avenue and Upper Dargle Road. The construction activities at Section 4b will comprise 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. Considerable clearance works are required at Circle K Bray, including the demolition of the forecourt awning, demolition of four pumps, removal of the car wash area and removal of a number of underground tanks. The car park access and parking arrangement at Circle K Bray will be rearranged and a new kerb separation with railing will be constructed in front of the proposed property boundary. The forecourt canopy will be rebuilt over the operational pumps. Accommodation works will also be carried out at the AXA premises, directly adjacent to Circle K Bray, including construction of a new low height wall, reconfiguration of the car park, improved access and landscaping works. Further information on the Circle K Bray demolition methodology is provided in Section 5.5.2.10. A principal retaining wall (RW016) will be constructed along the Dublin Road, north of Upper Dargle

Road. A minor retaining wall (RW014) will be constructed along the Dublin Road, south of Corke Abbey Avenue. Boundary walls and fencing will be relocated along Dublin Road, and accesses will be modified. Urban realm enhancement works will be carried out at the Dublin Road, Upper Dargle Road Junction. Various utility diversions and/or protections will be required; including electricity overhead lines, water distribution, and gas mains. Vegetation and trees will be removed, and trees will be replanted along Dublin Road. The expected construction duration will be approximately 9 months.

5.3.4.3 Section 4c: Upper Dargle Road to Bray South (Fran O'Toole Bridge)

Section 4c encompasses a length of approximately 350m along Dublin Road and Castle Street, between Upper Dargle Road and Ravenswell Road. The construction activities at Section 4c will comprise widening, 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. A principal retaining wall (RW017) will be constructed along the east side of Castle Street, south of Upper Dargle Road. Boundary walls and fencing will be relocated along Castle Street. A pine tree at the entrance to the North Wicklow Educate Together Secondary School (Ravenswell Grounds) on Castle Street will be protected. Various utility diversions and/or protections will be required; including electricity overhead lines and underground cables, water distribution, and gas mains. Trees and vegetation will be removed along Castle Street.

Accommodation works will be carried out at Castle Street Shopping Centre Car Park. All works associated with the Proposed Scheme in this location are confined to the existing carriageway, apart from minor widening into the existing shopping centre car park on the northbound side of the carriageway and reconfiguration of the Castle Street Shopping Centre Car Park which includes re-surfacing and lining works. The construction works will be carried out in a phased manner to keep the car park operational. The expected construction duration will be approximately 9 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 36 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	Q3	Q4
Section 1a	15 months	1,300	■	■	■	■	■							
Section 1b	15 months	1,300		■	■	■	■	■						
Section 2a	15 months	5,800		■	■	■	■	■						
Section 2b	12 months	5,700	■	■	■	■								
Section 3a	12 months	1,270					■	■	■	■				
Section 3b	9 months	500							■	■	■			
Section 3c	18 months	1,800					■	■	■	■	■	■		
Section 4a	12 months	300								■	■	■	■	
Section 4b	9 months	400										■	■	■
Section 4c	9 months	350								■	■	■		

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.

As mentioned in Section 5.1, it is envisaged that the UCD Bus Interchange will be constructed under a separate Construction Contract from the remainder of the Proposed Scheme, therefore it is possible that the UCD Bus Interchange 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 the programme assumes that the UCD Bus Interchange and the rest of Section 2a will be constructed concurrently in order to assess the worst-case scenario.

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 any decision by An Bord Pleanála, 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.

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 (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 (DTTAS) 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-0013_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 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, the NTA will ensure that a 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 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 investigation will be undertaken where necessary by the appointed contractor.

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), where necessary, 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 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 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 and Demolition Resource Waste Management Plan (CDRWMP) in Appendix A5.1 CEMP in Volume 4 of this EIAR.

The following structures will be demolished as part of the Proposed Scheme works:

- Woodbrook Estate Side Lodge, Dublin Road; and
- Elements (Awning, Pumps, Tanks) of Circle K Bray Service Station, Dublin Road.

Demolition 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.

5.5.2.10.1 Demolition of the Woodbrook Estate Side Lodge

The existing single story residential property south-east of the Wilford Roundabout, at the south end of the Woodbrook Estate, will be demolished and reconstructed. The existing lodge will be demolished prior to construction of the new lodge, which will be constructed approximately 24m north-east of the existing lodge. Relocation of the existing lodge is required to facilitate the proposed carriageway cross-section. The proposed lodge will re-use certain materials from the demolished lodge, where practicable. The occupants will need to be relocated during the demolition / construction of the residential property.

Prior to demolition of the property, the appointed contractor will undertake an asbestos survey. Should asbestos containing materials be found, it will be disposed of in accordance with the appropriate legislation. As there is an attic in the property, there will also be a requirement for a bat survey prior to demolition.

