Chapter 04
Proposed Development Description

Table of Contents

List of Figures

List of Tables

4 PROPOSED DEVELOPMENT DESCRIPTION

4.1 Introduction

This Chapter of the Environmental Impact Assessment Report (EIAR) provides a description of the Galway BusConnects: Dublin Road scheme (hereafter referred to as the Proposed Development).

Article 5(1)(a) of the Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (EIA Directive) requires that the EIAR contains:

'*a description of the project comprising information on the site, design, size and other relevant features of the project;…*'.

Section 50(2)(b)(i) of the Roads Act 1993 (as amended) states that the EIAR shall contain the following information:

'*a description of the proposed road development comprising information on the site, design, size and other relevant features of the development;…'.*

The layout of the chapter begins with the Proposed Development Overview (Section 4.2). This is followed by sections describing the design iteration process (Section 4.3) and the overall design principles applied to the Proposed Development (Section 4.4). Following this, there is a detailed description of the Proposed Development (Section 4.5) and a section describing the key infrastructure elements associated with the Proposed Development (Section 4.6). These sections should be read in conjunction with the Proposed Development plans (listed in Table 4-1 below), which are contained in Chapter 3 (Consideration of Reasonable Alternatives) of the EIAR, to provide a full understanding of the Proposed Development and its associated infrastructure elements.

Table 4-1 List of Drawings

Drawing Series Number	Description
BCGDR-BTL-SPW_ZZ-XX-DR-CR-00001-00003	Site Location Map and Site Location Plan
BCGDR-BTL-GEO_GA-XX-DR-CR-00000_00013	General Arrangement
BCGDR-BTL-GEO_HV-XX-DR-CR-00000-00011	Mainline Plan and Profile
BCGDR-BTL-GEO_CS-XX-DR-CR-00000_00006	Typical Cross Sections
BCGDR-BTL-ENV_LA-XX-DR-CE-00000_00011	Landscaping General Arrangement
BCGDR-BTL-SPW_BW-XX-DR-CR-00000-00011	Fencing and Boundary Treatment
BCGDR-BTL-TSM_KP-XX-DR-CR-00000-00011	Traffic Signs and Road Markings
BCGDR-BTL-DNG_RD-XX-DR-CD-00000_00011	Surface Water Drainage
BCGDR-BTL- XX_No_XX-DR-CD-06047-06050	Catchment Areas
BCGDR-BTL-DNG_RD-XX-DR-SE-00110	Attenuation Tank 1 General Arrangement
BCGDR-BTL-DNG_RD-XX-DR-SE-00111	Pump Station 1 Plan & Section
BCGDR-BTL-DNG_RD-XX-DR-SE-00120	Attenuation Tank 2 General Arrengement
BCGDR-BTL-DNG_RD-XX-DR-SE-00121	Pump Station 2 Plan & Section
BCGDR-BTL-UTL_UC-ZZ-DR-CU-00000-00011	Combined Existing Utilities Records
BCGDR-BTL-UTL_UW-ZZ-DR-CU-00000-00011	IW Water Asset Alterations
BCGDR-BTL-UTL_UE-ZZ-DR-CU-00000-00011	ESB Asset Alterations

Drawing Series Number	Description
BCGDR-BTL-UTL_UG-ZZ-DR-CU-00000-00011	GNI Asset Alterations
BCGDR-BTL-UTL_UL-ZZ-DR-CU-00020-00031	Telecommunications Asset Alterations
BCGDR-BTL-SPW_BW-XX-DR-SE-00101	Retaining Wall
BCGDR-BTL-LHT_RL-XX-DR-EO-00000_00011	Street Lighting

4.2 Proposed Development Overview

The Proposed Development has an overall length of approximately 3.9km, the extent of which is set out in Figure 1-1 in Chapter 1 (Introduction) of this EIAR and includes areas such as Roscam, Doughiska, Murrough, Renmore, Merlin Park and Wellpark. The Proposed Development comprises the provision of public transport facilities and active travel facilities from east of the Moneenageisha Junction to the Doughiska Junction. This route is a main arterial route into Galway City Centre for both commuters and tourists. It also runs adjacent to the Atlantic Technological University, Merlin Park Hospital, Bon Secours Hospital and a number of schools and other amenity locations.

The Proposed Development includes a substantial increase in the level of bus priority and cycle facilities provided along the corridor, including the provision of additional lengths of bus lane resulting in improved journey time reliability. Throughout the Proposed Development, bus stops will be enhanced to improve the overall journey experience for bus passengers, and cycle facilities will be substantially improved with segregated cycle tracks provided along the links and protected junctions with enhanced signalling for cyclists provided at junctions.

Moreover, pedestrian facilities will be upgraded, and additional signalised crossings be provided. In addition, urban realm works will be undertaken at key locations with higher quality materials, planting and street furniture provided to enhance pedestrians' experience.

Table 4-2 Summary of Changes as a Result of the Proposed Development

Total length of Proposed Development	**3.9km**	
	Existing (km)	**Proposed Development (km)**
Bus Lanes		
Inbound	0.8km	3.9km
Outbound	2.7km	3.9km
Bus Priority through Traffic Management		
Inbound	0.79km	3.9km
Outbound	2.88	3.9km
Total Bus Priority (both directions)	49%	100%
Bus Measures		
Proportion of Route with Bus Priority Measures	49%	100%
Cycle Facilities - Segregated		
Inbound	0	3.9km
Outbound	0	3.9km
Cycle Facilities – Non-segregated		
Inbound	0	0
Outbound	0	0

Cycle Facilities - Overall		
Total Cyclist Facilities (both directions)	0	3.9km
Other Features		
Number of Traffic Signal Controlled Junctions	6	9
Number of Signal Crossings	1	2

4.3 Design Iterations

The design of the Proposed Development has evolved through a comprehensive design iteration process, with particular emphasis on minimising the potential for environmental impacts where practicable, whilst ensuring the objectives of the Proposed Development are attained. In addition, feedback received from the comprehensive consultation programme, described in Chapter 1 (Introduction) of this EIAR, undertaken throughout the option selection and design development process have been incorporated, where appropriate. Chapter 3 (Consideration of Alternatives) of this EIAR, Section 3.5.2, documents the ways in which the design developed from inception.

4.4 Design Principles

The design of the Proposed Development was developed with reference to the Preliminary Design Guidance Booklet for BusConnects Core Bus Corridors (PDGB) (National Transport Authority (NTA)) (2021). This guidance document was prepared to ensure that a consistent design approach for the BusConnects Infrastructure Works was adopted based on the objectives of the Proposed Development. The project objectives are described in full in Chapter 2 (Need for the Proposed Development).

The purpose of the PDGB is to complement existing guidance documents/design standards relating to the design of urban streets, bus facilities, cycle facilities and urban realm, which include the following:

- The Design Manual for Urban Roads and Streets (DMURS) (Government of Ireland 2013);
- Cycle Design Manual (CDM) (NTA 2023);
- National Road Design Standards (Transport Infrastructure Ireland (TII));
- The Traffic Signs Manual, as updated (TSM) (Department of Transport, Tourism and Sport 2019);
- Guidance on the Use of Tactile Paving Surfaces (UK Department for Transport (DfT) 2021); and
- Building for Everyone: A Universal Design Approach (National Disability Authority (NDA)).

The design principles to simplify and improve bus, cycle, and pedestrian access for all have been employed throughout design of the Proposed Development. Accessibility for mobility impaired users is a core element of the design approach and it has been specifically informed by the principles of:

- DMURS;
- How Walkable is Your Town (Age Friendly Ireland and NDA, 2015);
- Shared Space, Shared Surfaces and Home Zones from a Universal Design Approach for the Urban Environment in Ireland (NDA 2012);
- Best Practice Guidelines, Designing Accessible Environments (Irish Wheelchair Association, 2020);
- Inclusive Mobility (UK Department for Transport, 2021);
- Guidance on the Use of Tactile Paving Surfaces (UK Department for Transport, 2021); and
- BS8300:2018 Design of an accessible and inclusive built environment - External Environment – code of practice.

Further details on accessibility for mobility impaired users is provided in Section 4.6.9. Taking guidance from the design principles as set out, the Proposed Development seeks to adopt a consistency and uniformity of approach to infrastructure provision along its route where practical to do so. The key elements of this infrastructure provision to be provided are described in Section 4.6, with their application along the route of the Proposed Development set out in Section 4.5.

4.5 Description of Proposed Development

This section details the Proposed Development. It should be read in conjunction with the Proposed Development plans, which are contained in Chapter 3 (Consideration of Reasonable Alternatives) of the EIAR.

For the purpose of describing the Proposed Development it has been split into two sections as follows:

- Section 1: East of Moneenageisha to Skerritt Junction; and
- Section 2: Skerritt Junction to Doughiska Junction.

4.5.1 Section 1: Moneenageisha to Skerritt Junction

4.5.1.1 Overview

The Proposed Development commences east of Moneenageisha Junction where it will tie into the BusConnects Cross-City Link project. This section of the Proposed Development is approximately 1500m in length. It is proposed to maintain the two-way general traffic lanes and introduce continuous bus lanes in both directions in this section. The existing footpaths will be upgraded and extended and segregated cycle tracks provided along the entire length of the route.

The existing junctions at Renmore Road and Ballyloughnane Road will be modified to a fully signalised junction with dedicated pedestrian and cyclist facilities. A new “cyclops” (Cycle Optimised Protected Signals) junction is proposed to replace the Skerritt roundabout which is designed to separate pedestrians and cyclists from traffic at the junction, reducing the possibility of collisions or conflict.

New access arrangements are proposed at the following locations:

- Kia dealership;
- Cloch Mhile building;
- Woodlands Campus - Brother of Charity Services (both entrances);
- DPL / Bathroom World;
- Renmore Park;
- The Connacht Hotel;
- Glenia Heights/Michael Collins Road;
- Galway Hospice Foundation;
- Galwegians Rugby Football Club;
- Flannery’s Hotel;
- Belmont Estate; and
- ATU Galway Campus.

Temporary land acquisition is required within this Section at various locations to facilitate works, including drainage connections and reconfiguration of access, footpaths, and cycle tracks. All temporary land acquisition is to be reinstated once works are completed.

Permanent land acquisition is required within this section to allow for the proposed cross-section widening and construction of new footpaths and cycleways. The following locations will be impacted by the additional land take for the Proposed Development:

- Greenspace and paved area outside of Brothers of Charity Services Galway;
- Greenspace by Wellpark Grove Park;
- Greenspace west of Connacht Hotel;
- Greenspace in The Connacht Hotel Car Park;
- Garden and driveway of 18 Dublin Road;
- Approximately 34 private car parking spaces (26 temporary lost, and 8 permanently lost);
- Public Greenspace south of Glenina Heights;
- Greenspace in the western corner of Galway Hospice Foundation;

- Greenspace by Bon Secours Hospital;
- TFI bike station Glenina;
- Greenspace by Galwegians Rugby Football Club;
- Greenspace and paved area in Flannery's Hotel Car Park;
- Industrial area to the west of Ballyloughane Road;
- Greenspace in Belmont;
- Gaelscoil Dara sports field; and
- Greenspace outside of ATU Galway Campus.

The works in the Brothers of Charity lands will include demolition of two single-story buildings located just inside the existing boundary wall. Boundary walls at the Brothers of Charity, Wellpark Grove Park, greenspace west of Connacht Hotel, the Connacht Hotel, 18 Dublin Road site, Duggan's Spar, Bon Secours Hospital, Galwegians Rugby Football Club, Flannery's Hotel, Industrial area at the corner of Ballyloughane, Belmont Estate, ATU Galway Campus and ATU Pitches will be demolished and will be rebuilt at the new boundary location.

4.5.1.2 Bus Lane Provision

An overview of the bus provision being proposed as part of the Proposed Development is provided in Section 4.6.4. Full bus priority through the use of dedicated bus lanes is provided throughout Section 1.

4.5.1.3 Bus Stops

The different types of bus stop (Island, Shared Landing, and In-Line) are described in Section 4.6.4. All the proposed bus stops within this section of the Proposed Development are Island Bus Stops. The bus stop locations and types are outlined in Table 4-3.

