



Chapter 05

Construction

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5 Construction

5.1 Introduction

This Chapter of the Environmental Impact Assessment Report (EIAR) describes the construction activities associated with the BusConnects Galway: Cross-City Link (University Road to Dublin Road) Scheme hereafter referred to as the Proposed Scheme.

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

Galway City Council (GCC) (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 GCC will employ an Employer's Representative team with appropriate competence to administer and monitor the Construction Contract for compliance with the Employer's Requirements.

In order to allow an assessment of the construction stage 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;
- A programme for the Proposed Scheme (i.e., when the sections will be constructed) is presented in Section 5.3;
- A general overview description of the construction methodology for each section (i.e., how the Proposed Scheme will be built) is presented in Section 5.4;
- Construction methodology is presented in Section 5.5; and
- Details on Construction Environmental Management aspects are presented in Section 5.6.

Details of mitigation measures proposed to address potential impacts arising from construction activities are described in Chapter 6 (Traffic & Transport) to Chapter 20 (Cumulative Impact & Environmental Interactions) as appropriate and are summarised in Chapter 21 (Summary of Mitigation & Monitoring Measures) of this EIAR.

A Construction Environmental Management Plan (CEMP) has also been prepared and is included as Appendix 5.1 in Volume 4 of this EIAR. The CEMP will be updated by GCC 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 TII Guidelines for the Creation, Implementation and Maintenance of an Environmental Operating Plan, and the handbook published by Construction Industry Research and Information Association (CIRIA) in the UK, Environmental Good Practice on Site Guide, 4th Edition (CIRIA 2015). All of the measures set out in the CEMP will be implemented in full.

5.2 Construction Phasing

Due to the dispersed nature of the scheme, it is anticipated that the construction works will be carried out at a minimum of three locations simultaneously at any given time. The scheme has therefore been split into three sections as detailed below and shown on Diagram 5.1. These sections have been further subdivided into 21 sub-sections. The sections / sub-sections are:

- Section A – University Road to Eyre Square, Woodquay and Headford Road;
 - Section A1 - University Road
 - Section A2 - Gaol Road and Galway Cathedral
 - Section A3 - Salmon Weir Bridge
 - Section A4 - Newtownsmith/Waterside
 - Section A5 - St. Vincent's Avenue/Walsh's Terrace
 - Section A6 - Dyke Road/Headford Road
 - Section A7 - St. Francis Street/Eglinton Street/Williamsgate Street
 - Section A8 - Woodquay/Daly's Place/Mary Street
- Section B – Eyre Square, Forster Street, Dock Road, Bóthar na mBan, Bóthar Uí Eithir and Fairgreen Road:
 - Section B1 - Bóthar na mBan/St. Brendan's Avenue
 - Section B2 - Prospect Hill
 - Section B3 - Eyre Square North/Eyre Square East/Eyre Square South
 - Section B4 - Victoria Place/ Merchant's Road/ Queen Street
 - Section B5 - Forster Street
 - Section B6 - College Road/Forster Street/Fairgreen Road/Bóthar Uí Eithir junction
 - Section B7 - Bóthar Uí Éithir
 - Section B8 - Fairgreen Road
- Section C – College Road to Dublin Road:
 - Section C1 – College Road (to junction with Lough Atalia Road)
 - Section C2 - College Road/Lough Atalia Road junction
 - Section C3 - College Road (to junction at Moneenageisha)
 - Section C4 - Moneenageisha junction
 - Section C5 - R338 Dublin Road

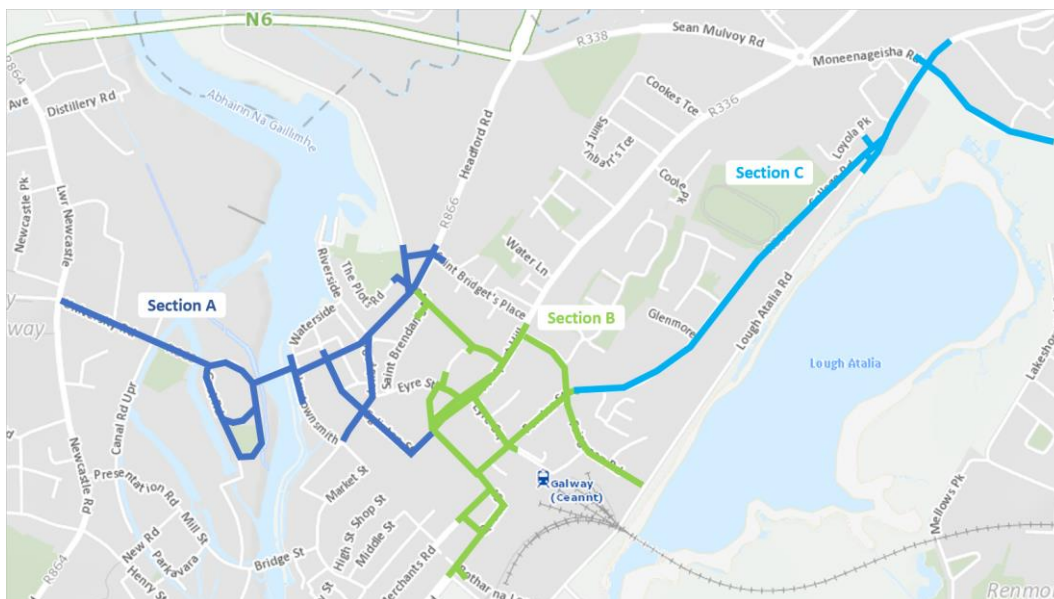


Diagram 5.1: Bus Connects Galway Cross-City Link

Diagrams showing these sections of the scheme are presented in the following sections of this Chapter. An overview of the construction activities to be carried out at each section / sub-section is provided in Section 5.4

5.3 Construction Programme

It is expected that construction will commence in 2023, subject to approval.

The construction works are anticipated to take 75 working weeks (approximately 18-20 months including holidays). It is anticipated that the Cross-City link section will be constructed and operational after 10 months. For the purposes of assessment, it is assumed that the opening of the scheme aligns with the implementation of the Cross-City Link, which is anticipated to occur at the end of 2023.

This construction duration is based on the assumption that a minimum of three works areas will be under construction at any given time, with one of these sections being from Section A, one from Section B and one from Section C as described in this report. With additional resources applied to the scheme, this construction duration could potentially be reduced.

Table 5.1: Construction Programme

Section	Duration weeks	in	Month																																			
			1		2		3		4		5		6		7		8		9		10*		11		12		13		14		15		16		17		18	
Section A1	8																																					
Section A2	16 (12+4)																																					
Section A3	4																																					
Section A4	8																																					
Section A5	6																																					
Section A6	10																																					
Section A7	8																																					
Section A8	12																																					
Section B1	20																																					
Section B2	8																																					
Section B3	20																																					
Section B4	6																																					
Section B5	4																																					
Section B6	10																																					
Section B7	4																																					
Section B8	3																																					
Section C1	6																																					
Section C2	12																																					
Section C3	20																																					
Section C4	10																																					
Section C5	16																																					

* Introduction of new bus routes and CCL restrictions

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 shown in Table 5.1 has been prepared with a view to providing as much separation as practicable between sections under construction at any given time. This has been done in order to minimise traffic disruption and facilitate the ease of movement of sustainable modes, bus services and goods along the Proposed Scheme.

5.4 Overview of Construction Works

An overview of the likely scheme construction phasing and the necessary construction works associated with each phase is outlined in the following sections below.

For the majority of the works associated with the scheme, it is envisaged that normal working hours will be followed. In specific circumstances, such as road crossings or road resurfacing, the works will be carried out at night.

Existing signage will be retained or relocated within widened footpaths. Additional new signage will also be required at locations throughout the scheme. Typical excavation depths for installation of new signage will be approximately 1m.

Existing road markings will be retained where still valid within the carriageway. New road markings will be applied at locations throughout the scheme either via removal and replacement of existing markings or application of new road markings following resurfacing works.

Utility covers will be raised to match new ground heights where applicable.

This section should be read in conjunction with the drawings listed in Table 5.2. These drawings are contained in Volume 3 of this EIAR.

Table 5.2: List of Relevant Drawings

Drawing Series Number	Description
BCG-SP-00-9001	Site Map and Site Location Plan
BCG-GA-00-9001	General Arrangement
BCG-ML-00-9001	Mainline Plan and Profile
BCG-CS-00-9001	Typical Cross Sections
BCG-LA-00-9001	Landscaping General Arrangement
BCG-BW-00-9001	Fencing and Boundary Treatment
BCG-TS-00-9001	Traffic Signs and Road Markings
BCG-DN-00-9001	Proposed Surface Water Drainage Works
BCG-UT-01-9001	Combined Existing Utilities Records
BCG-UT-02-9001	IW Foul Sewer Asset Alterations
BCG-UT-03-9001	IW Water Asset Alterations
BCG-UT-04-9001	ESB Asset Alterations
BCG-UT-05-9001	GNI Asset Alterations
BCG-UT-06-9001	Telecommunications Asset Alterations
BCG-RW-00-9001	Retaining Structures

Further details on the design specifications, with regards to matters such as parking and loading bay widths, signalised junctions, priority junctions, bus stops, accessibility, traffic signals, lighting, utilities, drainage, pavement, and landscape design, can be found in Chapter 4 (Proposed Scheme Description) of this EIAR.

5.4.1 Section A – University Road to Eyre Square, Woodquay and Headford Road

Section A of the proposed works has been split into 8 sub-sections as detailed in Diagram 5.2 and Table 5.3.

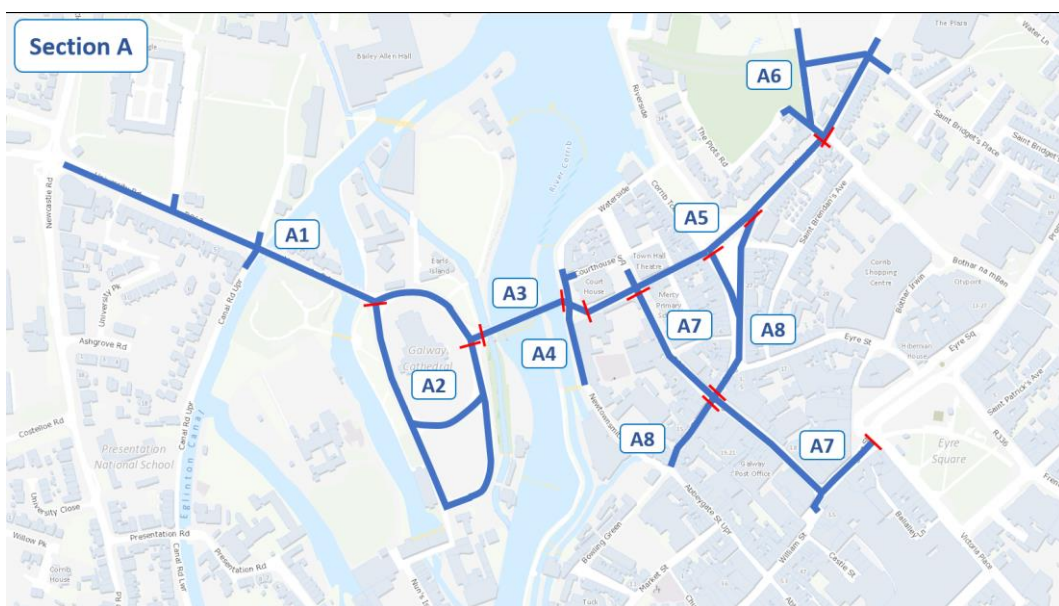


Diagram 5.2: Section A Sub-Sections

Table 5.3: Section A Sub-Sections

Section	Length (m)	Road Name	Drawing Number
A1	500	University Road	BCG-0100-00-01 & 02
A2	N/A	Gaol Road and Cathedral	BCG-0100-00-02
A3	85	Salmon Weir Bridge	BCG-0100-00-02
A4	130	Newtownsmith/Waterside	BCG-0100-00-02
A5	310	St. Vincent's Avenue / Walshs Terrace	BCG-0100-00-02 & 03
A6	420	Dyke Road / Headford Road	BCG-0100-00-03
A7	390	St. Francis Street / Eglinton Street / Williamsgate Street	BCG-0100-00-02 & 04
A8	260	Woodquay / Daly's Place / Mary Street	BCG-0100-00-03 & 04

5.4.1.1 Section A1 - University Road

Along University Road (from the junction with Newcastle Road to the Salmon Weir Bridge), the proposed scheme works will involve footpath widening, provision of an entry treatment at the entrance to NUIG, provision of two raised tables along the route at Canal Road Upper and Fisheries Field and the provision of two new signalised pedestrian crossings. Between the entrance to Fisheries Field and the Salmon Weir Bridge, it is proposed to install a bus gate and to designate the carriageway as a time-regulated bus lane in both directions.