All existing services (including electricity, water, gas, and telecommunications) will be identified, located, and turned off, prior to demolition works, in liaison with local service providers. Temporary disruption to services may arise during the course of the work, however existing services will be re-instated. Considerable site clearance and topsoiling will be required to facilitate construction of the proposed lodge. Site clearance works will include removal of nine trees. Any materials remaining in or around the house (e.g. furniture, kitchen appliances etc.) will be segregated and removed off site to an appropriately licensed facility.

Demolition of the property will commence from the roof structure working downwards. The appointed contractor will require the use of excavators and/or other suitable equipment for the demolition works. The remaining concrete and masonry structures will then be demolished and temporarily stockpiled in an appropriate location within the Proposed Scheme boundary. All material will be removed off site to an appropriately licensed facility. Any materials that are planned to be reused, where practicable (e.g., roof slates, limestone stone elements), will be stored appropriately by the appointed contractor.

The existing on-site waste treatment system will be decommissioned and the percolation area backfilled with suitable material. The existing boundary wall and the two vehicular access gates will be demolished and a new (set-back) boundary wall will be constructed. The stone piers from the existing gateway will be retained for reuse for the new gateway.

Safe access to the adjacent commercial properties will be maintained throughout the demolition activities, unless otherwise agreed with the individual landowners.

5.5.2.10.2 Demolition of Elements of Circle K Bray

The existing Circle K service station on the east side of the Dublin Road in Bray will be modified, to facilitate carriageway widening works. Considerable clearance works are required at Circle K Bray, including the demolition of the forecourt awning, demolition of four pumps, removal of the car wash area, removal of underground tanks and reconfiguration of the parking spaces. The low height kerb separation and railing will also be demolished and removed.

Demolition of elements of the service station will commence from the roof structure working downwards. The overhead awning will be removed first. The appointed contractor will require the use of excavators and/or other suitable equipment for the demolition works. The remaining concrete and masonry structures will then be demolished and temporarily stockpiled in an appropriate location within the Proposed Scheme boundary. All material will be removed off site to an appropriately licensed facility. The pumps will be decommissioned and demolished.

Due to the removal of the underground tanks there is risk of contamination. Decommissioning of the pumps and the underground tanks will be undertaken in accordance with the appropriate legislation.

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-0013_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 and coal holes extend outwards from buildings into adjoining footpaths or streets. Cellars, coal holes and light wells have been identified at Section 1a. 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 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 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:

- Watermains;
- Stormwater and foul sewers;
- 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 drawings (BCIDB-JAC-PAV_PV-0013_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

The appointed contractor will install street furniture such as rubbish bins, signage, seats, lighting, benches, planters, bollards, cycle racks and bus stops (including shelters and information displays etc.).

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-0013_XX_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 5.5.4.1.3. Further information on the structures along the Proposed Scheme is provided in the Structures General Arrangement drawings (BCIDB-JAC-STR_GA-0013_XX_00-DR-SS-9001) in Volume 3 of this EIAR.

Table 5.3: Principal Structures

Structure Name	Structure Reference	Section Reference
St Laurence's Subway	ST01	Section 2a
Woodbrook Estate Side Lodge	ST02	Section 4a
Retaining Walls	RW039	Section 2a
	RW043	Section 2b
	RW041	Section 3a
	RW023	Section 3a
	RW024	Section 3a
	RW045	Section 3a
	RW046	Section 3a
	RW038	Section 3c
	RW013	Section 3c
	RW016	Section 4b
	RW017	Section 4c

5.5.4.1.1 St Laurence's Subway (ST01)

The existing underpass structure on Stillorgan Road, at St. Laurence's Park, will be extended on the east side to accommodate the Proposed Scheme. The existing structure is located approximately 9km (kilometres) south of

Dublin City Centre. The existing structure carries Stillorgan Road over a pedestrian and cyclist link between St. Laurence's Park and Patrician Villas. The structure is a box culvert, with an approximate span of 3.7m, and length of 31.1m.

The proposed alignment and cross-section of the carriageway will require widening of the underpass structure, and construction of a parallel independent structure. The existing carriageway cross-section will be extended from 31.1m to 32.9m.

New wingwalls will be constructed to the east of the structure, parallel to the existing wingwalls. The existing wingwalls will retain the carriageway during construction activities reducing the need for temporary works. Once the new wingwalls are constructed, the space between the new and existing walls will be backfilled. The existing wall will be partially demolished such that the remaining sections are under the subbase of the surfacing.