Table 4-3 Proposed Bus Stop Location

Inbound/ Outbound	Bus Stop Name	Bus Stop Number	Chainage	Bus Stop Type	Bus Shelter	Proposed Facilities
Outbound	New	TBD	0+010	Island with lay-by	New standard bus shelter proposed	RTPI and Bus Shelter with Seating
Inbound	Brothers of Charity	522961	0+185	Island with lay-by	New standard bus shelter proposed	RTPI and Bus Shelter with Seating
Outbound	Renmore Park	522701	0+320	Island with lay-by	New standard bus shelter proposed	RTPI and Bus Shelter with Seating
Outbound	Glenina Heights	524131	0+675	Island with lay-by	New standard bus shelter proposed	RTPI and Bus Shelter with Seating
Inbound	Glenina Heights	524351	0+750	Island with lay-by	New standard bus shelter proposed	RTPI and Bus Shelter with Seating
Outbound	Galwegians RFC	524141	1+035	Island with lay-by	New standard bus shelter proposed	RTPI and Bus Shelter with Seating
Inbound	Dawn Dairies	524341	1+075	Island with lay-by	New standard bus shelter proposed	RTPI and Bus Shelter with Seating
Inbound	New	TBD	1+240	Island with lay-by	New standard bus shelter proposed	RTPI and Bus Shelter with Seating

Inbound/ Outbound	Bus Stop Name	Bus Stop Number	Chainage	Bus Stop Type	Bus Shelter	Proposed Facilities
Inbound	New	TBD	1+270	Island with lay-by	New standard bus shelter proposed	RTPI and Bus Shelter with Seating
Inbound	ATU Galway City	522841	1+310	Island with on-street bus stop	New standard bus shelter proposed	RTPI and Bus Shelter with Seating
Outbound	New	TBD	1+320	Island with lay-by	New standard bus shelter proposed	RTPI and Bus Shelter with Seating
Outbound	New	TBD	1+350	Island with lay-by	New standard bus shelter proposed	RTPI and Bus Shelter with Seating
Outbound	ATU Galway City	522811	1+400	Island with on-street bus stop	New standard bus shelter proposed	RTPI and Bus Shelter with Seating

4.5.1.4 Cycling Provision

The specific proposals for cycling facilities in Section 1 of the Proposed Development are described below. Provision for cyclists at the signal-controlled junctions are described in Section 4.6.3.6.

New segregated cycle tracks will be provided in both directions along the whole of this section of the Proposed Development. At some locations along the Proposed Development, the desired cycleway width cannot be achieved, and localised narrowing is required.

Signal-controlled crossings provided at all junctions through a combination of dedicated cycle crossings and shared toucan crossings.

4.5.1.5 Pedestrian Provision

A pedestrian crossing will be upgraded to toucan crossing, to the west of the Renmore Park, and a new toucan crossing at ATU entrance is proposed, connecting the inbound direction bus stops to the campus.

The existing TFI bike share station is going to be relocated backwards to accommodate the new geometry of the footway.

4.5.1.6 Junctions

An overview of the approach to junction review and design is provided in Section 4.6.7. Table 4-4 (Major/Signalised) and Table 4-5 (Non-Signalised) summarises the junction upgrade works to be provided along this section of the Proposed Development route.

Table 4-4 Major / Signalised Junctions

Junction Location	Description
Renmore Road / R338 Dublin Road	Existing Signal-Controlled T-Junction upgraded to Protected Signalised T-Junction The design prioritized the buses at the junction and safer facilities for active travels journeys, and aimed to minimize potential impacts from local access to the main street
Michael Collins Road / Hospice Access Road / R338 Dublin Road	Existing Signal-Controlled Junction upgraded to Protected Signalised Junction

Junction Location	Description
	The design prioritized the buses at the junction and safer facilities for active travels journeys, and aimed to minimize potential impacts from local access to the main street
Ballyloughnane Road / Belmont Road / R338 Dublin Road	Existing Pelican Crossing upgraded to Protected Signalised Junction The design prioritized the buses at the junction and safer facilities for active travels journeys, and aimed to minimize potential impacts from local access to the main street
Skerrit Junction	Existing Roundabout upgraded to Protected Signalised Junction with Inner Pedestrian Crossing The design prioritized the buses at the junction and safer facilities for cyclist, and aimed to minimize distance travelled by pedestrians

Table 4-5 Minor / Non-signalised Junctions

Junction Location	Description
R338 Dublin Road / Brothers of Charity West Access	Existing exit construction to be retained, upgrading to a raised crossing to prioritize pedestrian and cyclist aside crossing
R338 Dublin Road / Kia dealership Access	Existing exit construction to be retained, upgrading to a raised crossing to prioritize pedestrian and cyclist aside crossing
R338 Dublin Road / Cloch Mhile Access	Existing exit construction to be retained, upgrading to a raised crossing to prioritize pedestrian and cyclist aside crossing
R338 Dublin Road / DPL and Bathroom World Access	Existing exit construction to be retained, upgrading to a raised crossing to prioritize pedestrian and cyclist aside crossing
R338 Dublin Road / Brothers of Charity East Access	Existing exit construction to be retained, upgrading to a raised crossing to prioritize pedestrian and cyclist aside crossing
R338 Dublin Road / Renmore Park	Existing T-junction to be retained, upgrading the corners to a smaller radius and raised table to prioritize pedestrian and cyclist aside crossing.
R338 Dublin Road / Connacht Hotel and New Lawn Cemetery Access	Existing T-junction to be retained, upgrading to a raised crossing to prioritize pedestrian and cyclist aside crossing
R338 Dublin Road / Galwegians RFC Access	Existing exit construction to be retained, upgrading to a raised crossing to prioritize pedestrian and cyclist aside crossing
R338 Dublin Road / Flannery's Hotel Access	Existing exit construction to be retained, upgrading to a raised crossing to prioritize pedestrian and cyclist aside crossing

4.5.1.7 Parking and Loading Bays

There is no on-street parking or loading bays present in this sub-section and no changes are going to be made in this matter at the Proposed Development.

However, the Proposed Development will impact on existing private parking and loading along Section 1. Overall, there are approximately 34 current parking spaces affected along Section 1 of the Proposed Development. Under the proposals, 26 are temporary affected and 8 parking / loading spaces will be lost, all paid for/commercial spaces. The location of these permanent loss of parking / loading spaces are: Woodland Campus (Brothers of Charity site, 6 spaces lost) and Flannerys Hotel (2 spaces lost). It is noted that these are all private parking spaces, and other parking spaces for each location are available. In addition, an increase in 3 bus set down bays will be provided.

4.5.1.8 Landscape Design

For an overview of the landscape design principles and approach please refer to Section 4.6.11. The following sections provide a description of specific landscape and urban realm design in Section 1 of the Proposed Development.

Full details of the landscape proposals are set out in Drawings BCGDR-BTL-ENV_LA-XX-DR-CE-00001_00011, with photomontage illustration provided in Chapter 4 in Volume 3 of this EIAR.

4.5.1.9 Structures

There are no new structures proposed along this sub-section of the Proposed Development route.

4.5.1.10 Land Use and Accommodation

Moneenageisha Road Junction to Renmore Park

The Proposed Development commences approximately 250m East of the Moneenageisha Road Junction and travels along Renmore Park. This section of the Proposed Development includes Residential lands along Dublin Road, recreational, cultural and amenity lands at Lynch's Stone, and commercial zones containing various retail outlets such as the KIA dealership.

In order to construct the Proposed Development, permanent and temporary land take is required within this section at the following locations:

- Inbound from the start of the Proposed Development to the entry to Lakeview School Access Road to facilitate space for proposed cycle track, footpath, and portion of bus lane;
- Inbound from the Lakeview School Access Road to Renmore Park to facilitate space for proposed portion of bus lane, raised table and off-road cycle track & footpath;
- Outbound from the start of the Proposed Development to 30m east to create space for proposed footpath; and
- Outbound across from the Renmore Park Junction, to facilitate space for proposed footpath, landscaped area, and cycle track.

There are no additional accommodation works associated with land take requirements to facilitate the Proposed Development along this section of the route.

Renmore Park to Renmore Road

The Proposed Development continues along the Old Dublin Road (R338) from Renmore Park to Renmore Road. This section of the Proposed Development contains Commercial zones compromising of a number of retail outlets on the inbound stretch. Outbound the lands are zoned for Tourism, with the Connacht Hotel owning all of the land at this section.

In order to construct the Proposed Development, permanent and temporary land take is required within this section at the following locations:

- Outbound across from the Renmore Road Junction to create space for the proposed cycle track, footpath, and a portion of bus lane; and
- Inbound from the Renmore Road Junction west to facilitate space for the proposed footpath.

There are no additional accommodation works associated with land take requirements to facilitate the Proposed Development along this section of the route.

Renmore Road to Michael Collins Road / Hospice Access Road

The Proposed Development continues along the Old Dublin Road (R338) from Renmore Road to the Michael Collins Road / Hospice Access Road Junction. This section of the Proposed Development is zoned

for Health-related uses inbound, which contain the Bon Secours Hospital and its surrounding grounds. There are Residential lots along the outbound stretch of Glenina Heights.

Permanent land take is required through this section to facilitate the Proposed Development, as not all lands are in the ownership or control of Galway City Council (GCC).

Permanent land take is required within this section to facilitate:

- The proposed footpath along the entirety of the inbound section; and
- The new off-road cycle track and adjoining footpath will be located in the existing landscaped area.

There are no additional accommodation works associated with land take requirements to facilitate the Proposed Development along this section of the route.

Michael Collins Road / Hospice Access Road to Ballyloughane / Belmont Access Road

The Proposed Development continues along Dublin Road, from the Michael Collins Road and Belmont Access Road Junction, to the Ballyloughane and Belmont Access Road. This section of the Proposed Development includes a portion of Residential zones of Glenina Heights and Tourism related uses which contain Flannery's Hotel along the outbound stretch. Along the inbound stretch there are various residential lots.

Permanent land take is required within this section to facilitate:

- Footpath approximately 60m of land take required outbound east of Michael Collins Road;
- Footpath approximately 100m of land take required inbound east of Hospice Access Road;
- Footpath, cycle track and proposed island bus stop from between the Connacht Hotel Access Road and proposed Belmont Access Road; and
- New Belmont Access Road and footpaths opposite Ballyloughane Road.

There are no additional accommodation works associated with land take requirements to facilitate the Proposed Development along this section of the route.

Ballyloughane Road / Belmont Access Road to Skerritt Junction

This section continues along the Old Dublin Road (R338) from Ballyloughane Road and Belmont Access Road to the Skerritt Junction. This section of the Proposed Development compromises of the Atlantic Technological University and its surrounding grounds on the outbound stretch, and residential lots and public buildings such as the Galway Garda Regional and Divisional Headquarters.

Permanent land take is required through this section to facilitate the Proposed Development, as not all lands are in the ownership or control of GCC.

In order to construct the Proposed Development, permanent land take is required within this section at the following locations:

- Along the entirety of the outbound stretch there is land take required to facilitate a proposed landscaped area, cycle track, footpath, and island bus stop;
- East of Ballyloughane Road there is land take required to construct a new proposed footpath, cycle track, left turning pocket of carriageway and a portion of bus lane; and
- West of the Skerritt roundabout land take is required to facilitate the proposed footpath, cycle track, landscaped area, and portion of the proposed double island bus stop.

In addition to this land acquisition, the Proposed Development will require the acquisition or restriction or otherwise interference, either temporary or permanent to private rights associated with the land acquisition at the following locations:

- Entrances and the entirety frontage of Lakeview School and Brothers of Charity land take are required to construct the proposed footpath and cycle track;
- Entrance of Kia dealership land take is required to facilitate the proposed footpath;
- Entrance and adjacent parking space of Cloch Mhile Access land take are required to facilitate the proposed footpath;
- Entrance and adjacent parking lot of DPL / Bathroom World land take are required to facilitate the proposed footpath;
- Frontage of Wellpark Groove Park land take is required to construct the new proposed footpath, cycle track, and portion of island bus stop;
- Frontage of New Lawn Cemetery land take is required to construct the new proposed footpath, cycle track, and portion of the bus lane;
- Access, landscaped area and front row parking spaces of Connacht Hotel land take are required to construct the new proposed footpath, cycle track, and portion of the bus lane;
- Pedestrian access and adjacent parking spaces of Duggan's Spar land take are required to facilitate the construction of new steps;
- Garden and driveway of 18 Dublin Road land take are required to construct the new proposed footpath, and cycle track;
- Portion of landscaped area of Bon Secours Hospital land take is required to construct the new proposed footpath;
- Pedestrian entrance in the west corner of Galway Hospice Foundation land take is required to construct the proposed footpath;
- Entrance and the entirety frontage of Galwegians RFC land take are required to construct the new proposed footpath, cycle track, and portion of the bus lane;
- Entrance, landscaped area, and portion of bus parking space of Flannery's Hotel land take are required to construct the new proposed footpath, cycle track, and island bus stop;
- Frontage of industrial area to the west of Ballyloughane Road land take is required to construct the new proposed access road, footpath, cycle track, and portion of island bus stop;
- Entrance and landscaped area of Belmont Access Road land take are required to construct the new proposed footpath, and cycle track;
- Entrances and landscaped area of Atlantic Technological University land take are required to construct the new proposed footpath, cycle track, and island bus stops;
- Entrance and frontage of Gaelscoil Dara Sports Field land take are required to construct the new proposed footpath, cycle track, and island bus stops; and
- Footpath and garden of Garda Headquarter land take is required to facilitate the proposed footpath, cycle track, and toucan crossing.