Footpath widening works will require the existing footpaths to be broken out, and the bituminous layers of the road carriageway where widening is proposed to be removed, and the new widened footpath installed. This will require excavations of approximately 300mm of the existing road and footpaths. Drainage gullies will be relocated to the new kerb edge and will connect to a new drainage network proposed to be installed along University Road. The maximum depth of trench excavation required to install the new drainage, gully pots and new connection pipes is 1.7m – 1.8m. This new drainage network will outfall to the canal in the vicinity of Canal Road Upper. It will outfall via a proposed new petrol interceptor in Canal Road, which will require excavation of approximately 3.0m -3.5m for installation. Works will involve the diversion of Irish Water network within the new footpath. Additionally, a telecom chamber and a drainage manhole will likely require relocation to avoid proposed kerbs. Other utilities, where present will be either retained, protected or diverted as required.

Ducting for the proposed signalised pedestrian crossings will be trenched across the road and into the footpath with a maximum excavation depth of 1.2m.

For the provision of entry treatments (at the entrance to NUIG) and the raised tables (at the junction with Canal Road Upper and the entrance to Fisheries Field), the works will involve the milling of the top layer of surface course, application of bond coat and the construction of the entry treatment/raised table utilising bituminous materials. The proposed bus gate adjacent to the Fisheries Field entrance will be installed within the raised table.

Temporary traffic management will be required to accommodate these works, including narrowing the road to a one-way shuttle system to facilitate road crossing trenches, works through narrow pinch points at certain times and for the surfacing of the road. The duration is estimated to be approximately eight weeks. In addition, the closure of Canal Road Upper to all vehicles for a duration of three days is expected for the installation of the petrol interceptor.

5.4.1.2 Section A2 - Gaol Road and Galway Cathedral

To the west of Galway Cathedral, on Gaol Road the works involve footpath widening at the junction with University Road and to the south on Gaol Road the works involve re-development of the car and coach parking area to the south of Galway Cathedral. To the east of Galway Cathedral the works involve the closure of the existing carriageway and creation of a pedestrianised and landscaped public space.

Footpath widening works will require the existing footpaths to be broken out, and the bituminous layers of the road carriageway where widening is proposed to be removed, and the new widened footpath installed. This will require excavations of approximately 300mm of the existing road and footpaths. Drainage gullies will be relocated to the new kerb edge and will connect back to the existing drainage network. The maximum depth of trench excavation required to install gully pots and new connection pipes is 1.2m. Works will involve the relocation of an existing manhole.

Existing public toilets foul water connections will also need to be decommissioned and new public toilets connected to the foul drainage network. Other utilities, where present will be either retained, protected or diverted as required.

The car parking area south of Galway Cathedral will require the existing car parking area to be removed (including removal of existing kerbing and milling of the top layer of surface course). New carriageway surfacing, concrete islands and footpaths are to be provided within the revised car park area. The maximum depth of excavation within the existing car park is 300mm with trenches for new drainage connection pipes to be excavated to a maximum depth of 1.2m.

The area to the east of Galway Cathedral is to be closed to vehicular traffic and designated as a public pedestrian and landscaped space. The carriageway and footpaths that will ultimately become part of the public space will be removed and/or regraded, with a new paved and landscaped area installed to connect with the existing walls to the east (adjacent to the Canal). These will tie into the proposed landing area of the proposed Salmon Weir Pedestrian and Cycle Bridge which is due to complete construction by Q1 of 2023. This will require the removal of the existing bituminous layers on the road and replacement with new materials.

It is proposed that the existing surface carpark will be utilised as a construction compound for the contractor during the works, with this area being completed as per the scheme design at the end of the scheme. This will include connections to existing power, water and drainage services for the duration of the construction works.

Temporary traffic management will be required to accommodate these works, and the duration is estimated to be approximately 16 weeks (initial 12 weeks at the beginning of the programme and a further four weeks at the end of the programme upon removal of the proposed contractor's compound).

The proposed works will be undertaken in in a single main phase of traffic management:

Gaol Road (west of the cathedral) will be converted into a two-way traffic route and Gaol Road (east of the cathedral) will be closed to traffic to form part of the works area. The carpark will form part of the works area for the duration of the scheme. Access to Nuns Island to be maintained for the duration.

5.4.1.3 Section A3 – Salmon Weir Bridge

On the Salmon Weir Bridge, the works include widening the existing footpath on the northern side of the bridge and the removal of the footpath on the southern side of the bridge and replacing it with a rubbing strip.

Footpath widening works will require the existing footpaths to be broken out, and the bituminous layers of the road carriageway where widening is proposed to be removed, and the new widened footpath installed. This will require excavations of approximately 300mm of the existing road and footpaths. Other utilities, where present will be either retained, protected or diverted as required.

Temporary traffic management will be required to accommodate these works, and the duration is estimated to be approximately four weeks.

5.4.1.4 Section A4 - Newtownsmith/Waterside

The works at this location will involve the permanent closure of Waterside as it approaches St. Vincent's Avenue from the north (with the resultant space used to create a public space with permeability for cyclists), and the pedestrianisation of Newtownsmith as it approaches St. Vincent's Avenue from the south (from the location of the Corrib walkway access point northwards). Retractable bollards are to be installed at the beginning of the pedestrianised area to permit goods vehicles to exit from Newtownsmith at designated times. Cyclists are to be permitted to enter and utilise the pedestrianised area.

The pedestrianised area of Newtownsmith will require the existing footpaths to be broken out, and the bituminous layers of the road carriageway where widening is proposed to be removed, and the new surface to be raised and constructed at the level of the existing footway. This will require excavations of approximately 300mm of the existing road and footpaths. Drainage gullies will be relocated and will connect back to the existing drainage network. The maximum depth of trench excavation required to install gully post and new connection pipes is 1.2m. The maximum depth of excavation pit of the installation of bollards is 1.6m. Other utilities, where present will be either retained, protected or diverted as required.

The carriageway and footpaths on Waterside that will ultimately become part of the public space will be removed and/or regraded, with a new paved area installed to connect with the existing footpaths (either kerbside where connecting to an existing footpath, or at the back of a fully-replaced footpath) either side. This will require the removal of the existing bituminous layers on the road and replacement with new materials.

Temporary traffic management will be required to accommodate these works, and the duration is estimated to be approximately eight weeks.

5.4.1.5 Section A5 - St. Vincent's Avenue/Walsh's Terrace

Localised works along St. Vincent's Avenue and Walsh's Terrace (between the Salmon Weir Bridge and Dyke Road) involve footpath widening and the upgrade of the junction at Woodquay (which is to be tightened up and replaced with a single, in-only road from St. Vincent's Avenue). A large, raised table, incorporating a toucan crossing is to be installed between and including the Corrib Terrace and Riverside junctions.

An entry treatment is proposed at the junction with Court Lane, and a small improvement to the junction with Court Avenue to provide a sufficient footpath on the eastern side of the junction.

Footpath widening and landscaping works are proposed along the R866 Headford Road (Walsh's Terrace) between Woodquay and Bothar na mBan.

Footpath widening works will require the existing footpaths to be broken out, and the bituminous layers of the road carriageway where widening is proposed to be removed, and the new widened footpath installed. This will require excavations of approximately 300mm of the existing road and footpaths. Drainage gullies will be relocated to the new kerb edge and will connect back to the existing drainage network. The existing drainage pipe on Headford Road (Walsh's Terrace) to be moved onto northern side of the road. The maximum depth of trench excavation required to install the new drainage, gully pots and new connection pipes is 1.5m – 2.3m.

Works will involve the diversion of a section of Virgin Media network in the new footpath. ESB box and pole will need to be moved to avoid conflict with the new kerb. Similarly, a manhole will require relocation. A small section of existing watermain will also need to be diverted on Walsh's Terrace in the proposed footpath. Other utilities, where present will be either retained, protected or diverted as required.

For the provision of the entry treatment at Court Lane, the works will involve the milling of the top layer of surface course, application of bond coat and the construction of the entry treatment/raised table utilising bituminous materials.

Temporary traffic management will be required to accommodate these works, including the likely requirement for lane closures and a shuttle traffic system, and the duration is estimated to be approximately six weeks.

5.4.1.6 Section A6 - Dyke Road/Headford Road

Works on Dyke Road and the Headford Road include footpath widening on Dyke Road, installation of a contra-flow cycle track along Dyke Road, the signalisation of the junction of Dyke Road (heading north) and Dyke Road (heading east) and the signalisation of the junction of Dyke Road/Headford Road/St. Bridget's Place.

A short section of Dyke Road is also to have its carriageway widened (approaching the signalised junction of Dyke Road northbound/Dyke Road eastbound) and also realigned into a portion of the Dyke Road car-park. Junctions to be signalised will have pedestrian crossings incorporated.

Footpath widening works will require the existing footpaths to be broken out, and the bituminous layers of the road carriageway where widening is proposed to be removed, and the new widened footpath installed. This will require excavations of approximately 300mm of the existing road and footpaths. Drainage gullies will be relocated to the new kerb edge and will connect back to the existing drainage network. The maximum depth of trench excavation required to install the new drainage, gully pots and new connection pipes is 1.45m.

Works on Dyke Road will involve the decommissioning and diversion of a section of the existing ESB MV UG line. Similarly, a section of existing Eir duct and IW watermain will need to be decommissioned and diverted. An unidentified manhole will also require relocation to avoid the proposed kerb. Other utilities, where present will be either retained, protected or diverted as required.

Carriageway widening works will require the existing footpath to be broken out, full road build-up to be constructed and jointed to the existing adjacent carriageway, and replacement footpath constructed. Existing drainage, present kerbside, and other utilities present within the section of footpath to be removed will be relocated to the new kerb edge or the new footpath.

Ducting for the proposed signalisation works will be trenched across the road and into the footpath with a maximum excavation depth of 1.2m.

Temporary traffic management will be required to accommodate these works, including a one-way system and lane closures and a shuttle traffic system. The duration is estimated to be approximately 10 weeks.

5.4.1.7 Section A7 - St. Francis Street/Eglinton Street/Williamsgate Street

The works on St. Francis Street/Eglinton Street involve localised footpath widening along Eglinton Street and in the vicinity of the junction with Mary Street/Daly's Place, the provision of a new signalised crossing on St. Francis Street and the signalisation of the junction with Mary Street/Daly's Place.

Footpath widening works will require the existing footpaths to be broken out, and the bituminous layers of the road carriageway where widening is proposed to be removed, and the new widened footpath installed. This will require excavations of approximately 300mm of the existing road and footpaths. Drainage gullies will be relocated to the new kerb edge and will connect back to the existing drainage network. The maximum depth of trench excavation required to install gully post and new connection pipes is 1.2m. An ESB pole will need to be relocated on St. Francis Street to avoid conflict with the proposed Bus Shelter. A telecom chamber and a Manhole will be relocated into the proposed footpath on Eglinton Street. Other utilities, where present will be either retained, protected or diverted as required.