The construction form for this widening will be an in situ box culvert with a monolithic connection between the new and existing elements. The parallel independent structure will be constructed as described below:

- Site enabling works will be carried out, including the closure of the pedestrian route through the underpass, and a suitable diversion will be established;
- Excavation will be carried out, to foundation level, for the proposed box section and wingwalls;
- Local holes will be broken in the existing wingwalls, to allow for free draining of water;
- Removal of façade from existing box culvert elevation;
- Installation of reinforcement, in order to form monolithic connection;
- Fix reinforcement and cast ground slab for widened box culvert;
- Erection of formwork for walls and roof slab, and pouring of concrete for these sections;
- Fix reinforcement for wingwalls and pouring of concrete;
- Backfill of wingwalls to finished levels;
- Demolition of existing wingwall parapet and head wall below finished ground level;
- Installation of surfacing on widened section, and tie-in to the east of structure; and
- Landscaping and Finishing works.

The subway will be integral with the wingwall, provided via dowel connections between the wingwalls and the box elements. The stainless-steel dowels will be cast into box elements and the first sections of wingwall will be cast around the dowel allowing for the transfer of load. Reinforcement in the elements will be altered around these openings and will be able to resist the stress concentration introduced at these discrete points.

5.5.4.1.2 Woodbrook Estate Side Lodge (ST02)

The existing single story residential property south-east of the Wilford Roundabout, at the south end of the Woodbrook Estate, will be demolished to facilitate the Proposed Scheme cross-section required. A new lodge building will be constructed approximately 24m north-east of the existing lodge. The existing lodge demolition methodology is provided in Section 5.5.2.10.1.

The proposed lodge structure will be larger than the existing structure so that it is compliant with current Building Regulations (existing building footprint is approximately 56m^2, proposed building footprint is approximately 79m^2).

The lodge will be rebuilt using modern construction methods and materials, with key external items from the existing structure reused in the proposed structure. Where practicable, the following will be re-used from the existing structure: roof slates, timber barge boards, limestone stone elements, and wall brick course features. Where sufficient materials are not available (due to the proposed structure being larger) or are not salvageable, reclaimed materials with a similar colour and finish will be used, where practicable. It is intended that the chimney will be rebuilt in a like-for-like fashion, using reclaimed materials where practicable.

As part of the relocation works, the existing pedestrian gateway will be re-positioned, utilising retained stone piers. A new widened vehicle access will be provided with piers re-built with original materials. The car parking area will be reconfigured within the boundary. The existing boundary wall will be set-back and reconstructed, like for like.

Rebuilding the lodge will require removal of two trees. An additional seven trees will be removed, to facilitate road widening. To mitigate for the loss of trees, five new trees will be replanted, including three specifically positioned to provide screening along the southern boundary. As part of the drainage works, new on-site waste treatment will be installed. A septic tank will be installed with a percolation area, which will be landscaped.

The Woodbrook Estate Side Lodge reconstruction works will be undertaken in the following sequence:

- Site clearance and excavation;
- Utility diversions;
- Drainage and service ducting including installation of the septic tank and percolation area;
- Structural works – preparation and pouring of the structure foundations and concrete columns. Once completed, the structural steelwork, glass, aluminium panels and roof will be installed;
- Kerbs and paved area works;
- Construction of the boundary walls and gates; and
- Finishing works – pulling of cabling, and installation and commissioning of the mechanical and electrical infrastructure.

5.5.4.1.3 Retaining Walls

Retaining walls with a retained height greater than 1.5m are classed as principal structures. There are 11 principal retaining walls along the Proposed Scheme, as detailed in Table 5.4.