4.5.2 Section 2: Skerritt Junction to Doughiska Road Junction

4.5.2.1 Overview

Section 2 is approximately 1400m in length and runs from Skerrit Junction to Doughiska Junction where the Proposed Development ties in with the Martin junction completed in June 2023. Between the Skerritt Junction and the eastern extremity of the Proposed Development the additional required land is primarily to the north of the existing R338. The land take impacts include:

- The entrance to the former Corrib Great Southern Hotel site (now derelict);
- Greenspace outside the Woodhaven Estate;
- HSE lands at Merlin Park Hospital; and
- Agricultural land located adjacent to the Dublin Road to the east of Merlin Park.

There are interventions additionally proposed for instance tree removal and construction of retaining wall to allow the Proposed Development.

Raised tables will be provided to the access at the Woodhaven estate and the Merlin Gate estate.

The drainage works for Section 2 includes construction of trenches for short sections of attenuation pipes and surface water chambers. Combined kerbs and drainage systems will also be constructed at discrete

locations.

4.5.2.2 Bus Lane Provision

An overview of the bus provision being proposed as part of the Proposed Development is provided in Section 4.6.4. Full bus priority through the use of dedicated bus lanes is provided throughout Section 2.

4.5.2.3 Bus Stops

The different types of bus stop (Island, Shared Landing, and In-Line) are described in Section 4.6.4. All the proposed bus stops within this section of the Proposed Development are island bus stops. The bus stop locations and types are outlined in Table 4-6.

Table 4-6 Proposed Bus Stop Location

Inbound/ Outbound	Bus Stop Name	Bus Stop Number	Chainage	Bus Stop Type	Bus Shelter	Proposed Facilities
Inbound	Woodhaven	522831	1+705	Island with on-street bus stop	New standard bus shelter proposed	RTPI and Bus Shelter with Seating
Outbound	New	TBD	1+790	Island with on-street bus stop	New standard bus shelter proposed	RTPI and Bus Shelter with Seating
Inbound	Lios An Uisce	524331	2+100	Island with on-street bus stop	New standard bus shelter proposed	RTPI and Bus Shelter with Seating
Outbound	Galway Crystal (moved to east)	524151	2+135	Island with on-street bus stop	New standard bus shelter proposed	RTPI and Bus Shelter with Seating
Outbound	New / Coast Road Junction	524171	3+350	Island with on-street bus stop	New standard bus shelter proposed	RTPI and Bus Shelter with Seating
Inbound	New	TBD	3+350	Island with on-street bus stop	New standard bus shelter proposed	RTPI and Bus Shelter with Seating
Inbound	Castlegar GAA Club	524321	3+720	Island with on-street bus stop	New standard bus shelter proposed	RTPI and Bus Shelter with Seating
Outbound	Castlegar GAA Club	524181	3+760	Island with on-street bus stop	New standard bus shelter proposed	RTPI and Bus Shelter with Seating

4.5.2.4 Cycling Provision

The specific proposals for cycling facilities in Section 2 of the Proposed Development are described below. Provision for cyclists at the signal-controlled junctions are described in Section 4.6.3.6.

Cycling is to be provided along this section of the Proposed Development as follows:

- New segregated cycle tracks will be provided in each direction from Skerritt Junction to the Coast Road (chainage 3+280);
- A two-way segregated cycle track will be provided on the northern side of the route from the Coast Road to Doughiska Junction which will run behind the roadside tree line; and
- Signal-controlled crossings provided at all junctions through a combination of dedicated cycle crossings and shared toucan crossings.

At some locations along the Proposed Development, the desired cycleway width cannot be achieved, and localised narrowing is required.

4.5.2.5 Pedestrian Provision

The Proposed Development will upgrade pedestrian routes and crossing points to improve mobility along the second section also. Footpaths are to be replaced and widened with new high quality paving surface, and between chainage 2+280 and 3+760, a footpath will be implemented along the outbound carriageway to link with the existing ones at Doughiska.

A Pedestrian crossing is being proposed at all new non-signalized junctions and raised crossings in the minors' junctions and entrances.

4.5.2.6 Junctions

An overview of the approach to junction review and design is provided in Section 4.6.7. Table 4-7 (Major/Signalised) and Table 4-8 (Non-Signalised) summarises the junction upgrade works to be provided along this section of the Proposed Development route.

Table 4-7 Major / Signalised Junctions

Junction Location	Description
R338 Dublin Road East / R338 Dublin Road West / Merlin Park University Park Access / Supermac's Access	Proposed Protected Signalised Junction The design prioritized the buses at the junction and safer facilities for active travels journeys, and aimed to minimize potential impacts from local access to the main street
R338 Dublin Road / Murrough Access	Existing Signal-Controlled T-Junction upgraded to Protected Signalised Junction The design prioritized the buses at the junction and safer facilities for active travels journeys, and aimed to minimize potential impacts from local access to the main street
R338 Dublin Road / Rosshill Road	Proposed Protected Signalised Junction The design prioritized the buses at the junction and safer facilities for active travels journeys, and aimed to minimize potential impacts from local access to the main street
R338 Dublin Road / Coast Road	Existing Signal-Controlled T-Junction upgraded to Protected Signalised Junction The design prioritized the buses at the junction and safer facilities for active travels journeys, and aimed to minimize potential impacts from local access to the main street
R338 Dublin Road / Doughiska Road	Existing Signal-Controlled Junction upgraded to Protected Signalised Junction The design prioritized the buses at the junction and safer facilities for active travels journeys, and aimed to minimize potential impacts from local access to the main street

Table 4-8 Minor / Non-signalised Junctions

Junction Location	Description
R338 Dublin Road / Woodhaven Access	Existing exit construction to be retained, upgrading to a raised crossing to prioritize pedestrian and cyclist aside crossing
R338 Dublin Road / Merlin Gate Access	Existing exit construction to be retained, upgrading to a raised crossing to prioritize pedestrian and cyclist aside crossing

4.5.2.7 Parking and Loading Bays

There is no on-street parking or loading bays present in this sub-section and no changes are going to be made in this matter at the Proposed Development.

4.5.2.8 Landscape Design

For an overview of the landscape design principles and approach please refer to Section 4.6.11. The following sections provide a description of specific landscape and urban realm design in Section 1 of the Proposed Development.

Full details of the landscape proposals are set out in Drawings BCGDR-BTL-ENV_LA-XX-DR-CE-00001_00011, with photomontage illustration provided in Chapter 4 of Volume 3 of this EIAR.

4.5.2.9 Structures

In this sub-section, there is a proposal for one retaining wall in the northeast corner of Skerritt Junction, at the frontage of former Corrib Great Southern Hotel site. The proposed reinforced concrete wall length will be 50.0m and have a maximum height of 2m approximately above ground level.

Two pump station tanks will be provided in this section, each with a precast concrete pump sump with a diameter of ø1800mm, an inlet pipe of ø300mm and a B125 cover.

4.5.2.10 Land Use and Accommodation

The Proposed Development commences at the Skerritt Junction and travels along Dublin Road until Doughiska Junction. This section of the Proposed Development includes residential lands, a commercial zone, and large green areas, such as Merlin Meadows and Rosshill Park Woods.

Permanent land take is required through this section to facilitate the Proposed Development, as not all lands are in the ownership or control of GCC.

In order to construct the Proposed Development, permanent land take is required within this section at the following locations:

- Outbound from the Skerritt Junction to the end of Proposed Development

In addition to this land acquisition, the Proposed Development will require the acquisition or restriction or otherwise interference, either temporary or permanent to private rights associated with the land acquisition at the following location:

- Frontage to the R338 Dublin Road of former Corrib Great Southern Hotel land take is required to construct the proposed footpath, cycle track, and portion of carriageway;
- Entrance of Merlin Gate land take is required to facilitate the proposed geometry for site access;
- Frontage of Woodhaven land take is required to construct the proposed footpath, cycle track, and portion of carriageway;
- Frontage of Woodhaven land take is required to construct the proposed footpath, cycle track, and portion of carriageway;
- Frontage of Merlin Park University Hospital land take is required to construct the proposed footpath, cycle track, a pump station and portion of carriageway; and
- Frontage of agricultural land is required to construct the proposed footpath, cycle track, portion of carriageway and a pump station.

4.6 Key Infrastructure Elements

The following sections provide a description of the main infrastructure elements of the Proposed Development. The Proposed Development has been designed following guidance relating to the design

principles for urban streets, bus facilities, cycle facilities and urban realm encapsulated in the PDGB as outlined in Section 4.4.

4.6.1 Cross-Section Provision

Traffic lane widths (including bus lanes) will follow the guidance outline in DMURS, with the preferred width of traffic lanes on the Proposed Development being:

- 3.0m in areas with a posted speed limit ≤60km/h; and
- 3.25m in areas with a posted speed limit >60km/h.

Traffic lane widths of 2.75m are permissible but not desirable and should only be permitted on straight road sections with very low percentage of Heavy Goods Vehicles and where all desirable minimum widths for footpaths, cycle tracks, parking, bus lanes are not achievable without impact on third-party lands if appropriate, taking all design factors into account in the context of the Proposed Development objectives.

The desirable minimum width for a single direction, with flow, raised adjacent cycle track is 2.0m. Based on the Cycling Design Manual (NTA 2023) this allows for overtaking within the cycle track. The minimum width is 1.5m. The desirable width for a two-way cycle track is 3.00m with a 0.5m buffer between the cycle track and the carriageway.

2.0m is a desirable minimum width for footpaths, with 1.2m being a minimum width at pinch points.

An example of the typical BusConnects road layout (without multiple traffic lanes in each direction or median) is shown in Figure 4-1 below.

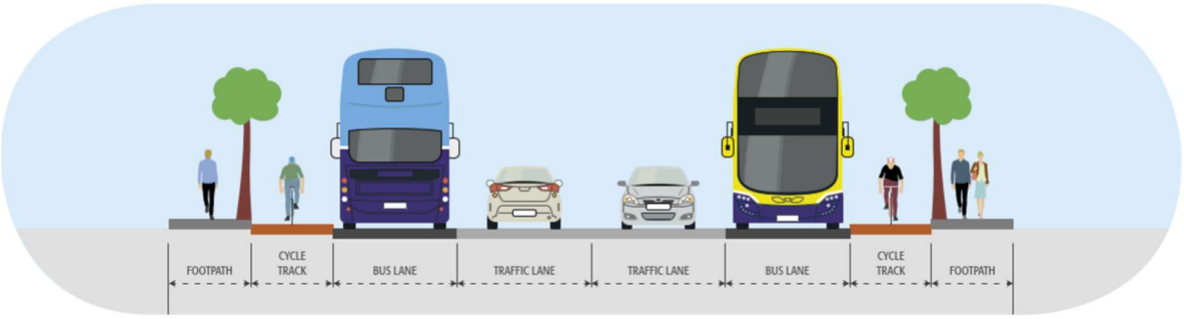

Figure 4-1 Typical BusConnects Road Layout (PDGP)-Section

The cross-sectional design of the mainline has been developed to achieve the desirable width criteria contained within the PDGB wherever reasonably practicable. Where these criteria are not achievable, for instance due to physical constraints at pinch points, the widths have been reduced as shown in Table 4-9.

Table 4-9 DMURS Cross-Sectional Design Parameters

Design Element	Desirable Minimum	Minimum Width	Permitted Reductions at Constraints
Footpath	2.0m	1.8m	1.2m (over distances <2m as per Preliminary Appendix A4.1 in Volume 4 of this EIAR)
Cycle Track (one-way)	2.0m	1.5m	
Cycle Track (two-way)	3.25m + 0.5m (buffer)	Refer to Cycling Design Manual (NTA 2023) Width Calculator	Reduced at bus stops.

Design Element	Desirable Minimum	Minimum Width	Permitted Reductions at Constraints
		0.3m (buffer)	
Bus Lane	3.0m	3.0m	N/A
Traffic Lane	Preferred Width: 3.0m where speed ≤ 60 km/h 3.25m where speed limit > 60 km/h	3.0m	2.75m (low Heavy Goods Vehicle flow)

For the Proposed Development, the width of the bus lanes and traffic lanes have not been reduced below 3.0m. The width of the cross-sectional elements detailed in Table 4-9 have been reduced at a number of constrained locations across the Proposed Development. These deviations from the standards are outlined for each section of the Proposed Development in Section 4.5.

4.6.2 Pedestrian Provision

4.6.2.1 Footpath Widths

The desirable minimum width for a footpath is 2.0m. This width should be increased in areas catering for significant pedestrian volumes where space permits. DMURS defines the absolute minimum footpath width for road sections as 1.8m based on the width required for two wheelchairs to pass each other. This width should be increased in areas catering for significant pedestrian volumes where space permits or in areas where designated additional outdoor functionality has been determined to increase the overall footpath regime Building for Everyone: A Universal Design Approach defines acceptable minimum footpath widths at specific pinch points as being 1.2m wide over a two-metre length of path.

In line with the Road User Hierarchy designated within DMURS, at pinch points the width of the general traffic lane should be reduced first, then the width of the cycle track should be reduced before the width of the footpath is reduced where practicable. For the majority of the Proposed Development extents minimum lane widths have been adopted throughout.