Ducting for the proposed signalised pedestrian crossing will be trenched across the road and into the footpath with a maximum excavation depth of 1.2m.

Temporary traffic management will be required to accommodate these works, including lane/road closures and a resultant shuttle traffic system, and the duration is estimated to be approximately eight weeks.

5.4.1.8 Section A8 - Wood Quay/Daly's Place/Mary Street

The works within Woodquay involve the removal of a substantial portion of the carriageway space and conversion of same to a pedestrian and landscaped public space through extensive footpath widening and landscaping and the provision of a southbound traffic lane linking Woodquay to Daly's Place/Eyre Street. Entry treatments are also proposed at the junction with St. Brendan's Avenue and the junction with St. Anthony's Place. A contra-flow cycle track from Daly's Place to St. Vincent's Avenue is also proposed.

On Mary Street, the works involve localised footpath widening approaching the junction with Eglinton Street, which is to be signalised.

Footpath widening works will require the existing footpaths to be broken out, and the bituminous layers of the road carriageway where widening is proposed to be removed, and the new widened footpath installed. This will require excavations of approximately 300mm of the existing road and footpaths. Drainage gullies will be relocated to the new kerb edge and will connect back to the existing drainage network. The maximum depth of trench excavation required to install gully pots and new connection pipes is 1.2m.

Several manholes will need to be relocated to avoid conflict with proposed kerbs. Other utilities, where present will be either retained, protected or diverted as required.

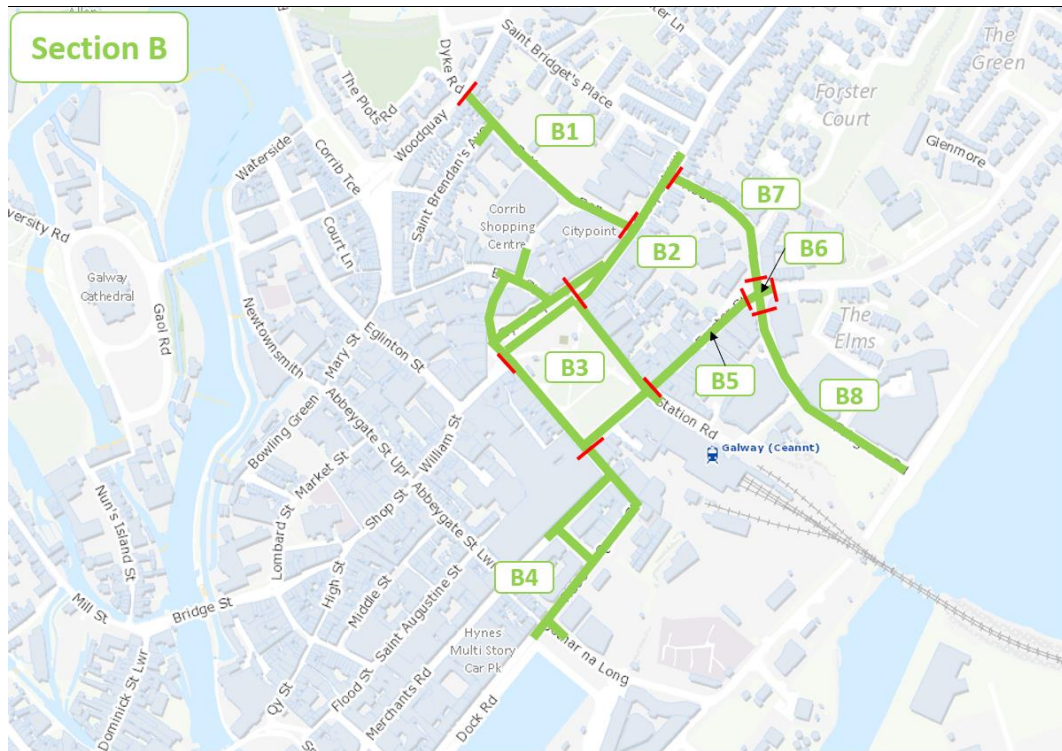
At the proposed traffic signal junction, new ducting, crossing the road on all arms of the junction will require trenches to be excavated up to a maximum depth of 1.2m

For the provision of the entry treatments, the works will involve the milling of the top layer of surface course, application of bond coat and the construction of the entry treatment/raised table utilising bituminous materials.

Temporary traffic management will be required to accommodate these works, including lane/road closures and a resultant shuttle traffic system, and the duration is estimated to be approximately 12 weeks.

5.4.2 Section B – Eyre Square, Forster St, Dock Road, Bothar na Mban, Bothar Ui hEithir and Fairgreen Road

Section B of the proposed works has been split into eight sub-sections as detailed in Diagram 5.3 and Table 5.4.

**Diagram 5.3: Section B Sub-Sections****Table 5.4: Section B Sub-Sections**

Section	Length (m)	Road Name	Drawing Number
B1	250	Bóthar na mBan/St. Brendan's Avenue	BCG-0100-00-03 & 04 & 05
B2	220	Prospect Hill	BCG-0100-00-04 & 05
B3	N/A	Eyre Square North/Eyre Square East/Eyre Square South	BCG-0100-00-04 & 06
B4	405	Victoria Place/ Merchant's Road/ Queen Street	BCG-0100-00-06
B5	155	Forster Street	BCG-0100-00-07
B6	N/A	College Road/Forster Street/Fairgreen Road/Bóthar Uí Éithir junction	BCG-0100-00-07
B7	175	Bóthar Uí Éithir	BCG-0100-00-05 & 07
B8	275	Fairgreen Road	BCG-0100-00-07

5.4.2.1 Section B1 - Bóthar na mBan/St. Brendan's Avenue / Headford Road

The proposed scheme works will involve road realignment, entry treatment installation, footpath widening, new footpath and also the demolition of two residential properties.

The two residential properties to be demolished are No. 20 St. Brendan's Avenue and No. 5/6 Headford Road. These properties are two-storey end of terrace houses, with a shared party wall with the adjoining property. A detailed methodology will be developed by the contractor for the demolition to ensure that the works are undertaken safely and with appropriate works to support the adjoining property. The proposed demolition will include the decommissioning and removal of all domestic utilities and heating systems, including water, electricity, gas and telecoms along with the removal of all above ground structures and their associated foundations. The shared party, which is assumed to be of stone or blockwork construction, will be maintained with associated structural interventions as may be required to ensure structural integrity of the remaining properties. The works will include the installation of appropriate insulation and weathering to the party wall. Reconstruction of the roof tie-in to seal the building will also be required. All demolition waste will be categorised and disposed of to appropriately licenced facilities.

Road widening and realignment is necessary at both ends of Bothar na mBan, in the location of the two residential properties to be demolished and also realignment of the road onto lands at Galway County Council's County Hall. New carriageway will require the existing footpath to be broken out, full road build-up to be constructed and jointed to the existing adjacent carriageway, and replacement footpath constructed.

Footpath widening works will require the existing footpaths to be broken out, and the bituminous layers of the road carriageway where widening is proposed to be removed, and the new widened footpath installed. This will require excavations of approximately 300mm of the existing road and footpaths. Drainage gullies will be relocated to the new kerb edge and will connect back to the existing drainage network. The maximum depth of trench excavation required to install gully post and new connection pipes is 1.2m. Works will involve the decommissioning and diversion of a section of the existing ESB LV UG line. Additionally, a section of the ESB LV OH Cable will be undergrounded in the new footpath. Similarly, a section of existing Eir duct and chambers will need to be decommissioned and diverted. Several manholes will need to be relocated to avoid conflict with proposed kerbs. Other utilities, where present will be either retained, protected or diverted as required.

For the provision of entry treatments (at the entrance to Eyre Square North, Bothar Irwin and St. Brendan's Avenue), the works will involve the milling of the top layer of surface course, application of bond coat and the construction of the entry treatment/raised table utilising bituminous materials and natural stone.

Ducting for the proposed signalised pedestrian crossing will be trenched across the road and into the footpath with a maximum excavation depth of 1.2m.

Temporary traffic management will be required to accommodate these works, including lane closures and a resultant shuttle traffic system, and the duration is estimated to be approximately 20 weeks.

5.4.2.2 Section B2 - Prospect Hill

The works on Prospect Hill comprise the signalisation of the junction with Bohermore/Bóthar Uí hÉithir and the realignment of the junction with Bóthar na mBan (to re-designate Prospect Hill to the south-west as the minor arm of a T-junction with a proposed entry treatment). A portion of the existing footpath and stone wall outside the entrance to Galway County Hall will be removed to facilitate the junction realignment, with the boundary wall and existing footpath both set back.

The works will also involve the conversion of Prospect Hill (between Bóthar na mBan and Eyre Square) into a two-way traffic route which then becomes a looped, one-way circular carriageway route that approaches Eyre Square before looping around and returning out via the two-way portion of Prospect Hill (this is to facilitate a taxi rank, drop-off and loading and to allow onward loading access to Eyre Square North at specific times via a new access-controlled link (as outlined in Section 4.5.1.12)).

Footpath widening will also be carried out (as a number of existing traffic lanes are to be removed). Carriageway widening and new carriageway construction will be required as part of the realignment of the junction with Bóthar na mBan and the new one-way looped route.

A signalised pedestrian crossing is also proposed on Bóthar na mBan adjacent to the new T-junction with Prospect Hill.

Significant public realm and landscaping works are proposed between Eyre Square and Bóthar na mBan requiring replacement of the entire surface.

Footpath widening works will require the existing footpaths to be broken out, and the bituminous layers of the road carriageway where widening is proposed to be removed, and the new widened footpath installed. This will require excavations of approximately 300mm of the existing road and footpaths. Drainage gullies will be relocated to the new kerb edge and will connect back to the existing drainage network. The maximum depth of trench excavation required to install gully post and new connection pipes is 1.2m. A section of a watermain at the Prospect Hill /Bóthar na mBan junction will require protection. An Eir Chamber will need to be relocated to avoid conflict with the new kerb at the Prospect Hill/Bóthar Uí Éithir junction. Other utilities, where present will be either retained, protected or diverted as required.

5.4.2.3 Section B3 - Eyre Square North/Eyre Square East/Eyre Square South

The works on Eyre Square North involve the removal of the carriageway space running parallel to Eyre Square North (to the north of the Liam Mellows Statue) and conversion of this area to a pedestrianised and landscaped public space.

The vehicular linkage between Eyre Square North and Prospect Hill is also to be closed and replaced with a time-dependent controlled access link (controlled through retractable bollards) to facilitate access for loading and local access to Shop Street at specific times. A new raised table and relocated pedestrian crossing on Eyre Square north, connecting Eyre Square west with Rosemary Avenue is proposed. New surfacing, to be raised to existing footway level is proposed across the entire width of Rosemary Avenue and Eyre Street (Between Bothar Irwin and Eyre Square).

On Eyre Square East, the works involve localised footpath widening at the north-eastern corner (between Eyre Square East and Eyre Square North) and upgrade of the existing pedestrian crossing at the same location, the provision of an entry treatment at St. Patrick's Avenue and localised carriageway widening at the south-eastern corner.

The junction of Eyre Square East, Eyre Square South and Forster Street is to be fully signalised. On Eyre Square South minimal works are proposed.

Footpath widening works will require the existing footpaths to be broken out, and the bituminous layers of the road carriageway where widening is proposed to be removed, and the new widened footpath installed. This will require excavations of approximately 300mm of the existing road and footpaths. Drainage gullies will be relocated to the new kerb edge and will connect back to the existing drainage network. The maximum depth of trench excavation required to install gully post and new connection pipes is 1.2m. Enet chambers and several other manholes to be relocated to avoid conflict with the proposed kerb. Other utilities, where present will be either retained, protected or diverted as required.