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

Structure Reference	Structure Type	Details	Chainage (m)	Length (m)	Max Retained Height (m)	Section Reference
RW039	Earth Embankment	Stillorgan Road west side of mainline, to accommodate new bus stop, limited land taken. Carriageway is 1.5m lower than green area behind the existing bus stop.	A6195 to A6240	45	1.5	Section 2a
RW043	Existing wall at Loughlinstown Roundabout	Existing retaining structure supporting the embankment at Loughlinstown Roundabout. Ground improvement works required. Composition of structure unknown.	A14050 to A14140	110	3.6	Section 2b
RW041	Earth Embankment	Dublin Road west side of mainline. Impact on vegetated verge adjacent to school grounds.	A14700 to A14750	50	2.0	Section 3a
RW023	Cast In Situ RC Wall	Dublin Road west side of mainline at Stonebridge Road junction, to accommodate the proposed widening.	E10 to A14770	40	2.5	Section 3a
RW024	Precast RC Wall	Along the east side of Dublin Road, between Rathmichael Park and Stonebridge Road junctions to accommodate widening and support traffic surcharge.	A14770 to A14800	30	1.5	Section 3a
RW045	Existing Masonry Wall at St. Anne's Roundabout	Existing retaining wall west of St. Anne's Roundabout. No structural works required.	A15175 to A15025	135	1.5	Section 3a
RW046	Existing Masonry Wall at St. Anne's Roundabout	Existing retaining structure supporting the Dublin Road, south-east of roundabout. Strengthening works required. Composition of structure unknown.	A15175 to A15025	120	3.2	Section 3a
RW038	Precast RC Wall	Dublin Road east side of the mainline. Level of verge reduces on approach to junction.	A17040 to A17080	40	1.8	Section 3c
RW013	Precast RC Wall	Dublin Road east side of mainline, to accommodate the proposed cross-section. Traffic surcharge needs to be considered.	A17190 to A17290	100	1.5	Section 3c
RW016	Cast In Situ RC Wall	Dublin Road east side of mainline, to accommodate the proposed cross-section before the Upper Dargle Road junction. No traffic surcharge needs to be considered.	A18085 to A18130	45	2.5	Section 4b
RW017	Cast In Situ RC Wall	Along Castle Street, south of Upper Dargle Road to accommodate road widening and support traffic surcharge.	A18150 to A 18190	40	2.0	Section 4c

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 cladding 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 UCD Bus Interchange

Within the UCD Campus, a new Bus Interchange, with an associated Plaza Island, will be constructed at the campus entrance along Stillorgan Road. The Bus Interchange will be designed with 20 bus stops, with 12 bespoke shelters, and a circulation area. The Plaza Island will consist of two sheltered waiting areas with canopies, each

serving two bus stops on each side of the Plaza Island. The shelter's cantilevered canopies will provide large, covered areas for waiting, supplemented by semi-enclosed waiting rooms. Approximately 87m of linear seating will be provided. Bus stops and bus information displays will be integrated into the Plaza Island. The Bus Interchange will be integrated into a woodland walkway, with key pedestrian and cyclist connections. A new shared path will be constructed between Stillorgan Road and the Bus Interchange, and the existing walkway connecting Stillorgan Road and O'Reilly Hall will be redesigned. The Bus Interchange will tie-in to the existing campus, as a high-quality urban realm. Two sets of gates will be erected at the entrance to the UCD Campus at Belfield.

The two pavilions will be 12m in length and 4m in width. The pavilions will consist of glass walls on all sides, with an opening on each long side, facing the two bus stops on either side. Wooden benches will line the long sides of the shelter on the inside and outside. The shelters will feature a central skylight. The pavilions will comprise a primary steel tube frame, supported on three circular columns, clad with a secondary frame of pre-weathered Rheinzink panels. Drainage from each roof will be directed through the columns to a below ground rainwater drainage system, eased by the presence of green rooves incorporated into the roof of each canopy. Up-lighting on the canopies will be provided. The carriageway will be surfaced with concrete, and the Island Plaza will be surfaced with silver granite kerb and pavers.

The Bus Interchange works will be undertaken in the following sequence:

- Site clearance and excavation;
- Utility diversions;
- Drainage and service ducting;
- Structural works – preparation and pouring of the structure foundations and concrete columns. Once completed, the structural steelwork, glass, aluminium panels and sedum/green roof will be installed;
- Kerbs and paved area works;
- Street furniture; and
- Finishing works – pulling of cabling, and installation and commissioning of the mechanical and electrical infrastructure.

5.5.4.2.2 Circle K Bray

The existing Circle K service station on the east side of the Dublin Road in Bray will be modified, to facilitate carriageway widening works. Considerable clearance works and demolition works are required at Circle K Bray, as described in Section 5.5.2.10.2.

Following the clearance works and demolition works, the forecourt canopy will be rebuilt over the remaining four operational pumps. The car wash, service station and existing access will be reconfigured. The car park access and parking arrangement at Circle K Bray will be repositioned and a new kerb separation with railing will be constructed in front of the boundary.

The Circle K Bray service station works will be undertaken in the following sequence:

- Site clearance and excavation;
- Decommissioning of four pumps. Removal of the underground tanks and connections relevant to these pumps;
- Utility diversions;
- Drainage and service ducting, in particular the underground tank connections to the operational pumps;
- Structural works – preparation and pouring of the structure foundations and concrete columns. Once completed, the forecourt canopy will be modified;
- Kerbs and paved area works;
- Street furniture and landscaping; and
- Finishing works – pulling of cabling, and installation and commissioning of the mechanical and electrical infrastructure.

The service station operation will be impacted during the construction works.

5.5.4.2.3 Retaining Walls

Retaining walls with a retained height less than 1.5m are classed as minor retaining walls. There are 10 minor retaining walls along the Proposed Scheme, as detailed in Table 5.5. 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 5.5.4.1.3.