Throughout the Proposed Development, footpath widths of two metres or wider have been proposed, however where this has not been achieved, deviations from standard have been required as outlined in Section 4.5.

4.6.2.2 Pedestrian Crossings

Where possible, DMURS recommends that designers provide pedestrian crossings that allow pedestrians to cross the street in a single, direct movement. To facilitate road users who cannot cross in a reasonable time, the desirable maximum crossing length without providing a refuge island applied across the Proposed Development is 18m. This may be increased to 19m as an absolute maximum. This is applicable at stand-alone pedestrian crossings as well as at junctions.

Refuge islands should be a minimum width of two metres. Larger refuge islands should be considered by designers in locations where the balance of place and movement is weighted towards vehicle movements, such as areas where the speed limit is 60kph or greater, in suburban areas or where there is an increased pedestrian safety risk due to particular traffic movements. Straight crossings can be provided through refuge islands only where the island is 4m wide or more. Islands of less than 4m in width should provide for staggered crossings.

Along the Proposed Development, pedestrian crossings varying from 2.4m to 4m in width have been incorporated. Larger pedestrian crossing widths have been allocated in areas that are expected to accommodate a high number of pedestrians crossing or at locations where both pedestrians and cyclists share a crossing such as at a Toucan crossing.

At signalised junctions and standalone pedestrian crossings, the footway is to be ramped down to carriageway level to facilitate pedestrians who require an unobstructed crossing. At minor junctions, raised tables are provided to raise the road level up to footway level and facilitate unimpeded crossing. Tactile paving is provided at the mouth of each pedestrian crossing and is to be designed in accordance with standards. Audio units are to be provided on each traffic signal push button.

Formal crossing points are to be provided on the upstream side of bus stop islands, consisting of an on demand signalised pedestrian crossing with appropriate tactile paving, push buttons and LED warning studs. A secondary informal crossing should be provided on the desire line on the downstream side of the island.

4.6.3 Cycling Provision

One of the objectives for the Proposed Development is to enhance the potential for cycling by providing safe infrastructure, segregated from general traffic wherever practicable. Physical segregation ensures that cyclists are protected from motorised traffic and can bypass vehicular congestion, thus improving cyclist safety and reliability of journey times. Physical segregation can be provided in the form of vertical segregation, (e.g., raised kerbs), horizontal segregation (e.g., parking/verge protected cycle tracks), or both. Bike racks will generally be provided, where practicable, at Island Bus Stops and key additional locations as noted in the Landscaping General Arrangement drawings (BCGDR-BTL-ENV_LA-XX-DR-CE-00000_00011) in Volume 3 of this EIAR.

The ‘preferred cross-section template’ developed for the Proposed Development includes protected cycle tracks, providing vertical segregation from the carriageway to the cycle track and vertical segregation from the cycle track to the footpath.

The principal source for guidance on the design of cycle facilities is the CDM (NTA 2023) and the PDGB.

The desirable minimum width for a single-direction, with-flow, stepped cycle track is 2.00m. This arrangement allows for two-abreast cycling, and based on the CDM Width Calculator, this also allows for overtaking within the cycle track. The minimum width is 1.5m which, based on the CDM Width Calculator, allows for single file cycling. Localised narrowing of the cycle track below 1.5 m is also necessary over very short distances to cater for local constraints (e.g., exceptional mature trees).

The desirable minimum width for a two-way cycle track is 3.00m. Using the CDM width calculator, reduction of these desirable minimum widths can be considered on a case-by-case basis, with due cognisance of the volume of cyclists anticipated to use the route as well as the level of service required.

The Proposed Development will provide fully segregated cycle tracks throughout 100% of the Proposed Development which is approximately 3.9 km in length. Details of the proposed cycle provision throughout the extent of the Proposed Development are provided in the following sections.

4.6.3.1 Cycle Tracks

A cycle track is a segregated track which is physically segregated from the adjacent traffic lane and/or bus lane horizontally and/or vertically, as shown in Figure 4-2.

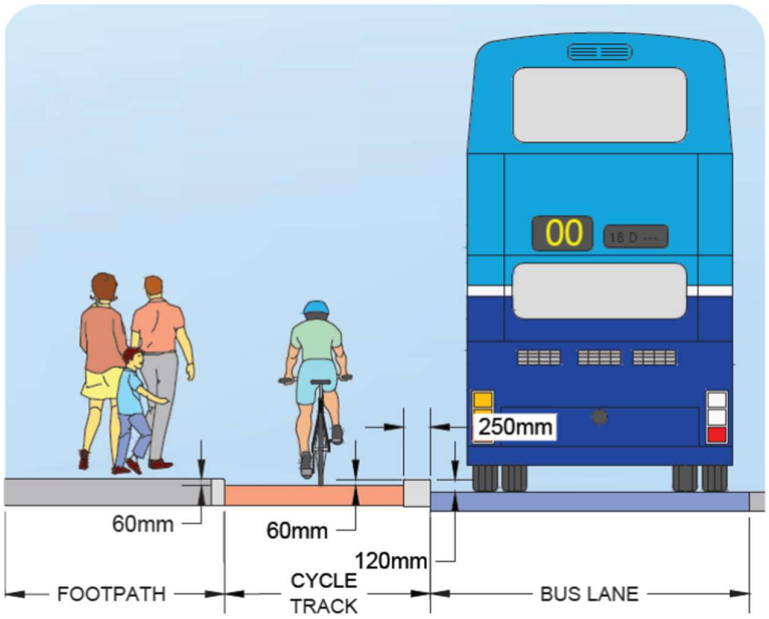

Figure 4-2 Segregated Cycle Track

Wherever possible, the Proposed Development design has endeavoured to incorporate segregated cycle tracks and has done so across the full length of the route.

The desirable minimum width for a single-direction, with-flow, raised-adjacent cycle track is 2m. This is based on the CDM width calculator and allows for overtaking within the cycle track. The minimum width is 1.5m, based on the CDM width calculator, allows for single file cycling. Localised narrowing of the cycle track below 1.5m may be necessary over very short distances to cater for local constraints (e.g. mature trees).

4.6.3.2 Cycle Lanes

Cycle lanes are designated lanes on the carriageway that are reserved either exclusively or primarily for the passage of cyclists, they do not have vertical and/or horizontal separation from adjacent traffic lanes. Standard cycle lanes include mandatory cycle lanes and advisory cycle lanes. Mandatory cycle lanes are marked by a continuous white line which prohibits motorised traffic from entering the lane, except for access. Parking is not permitted on mandatory cycle lanes. Mandatory cycle lanes are 24 hour unless time plated in which case they are no longer cycle lanes. Advisory cycle lanes are marked by a broken white line which allows motorised traffic to enter or cross the lane. they are used where a mandatory cycle lane leaves insufficient residual road space for traffic, and at junctions where traffic needs to turn across the cycle lane. Parking is not permitted on advisory cycle lanes other than for set down and loading. Advisory cycle lanes are 24 hours unless time plated.

Cycle tracks are the preferred cycling infrastructure proposed along the length of the Proposed Development. Where necessary the use of cycle lanes have been limited to the following locations typically along the route:

- Transitions to existing cycle lanes, typically on side roads of the main corridor alignment; and
- Transitions to existing roadways that do not have cycle facilities.

4.6.3.3 Offline Cycle Track

Offline cycle tracks are fully offset from the road carriageway by a grass verge, providing a greater level of protection and comfort to cycle users. Offline sections of cycle track provided are provided at the following locations:

- CH 0+110 to CH 0+160 at Lynch's Stone inbound cycle track constructed to provide enhanced segregation and mitigate loss of heritage area;
- CH 0+620 to CH 0+800 outbound cycle track constructed on the Dublin Road (R338) to provide enhanced segregation and mitigate tree loss in verge area;
- CH 1+160 to CH 2+190 outbound cycle track constructed on the Dublin Road (R338) to provide enhanced segregation and mitigate tree loss in verge area;
- CH 2+130 to CH 1+420 outbound cycle track constructed on the Dublin Road (R338) to facilitate movement around proposed bus stop & Rosshill Road Junction, provide enhanced segregation and mitigate tree loss in verge area; and
- CH 3+260 to CH 3+750 outbound two-way cycle track constructed on The Dublin Road (R338) to facilitate movement around proposed bus stop & Coast Road Junction, provide enhanced segregation and mitigate tree loss in verge area.

4.6.3.4 Quiet Street Treatment

Where the Proposed Development cannot facilitate cyclists without significant impact on bus priority, alternative cycle routes are explored for short distances away from the Proposed Development bus route. Such offline options may include directing cyclists along streets with minimal general traffic other than car users who live on the street.

The Proposed Development accommodates cyclists as part of the mainline CBC scheme. No alternative offline cycle routes were considered necessary or feasible.

4.6.3.5 Treatment of Constrained Areas

At some locations along the Proposed Development, standard width of cycleways cannot be achieved, and localised narrowing will be required.

Providing a standard width would require additional land take from either surrounding private properties or pedestrian areas. Due to the high foot traffic in this area, it is preferable to provide a reduced cycleway width; This has occurred at the following location

- Outbound between CH 0+620 to CH 0+800 – Reduced to 1.75m

It is also noted that cycle tracks narrow to minimum 1.5m width at the bus stop island.

4.6.3.6 Cycle Provision Through Junctions

Junctions have been designed to facilitate a high level of safety, comfort, and priority for sustainable modes of travel (i.e., walking and cycling) and for public transport by prioritising the space and time allocated to these modes within the operation of a junction. This will also accommodate the forecast future year traffic volumes as safely and efficiently as possible within the remaining space and time. This has allowed the BusConnects Infrastructure team to maximise the number of people moving through each junction and to prioritise these sustainable modes of travel.

Segregated cycle tracks are proposed along the full length of the Proposed Development. Toucan crossings are generally not proposed to avoid unnecessary interaction between cyclists and pedestrians. Instead, cyclists are kept separate from pedestrians and provided with dedicated signals at road crossings. A Toucan Crossing is proposed at the pedestrian/cycle access to ATU and at Bon Secours Hospital where there is a particular mid-block demand to cross the R338.

The greater space available at the Skerrit Roundabout has afforded adoption of a Cyclops type protected junction (CDM TL502) with cyclists provided with an orbital cycle track around the junction. Left turning cyclists can effectively bypass the junction, while giving way at pedestrian crossings.

These locations are shown on the General Arrangement drawings (BCGDR-BTL-GEO_GA-XX-DR-CR-00001_00013) included in Volume 3 of this EIAR.

4.6.4 Bus Service Provision

One of the objectives of the Proposed Development is to enhance the capacity and potential of the public transport system by improving bus speeds, reliability, and punctuality through the provision of bus lanes and other measures to provide priority to bus movement over general traffic movements. Several measures can be used to achieve this. This is described further in this section.

4.6.4.1 Bus Lanes

Bus priority can be achieved by means of providing a dedicated lane within the carriageway for the bus to travel independently from the general traffic. This includes priority through junctions by bringing the bus lane to the junction stop line as per general traffic lanes. This means in some circumstances that left-turning traffic cannot use the bus lane at junctions and instead will be provided with a dedicated left-turn traffic signal phase for the turn movement off the general traffic lane or will be provided with a separate left-turning lane. In general, bus lanes will be a minimum of 3m wide. This is as per the guidance for traffic lane widths outlined in DMURS. Larger lane widths may be needed in some instances to enable buses to navigate corners, etc. ('swept path'). Bus lanes are shown on the General Arrangement drawings (BCGDR-BTL-GEO_GA-XX-DR-CR-00000_00013) included in Volume 3 of this EIAR.

4.6.4.2 Signal Controlled Bus Priority

Signal Controlled Bus Priority uses traffic signals to enable buses to get priority ahead of other traffic on single lane road sections, but it is only effective for short distances. This typically arises where the bus lane cannot continue due to obstructions on the roadway. An example might be where a road or street has cross section pinch-points where it narrows due to existing buildings or structures that cannot practically be demolished to widen the carriageway to make space for a bus lane. It works using traffic signal controls (typically at junctions) where the bus lane and general traffic lane must merge ahead and share the road space for a short distance until bus priority recommences downstream. The general traffic will be stopped at the signal to allow the bus pass through the narrow section first and when the bus has passed, general traffic will then be allowed through the lights.

There are no sections of signal-controlled priority proposed as part of this Proposed Development.

4.6.4.3 Bus Gates

A Bus Gate is a sign-posted short length of stand-alone bus lane. This short length of road is restricted exclusively to buses, taxis, cyclists and emergency vehicles. It facilitates bus priority by removing general through traffic along the overall road where the Bus Gate is located. General traffic will be directed by signage to divert away to other roads before they arrive at the Bus Gate.

There are no bus gates proposed as part of this Proposed Development.