Carriageway widening works will require the existing footpath to be broken out, full road build-up to be constructed and jointed to the existing adjacent carriageway, and replacement footpath constructed. Existing drainage present kerbside, and other utilities present within the section of footpath to be removed will be relocated to the new kerb edge or the new footpath.

For the provision of the entry treatment, the works will involve the milling of the top layer of surface course, application of bond coat and the construction of the entry treatment/raised table utilising bituminous materials and natural stone.

Ducting for the proposed signalisation works will be trenched across the road and into the footpath with a maximum excavation depth of 1.2m. The maximum depth of excavation pit of the installation of bollards is 1.5m.

Temporary traffic management will be required to accommodate these works, including lane/road closures and a resultant shuttle traffic system, and the duration is estimated to be approximately 20 weeks.

5.4.2.4 Section B4 - Victoria Place/ Merchant's Road/ Queen Street

Localised works on Victoria Place, Merchant's Road and Queen Street primarily involve footpath widening, provision of new raised uncontrolled pedestrian crossings and two new signalised pedestrian crossings on Forthill Road. An entry treatment is proposed at the junction of Forthill Road and Queen Street.

Footpath widening works will require the existing footpaths to be broken out, and the bituminous layers of the road carriageway where widening is proposed to be removed, and the new widened footpath installed. This will require excavations of approximately 300mm of the existing road and footpaths. Drainage gullies will be relocated to the new kerb edge and will connect back to the existing drainage network. A new drainage pipe will be laid on Merchants Road and Forthill Street, with an outlet to tie into existing network on Queen Street. The depth of trench excavation required to install the new drainage, gully post and new connection pipes is 1.55m. Works will also involve the diversion of a watermain on Merchants Road. Several manholes will be relocated to avoid conflict with proposed kerbs. Other utilities, where present will be either retained, protected or diverted as required.

For the provision of the entry treatments/raised uncontrolled crossings, the works will involve the milling of the top layer of surface course, application of bond coat and the construction of the entry treatment/raised table utilising bituminous materials and natural stone.

Ducting for the proposed signalisation works will be trenched across the road and into the footpath with a maximum excavation depth of 1.2m.

Temporary traffic management will be required to accommodate these works, including lane/road closures and a resultant shuttle traffic system, and the duration is estimated to be approximately six weeks.

5.4.2.5 Section B5 - Forster Street

The works on Forster Street involve the replacement of existing footpaths and widening of footpaths to the eastern end of the street, in the vicinity of the junction with Bóthar Uí Eithir/College Road/Fairgreen Road. The works at that junction are detailed in Section 5.4.2.6.

Footpath widening works will require the existing footpaths to be broken out, and the bituminous layers of the road carriageway where widening is proposed to be removed, and the new widened footpath installed. This will require excavations of approximately 300mm of the existing road and footpaths. Drainage gullies will be relocated to the new kerb edge and will connect back to the existing drainage network. The maximum depth of trench excavation required to install gully post and new connection pipes is 1.2m. Other utilities, where present will be either retained, protected or diverted as required.

Temporary traffic management will be required to accommodate these works, including lane closures and a resultant shuttle traffic system, and the duration is estimated to be approximately four weeks.

5.4.2.6 Section B6 - College Road/Forster Street/Fairgreen Road/Bóthar Uí Eithir junction

The works at this junction comprise the upgrade of the junction to reduce the overall size and provide wider footpaths and shorter crossing distances. Therefore, the works primarily comprise footpath widening and the removal of islands within the main carriageway and the installation of replacement traffic signals.

Footpath widening works will require the existing footpaths to be broken out, and the bituminous layers of the road carriageway where widening is proposed to be removed, and the new widened footpath installed. This will require excavations of approximately 300mm of the existing road and footpaths. Drainage gullies will be relocated to the new kerb edge and will connect back to the existing drainage network. The maximum depth of trench excavation required to install gully post and new connection pipes is 1.2m. Other utilities, where present will be either retained, protected or diverted as required.

Islands within the main carriageway will be broken out and the carriageway within the junction resurfaced. This will require the removal of the existing bituminous layers on the road and replacement with new materials.

Temporary traffic management will be required to accommodate these works, including lane closures and a resultant shuttle traffic system, and the duration is estimated to be approximately 10 weeks.

5.4.2.7 Section B7 - Bóthar Uí Éithir

Works on Bóthar Uí Eithir are localised in nature and primarily comprise localised footpath widening at the junction to the south (with Forster Street/College Road) and the junction to the north (with Prospect Hill/Bohermore).

An entry treatment is also proposed at the entrance to Forster Court, and the existing entrance into the grounds of St. Patrick's Church (towards the southern end of Bóthar Uí Éithir) is to be amended.

Footpath widening works will require the existing footpaths to be broken out, and the bituminous layers of the road carriageway where widening is proposed to be removed, and the new widened footpath installed. This will require excavations of approximately 300mm of the existing road and footpaths. Drainage gullies will be relocated to the new kerb edge and will connect back to the existing drainage network. The maximum depth of trench excavation required to install gully post and new connection pipes is 1.2m. Other utilities, where present will be either retained, protected or diverted as required.

For the provision of the entry treatment the works will involve the milling of the top layer of surface course, application of bond coat and the construction of the entry treatment/raised table utilising bituminous materials and natural stone.

Temporary traffic management will be required to accommodate these works, including lane closures, and the duration is estimated to be approximately four weeks.

5.4.2.8 Section B8 - Fairgreen Road

The works at Fairgreen Road primarily comprise the upgrade at the signalised junction with College Road/Forster Street (as outlined above in Section 5.4.2.6), the provision of new entry treatments and some localised footpath widening in the vicinity of the entrance to the Radisson Blu Hotel, footpath replacement and the installation of a new controlled pedestrian crossing between Fairgreen House and the coach station.

Footpath widening works will require the existing footpaths to be broken out, and the bituminous layers of the road carriageway where widening is proposed to be removed, and the new widened footpath installed. This will require excavations of approximately 300mm of the existing road and footpaths. Drainage gullies will be relocated to the new kerb edge and will connect back to the existing drainage network.

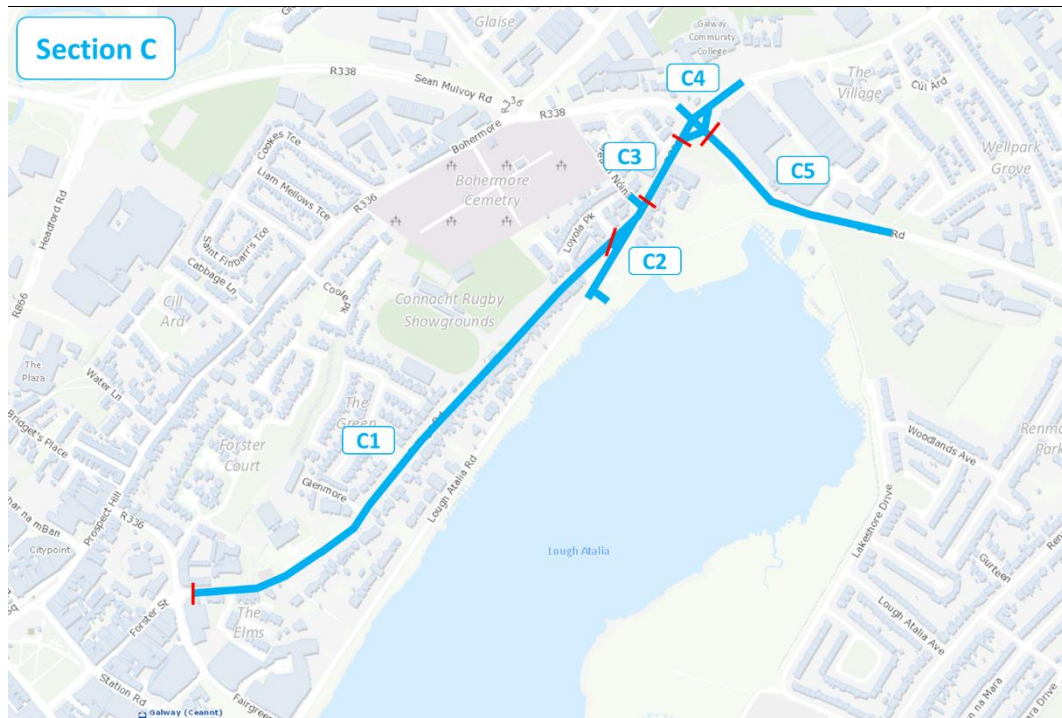
The maximum depth of trench excavation required to install gully post and new connection pipes is 1.2m. Several manholes will need to be relocated to avoid conflict with proposed kerbs. Other utilities, where present will be either retained, protected or diverted as required.

For the provision of entry treatments, the works will involve the milling of the top layer of surface course, application of bond coat and the construction of the entry treatment/raised table utilising bituminous materials.

Temporary traffic management will be required to accommodate these works, including lane closures, and the duration is estimated to be approximately three weeks.

5.4.3 Section C – College Road to Dublin Road

Section C of the proposed works has been split into five sub-sections as detailed in Diagram 5.4 and Table 5. 5.

**Diagram 5.4: Section C Sub-Sections****Table 5. 5: Section C Sub-Sections**

Section	Length (m)	Road Name	Drawing Number
C1	885	College Road (to junction with Lough Atalia Road)	BCG-0100-00-07 & 08 & 09
C2	120	College Road/Lough Atalia Road junction	BCG-0100-00-09
C3	195	College Road (to junction at Moneenageisha)	BCG-0100-00-10
C4	N/A	Moneenageisha junction	BCG-0100-00-10
C5	370	R338 Dublin Road	BCG-0100-00-10 & 11

5.4.3.1 Section C1 – College Road (to junction with Lough Atalia Road)

The works along College Road between the junction with Forster Street and the junction with Lough Atalia Road primarily comprise localised footpath widening works, the provision of entry treatments at a number of junctions, new priority pedestrian crossings and the installation of a bus gate on College Road, west of the entrance to Galway City Hall.

Footpath widening works will require the existing footpaths to be broken out, and the bituminous layers of the road carriageway where widening is proposed to be removed, and the new widened footpath installed. This will require excavations of approximately 300mm of the existing road and footpaths. Drainage gullies will be relocated to the new kerb edge and will connect to a new drainage network. A new drainage pipe is to be laid along a section of the College Road from Yeats College to Lough Atalia. The maximum depth of trench excavation required to install the new drainage pipe, gully post and new connection pipes is 1.75m.

Works will involve the relocation of Eir chambers and duct that conflict with the kerb adjacent the College Road/Glenmore Junction. Two additional Telecom chambers and several manholes will be relocated along the College Road. Other utilities, where present will be either retained, protected or diverted as required.

For the provision of the entry treatments the works will involve the milling of the top layer of surface course, application of bond coat and the construction of the entry treatment/raised table utilising bituminous materials.

Carriageway widening works (at the localised realignment point) will require the existing footpath to be broken out, full road build-up to be constructed and jointed to the existing adjacent carriageway, and replacement footpath constructed. Existing drainage present kerbside, and other utilities present within the section of footpath to be removed will be relocated to the new kerb edge or the new footpath.

Ducting for the proposed signalised pedestrian crossing and the proposed zebra crossing will be trenched across the road and into the footpath with a maximum excavation depth of 1.2m.

For the proposed bus gate, the works primarily involve footpath widening, the installation of traffic signals and the application of a coloured red resin surface to the carriageway on either side of the bus gate to delineate the proposed vehicle restrictions.

Temporary traffic management will be required to accommodate these works, including lane closures, and the duration is estimated to be approximately six weeks.