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

Structure Reference	Structure Type	Chainage (m)	Length (m)	Max Retained Height (m)	Section Reference
RW034	Cast In Situ RC Wall	A2420 to A2440	20	0.5	Section 1b
RW031	Earth Embankment	A6305 to A6380	75	1.0	Section 2a
RW044a	Precast RC Wall	A8805 to A8825	20	1.0	Section 2b
RW044b	Precast RC Wall	A8805 to A8825	20	1.0	Section 2b
RW022	Precast RC Wall	A14560 to A14660	100	1.0	Section 3a
RW036	Precast RC Wall	A14800 to A14980	180	0.5	Section 3a
RW042	Precast RC Wall	A15880 to A16010	130	1.2	Section 3c
RW027	Cast In Situ RC Wall	A16310 to A16350	40	0.5	Section 3c
RW029	Earth Embankment	A16785 to A16840	55	1.3	Section 3c
RW014	Cast In Situ RC Wall	A17755 to A17800	45	1.0	Section 4b

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 Compounds will be reinstated (refer to the Landscaping General Arrangement drawings (BCIDB-JAC-ENV_LA-0013_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 5.6. 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	Section									
Type	**1a**	**1b**	**2a**	**2b**	**3a**	**3b**	**3c**	**4a**	**4b**	**4c**
Lorry	3	3	15	16	3	1	6	3	3	3
Backhoe Mounted Hydraulic Breaker	2	2	7	7	2	1	4	1	2	1
8t (tonne) Excavator	1	1	5	5	2	1	4	1	2	1
13t (Rubber Wheeled) Excavator	1	1	7	7	2	-	3	1	1	1
16t (Rubber Wheeled) Excavator	-	1	3	3	1	-	2	-	1	1
6t Dumper	2	2	8	10	3	1	4	1	2	1
Road Planer	1	1	1	1	1	-	1	1	1	1
Road Sweeper	2	2	10	10	2	1	3	2	2	2
Asphalt Paver	2	2	6	6	2	1	3	2	2	2
Asphalt Roller	3	4	6	6	3	1	3	2	3	2
3t Roller	2	2	5	5	2	1	3	1	1	1
Piling Rig	-	-	-	-	-	-	-	-	-	1
Concrete pump	-	-	-	-	-	-	-	1	1	-
Crane	-	-	-	-	-	-	-	-	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.

The Construction Compound BR1 will be located south-west of the Wilford Junction, with access/egress from Dublin Road, as shown in Image 5.1. The area of Construction Compound BR1 is approximately 10,930m^2 (metres squared).