4.6.4.4 Bus Stops

To improve the efficiency of the bus service along the Proposed Development the position and number of bus stops has been evaluated as part of a bus stop assessment. The criteria that are considered when locating a bus stop are as follows:

- Driver and waiting Passengers are clearly visible to each other;
- Location close to key facilities;
- Location close to main junctions without affecting road safety or junction operation;
- Location to minimise walking distance between bus interchange stops;
- Where ideally there is space for a bus shelter;
- Location in pairs, 'Tail to Tail' opposite sides of the road;
- Close to (and on exit side of) pedestrian crossings;
- Away from sites likely to be obstructed; and
- Adequate footpath width.

It is important that bus stops are not located too far from pedestrian crossings as pedestrians will tend to take the quickest route, which may be hazardous. Locations with no or indirect pedestrian crossings should be avoided.

4.6.4.5 Island Bus Stops

Where sufficient space allows, Island Bus Stops are the preferred bus stop option for the Proposed Development. This option will reduce the potential for conflict between pedestrians, cyclists and stopping buses by directing cyclists behind the bus stop, thus creating an island area for boarding and alighting passengers. To address the pedestrian/cyclist conflict, a pedestrian priority crossing point in the form of a zebra crossing is proposed for pedestrians accessing the bus stop island area. A 1:20 maximum gradient ramp is provided on the cycle track to raise the cycle track to the level of the footpath/island area onto a 4m wide crossing. Suitable tactile paving is also provided at the crossing point. The desired minimum island width of 3m has been adopted to accommodate the provision of a full end panel shelter and nominal length of 25m to accommodate a 19m typical bus cage arrangement and adjusted to suit the site constraints (e.g. between driveway entrances).

An example of an Island Bus Stop is showed in Figure 4-3.

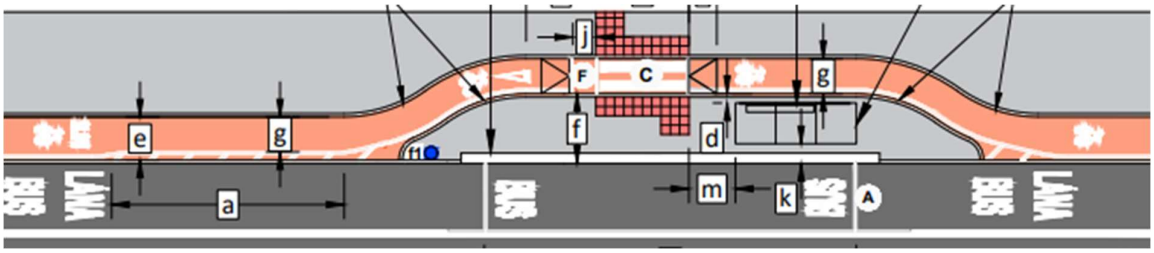

Figure 4-3 Examples of an Island Bus-Stop

4.6.4.6 Bus Shelters

The Proposed Development supports the intent of providing significant improvement in the customer experience for bus service users in Galway under the BusConnects programme. The provision of high-quality bus shelters at bus stops forms part of this level of service improvement. Bus shelters offer protection for people from poor weather, with lighting to help them feel more secure. Seating is provided to assist ambulant disabled and older passengers. Real Time Passenger Information (RTPI) signage is included at bus stops to provide information on the bus services which use the stop. The optimum bus shelter configuration used on the Proposed Development to provide maximum comfort and protection from the elements to the travelling public is the 3-Bay Reliance 'mark' with full width roof.

Figure 4-4 Example of a 3-Bay Reliance Cantilever Shelter

Ideally bus shelters should be located on the island bus stop boarding/alighting area where space permits. Where this is not feasible, the shelters should be located parallel to the island to the rear of the footpath. Where bus shelters cannot be located directly on the dedicated island or parallel to the island due to spatial and or other constraints, they should ideally be located downstream of the stop area. This will inherently promote eye to eye contact between boarding passengers and oncoming cyclists and buses when signalling the bus and also improve the courtesy arrangement for segregation of boarding and alighting passengers. One example of these scenarios is shown below:

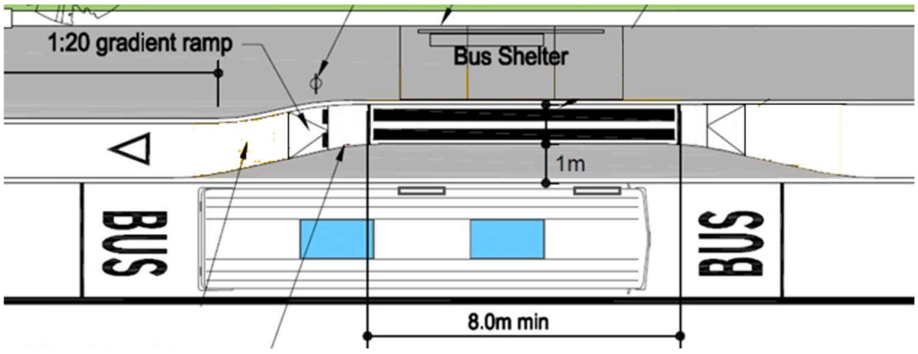

Figure 4-5 Alternative Shelter Location Back of Footpath (Narrow Island with Adequate Footpath Widths)

4.6.5 General Traffic Provision

4.6.5.1 Traffic Lanes

For roads or streets with a design speed of 60 km/h or less, traffic lane widths follow the guidance outlined in DMURS, with the preferred minimum width of general traffic lanes on the Proposed Development being:

- 3.0m in areas with a posted speed limit ≤ 60 km/h; and
- Reduced traffic lane widths of 2.75m in limited locations (these are permissible in DMURS but are not desirable). Reduced lane widths have only been applied on short, constrained sections with very low heavy goods vehicle (HGV) traffic and where all desirable minimum widths for footpaths, cycle tracks, parking, bus lanes are not achievable without impact on third-party land.

4.6.6 Pavement

Pavement assets along the Proposed Development comprise bus-lanes, general traffic lanes, cycle lanes and specific trafficked areas (e.g., offline bus stops, bus terminals, offline parking and loading bays).

Kerbs, Footways and Paved Areas (KFPA) assets along the Proposed Development comprise kerbs, footpaths and cycle tracks.

For the purpose of design, the pavement assets are categorised into two networks. The primary network refers to the bus corridor under consideration, while the secondary network refers to the roads impacted by the re-routing of existing traffic from the Proposed Development to the nearby road network.

As part of the Proposed Development, varying pavement works will be undertaken. These works will comprise the following:

- Widening of the existing carriageways;
- Carriageway realignment;
- Rehabilitation and strengthening of the existing carriageways;
- Other specific trafficked areas (e.g., bus laybys, offline parking and loading bays);
- New pedestrian areas including footpaths; and
- New cycle facilities.

Pavements are designed and constructed in accordance with TII's publications, international standards and relevant Local Authority standards.

4.6.6.1 Design Requirements

The Proposed Development pavement design will include new pavement, pavement strengthening or rehabilitation works where the existing pavement will be disturbed by construction works. Special attention to addressing problems associated with wheel-track rutting and ensuring that ponding will not arise at bus-stops and pedestrian/cycle crossings will be a key focus.

The prevailing principle being followed by the Proposed Development pavement design is the provision of a high-quality pavement construction. Therefore, the Proposed Development pavement must provide sufficient durability, longevity, and strength, to be able to withstand repetitive wheel track loading on a frequent basis. The pavement design strategy includes for minimising ongoing maintenance requirements along the route to minimise impact on continuity of bus service operations.

The Proposed Development design for KFPA will include new improved pedestrian and cycle facilities including landscaped areas.

4.6.6.2 Design Standards

The preliminary design of pavement assets is based on the following standards:

- DN-PAV-03021 (Aug. 2022) – Analytic Pavement and Foundation Design;
- DN-PAV-03023 (Oct. 2020) – Surfacing Materials for New and Maintenance Construction for use in Ireland;
- AM-PAV-06050 (Mar. 2020) – Pavement Assessment, Repair and Renewal Principles;
- PE-SMG-02002 (Dec. 2010) – Traffic Assessment;
- CC-SPW-00600 (Sept. 2024) – Earthworks Specification for National Roads;
- CC-SPW-00700 (Jan. 2016) – Specification for Road Works Series 700 – Road Pavements – General;
- CC-SPW-00800 (Oct. 2023) – Road Pavements - Unbound and Hydraulically Bound Mixtures; and
- CC-SPW-00900 (Oct. 2023) - Specification for Road Works Series 900 - Road Pavements - Bituminous Materials.

The different pavement assets are designed taking consideration of:

- Changes in road geometry;
- Existing pavement construction build-up;
- Existing pavement condition;
- Landscape Architect's requirements; and
- The impact of other assets such as drainage, utilities, and structures.

The preliminary design of KFPA assets is based on the following standards:

- DN-PAV-03021 (Aug. 2022) – Analytic Pavement and Foundation Design;
- DN-PAV-03026 (Jan. 2005) – Footway Design;
- DN-PAV-03023 (Jun. 2020) – Surfacing Materials for New and Maintenance Construction for use in Ireland;
- AM-PAV-06050 (Mar. 2020) – Pavement Assessment, Repair and Renewal Principles;
- PE-SMG-02002 (Dec. 2010) – Traffic Assessment (Including Erratum No. 1, dated July 2011);
- CC-SPW-00600 (Mar. 2013) – Specification for Road Works Series 600 – Earthworks;
- CC-SPW-00700 (Jan. 2016) – Specification for Road Works Series 700 – Road Pavements – General;
- CC-SPW-00800 (Oct. 2023) – Road Pavements - Unbound and Hydraulically Bound Mixtures;
- CC-SPW-00900 (Oct. 2023) - Specification for Road Works Series 900 - Road Pavements - Bituminous Material;
- CC-GSW-00900 (Dec. 2023) – Note for Guidance on CC-SPW-00900 – Road Pavements – Bituminous Materials;

- CC-SPW-01000 (Mar. 2013) – Specification for Road Works Series 1000 – Road Pavements – Concrete Materials;
- CC-SPW-01100 (Feb. 2012) – Specification for Road Works Series 1100 – Kerbs, Footways and Paved Areas; and
- BS 7533 series of standards (1999–2021) – Pavement Constructed with Clay, Natural Stone or Concrete Pavers.

4.6.7 Junctions

The design for each junction within the Proposed Development was developed to meet the objectives of the scheme and to align with the geometric parameters set out in conjunction with the junction operation principles described in the DMURS. Various traffic modelling tools were used to assess the impact of the proposals on a local, corridor and surrounding road network level which is further described in Appendix 6.1 (Traffic Modelling Report) in Volume 4 of this EIAR. A traffic impact assessment has been undertaken for the Proposed Development in order to determine the predicted magnitude of impact Proposed Development measures may have against the likely receiving environment. The impact assessments have been carried out using the following scenarios:

- 'Do Nothing' – This scenario represents the current baseline traffic and transport conditions study area without the Proposed Development in place and other GTS projects.
- 'Do Minimum' – This scenario represents the likely conditions of the road and street network with all major committed transportation schemes in place that will impact on the use of public transport and general traffic, without the Proposed Development.
- 'Do Something' – This scenario represents the likely conditions of the road and street network with all major committed transportation schemes in place that will impact on the use of public transport and general traffic, with the Proposed Development (i.e. the 'Do Minimum' scenario with the addition of the Proposed Development) in place.

For the Proposed Development, a key policy is to ensure appropriate capacity and reliability for the bus services so as to maximise the overall throughput of people in an efficient manner. The design for each junction within the Proposed Development was an iterative process and was developed to meet the underlying objectives of the Proposed Development. The junctions shall provide safe and convenient crossing facilities for pedestrians with as little delay as possible.

4.6.8 Traffic Signage

Preliminary traffic sign design shall identify the requirements of the Proposed Development. A combination of Information, Regulatory and Warning signs shall be assessed taking consideration of key destinations/centres; intersections/decision points; built and natural environment.

In line with DMURS, signage proposals shall be kept to the minimum requirements of the Traffic Signs Manual (TSM) to avoid sign congestion within the Proposed Development streets.

The preliminary assessment shall consider the applicable requirements for all information signs (TSM Chapter 2), regulatory signs (TSM Chapter 5), warning signs (TSM Chapter 6), and road markings (TSM Chapter 7).

4.6.9 Accessibility for Mobility Impaired Users

The aim of the Proposed Development is to provide enhanced walking, cycling and bus infrastructure along the corridor. In achieving this aim, the Proposed Development has generally been developed using the PDGB and in accordance with the principles of DMURS and Building for Everyone: A Universal Design Approach (NDA 2020).

The following non exhaustive list of relevant standards and guidelines have informed the approach to Universal Design in developing the Proposed Development:

- Preliminary Design Guidance Booklet for BusConnects Core Bus Corridors (NTA 2021);
- Building for Everyone: A Universal Design Approach;
- How Walkable is Your Town? (Agre Friendly Ireland and the NDA 2015);
- Shared Space, Shared Surfaces and Home Zones from a Universal Design Approach for the Urban Environment in Ireland (NDA 2012);
- Best Practice Guidelines, Designing Accessible Environments (Irish Wheelchair Association 2020);
- Inclusive Mobility (UK Department for Transport, 2021);
- Guidance on the Use of Tactile Paving Surfaces (UK Department for Transport, 2021); and
- BS8300:2018 Volume 1 Design of an accessible and inclusive built environment. External Environment – code of practice (BSI 2018).