5.4.3.2 Section C2 - College Road/Lough Atalia Road junction

The junction of College Road/Lough Atalia Road is to be realigned into a standard, signal controlled, T-junction arrangement, with a reduced junction footprint. The College Road (from City Hall) arm of the junction will be the minor arm of the 'T' arrangement. Existing traffic islands within the existing junction are to be removed, and the College Road approach to the junction realigned to route through the existing grassed area between College Road and Lough Atalia Road. The new T-junction will be signalised. The existing junction area that becomes redundant will be used to provide new or widened footpaths and provision of new landscaped areas. The existing entrance to Loyola Park will be retained in its current location but altered to a priority controlled access with a new entry treatment and kerb lines.

Footpath widening works will require the existing footpaths to be broken out, and the bituminous layers of the road carriageway where widening is proposed to be removed, and the new widened footpath installed. This will require excavations of approximately 300mm of the existing road and footpaths. Drainage gullies will be relocated to the new kerb edge and will connect back to the new drainage network. A new drainage pipe and non-return valve to be installed at discharge point into Lough Atalia. The maximum depth of trench excavation required to install the new pipe, gully post and new connection pipes is 2.2m. Additionally, a new attenuation tank and petrol interceptor will be installed, which will require excavation of approximately 3.5m -3.75m for installation. The outfall for the new pipe will be located in the existing rock armour along the shore of Lough Atalia, adjacent to the existing playground. All works will be carried out from the land side.

Works will involve the decommissioning and diversion of existing Eir and Virgin Media ducts. Additionally, an ESB LV OH line will need to be diverted and an electrical pole will need to be relocated. A manhole will need to be relocated to avoid the proposed kerb. Other utilities, where present will be either retained, protected or diverted as required.

For the provision of the entry treatments the works will involve the milling of the top layer of surface course, application of bond coat and the construction of the entry treatment/raised table utilising bituminous materials.

The construction of new carriageway in existing hard-standing areas will require the existing footpath to be broken out, full road build-up to be constructed and jointed to the existing adjacent carriageway, and replacement footpath constructed. Existing drainage present kerbside, and other utilities present within the section of footpath to be removed will be relocated to the new kerb edge or the new footpath. Where the carriageway is to be constructed in grassed areas, excavation and full road build-up will be required. Where islands are to be removed, the carriageway surface beneath will be resurfaced and jointed to the adjacent carriageway surface.

Ducting for the proposed signalisation works will be trenched across the road and into the footpath with a maximum excavation depth of 1.2m.

Temporary traffic management will be required to accommodate these works, including lane closures, and the duration is estimated to be approximately 12 weeks.

5.4.3.3 Section C3 - College Road (to junction at Moneenageisha)

The works proposed on College Road (between Lough Atalia Road and Moneenageisha) comprise significant carriageway widening on the western side of College Road to facilitate the construction of an additional outbound bus lane and inbound cycle track. Entry treatments are proposed at the entrances to Loyola Park, Gleann Nóinín and the Huntsman Inn.

Boundary walls along the section to be widened will be removed and set back at five properties (139 College Road, Gleann Noinin, Circle K, Moneenageisha Court and Bay View House). At 139 College Road and Gleann Noinin the existing lands within property boundaries will be broken out/excavated as necessary.

At Circle K, the existing boundary wall is proposed to be set back as part of the road widening along this section. This will require the temporary acquisition of the entire Circle K property in order to complete the works. The works will include the decommissioning of all fuel tanks and systems in accordance with design standards identified in the “Design, construction, modification, maintenance and decommissioning of filling stations” publication (APEA, 2011), for the duration of the works. The works will include the complete removal of two of the six underground fuel storage tanks located on the site. It will also include the removal of two of the existing pumping stations located in the forecourt of the site. The existing canopy over the forecourt will require removal and replacement with a smaller canopy which will not overhang the relocated boundary wall and the existing display signage will be required to be set back. The removal of the two underground tanks and the removal of the two pumping stations will also require the removal and relocation of a number of underground fuel pipes within the site.

At Moneenageisha Court, the existing boundary wall will be set back. This boundary wall is a retaining wall. A proposed new retaining wall (which retains a level difference of approximately 1.2m) will be constructed along the proposed new boundary. This wall will have an exposed face of approximately 2.4m on the College Road side. The wall will be a reinforced concrete wall and will require excavations of approximately 2.0m below existing ground level across the frontage of Moneenageisha Court with the temporary removal of the existing road parallel to College Road. Replacement car-parking is provided at the north western corner of the development. Existing landscaped sections will be excavated and replaced with car-park surfacing. This will require excavations of approximately 300mm of the existing grass and landscaped areas.

At Bay View House, the existing boundary wall will be set back. This boundary wall will be a retaining wall.

A proposed new retaining wall (which retains a level difference of approximately 0.9m) will be constructed along the proposed new boundary. The existing access gates and steps will be reconstructed along the new boundary. Internal car parking will be re-configured.

New carriageway will require the existing footpath to be broken out, full road build-up to be constructed and jointed to the existing adjacent carriageway, and replacement footpath and cycle-track constructed.

Drainage gullies will be relocated to the new kerb edge and will connect back to the new drainage network. Two runs of new drainage pipes are to be laid in the roadway, carrying the water in opposite directions. They will outfall via proposed petrol interceptors, which will require excavation of approximately 3.2m -3.4m for installation. The maximum depth of trench excavation required to install the new pipes, gully post and new connection pipes is 2.0m.

Works will involve the decommissioning and diversion of existing ESB LV UG Line, MV UG Line and LV OH cable, along with a pole, into the new footpath. Additionally, runs of Eir, Virgin Media and BT ducts will be diverted. Several manholes will need to be relocated to avoid conflict with proposed kerbs. Other utilities, where present will be either retained, protected or diverted as required.

Temporary traffic management will be required to accommodate these works, including lane closures, and the duration is estimated to be approximately 20 weeks.

5.4.3.4 Section C4 - Moneenageisha junction

The works at the junction at Moneenageisha involve the upgrade of the junction to provide two bus priority gates on approach to and through the junction from the College Road approach and also from the Dublin Road approach.

Removal and amendments to existing splitter islands are also proposed on order to facilitate the new cycle tracks, toucan crossing and proposed widened footpaths in some locations. The works predominantly relate to island removal, footpath widening and replacement of traffic signals.

Footpath widening works will require the existing footpaths to be broken out, and the bituminous layers of the road carriageway where widening is proposed to be removed, and the new widened footpath installed. This will require excavations of approximately 300mm of the existing road and footpaths. Drainage gullies will be relocated to the new kerb edge and will connect back to the existing drainage network. The maximum depth of trench excavation required to install gully post and new connection pipes is 1.2m. Works will include diversion of an ESB MV UG line, a section of which is within the junction. Other utilities, where present will be either retained, protected or diverted as required.

Islands within the main carriageway will require the existing islands to be broken out, full road build-up to be constructed and jointed to the existing adjacent carriageway. This will require the removal of the existing bituminous layers on the road and replacement with new materials.

New/relocated splitter islands will require the carriageway surface course to be milled out and new islands constructed.

Where existing ducting cannot be re-used, ducting for the relocated signals will be trenched across the road and into the footpath with a maximum excavation depth of 1.2m.

Temporary traffic management will be required to accommodate these works, including lane/road closures, and the duration is estimated to be approximately 10 weeks.

5.4.3.5 Section C5 - R338 Dublin Road

The works on the R338 Dublin Road comprise the installation of inbound and outbound bus lanes, raised adjacent cycle tracks and footpaths on both sides of the road. This is to be achieved via a combination of carriageway widening, re-purposing of existing traffic lanes and setting back the existing footpath. An entry treatment is proposed at the entrance to the Huntsman Inn and Wellpark Retail Park.

Approaching the junction at Moneenageisha, footpath widening is proposed as part of the tightening of the entrance to the junction (removal of the left-slip to College Road, etc.).

Footpath widening works will require the existing footpaths to be broken out, and the bituminous layers of the road carriageway where widening is proposed to be removed, and the new widened footpath installed. This will require excavations of approximately 300mm of the existing road and footpaths. Drainage gullies will be relocated to the new kerb edge and will connect back to a new drainage network. Three runs of drainage pipes will be laid within the roadway with outlets to tie into the existing network. The maximum depth of trench excavation required to install the drainage pipes, gully post and new connection pipes is 1.8m – 2.3m. Additionally two new petrol interceptor will require excavation of approximately 3.0m -3.5m for installation.

Works will involve the diversion of two runs of ESB MV UG Line along the Dublin Road, along with diversions of a watermain and an Eir Duct. Other utilities, where present will be either retained, protected or diverted as required.

Carriageway widening works will require the existing footpath to be broken out, full road build-up to be constructed and jointed to the existing adjacent carriageway, and replacement footpath/raised adjacent cycle lane to be constructed. Existing drainage present kerbside, and other utilities present within the section of footpath to be removed will be relocated to the new kerb edge or the new footpath.

Carriageway widening works on the Lough Atalia side of Dublin Road, between Brothers of Charity and the existing billboard adjacent to the Huntsman Inn will require the construction of a retaining wall. The retaining wall is required between the proposed Dublin Road widening and the footpath / greenway area to the south.

Work to re-grade the existing ground profile is required between the realigned footpath / greenway and the bank of Lough Atalia, which slopes to the water. Part of the widening works is located within the Galway Bay Complex SAC and adjacent to the Inner Galway Bay SPA at this section at Lough Atalia. A new kerbline and drainage run is required to prevent run-off directly into Lough Atalia.

The SPA, in the vicinity of the widening, is a dry bay, with a grassed surface and is bounded by a cut stone dock wall which runs perpendicular to the Dublin Road, which degrades to a loose stone embankment as it wraps around the bay, running parallel to the Dublin Road. The section parallel to the proposed works is heavily vegetated. It is assumed that the section through this area comprises of a degraded loose stone wall beneath the vegetation.

The proposed works comprises a new 4.0 m wide footway/cycleway offset approximately 0.9m from the SPA boundary. Due to the uncertainty of the existing wall, it is proposed to install a new retaining wall through here to support the footway/cycleway, which is approximately 1.3m above the depressed bay level. To avoid encroachment into the SPA boundary, it is proposed to retain the existing stone wall/embankment by constructing a mass concrete gravity wall in behind it. This requires the material in behind the wall to be excavated out and then backfilled with mass concrete. Due to the potential instability of the stone wall, care is required during construction to protect the existing stone wall/embankment. While the wall itself has not been identified as being of heritage importance, the area behind it is designated as an SPA. In order to avoid the collapse of the existing wall/slope, the installation of a temporary/sacrificial support to maintain the integrity of the slope and contain the concrete from seeping through the stone wall and into the SPA will be provided in a worst-case construction scenario. Protection from construction run-off into the SPA will be implemented during construction along this section, refer to measures included in the CEMP (Appendix 5.1 of this EIAR).

An existing advertising billboard is present along the green area adjacent to the Dublin Road. It has two separate sides, each approximately 12m in length. The works require the removal of 6m in length of both sides of the billboard, with the remaining 6m to be maintained, during and post construction. The removal of the sections of the billboard will require the excavation around and removal of six vertical steel posts and the timber frame mounted on these posts. Existing lighting and associated cables are to be demounted from the section of billboard to be removed, with the remaining lights to be re-cabled as necessary. Existing buried electricity cables are to be diverted as required.

A portion of the landscaped area in front of the grounds of the G Hotel will be removed to facilitate footpath re-location and the construction of the raised adjacent cycle lane. This will require the landscaped area to be removed and excavated to allow the footpath/cycle lane to be constructed.

Temporary traffic management will be required to accommodate these works, including lane closures and the duration is estimated to be approximately 16 weeks.