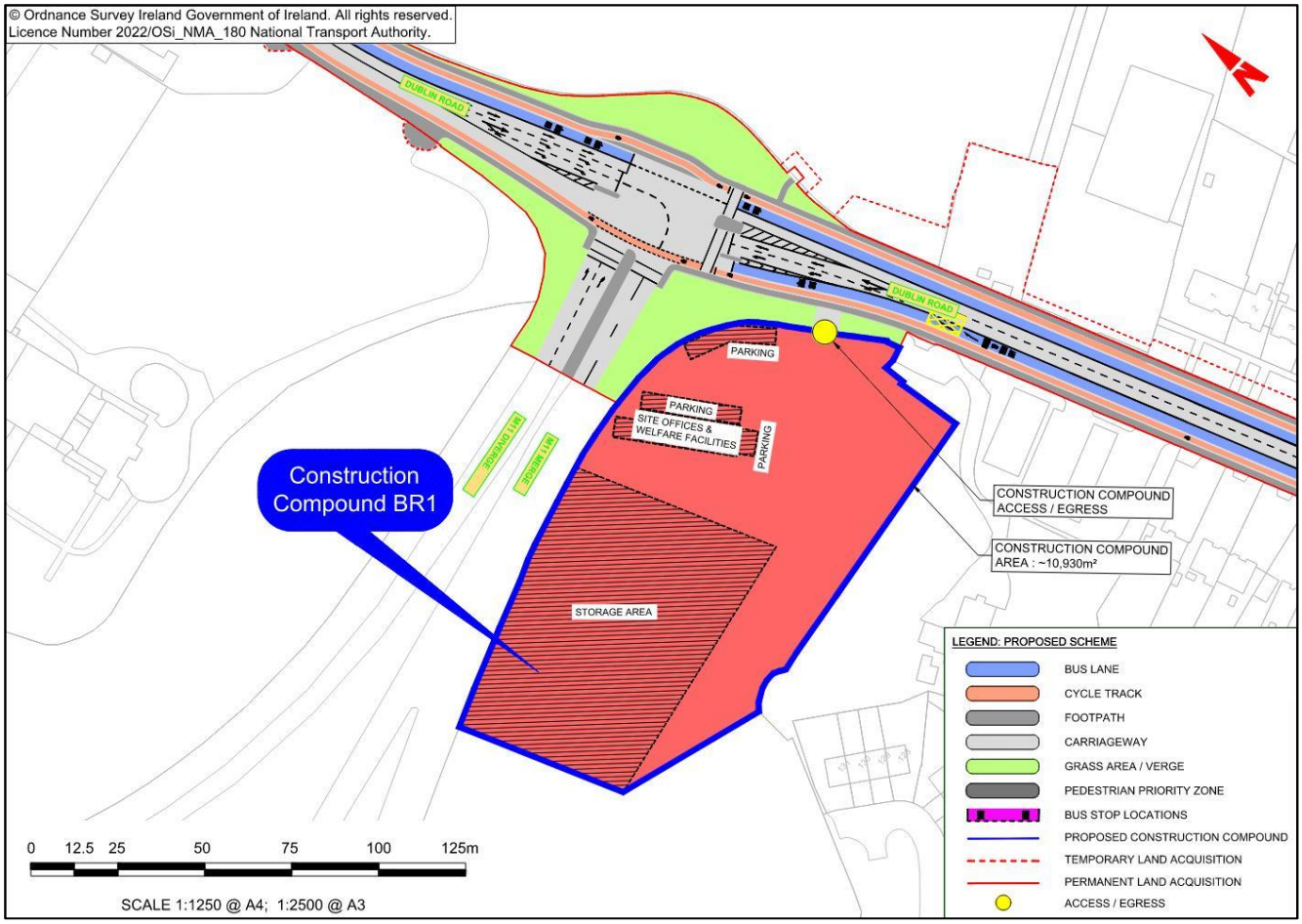

Image 5.1: Location and Extent of Construction Compound BR1

Construction Compound BR2 will be located east of Stillorgan Road, with access/egress from Fosterbrook, as shown in Image 5.2. The area of Construction Compound BR2 is approximately 1,290m^2.