The Disability Act 2005 (as amended) places a statutory obligation on public service providers where practicable and appropriate to ensure the provision of access to the service by persons with and persons without disabilities is integrated. An Accessibility Audit of the existing environment and the proposed draft preliminary design for the corridor was undertaken. The Audit provided a description of the key accessibility features and potential barriers to persons with disabilities based on the Universal Design standards of good practice. The Audit was undertaken in the early design stages with the view to implementing any key measures identified as part of the design development process.

In achieving the enhanced pedestrian facilities there has been a concerted effort made to provide clear segregation of modes at key interaction points along the corridor which was highlighted as a potential mobility constraint in the Audit of the existing situation, particularly for people with vision impairments. In addressing one of the key aspects to segregation, the use of the 60mm set down kerb between the footway and the cycle track is of particular importance for guide dogs, whereby the use of white line segregation is not as effective for establishing a clear understanding of the change of pavement use and potential for cyclist/pedestrian interactions.

One of the other key areas that was focused on was the interaction between pedestrians, cyclists and buses at bus stops. The Proposed Development has implemented the use of island bus stops to manage the interaction between the various modes with the view to providing a balanced safe solution for all modes.

4.6.10 Integration

4.6.10.1 Interchange with Existing and Proposed Public Transport Network

One of the key objectives of the Proposed Development is to enhance interchange between the various modes of public transport operating in the city and wider metropolitan area. City, Regional and National buses will play a crucial role in the connectivity and mobility of Galway in the future. The Galway Transport Strategy proposes a revised bus network for Galway City comprising of five cross-city bus services, with two of the services (the Green and the Brown service) travelling along Dublin Road. The Proposed Development will help transform the operation of Galway City's bus services, which include the following features:

- Buses would travel into and out of the city without being delayed in traffic, improving journey times and reliability;
- Buses that spend less time stuck in traffic are available to run more frequent services;
- As more people use the bus, private bus operators would become more confident to invest in their business and fleet;
- Provision of bus priority measures in and out of the city is an important support for future Park & Ride proposals identified in the GTS; and
- Tourist buses would be more willing to travel to Galway on day trips due to the reliability of journey times and reduced risk of encountering delays due to traffic congestion.

For the purposes of this report, it has been assumed that these bus routes will all be put in place before or in tandem with the implementation of this Proposed Development.

4.6.10.2 Integration with Other Road Users

General traffic flow and local access will be maintained along the Proposed Development corridor although there will be impacts on vehicle routing along the route due to the creation of bus priority and the introduction of turning movement restrictions. The provision of bus priority and segregated cycling facilities will result in more efficient movement of increased numbers of people along the route, without removing the option for general traffic to use the route. It is recognised that there is dependence by some on cars or business vehicles. Through the provision of bus priority and improved cycling and pedestrian facilities all road users get better equitable choices and associated more efficient use of the road space for people movement. The improvement provided to more reliable sustainable travel options is being balanced against the general traffic flow impacts. However, it is recognised that some members of the public and local businesses will remain dependant on cars or other private vehicles.

4.6.10.3 Integration with Other Infrastructure Projects

Several infrastructure projects are planned within the vicinity of the Proposed Development which will interface with the proposals. These are outlined below:

BusConnects Galway Cross City

The 'Cross-City Link' (University Road to Dublin Road) Scheme which has an overall combined length of approximately 6.7km, and is routed along the University Road, St. Vincent's Avenue, St. Francis Street, Eglinton Street, Eyre Square, Forster Street, College Road and Dublin Road and also encompasses numerous roads within the city centre including Fairgreen Road, Bothar Uí Eithir, Prospect Hill, Bothar na mBan, St. Brendan's Avenue, Headford Road, Dyke Road, Woodquay, Daly's Place, Merchants Road, Forthill Street, Queen Street and Dock Road.

The 'Cross City Link' Scheme will support integrated sustainable transport usage through infrastructure improvements and transport management measures for active travel (both walking and cycling), and the provision of enhanced bus priority measures for existing (both public and private) and all future services who will use the corridor. The Proposed Development ties into the Cross-City Link at the Dublin Road east of the Moneenageisha Junction. A Planning application was submitted to An Bord Pleanála and in September 2024, An Bord Pleanála approved the application with conditions.

Ballybane Road and Castlepark Road Cycle network scheme

Part 8 - LA 3/2023 Ballybane Road and Castlepark Road Cycle network scheme - Provision of a segregated cycle route along the R865 Ballybane Road and the L5029 Castlepark Road. The current scheme will link into an approved dedicated cycle lane network serving this eastern neighbourhood suburban area.

N6 Galway City Ring Road (N6 GCRR)

The N6 GCRR sits within the overall transport system. It addresses the transport problem in Galway City by adding trip capacity to the existing transport network thereby reducing trips through the city centre and the new links incorporated as part of the N6 GCRR provide for the strategic need of the national road network and for the connectivity of Galway City and the West Region to the national road and Ten - T network.

The N6 GCRR project is currently at planning stage.

4.6.11 Landscape and Urban Realm

Urban realm refers to the everyday street spaces that are used by people to shop, socialise, play, and use for activities such as walking, exercise, or commute to/from work. The urban realm encompasses all streets, squares, junctions, and other rights-of-way, whether in residential, commercial, or civic use. When well designed and laid out with care in a community setting, it enhances the everyday lives of residents and those passing through. It typically relates to all open-air parts of the built environment where the public has free access. It would include seating, trees, planting, and other aspects to enhance the experience for all.

Successful urban realms or public open space tend to have certain characteristics. These include:

- being welcoming and appealing;
- having a distinct identity;
- being pleasant and safe; and
- are easy to move through.

4.6.11.1 Landscape and Character Analysis

The landscape and urban realm proposals included within the Proposed Development are derived from analysis of the existing urban realm, including existing street and public space character, heritage features, boundaries, tree planting and vegetation, and the range of contemporary and heritage materials in use that inform the quality and character of different parts of the overall route.

The analysis identified the range of character areas along the route informed by adjacent land uses fronting onto the route; the character and heritage of buildings including any protected structures and private gardens or grounds; the nature and presentation of any boundary walls, railings or hedgerows; existing street trees or vegetation and the nature and quality of streetscape materials.

This analysis provided an understanding of the existing character areas along the route and facilitated detailed and iterative consideration as to the integration of the Proposed Development. This analysis informed design changes to the initial proposals so as to avoid adverse impacts of existing streetscape character, and also identified opportunities for enhancement and creation of new spaces along the route. Character analysis also informed the development of mitigation proposals where public or private property would be directly impacted by the Proposed Development.

4.6.11.2 Hardscape

The Proposed Development has been developed in a manner which employs best practice in urban design and having regard to the Street Material typology described in Chapter 4 Streetscape Materials of Galway Public Realm Strategy (GPRS), Galway City Council (2019).

Material Typologies

The GPRS sets out the typical streetscape arrangements for the public realm typologies for Galway as illustrated in Figure 4-6.

It showcases how the design approach and application of the material palette and streetscape elements differ in each typology. The materials palette accounts for different typologies and different conditions within those typologies. A hierarchy of streets and spaces ensures that the proposals are cost-efficient while setting apart special places in the city. The proposed materials are based on the existing materials and treatments along various parts of the route to match existing material treatments, while also identifying areas of opportunity for enhancement through the use of higher quality materials.

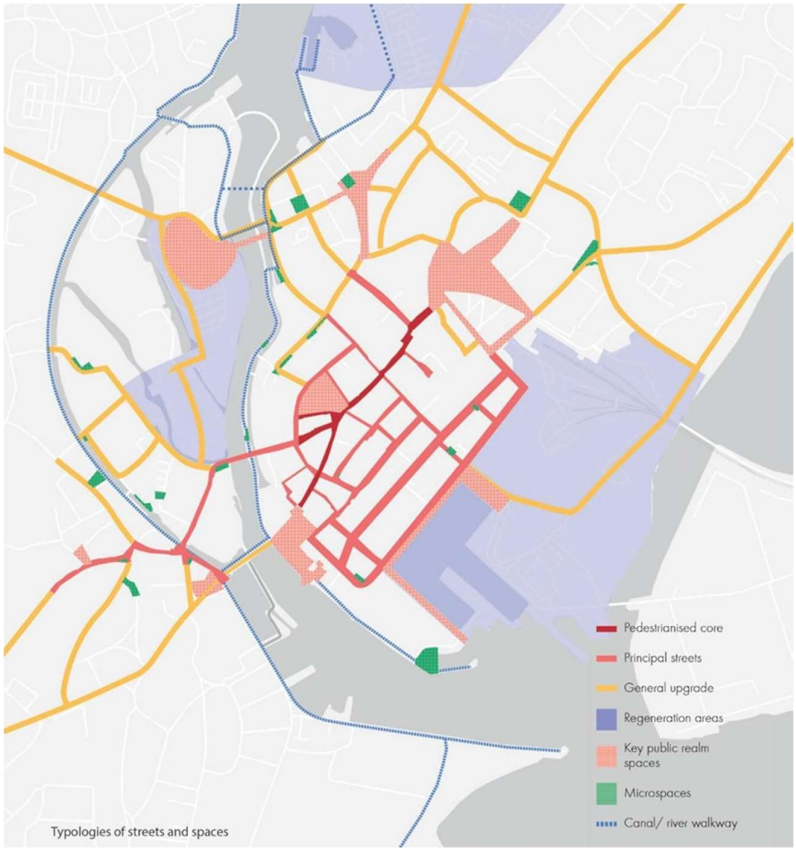

Figure 4-6 Typologies of Streets and Spaces, extract from Galway Public Realm Strategy

The proposed material typologies employed in the preliminary design for the Proposed Development are characterised as:

- **Poured in situ concrete pavement** - Used generally on existing footpaths outside of the identified upgrade areas. Concrete pavements can be laid with or without a kerb, can have neatly trowelled edges and textured surface for a clean, durable, slip resistant surface.
- **Asphalt footpath**. Used locally on existing footpaths and will tie in with other sections of urban realm. Laid with a road kerb, can have a smooth finish or textured aggregate surface, provides a strong flexible slip resistant surface.
- **Precast concrete unit paving** - Concrete paving slabs and bricks available in a wide variety of sizes, colours and finishes to provide an enhanced urban realm. Can be used with matching concrete kerbs or with salvaged natural stone kerbs as appropriate. This is used extensively along the Proposed Development.
- **Natural stone paving** - Employed for high quality urban realm areas, mostly in city centre locations. This typology represents new or re-used natural stone paving and kerbs surface and is used to create enhanced public spaces for major urban realm interventions.
- **Stone or concrete setts** - Proposed for distinguishing features such as pedestrian crossing points, raised tables and parking/set-down areas.
- **Self-binding gravel** - Proposed for some pedestrian pathways that are offroad and leading through informal landscaped areas.
- **No change/existing surface retained** - At some locations, the Proposed Development does not necessitate any alteration to the alignment of the existing footpath or roadway. These include established and more recently constructed sections of streetscape.

4.6.11.3 Public Realm Upgrades/General Upgrade

The proposed treatment of the space surrounding the Lynch's/Mile Stone will follow the palette of Galway Public Realm Strategy (GCC, 2019). The strategy provides a palette for general upgrades across the city. Here the focus is on lifting the quality of streetscape and achieving a level of consistency in the design approach. The proposed materials palette is described as concrete paving and concrete setts paving with granite kerb, as illustrated in Figure 4-7.