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 5.2 and Section 5.3, and also with the traffic management stages set out in Section 5.5.2.3

5.5.1 Pre-Construction

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

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

GCC 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, demolition of houses at (20 St. Brendan's Avenue and 5/6 Headford Road), other demolition works (e.g., such as boundary walls), installation of fencing and signage, vegetation clearance and treatment of non-native invasive species, 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 5.5.2.3.

This will be a mixture of boundary walls / fencing along industrial / commercial land, boundary walls along residential properties, fence posts 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 5.5.2.3.

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 the Construction Traffic Management Plan in Appendix 5.1 in Volume 4 of this EIAR. 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 (DTTS 2019), hereafter referred to as the Traffic Signs Manual.

5.5.2.4 Tree Protection

Trees to be retained within and adjoining the works areas will be suitably protected as necessary as per 'British Standard (BS) 5837:2012 Trees in Relation to Design, Demolition, and Construction' (British Standards Institution (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 (BCG-LA-00-9001).

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 16.1 Arboricultural Report 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) of this EIAR and further information on the assessment of tree removal with regards to landscape and visual impact is provided in Chapter 16 (Landscape (Townscape) & Visual) of this EIAR.

5.5.2.5 Vegetation Clearance and Treatment of Non-Native Invasive Species

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

A suitably qualified specialist will be appointed by the contractor to monitor vegetation clearance, and treatment of non-native invasive species. Prior to construction, confirmatory invasive species surveys will be undertaken by the specialist to re-confirm the presence and / or extent of species within the footprint of the Proposed Scheme. Further information with regards to pre-construction ecological surveys and restrictions are provided in Chapter 12 (Biodiversity) of this EIAR. Vegetation identified for removal will be removed in accordance with 'BS 3998:2010 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 5.1 CEMP in Volume 4 of this EIAR.

5.5.2.6 Archaeological Investigations

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

5.5.2.7 Ground Investigations

Prior to construction localised confirmatory ground investigations will be undertaken to verify the results of the assessments, undertaken and reported in this EIAR.

Information on the specific ground investigations conducted along the Proposed Scheme have been outlined in Chapter 14 (Land, Soils, Geology & Hydrogeology) of this EIAR.

5.5.2.8 Construction Compounds

As part of preparatory works, the Construction Compounds will be set up, which will include installation of the necessary facilities including the site office, welfare facilities, etc. Controlled access to the Construction Compounds will be implemented, fencing will be erected, and lighting will be installed. The Construction Compounds will be secured with Closed-Circuit Television (CCTV), to ensure safe storage of all material, plant and equipment. Further information on the Construction Compounds is included in Section 5.5.3.14.

5.5.2.9 Lighting

The majority of the Proposed Scheme route 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 (Basis of Infrastructure Design) in Chapter 4 (Proposed Scheme Description) of this EIAR.

5.5.2.10 Demolition

In some locations along the Proposed Scheme, items, such as houses (20 St. Brendan's Avenue and No. 5/6 Headford Road), walls, gates, fencing, lighting poles, bus stops, etc., will need to be removed or demolished. Demolition of structures will be carried out in a controlled manner, under supervision. All plant and equipment will be maintained in good working order and inspected in accordance with manufacturers recommended intervals. Demolition works areas will be appropriately hoarded and signposted. Best practice industry standard working methods will be used to minimise the generation of dust, noise and other environmental effects resulting from the demolitions as described in Chapter 7 (Air Quality) and Chapter 9 (Noise & Vibration) of this EIAR.

The impacts of materials arising from the Proposed Scheme demolitions are assessed in Chapter 17 (Waste & Resources) of this EIAR. Measures for managing demolition materials are included in the Construction Demolition Resource Waste Management Plan (CDRWMP) in Appendix 5.1 CEMP in Volume 4 of this EIAR.

5.5.3 Road and Street Upgrades

5.5.3.1 General

The Proposed Scheme will be constructed in a manner which will minimise, as much as practicable, any disturbance to residents, businesses and road users. Road and street upgrade works will be completed in a staged manner, as described in Section 5.3, 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 homes and businesses 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 (BCG- BW-00-9001) 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 Transport Infrastructure Ireland (TII) Guidelines for the Management of Waste from National Road Construction Projects (TII 2017), and the Waste Management Act, 1996, as amended. The management of materials is discussed in Chapter 17 (Waste & Resources) of this EIAR. The overall estimated quantities of demolition, excavation and construction materials for the Proposed Scheme are outlined respectively in Table 17.7, Table 17.8 and Table 17.9 in Chapter 17 (Waste & Resources) of this EIAR.

5.5.3.4 Drainage

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

Specific controls and mitigation measures will be put in place to manage runoff and minimise pollution to receiving waterbodies 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 18 (Material Assets) of this EIAR and the Surface Water Management Plan (SWMP) in Appendix 5.1 CEMP in Volume 4 of this EIAR.

5.5.3.5 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 18 (Material Assets) of this EIAR.

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

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

The majority of utilities are anticipated to be retained and protected in their current position with the new works constructed over the top of existing infrastructure. Where there are poles or boxes within the footprint of the widening works, these will need to be temporarily relocated to enable the widening works to be completed.

The existing utilities will be protected where possible. Risks associated with diversions include:

- Programme - Diversion of some utilities includes work to be completed by Statutory Undertakers. Availability of resources and lead-in times for the diversion works are common issues which cause delay on construction schemes, particularly a scheme like the CCL works.
- Room for new services - Verges and footways are full of utilities (both known and unknown) – therefore finding space for the installation of new infrastructure is difficult.

Retaining the existing infrastructure in place is not without risk either, these risks include:

- Position of existing services - depending on the construction make-up of the proposed works, it may be required to lower/move the existing ducting – there may be other utilities or obstructions which may impede this. In some instances, a diversion may be required.

The programme and sequencing are based on the retention of the existing services in their current position with diversions only where highlighted in the information provided. Reasonable allowances have been made within the programme for dealing with these diversions.

Any further utility diversions needed to facilitate the new works could have a major effect on section durations. Detailed consultations should take place with Statutory undertakers in advance of the detailed design of the scheme and clear information regarding their requirements and proposals agreed in advance of the construction contract. Any utility diversions which require a long lead-in time for equipment should be procured in advance of the main construction contract.

5.5.3.6 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.

Existing asphalt / bituminous layers will be removed using road planers, with plantings being recycled where possible, as is common practice. Following this, existing lower courses of road make-up or ground will be excavated in layers using mechanical excavators in order to segregate materials for reuse, recycling, or disposal as appropriate, with materials being transported using lorries. The new or rehabilitated pavement will then be constructed from formation level, in coordination with the installation of street furniture assets. Plant used in construction of the new road make-up will be excavators, rollers, dumpers, and lorries, as detailed in Section 5.5.3.13. Specialist road paving machines will be used to lay bituminous layers. Road markings and reflective road studs where appropriate 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.

5.5.3.7 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 34 signalized junctions along the Proposed Scheme will be upgraded to provide bus priority, enhanced pedestrian crossings and segregated cycling facilities in places. In general traffic signals will be replaced, and additional dedicated signals will be provided for buses, cyclists and pedestrians as appropriate. Extensive 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.

5.5.3.8 Ancillary Road Furnishings

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

5.5.3.9 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 (BCG-LA-00-9001) in Volume 3 of this EIA.

5.5.3.10 Structural Works

Retaining walls are proposed at two locations, one at College Road and one at Dublin Road.

The retaining wall at College Road is located along the boundary of Moneenageisha Court. A proposed new retaining wall (which retains a level difference of approximately 1.2m) will be constructed along the proposed new boundary. This wall will have an exposed face of approximately 2.4m on the College Road side. The wall will be a reinforced concrete wall and will require excavations of approximately 2.0m below existing ground level across the frontage of Moneenageisha Court with the temporary removal of the existing road parallel to College Road.

Carriageway widening works on the Lough Atalia side of Dublin Road, between Brothers of Charity and the existing billboard adjacent to the Huntsman Inn will require the construction of a retaining wall and a mass concrete gravity wall. The retaining wall will be required between the proposed Dublin Road widening and the footpath / greenway area to the south. The proposed new retaining wall (which retains a maximum level difference of approximately 1.0m) will be constructed along the proposed new boundary. This wall will have a maximum exposed face of approximately 2.15m on the Lough Atalia side. The wall will be a reinforced concrete wall and will require excavations of approximately 0.5m below existing ground level across the frontage of the Dublin Road boundary. A mass concrete gravity wall will be required underneath the realigned footpath / greenway and the bank of Lough Atalia, in order to prevent impact on the loose stone embankment as it enters the SPA.

The demolition of two end of terrace houses will necessitate the construction of two new gable walls at the boundaries of number 19 St. Brendan's Avenue and at number 4 Headford Road. Works will require temporary and support of these properties during demolition and the construction of 2 no. new gable walls.

5.5.3.11 Principal Structures

The principal structural works which form part of the Proposed Scheme are summarised in Table 5.6. Further details are provided in Section 5.5.3.19 to Section 5.5.3.21.

Table 5.6: Principal Structures

Structure Name	Structure Reference	Section Reference
Moneenageisha Court Retaining Wall	STR_RW_01	STR_RW_01_2
Dublin Road Retaining Wall	STR_RW_01	STR_RW_02_2

5.5.3.12 Construction Site Decommissioning

On completion of construction, all construction facilities and equipment such as plant, materials, temporary signage, laydown areas, and the Construction Compounds etc. will be removed. The areas which were occupied by the Construction Compounds will be reinstated – refer to the General Arrangement Drawings (BCG-GA-00-00 to BCG-GA-00-13) in Volume 3 of this EIAR.

5.5.3.13 Construction Plant and Equipment

In order to assess a reasonable worst case Construction Phase impact scenario, with regards to air quality, noise and vibration, an estimate of construction plant and equipment that will be necessary to construct the Proposed Scheme has been prepared, refer to Table 5.7.

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 5.7: Estimated Peak Daily Plant and Equipment Numbers

Plant / Equipment	Plant and Equipment Numbers per Section																				
Type	A1	A2	A3	A4	A5	A6	A7	A8	B1	B2	B3	B4	B5	B6	B7	B8	C1	C2	C3	C4	C5
Lorry	4	8	2	4	4	4	4	8	10	8	8	4	4	8	4	4	6	8	12	8	12
Backhoe Mounted Hydraulic Breaker	2	2	1	1	2	2	2	2	2	2	2	2	1	2	2	2	2	2	2	2	2
8t Excavator	1	2	1	1	1	1	1	2	2	2	2	1	1	2	1	1	1	2	2	2	2
13t (Rubber Wheeled) Excavator	0	1	0	0	0	1	0	1	1	1	1	0	0	1	0	0	1	1	1	1	1
16t (Rubber Wheeled) Excavator	1	1	0	1	1	1	1	1	2	1	1	1	0	1	1	1	1	1	1	1	1
6t Dumper	2	4	1	2	2	4	2	4	4	4	4	2	2	4	2	2	2	4	4	4	4
Road Planer	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Road Sweeper	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Asphalt Paver	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Asphalt Roller	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3t Roller	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
50t Crane	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0

5.5.3.14 Construction Compounds

It is anticipated that three construction compounds will be utilised during the construction of the Proposed Scheme, two main compounds located at Galway Harbour Enterprise Park and a satellite compound at Galway Cathedral Car-Park.

The Construction Compound locations have been selected due to the amount of available space at these locations, their locations near the majority of the Proposed Scheme major works and their access to the Regional and Local Road network.

The locations of the Construction Compounds and Satellite Construction compound in relation to the Proposed Scheme are shown in Diagram 5.5. The main Construction Compounds will be located in the Galway Harbour Enterprise Park, within Galway Docks. These compounds are proposed to be split into two distinct locations due to available space. The appointed contractor's CTMP shall include measures for managing traffic accessing and egressing the Construction Compounds. This CTMP will require construction traffic to route along the access routes identified in Diagram 5.5 within the Galway Harbour Enterprise Park. The third compound will be located at the car-park of Galway Cathedral.