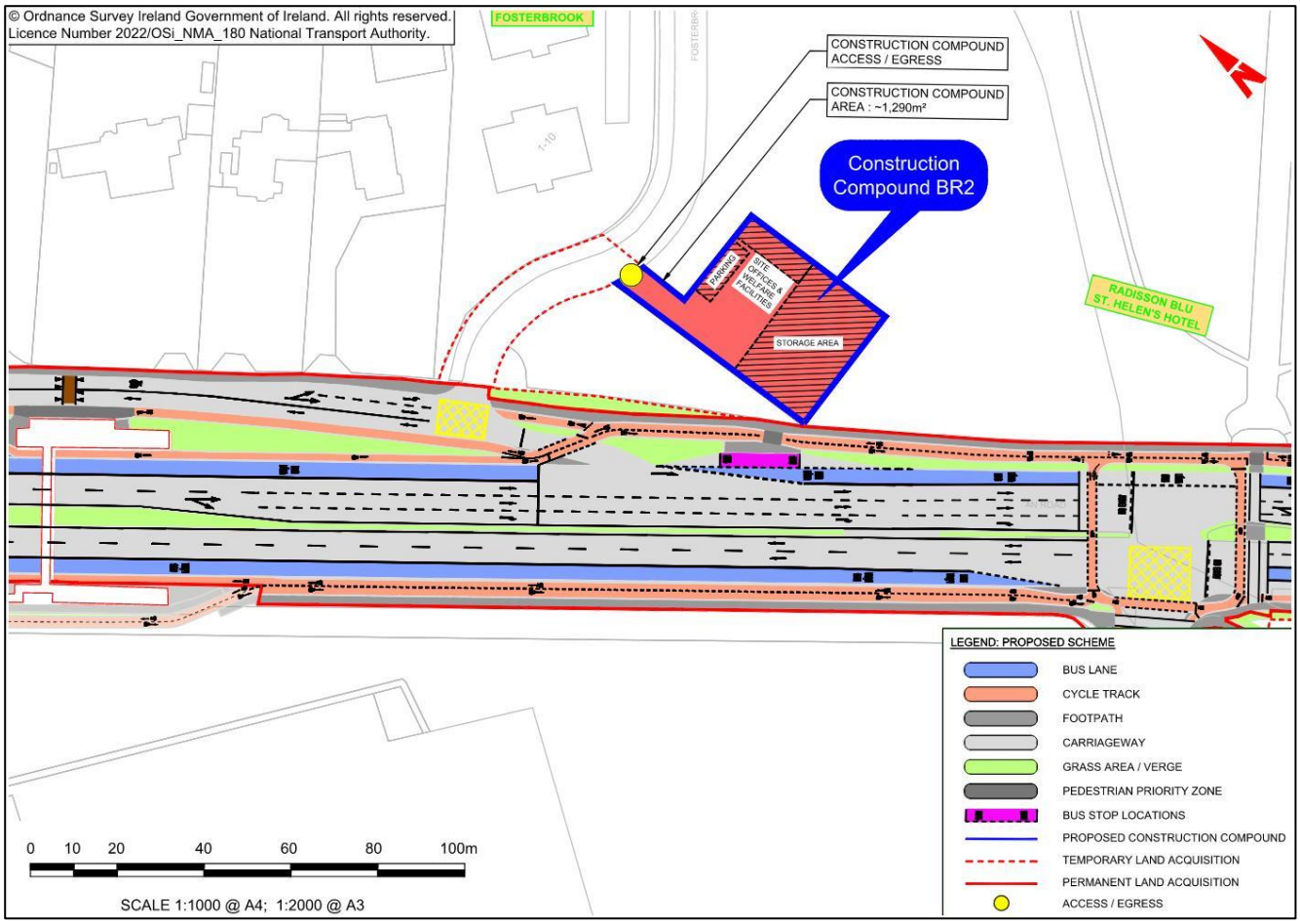

Image 5.2: Location and Extent of Construction Compound BR2

5.7.2 Construction Compound Activities

As shown in Image 5.1 and Image 5.2, 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 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

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 Chapter 8 of the Traffic Signs Manual (DTTAS 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 (DTTAS 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. Where this is not practicable, pedestrians will be directed to use the footpath on the opposite side of the road, crossing at controlled crossing points.

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 to accommodate the 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 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 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, include those identified in Table 5.7.

Table 5.7: Road Closures, Lane Closures and Diversions

Section Ref.	Lane Closures/Modifications				Diversions
	Minimum One Lane of Traffic in Each Direction (for roads that are two-way)	Temporary Lane Closures	Temporary Road Closures (Night-time)	Short Sections of Stop/Go System	
Section 1a	Yes	Yes (Footway, Cycle Track, Public Transport and General Traffic)	No	No	Yes (Footway and Cycle Track diverted from Charlemont Place to Adelaide Road via Harcourt Terrace)
Section 1b	Yes	Yes (Footway, Cycle Track, Public Transport and General Traffic)	No	No	No
Section 2a	Yes	Yes (Footway, Cycle Track, Public Transport and General Traffic)	No	No	No
Section 2b	Yes	Yes (Footway, Cycle Track, Public Transport and General Traffic)	No	No	No
Section 3a	Yes	Yes (Footway, Cycle Track, Public Transport and General Traffic)	No	Yes	No
Section 3b	Yes	Yes (Footway)	No	Yes	No
Section 3c	Yes	Yes (Footway, Cycle Track, Public Transport and General Traffic)	No	Yes	No
Section 4a	Yes	Yes (Footway, Cycle Track, Public Transport and General Traffic)	No	Yes	No
Section 4b	Yes	Yes (Footway, Cycle Track, Public Transport and General Traffic)	No	Yes	No
Section 4c	Yes	Yes (Footway, Cycle Track, Public Transport and General Traffic)	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 reversed during the afternoon peak period. 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 5.3, 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.