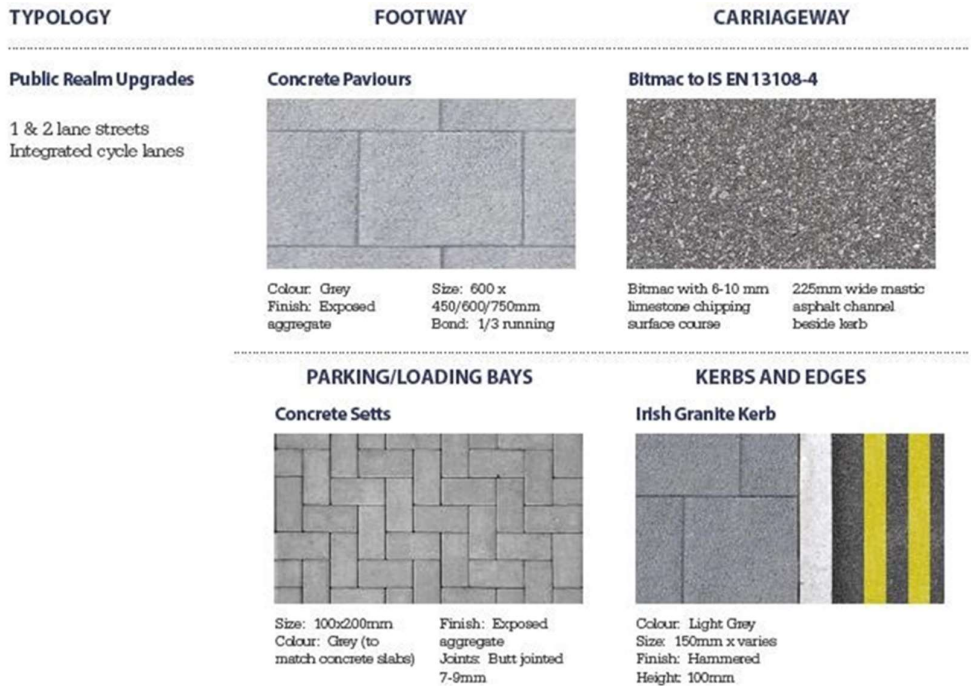

Figure 4-7 Public Realm Upgrade Materials Palette (extract from GPRS)

4.6.11.4 Detailing

The Proposed Development design considered re-use of existing high-quality and natural stone kerbs so as to maintain streetscape character, reduce construction costs and maximise sustainability.

Pedestrian crossings at side streets will be raised where practicable and will be distinguished using stone or concrete setts as appropriate to the locality.

In some locations, existing street trees have disturbed or broken footpath surfaces. The footpath around such trees will be replaced where appropriate with self-binding gravel so as improve the vitality of the trees and ensure accessible pedestrian facilities.

Sustainable Drainage Systems (SuDS) will be incorporated, in accordance with Galway City Development Plan, within hardscape areas to locally manage surface water run-off and reduce demand for piped surface water drainage infrastructure.

Informal footpaths through landscaped areas that are set back from the main carriageway will be formed using self-binding gravel as an alternative to asphalt or concrete.

Where private or commercial property boundaries are realigned, boundary walls and railings will be reinstated to match the existing and may be extended to other properties along the same street to enhance streetscape character.

Existing street furniture such as seating will be relocated within the revised streetscape and new street furniture will be provided at locations where opportunity sites have been identified to establish or enhance public spaces.

Hardscape works will be complemented by soft landscaping including trees, hedgerows, native planting, ornamental planting, amenity grass areas and species rich grasslands as appropriate. Soft landscaping will enhance the amenity value and visual character of streets and spaces, mitigate the loss of existing trees, and enhance ecological value along the route.

4.6.11.5 Softscape

Softscape refers to existing trees including street trees and groups of trees, new tree planting, hedgerows, ornamental planting and amenity grasslands. Softscape plays an important role in ensuring that streets and public spaces are attractive and healthy spaces for the local community, but also in providing better air quality, managing surface water run-off and in maintaining and creating habitats.

Planting Strategy

The planting strategy has been developed in response to the objectives set out in both the Galway City Council Development Plan (GCDP) 2023-2029 and in response to landscape and urban realm opportunities arising from the Proposed Development to integrate new infrastructure within the existing local context and to enhance the visual and amenity value of streets and spaces.

Where possible the initial conservation of existing biodiversity has been considered. The Arboricultural Survey identified the quality of existing trees. The information was overlaid on the proposed routes to inform the design process. The overarching planting strategy is to retain established trees and vegetation wherever possible for their arboricultural amenity and biodiversity value.

The planting strategy includes replacement of street trees and groups of trees that may be impacted by the Proposed Development, but also the introduction of new tree planting and street trees within other spaces and along streets. Reinforcement of green infrastructure along the route will improve the overall amenity, character and appeal of the route corridor and localities along it, as well as enhancing biodiversity.

In addition to trees and street trees, other vegetation is also proposed along the route including hedgerows, ornamental planting, amenity grassland, shrub and meadow grass areas.

Throughout the design process, collaboration between the Landscape and Urban Realm designers and the Drainage Engineers has sought to adopt Sustainable Drainage Solutions (SuDS) to manage storm water run-off. SuDS features have been considered along the route and incorporated within suitable landscape areas in the form of rain gardens, bioretention areas, filter drains, swales, tree pits and permeable paving.

Arboricultural Survey

An Arboricultural Impact Assessment (AIA) Report (Appendix 16.1 in Volume 4 of this EIAR) identifies the likely direct and indirect impacts to trees of the Proposed Development along with suitable mitigation measures, as appropriate to allow for the successful retention of significant trees, or to compensate for trees to be removed.

The Arboricultural Survey identified trees and groups of trees along the route of the Proposed Development and provided a detailed schedule of the characteristics, vitality and quality of trees. The AIA Report was prepared by overlaying the Proposed Development General Arrangement with the tree survey so as to identify trees or groups of trees that might be impacted by the Proposed Development. The AIA Report includes recommendations for the retention, removal or management of trees and identifies trees that will be impacted by virtue of the Proposed Development. It also sets out tree protection measures for trees adjacent to the Proposed Development that might otherwise risk damage during construction.

Typical Planting Typologies

A range of general planting typologies are incorporated into the Proposed Development as appropriate to localities and character areas along the route. In some instances, planting is focussed on reinstatement and repair of existing tree group areas that will be impacted to facilitate construction of new footpaths and road infrastructure. In other cases, planting is focussed on enhancing the amenity, green infrastructure, and biodiversity along the route and in providing distinctive and attractive places for people to gather and relax.

New Street Trees and Tree Groups

A range of urban street tree species have been incorporated into the overall Proposed Development planting design depending on location and whether trees are to be planted in grass verges or in tree pits within paved urban environments as appropriate, and also to ensure diversity of species and provide habitats for urban wildlife.

As noted on the Landscaping General Arrangement (BCGDR-BTL-ENV_LA-XX-DR-CE-00000_00011) in Volume 3 of this EIAR, a range of urban street tree species have been considered.

The proposed planting has allowed for species similar to those on site and to those removed and is specified to be planted at an advanced heavy-standard size (min. 4.5m height) specially along Merlin Park boundary.

Elsewhere along the route of the Proposed Development there are a range of existing mature and immature street trees. While it is proposed to retain and protect existing trees wherever possible, some will be impacted. The Proposed Development includes replacement and additional planting of semi-mature street trees to mitigate the loss of existing trees and to maintain the long-term tree-lined character of streets. The Proposed Development incorporates additional landscaping arising from junction reconfiguration, reinforcement of existing vegetation areas, and the establishment of new urban realm and landscape opportunity areas. Tree species will be determined by location and will comprise either native trees species as set out above, or selected non-native street trees suitable for coastal areas, tolerant to salt laden wind and tolerant to drought.

Landscaping proposals respond to the different localities and may include grass planting, hedgerows, trees, grasses, ornamental planting and swathes of spring bulbs. The full range of proposed ornamental planting, shrub and hedging species specified for the Proposed Development are included in the landscaping drawings.

Boundary Planting

The Proposed Development corridor is bounded by a wide range of established private, institutional, commercial and public land boundaries. While the design development has sought to avoid impacts on such boundaries, the Proposed Development will nonetheless require both temporary and permanent acquisition of lands.

Impacted property boundaries will be reinstated following construction. In some instances, boundaries will be re-built along their original alignments. In other cases, boundaries will be re-built on a new setback alignment. In general, property boundaries will be reinstated on a ‘like for like’ basis, including any walls, piers, fences, railings, gates, driveway finishes and private landscaping. Private grounds that are utilised in part for construction access will be reinstated following completion of the works to match the existing landscaping of the property. Where private grounds are reduced by permanent land take required for the Proposed Development, the remaining grounds will be reinstated to match the landscape and character of the existing grounds in consultation with the property owner.

4.6.12 Lighting

A review of the existing lighting provision along the extent of the route has been carried out to understand the impact of the Proposed Development on lighting columns and associated infrastructure. Several existing columns are proposed to be relocated or replaced to accommodate the Proposed Development, as shown on the Street Lighting drawings (BCGDR-BTL-LHT_RL-XX-DR-EO-00001_00011) in Volume 3 of this EIAR.

In locations where road widening and/or additional space in the road margin is required, it is proposed that the public lighting columns will be replaced and relocated to the rear of the footpath to eliminate conflict with pedestrians, eliminating pedestrian obstruction. For existing columns that have specific aesthetic requirements, the intent for the replacement (where applicable) of such columns will include:

- Replacing the existing heritage columns and brackets with identical replica columns and brackets;
- Replacing existing luminaires with approved LED heritage luminaires; and
- Ensuring the electrical installation is compliant with the latest version of the National Rules for Electrical Installations (I.S. 10101).

4.6.12.1 New Lighting

All new lighting on the Proposed Development will aim to minimise the effects of obtrusive light at night and reduce visual impact during daylight and will be designed and installed in accordance with the requirements of the relevant National Standards and guides, including but not limited to:

- Galway City Local Authority Guidance Specifications;
- EN 13201: 2014 Road Lighting (all sections);
- ET211:2003 Code of Practice for Public Lighting Installations in Residential Areas;
- BS 5489-1:2020 (2020) Design of road lighting - Lighting of roads and public amenity areas. Code of practice;
- CC-SPW-01300 Specification for Road Lighting Columns, Series 1300 (TII 2019);
- CC-SPW-01400 Specification for Electrical Works for Road Lighting and Traffic Signs, Series 1400 (TII 2019);
- IS EN 40-7:2003 – Lighting Columns; and
- Institution of Lighting Professionals – GN01 Guidance Notes for Reduction of Obtrusive Light (2021).

Lighting schemes will comply with the 'Guidance notes for the Reduction of Light Pollution' issued by the Institution of Lighting Professionals (ILP). Light Emitting Diode (LED) lanterns will be the light source for any new or relocated public lighting provided.

4.6.12.2 Lighting at Bus Stops

The Proposed Development will include for the provision of lighting in covered areas, open areas and passenger waiting areas.

The location of the lighting column will be dictated by light spread of fittings to give the necessary level of illumination.

4.6.13 Utilities

There are a number of measures proposed to protect existing utilities during the Construction Phase of the Proposed Development. These are specifically outlined in Chapter 5 (Construction) and Chapter 18 (Material Assets) of this EIAR.

Where there are clashes between the existing utility infrastructure, measures are proposed to either protect the infrastructure in place or divert the utility infrastructure as required.

The utility design strategy included the analysis of records provided by all utility providers associated with the Proposed Development corridor. The analysis included desktop reviews including review of topographic surveys together with site reconnaissance. In locations where critical assets were identified and the risk of interference was considered high, Ground Penetrating Radar surveys were undertaken to inform the design.

4.6.13.1 Utility Diversions

Due to the extensive nature of the Proposed Development, there are certain areas along the route which will require utility diversions, due to localised conflicts. Identified service conflicts and recommended diversions are described and assessed in Chapter 18 (Material Assets) of this EIAR.

These conflicts have been identified, so that the conflict can be resolved by relocating or diverting the services, where necessary, and protecting in-situ where appropriate.

The principal statutory and other service providers affected are:

- ESB;
- Uisce Éireann (Water & Public Sewer);
- Gas Networks Ireland; and
- Telecommunication Services – Eir, Virgin Media, eNet, BT and GCC Fibre Optic Network.

In addition to the above, it will be necessary to relocate and upgrade some of the existing public lighting and traffic signalling network and equipment along the extents of the Proposed Development.

4.6.14 Drainage

4.6.14.1 Relevant Standards and Approach

The drainage design for the Proposed Development was developed following consultation with GCC. The design basis was developed taking account of the Planning requirements of GCC, Galway City Development Plan 2023, Transport Infrastructure Ireland (TII) requirements and international best practices such as CIRIA The SuDS Manual (C753) (2015).

The principal objectives of drainage design are as follows:

- To drain surface water from existing and proposed pavement areas throughout the Proposed Development and maintain the existing standard of service;
- To maintain existing run-off rates from existing and newly paved surfaces using Sustainable Urban Drainage Systems (SuDS); and
- To minimise the impact of the runoff from the carriageway on the surrounding environment using SuDS, silt traps and/or bypass oil separators.

No drainage features like gullies or manholes shall be located at, or any ponding will be allowed to occur at, pedestrian crosswalk locations or at bus-stop locations.

Drainage of newly paved areas includes SuDS measures to treat and attenuate any additional run-off. These measures will ensure that there is:

- No increase in existing run-off rates from newly paved areas; and
- Appropriate treatment to ensure run-off quality.

SuDS measures are included for each catchment where there is an increase in the impermeable drainage area to ensure no increase in runoff and provision is made for treatment. A hierarchical approach to the selection of SuDS measures has been adopted with ‘Source’ type measures e.g., Tree pits implemented in preference to catchment type measures e.g., attenuation tanks.

The Drainage Option Design Report and the Drainage Design Basis Statement are included in Appendix 4.1 of Volume 4 of this EIAR.