The first Construction Compound at Galway Harbour Enterprise Parks is approximately 2,180m² in area and will contain site offices, and welfare facilities for GCC and contractor personnel. Limited car parking will be allowed at this Construction Compound, in line with the principles of the Construction Stage Mobility Management Plan (CSMMP). The second Construction Compound at Galway Harbour Enterprise Park is approximately 2,710m² in area and will be used to store materials for reuse such as topsoil, subsoil, concrete, rock etc., together with materials delivered to site for use in the construction of the scheme, e.g. pipes and ducting. Items of plant and equipment will also be stored within this Construction Compounds including the provision of a crusher. The third compound, located at Galway Cathedral, is approximately 2,990m² in area and will also be used to store plant and materials, together with site personnel welfare facilities.

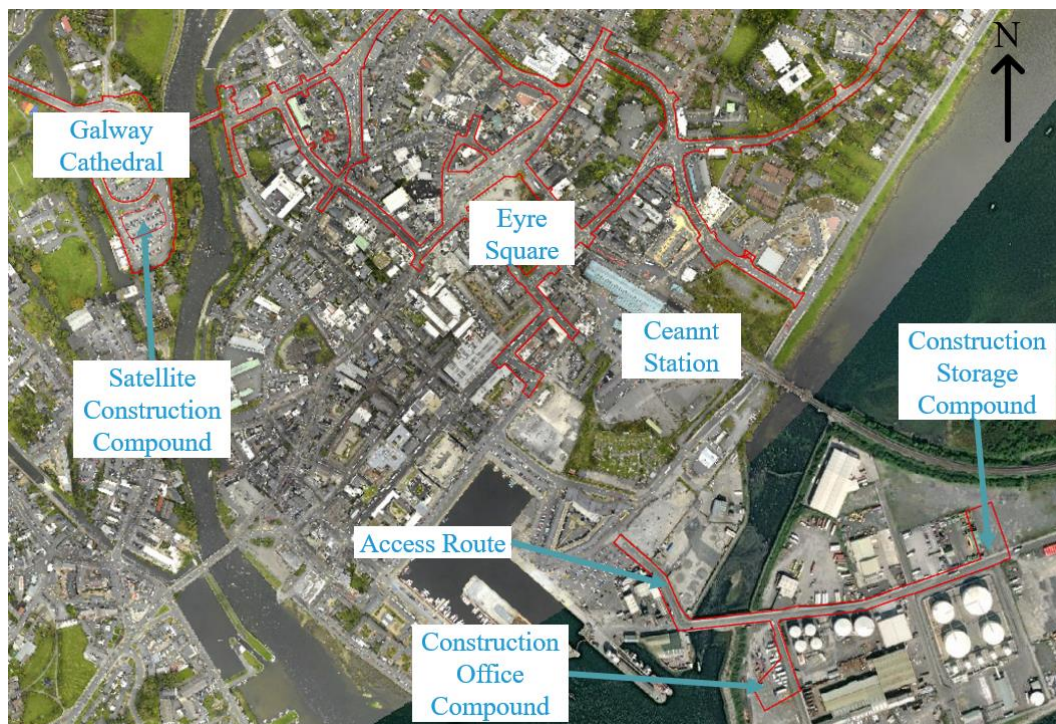


Diagram 5.5: Proposed Construction and Satellite Construction Compound locations

The Construction Compounds will be engineered with appropriate services. Water, wastewater, power, and communications connections will be organised by the appointed contractor.

At work areas along the Proposed Scheme, where permanent provisions (for the duration of the construction programme) are not practicable, appropriate temporary provisions will be made, including the use of generators if required. Temporary welfare facilities will need to be used, for example, portable toilets in the vicinity of works. Wastewater from temporary welfare facilities will be collected and disposed of to a suitably licenced facility.

Appropriate environmental management measures will be implemented at the Construction Compounds for example, to minimise the risk of fuel spillage, and to ensure that the Construction Compounds and the approaches to them are appropriately maintained

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

5.5.3.15 Construction Traffic Management

The Construction Traffic Management Plan (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. Refer to Diagram 5.6 for indicative traffic management routes.

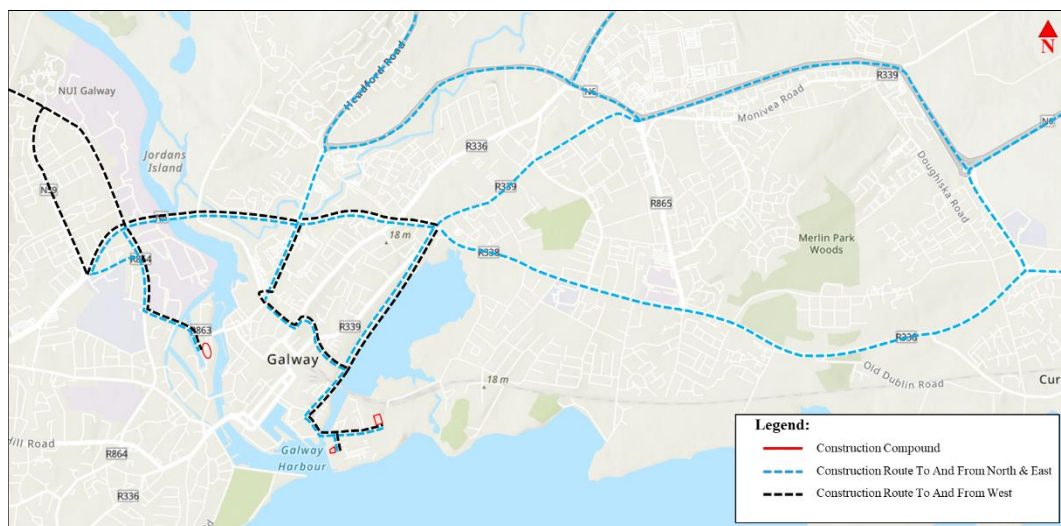
The staging of construction and associated temporary traffic management measures has considered the receiving environment when developing the schedule of works.

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

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

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

The construction traffic management measures have been developed in accordance with the Traffic Signs Manual. Construction traffic management measures are summarised in Section 5.6.1.1, with further details (such as routing of construction vehicles, timings of material deliveries, etc.) included in the CTMP in Appendix 5.1 CEMP in Volume 4 of this EIAR.



5.5.3.17 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 5.5.4). Wherever practicable, bus services will be prioritised over general traffic. However, the temporary closure of sections of existing dedicated bus lanes will be required to facilitate the construction of new bus priority infrastructure that is being developed as part of the Proposed Scheme. Some existing bus stop locations will need to be temporarily relocated to accommodate the works. In such cases, bus stops will be safely accessible to all users and all temporary impacts on bus services will be determined in consultation with GCC and the service providers.

5.5.3.18 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.

Two-way traffic will generally be maintained along the Proposed Scheme, however in circumstances where there is not sufficient road width to allow two-way traffic (e.g. reduced lane width), single lane traffic controlled by a stop / go system of temporary traffic lights will be implemented with priority provided to traffic travelling towards the City Centre during the morning, and reversed during the afternoon where appropriate. Lane closures and route diversions will supplement this system if traffic volumes are heavy. Short delays may occur outside of the AM and PM peaks, for example as a result of vehicles accessing the works.

For most of the Proposed Scheme the existing carriageway width is sufficient to maintain full width two-way traffic throughout the works. However, where the carriageway width is restricted, at various sections throughout the Proposed Scheme. The construction works will be split into traffic management stages as described in 5.5.3.19 to Section 5.5.3.21.

5.5.3.19 Section A – University Road to Eyre Square, Wood Quay and Headford Road

Section A1 - University Road

The proposed works will be undertaken in four main phases of traffic management:

- Phase 1 – Widening works on Northern footpath, traffic to be reduced to a single lane in each direction and realigned in narrow lanes to the South.
- Phase 2 – Widening works on Southern footpath, traffic to be reduced to a single lane in each direction and realigned in narrow lanes to the North. Traffic to operate on a shuttle system through pinch points.
- Phase 3 – Works will be undertaken out-of-hours. Traffic to be reduced to single lane shuttle working.

- Phase 4 - Close off the Canal Road Upper the petrol interceptor installation works for three days (to be undertake in conjunction with Phase 1 or 2 above).

Section A2 - Gaol Road and Galway Cathedral

Temporary traffic management will be required to accommodate these works, and the duration is estimated to be approximately four weeks.

The proposed works will be undertaken in in a single main phase of traffic management:

- Gaol Road (west of the cathedral) will be converted into a two-way traffic route and Gaol Road (east of the cathedral) will be closed to traffic form part of the works area. The carpark will form part of the works area for the duration of the scheme. Access to Nuns Island to be maintained for the duration.

Section A3 - Salmon Weir Bridge

The proposed works will be undertaken in three main phases of traffic management:

- Phase 1 – Removal works on the southern footpath. Traffic to be reduced to single lane shuttle working.
- Phase 2 – Widening works on the northern footpath. Traffic to be reduced to single lane shuttle working.
- Phase 3 – Resurfacing of the bridge. This will require the closure of the bridge to vehicular traffic for one night.

Section A4 - Newtownsmith/Waterside

The proposed works will be undertaken in three main phases of traffic management:

- Phase 1 – Closure of Waterside, between Courthouse Square and St. Vincent's Avenue. Pedestrian and cyclist permeability will be maintained.
- Phase 2 – Closure of Newtownsmith, between access to the river walk and St. Vincent's Avenue. Pedestrian and cyclist permeability maintained. HGV egress from Newtownsmith to be maintained under contractor control.
- Phase 3 – Full closure of Newtownsmith for all vehicles including HGV egress, for the installation of retractable bollards.

Section A5 - St. Vincent's Avenue/Walsh's Terrace

The proposed works will be undertaken in three main phases of traffic management:

- Phase 1 – Footpath widening and drainage works on the northern footpath, traffic reduced to single lane shuttle running.
- Phase 2 – Footpath widening works on the southern footpath, traffic reduced to single lane shuttle running.
- Phase 3 – Road surfacing and raised table construction, traffic reduced to single lane shuttle running.

Section A6 - Dyke Road/Headford Road

The proposed works will be undertaken in four main phases of traffic management:

- Phase 1 – Closure of the road connecting Dyke Road to Headford Road adjacent to the Dyke Road carpark and completion of the widening on the northern side of this road and the footpath widening on the southern side of the road.
- Phase 2 – Closure of the Dyke Road, between the Headford Road and the Dyke Road car-park, with local access only maintained to the Plots. Widening of the road to the west, construction of the proposed cycle track and installation of the new footpath on the eastern side to be carried out under this road closure.
- Phase 3 – Realignment and installation of new traffic signal controlled junctions, with one-way circulatory system in place, reduced to one lane.
- Phase 4 - Road surfacing, traffic reduced to single lane shuttle running.

Section A7 - St. Francis Street/Eglinton Street/Williamsgate Street

The proposed works will be undertaken in three main phases of traffic management:

- Phase 1 – Widening works on Northern footpath, traffic reduced to single lane shuttle operation with a temporary footpath on the Northern side.
- Phase 2 – Widening works on Southern footpath, traffic reduced to single lane shuttle operation with a temporary footpath on the Southern side.
- Phase 3 – Road surfacing works; traffic reduced to single lane shuttle working.