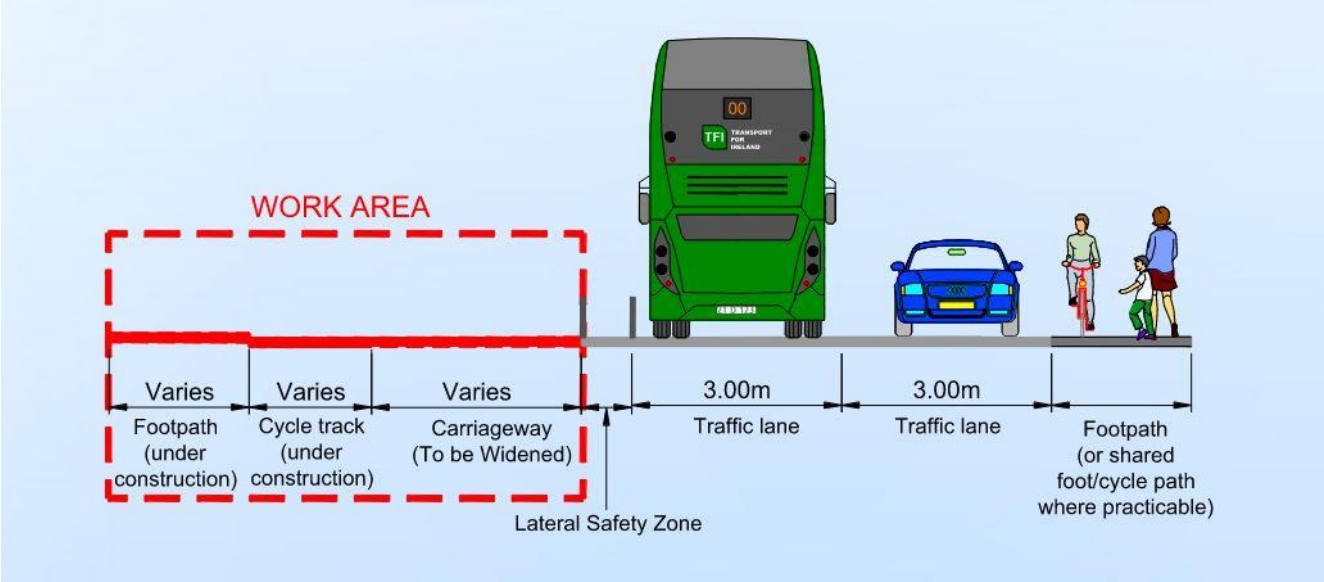

Image 5.3: Work Area – Stage A

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 5.4.

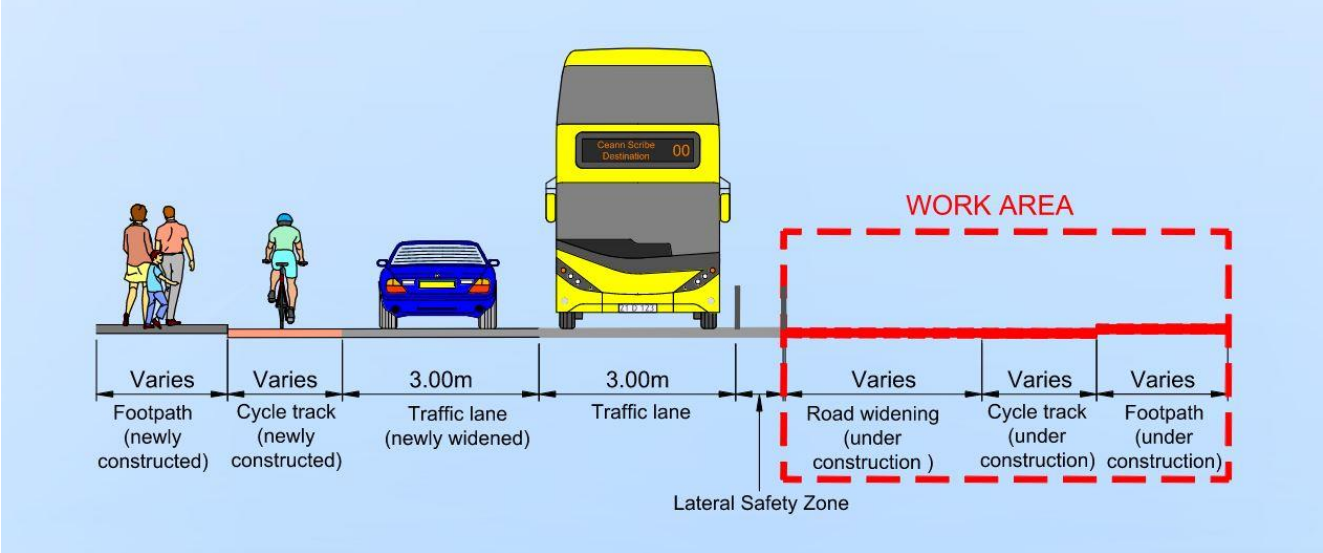

Image 5.4: Work Area – Stage B

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 of 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 (NRA 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 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. 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 mitigation measures identified in this EIAR and any additional measures required pursuant to conditions imposed by An Bord Pleanála to any grant of approval.

5.10.1.4 Construction and Demolition Resource and Waste Management Plan

The 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 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 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) and in Appendix A5.1 CEMP in Volume 4 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 daytime/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 150 to 200 personnel directly employed across the Proposed Scheme on average, rising to 280 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, and 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 Safety and Health 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 Safety and Health 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

British Standards Institution (BSI) (2010). BS 3998:2010 Tree Work. Recommendations

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

Construction Industry Research and Information Association (CIRIA) (2015). Environmental Good Practice on Site Guide, 4th Edition

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

National Roads Authority (NRA) (2007). Guidelines 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

Directives and Legislation

No. 10 of 1996 – Waste Management Act, 1996, as amended

No. 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