Section A8 - Wood Quay/Daly's Place/Mary Street

The proposed works will be undertaken in three main phases of traffic management:

- Phase 1 – On Woodquay, works on eastern lane, traffic reduced to single lane in each direction and realigned in narrow lanes to the west.
- Phase 2 – On Woodquay, works on western lane and eastern footpath, traffic reduced to single lane in each direction and realigned in narrow lanes to the east.
- Phase 3 – On Daly's Place, Mary Street and a section of Woodquay, works undertaken out-of-hours; traffic reduced to single lane one-way operation.

5.5.3.20 Section B – Eyre Square, Forster Street, Dock Road, Bothar na mBan, Bothar Ui hEithir and Fairgreen Road

Section B1 - Bóthar na mBan/St. Brendan's Avenue

The proposed works will be undertaken in three main phases of traffic management:

- Phase 1 – On St. Brendan's Avenue traffic reduced to single lane shuttle working.
- Phase 2 – On Bóthar na mBan, works on Eastern lane, traffic reduced to single lane in each direction and realigned in narrow lanes to the West.
- Phase 3 – On Bóthar na mBan, works on Western lane, traffic reduced to single lane in each direction and realigned in narrow lanes to the East

Section B2 - Prospect Hill

The proposed works will be undertaken in three main phases of traffic management:

- Phase 1 – Between Eyre Square and Bóthar na mBan, works on Western lane, traffic reduced to single lane in each direction and realigned in a narrow lane to the East.
- Phase 2 – Between Eyre Square and Bóthar na mBan, works on Eastern lane, traffic reduced to single lane in each direction and realigned in a narrow lane to the West.
- Phase 3 – Work on Prospect hill and Bohermore junction, traffic reduced to single lane one-way.

Section B3 - Eyre Square North/Eyre Square East/Eyre Square South

The proposed works will be undertaken in four main phases of traffic management:

- Phase 1 – Realignment of the corner of Eyre Square North and Eyre Square East and also the corner of Eyre Square east and Forster Street, traffic to operate on a one-way shuttle system through these junctions.
- Phase 2 – Works on Eyre Square North, with the existing access road closed to all traffic. Access for deliveries to be maintained via Rosemary Avenue and Eyre Street.
- Phase 3 – Works on Rosemary Avenue and Eyre Street, with roads to be closed to vehicular access for the duration of the works.
- Phase 4 – Road surfacing works to be carried out under single lane shuttle operation.

Section B4 - Victoria Place/ Merchant's Road/ Queen Street

The proposed works will be undertaken in three main phases of traffic management:

- Phase 1 – On Merchants Road and Queen Street, traffic reduced to single lane one-way, works to be undertaken on alternating footpaths.

- Phase 2 – On Forthill Street, works on Northern lane, traffic reduced to single lane one-way, works to be undertaken on alternating footpaths.
- Phase 3 – Overnight closure of Merchants Road (Forthill Street to Queen Street) and Queen Street to Dock Road, for the installation of raised tables.
- Phase 4 – Single lane operation on all routes during road surfacing works.

Section B5 - Forster Street

The proposed works will be undertaken in two main phases of traffic management:

- Phase 1 – Widening works on Northern footpath, traffic reduced to single lane shuttle working.
- Phase 2 – Widening works on Southern footpath, traffic reduced to single lane shuttle working.

Section B6 - College Road/Forster Street/Fairgreen Road/Bóthar Uí Eithir junction

The proposed works will be undertaken in three main phases of traffic management:

- Phase 1 – reduce approaches to sign lanes and the installation of a mini-roundabout, with actively controlled pedestrian crossings, island removal and footpath widening to be undertaken.
- Phase 2 – shuttle-controlled operation with road crossings and traffic signal installation to be carried out;
- Phase 3 – overnight junction closure to facilitate surfacing works.

Section B7 - Bóthar Uí Éithir

The proposed works will be undertaken in two main phases of traffic management:

- Phase 1 – Works on the Eastern lane, traffic reduced to single lane one-way and realigned to the West.
- Phase 2 – Works on the Western lane, traffic reduced to single lane one-way and realigned to the East

Section B8 - Fairgreen Road

The proposed works will be undertaken in three main phases of traffic management:

- Phase 1 – Works on the northern/eastern side, traffic reduced to single lane in each direction and realigned in narrow lanes to the south/west.
- Phase 2 – Works on the southern/western side, traffic reduced to single lane in each direction and realigned in narrow lanes to the East.
- Phase 3 – Works to be undertaken out-of-hours including road-crossing trenches and road surfacing; traffic reduced to single lane shuttle working.

5.5.3.21 Section C – College Road to Dublin Road

Section C1 – College Road (to junction with Lough Atalia Road)

The proposed works will be undertaken in two main phases of traffic management:

- Phase 1 – Widening works on the northern footpath including footpath widening and drainage installation, traffic reduced to single lane shuttle working.
- Phase 2 – Widening works on southern footpath, traffic reduced to single lane shuttle working.

Section C2 - College Road/Lough Atalia Road junction

The proposed works will be undertaken in three main phases of traffic management:

- Phase 1 – Removal of existing islands. Temporary pedestrian routes and crossing to be provided. Existing traffic operation maintained.
- Phase 2 – Construction of the realignment of College Road through a green area; existing traffic operation to be maintained;
- Phase 3 – Construction of landscaped area; traffic to be switched over to proposed future arrangement.

Section C3 - College Road (to junction at Moneenageisha)

The proposed works will be undertaken in three main phases of traffic management:

- Phase 1 – Works on the western side, traffic reduced to a single lane in each direction and realigned in narrow lanes to the east.
- Phase 2 – Works on the eastern side, traffic reduced to single lane in each direction and realigned in narrow lanes to the west.
- Phase 3 – Road surfacing works in the carriageway, traffic reduced to single lane in each direction and realigned as required to complete the works.

Section C4 - Moneenageisha junction

The proposed works will be undertaken in three main phases of traffic management:

- Phase 1 – Existing island removal and carriageway widening. Traffic to be reduced to a single lane approach on all arms during the works.
- Phase 2 - Bus Gate installation and footpath widening. Traffic to be reduced to a single lane approach on Dublin Road and College Road approaches.
- Phase 3 – Road surfacing, full junction closure over 2 -3 consecutive nights.

Section C5 - R338 Dublin Road

The proposed works will be undertaken in three main phases of traffic management:

- Phase 1 – Works on the southern side, including road widening, traffic reduced to three lanes on the Dublin Road and realigned in narrow lanes to the north.
- Phase 2 – Works on the northern side, traffic reduced to three lanes on the Dublin Road and realigned in narrow lanes to the south.
- Phase 3 – Road surfacing works in the carriageway, traffic reduced to single lane in each direction and realigned as required to complete the works.

5.5.4 Road Closures and Diversions

Road closures and diversions will be carried out during the Construction Phase of the Proposed Scheme. However, these measures will be minimised wherever possible, likely to be short lived and only required for limited activities. 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 Galway City Council, in consultation with An Garda Síochána, as necessary. Access will be maintained for emergency vehicles along the Proposed Scheme, throughout the Construction Phase.

5.5.5 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 20 (Cumulative Impacts & Environmental Interactions) of this EIA.

Interface liaison will take place on a case-by-case basis through Galway City Council, 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.

5.6 Construction Environmental Management

5.6.1 Construction Environmental Management Plan

As stated in Section 5.1, a Construction Environmental Management Plan (CEMP) has been prepared for the Proposed Scheme and is included as Appendix 5.1 in Volume 4 of this EIA. The CEMP will be updated by GCC 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 contractor, immediately following appointment, must detail in the CEMP the manner in which it is intended to effectively implement all the applicable mitigation measures identified in this EIAR. The CEMP has regard to the guidance contained in the TII Guidelines for the Creation, Implementation and Maintenance of an Environmental Operating Plan, and the handbook published by Construction Industry Research and Information Association (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 (Traffic & Transport) to Chapter 20 (Cumulative Impacts & Environmental Interactions) as appropriate and are summarised in Chapter 21 (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 GCC.

5.6.1.1 Construction Traffic Management Plan

The Construction Traffic Management Plan (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, refer to Appendix 5.1 of Volume 4 of this EIAR. It will be a condition of the Employer's Requirements that the successful 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.

5.6.1.2 Invasive Species Management Plan

The Invasive Species Management Plan (ISMP) has been prepared which provides the strategy to be adopted in order to manage and prevent the spread of the non-native invasive plant species. Non-native invasive plant species were identified in close proximity to the Proposed Scheme during ecological surveys. It will be a condition of the Employer's Requirements that the successful 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 GCC's approval. Further details on the assessment of non-native invasive species, and associated mitigation measures are provided in the ISMP.

5.6.1.3 Surface Water Management Plan

The Surface Water Management Plan (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 contractor, immediately following appointment, must detail in the SWMP how it is intended to effectively implement all the applicable measures identified in this EIA and any additional measures required pursuant to conditions imposed by An Bord Pleanála to any grant of approval.

5.6.1.4 Construction and Demolition Resource and Waste Management Plan

The Construction and Demolition Resource and Waste Management Plan (CDRWMP) has been prepared which provides the strategy that will be adopted in order to ensure that optimum levels of reduction, re-use and recycling are achieved.

It will be a condition of the Employer's Requirements that the successful 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 EIA 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 17 (Waste & Resources) of this EIA.

5.6.1.5 Environmental Incident Response Plan

The Environmental Incident Response Plan (EIRP) has been prepared to ensure that in the unlikely event of an incident (environmental, or non-environmental), response efforts are prompt, efficient, and suitable for the particular circumstances. The EIRP details the procedures to be undertaken in the event of a significant release of sediment into a watercourse, or a significant spillage of chemical, fuel or other hazardous substances (e.g., concrete), non-compliance incident with any permit or licence, or other such risks that could lead to a pollution incident, including flood risks. It will be a condition of the Employers Requirements that the successful 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 EIA and any additional measures required pursuant to conditions imposed by An Bord Pleanála to any grant of approval.

5.6.2 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 (Traffic & Transport) to Chapter 20 (Cumulative Impacts & Environmental Interactions) and summarised in Chapter 21 (Summary of Mitigation & Monitoring Measures) and Appendix 5.1 CEMP in Volume 4 of this EIA.

5.6.3 Working Hours

The construction working hours will be time restricted in accordance with the Construction Contract. Normal construction working hours will be restricted to between 07:00 and 19:00 on weekdays. Night-time, Saturday and Sunday working will be required during certain periods to minimise the impact on road traffic movements during the daytime, for example at busy road junctions and in commercial areas, and for such works as pavement / road surfacing. The planning of such works will take consideration of sensitive receptors, in particular any nearby residential areas.

5.6.4 Personnel Numbers

Throughout the Construction Phase there will be some variation in the numbers of personnel working on site. It is anticipated there will be approximately 70-80 personnel directly employed across the Proposed Scheme, rising to 100 personnel at peak construction.

5.6.5 Construction Health and Safety

The requirements of the Safety, Health and Welfare at Work Act 2005, the Safety, Health and Welfare at Work (Construction) Regulations, 2013 and other relevant Irish and EU safety legislation will be complied with at all times. As required by the Regulations, a Health and Safety Plan will be formulated which will address health and safety issues from the design stages through to the completion of the Construction Phase. This plan will be reviewed as the Proposed Scheme progresses. The contents of the Health and Safety Plan will follow the requirements of the Regulations. In accordance with the Regulations, a “Project Supervisor Design Process” has been appointed and “Project Supervisor Construction Stage” will be appointed as appropriate.

5.7 References

Association for Petroleum and Explosives Administration (APEA) and Energy Institute (2011) Design, Construction, Modification, Maintenance and Decommissioning of Filling Stations.

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

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

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

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

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

Transport Infrastructure Ireland (2017). The Management of Waste from National Road Construction Projects.

Directives and Legislation

Safety, Health and Welfare at Work (Construction) regulations 2013.

Safety, Health and Welfare at Work Act 2005, as amended.

Waste Management Act 1996, as amended.