4.6.14.2 Existing Drainage Description

The existing drainage network along the Proposed Development is located within Sub catchment CARROWMONEASH [Oranmore]_SC_010 of the main WFD Galway Bay Southeast Catchment. The drainage network can be split into the seven catchment areas based on topography and the existing pipe network supplied by Uisce Eireann and GCC. The approximate catchment areas, existing sewer networks, outfalls and watercourses are shown on the existing catchment drawings (refer to drawings BCGDR-BTL-XX_No_XX-DR-CD-06047_06050 within Volume 3 of this EIAR) The existing catchments are summarised in Table 4-10

Table 4-10 Existing Drainage

Existing Catchment Reference	Chainage (m)	Approx. Drainage Catchment Area (km^2)	Existing Network Type	Existing Outfalls
Catchment 1	0+600 to 0+357	3.250	Surface Water (Storm)	Network outfalls to the Corrib Estuary via Lough Atalia
Catchment 2	0+000 to 0+357	0.160	Surface Water (Storm)	Network outfalls to the Corrib Estuary via Lough Atalia
Catchment 3	0+357 to 0+626	0.180	Combined Sewer	Network outfalls to Mutton Island Wastewater Treatment Plant
Catchment 4	0+626 to 0+808	0.600	Surface Water (Storm)	Network outfalls to the Corrib Estuary near Mellows Pitch & Putt
Catchment 5	0+808 to 1+830	2.820	Surface Water (Storm)	Network outfalls to the Corrib Estuary near Ballyloughane Strand SAC
Catchment 6	1+830 to 3+032	2.980	Surface Water (Storm)	Network outfalls to the Corrib Estuary North of Rabbit Island
Catchment 7	3+032 to 4+075	1.690	Surface Water (Storm)	Network outfalls to Oranmore Bay

4.6.14.3 Proposed Drainage/Runoff

The drainage design aims to sustain flow levels within the existing pipe network after a rainfall event by controlling the discharge rate within each catchment. Flows will be controlled by the implementation of SuDS techniques, where practicable. One of the principal objectives of the road drainage system is to minimise the impact of the runoff from the roadways on the surrounding environment via the position of: filter drains, swales, bio-retention areas, tree pits, oversized pipes, silt traps and attenuation features if necessary. Some areas along the Proposed Development will have increased impermeable areas, additional permeable areas are also provided by the softening of urban realm along the routes.

Each catchment area has been broken down into sub-catchments/networks to determine the change in impermeable surface area along the Proposed Development. Where there is a net increase in impermeable surface area, a form of attenuation will be required prior to discharge. Where there is no net change or net decrease, then no form of attenuation will be required prior to discharge.

A summary list of the sub-catchments, the associated chainage, and impermeable surface area differential is given in Table 4-11. In addition, the table contains a column entitled 'Net change' which takes account of the change of use from impermeable to permeable areas and vice versa.

Table 4-11 Summary of Increased Permeable and Impermeable Areas

Existing Catchment Reference	Sub-Catchment / Network Reference	Chainage (m)	Road Corridor Area (m2)	Change of use to Impermeable areas (m2)	Change of use to Permeable areas (m2)	Net Change (m2)	Net Change / Road corridor (%)
Catchment Area 1	Network 1	0+000 to 0+360	8083	1726	322	1404	17

Existing Catchment Reference	Sub-Catchment / Network Reference	Chainage (m)	Road Corridor Area (m2)	Change of use to Impermeable areas (m2)	Change of use to Permeable areas (m2)	Net Change (m2)	Net Change / Road corridor (%)
Catchment Area 3	Network 2	0+360 to 0+630	6241	656	38	618	10
Catchment Area 5	Network 3	0+630 to 1+140	12361	1884	686	1198	10
Catchment Area 5	Network 4	1+140 to 1+370	7171	1872	459	1413	20
Catchment Area 5	Network 5	1+370 to 1+650	9973	-958	1503	-2461	-25
Catchment Area 6	Network 6	1+650 to 2+175	12127	2461	0	2461	20
Catchment Area 6	Network 7	2+175 to 3+030	18820	3868	29	3839	20
Catchment Area 7	Network 8	3+030 to 3+800	19463	483	2108	-1625	-8
Catchment Area 7	Network 9	3+800 to 3+880	3310	373	0	373	11

4.6.14.4 Proposed Drainage System

The principal objectives of drainage design are as follows:

- All drainage structures for newly paved areas are designed with a return period of no flooding in 1:100 years with a 20% climate change allowance;
- All drainage structures for combined new/existing paved areas are designed with a return period of no flooding in 1:30 years with a 20% climate change allowance;
- Unless informed otherwise via hydraulic models, drainage structures for existing paved areas are assumed to have been designed with a return period of no flooding in 1:5 years;
- A SuDS drainage strategy has been developed for all newly paved areas in accordance with the SuDS hierarchy. SuDS are provided to ensure no increase on existing runoff rates from new paved areas will also provide a level of treatment before discharging into the existing network system; and
- Infiltration rates were assumed to be zero for calculating the required attenuation volumes for SuDS measures. This is a conservative approach and ensures SuDS measures are not knowingly undersized at this stage of the design. Where necessary, permeability tests will be completed so that infiltration rates can be considered in further design.

The following drainage types are proposed for the Proposed Development catchments comprising newly paved and combined existing/newly paved areas, as indicated on the Proposed Surface Water Drainage Works (BCGDR-BTL-DNG_RD-XX-DR-CD-00001_00011) in Volume 3 of this EIAR:

The following drainage systems are proposed for the catchments comprising newly paved and combined existing/newly paved areas:

Sealed Drainage Systems collect, convey and discharge runoff via a sealed pipe network. For the purposes of the Proposed Development, this type of drainage comprises sealed pipes which are connected to gullies and kerb drainage outlets along the kerb line. Precise location of gullies will be determined during detailed

design. Sealed systems are provided where there are sensitive aquifers, as is the case for Networks 7 and 8.

SuDS features: Grassed areas in the form of rain gardens and trees pits, will provide attenuation and treatment to surface water along the Proposed Development.

Oversized Storage Pipe: Where it was found there was a net increase in impermeable surface area within a network, a flood compensation pipe was provided within the network. Where there was no net decrease in the impermeable surface area within a network, no form of compensation storage was provided. The flood compensation pipe will provide additional capacity within the drainage system, which will reduce the likelihood of surface water surcharge onto the public road during an intense storm event.

Gully gratings: Gully pots will be provided at the end of kerb drainage runs and beneath gully gratings. These gully pots incorporate a sump and will act as traps for sediment and grit, which can then be cleaned out as part of maintenance works.

Attenuation Storage Tanks incorporating flow control: These are provided within drainage Networks 7 and 8 only. They collect surface water from the adjacent network and their outflow rate will be reduced by a flow control mechanism such as a Hydro brake or similar.

Petrol Interceptors / Petrol interceptors will be provided in areas where surface water is collected from trafficked roads, where a risk of oil entering the drainage network exists. They separate the oil prior to the surface water being discharged from the network.

For catchments where there is no change in the impermeable surface area and the kerb line is to be changed the existing sealed pipe network will be retained with new split entry gully connections provided as appropriate. As for any new drainage network, the gullies will be located in the kerb line between the cycle-track and the bus lane and/or the footpath and the cycle track depending on the highway profile.

For catchments where there is no change in the impermeable surface area and no change to the kerb line the current drainage will remain unchanged.

4.6.14.5 Runoff Attenuation and Sustainable Drainage Systems (SuDS)

SuDS measures and/or attenuation systems will be provided to ensure no increase in existing run off rates from newly paved and combined existing/newly paved catchment areas. The capacity of the proposed SuDS measures and attenuation systems was based on the incoming flows and existing discharge rates for each catchment. A range of storm durations were tested for each catchment from 30-minutes to 24 hours to ensure that the proposed measures are sufficient.

The proposed development will create additional impermeable area through widening of the carriageway to provide designated bus, cycle and running lanes in addition to a footway. Without mitigation, the increased impermeable area would lead to increased run off rates and faster time to peak flow in the existing drainage network.

Where practical, within new areas of public realm gained as part of the design, a sustainable drainage system is considered in the form of rain gardens and tree pits. SuDS are also being considered in existing areas, where practicable and possible.

Networks 7 and 8 consist of two sealed collection networks. These two networks drain to attenuation tanks which both have pumping stations. The pumping station at Network 8 will have a flow rate of 2 l/s, while the pumping station at Network 7 will have a flow rate of 4 l/s. Collected surface waters are pumped from the attenuation tank at Network 7 to the attenuation tank at Network 8 and then on to the existing 1500mm surface water pipe at Chainage 2+170 approx.

4.6.14.6 Pollution Control

One of the principal objectives of the road drainage system is to minimise the impact of the runoff from the roadways on the surrounding environment via the provision of:

- Filter drains;
- Swales;
- Tree pits;
- Oil / petrol interceptors;
- Silt traps; and
- Attenuation features, as necessary.

Pollution Control measures from the proposed road development will be designed in accordance with the TII Publications (Standards), namely DN-DNG-03022 Drainage Systems for National Roads (TII 2015a), DN-DNG03066 Design of Earthworks Drainage, Network Drainage, Attenuation & Pollution Control (TII 2015b) and DNDNG-03065 Road Drainage and the Water Environment (TII 2015c).

The proposed road drainage system is shown in the Proposed Surface Water Drainage Works drawings (BCGDR-BTL-DNG_RD-XX-DR-CD-00001_00011) in Volume 3 of this EIAR. The proposed system incorporates a variety of drainage measures including, kerb and gully drainage, carrier drains, tree pits, sealed pipes, swales / carrier drains, filter drains, attenuation areas and pollution control as required in accordance with the above design standards. Pollution Control will be achieved during the conveyance of the road runoff to the attenuation features along the gullies and pipes to grassed swales / carrier drains and filter drains where the drainage is allowed filter through the vegetation and filter medium.

The attenuation tanks will include a forebay and oil / petrol interceptor at each outfall location. Where there is treatment by filtration in a swale, tree pit or filter drain an oil / petrol interceptor will not be required.

The oil / petrol interceptors will be designed as per DN-DNG-03066 (TII 2015b) and CIRIA R142 Control of Pollution from Highway Drainage Discharges (CIRIA 1994). A minimum class 2 bypass interceptor will be installed where required.

4.6.15 Maintenance

All traffic signal and communications equipment are designed based on long-term maintenance requirements. All equipment will be accessible without significant disrupting pedestrian, bicycle, or vehicle traffic.

Apparatus have been designed and located to allow for easy access and the safe maintenance of the Proposed Development into the future. This included provision, where practicable, of:

- Use of retention sockets, where applicable, for the erection of Traffic Signal, CCTV, Above Ground Detection, and other equipment mounting poles to allow for the ease of installation, maintenance and replacement;
- The use of lightweight equipment poles, where appropriate, such as cantilever signal poles. Consideration will be given to the selection of products that allow for maintenance activities to be undertaken from ground level, such as tilt down poles or poles with wind-down mechanisms;
- Placement of poles and retention sockets within 7m of chambers to provide ease of installation and replacement of cables;
- Locating chambers away from pedestrian desire lines, and areas of tactile paving. This is to provide for a reduced impact of Traffic Management;
- On longitudinal duct runs, chambers to be placed at appropriate centres to allow for the ease of installation and replacement of cables;
- Safe areas to be provided for the access and parking of maintenance vehicles; and
- Locating controller, and other, cabinets in positions that allow for safe access and clear visibility of the operation of the junction.

4.6.16 Safety and Security

The requirement for a pleasant, safe and secure environment for passengers waiting at Bus Stops and undertaking their journeys is a key component of the proposed public transport service. This is facilitated by the provision of:

- RTPI – Each stop will be provided with Real Time Passenger Information showing the estimated time of arrival of subsequent buses; and
- Public Lighting – each stop will have public lighting designed to ensure the safe operation of the stops in all lighting conditions and to enhance the sense of security at the stops.

In addition to the measures outlined above, it is proposed to install traffic monitoring cameras at key locations including junctions to enable the monitoring of traffic flows along the Proposed Development and provide rapid identification of any events that are causing, or are likely to cause, disruption to bus services on the route and to road users in general.

4.6.17 Land Use and Accommodation Works

The land use along the Proposed Development comprises a mix of residential, commercial properties, community, recreational, cultural and institutional uses. The extent of the impact due to the Proposed Development on a landowner's holding is shown on the Compulsory Purchase Order maps for the Proposed Development.

The Proposed Development has retained as far as practicable the existing horizontal and vertical layout along the route to minimise the amount of land acquisition required. However, in order to construct the Proposed Development, it is necessary to compulsorily acquire individual plots of land along sections of the route.

The nature and extent of accommodation works associated with any land acquisition varies and is described as appropriate for each sub-section of the Proposed Development Route in Section 4.5.

The proposed accommodation works typically consist of relocated boundary walls and gates, and the regrading of driveways and adjacent grass areas, where deemed necessary. Where driveways are proposed to be regraded a maximum gradient of 5% in accordance with Recommendations for Site Development Works for Housing Areas, Department of the Environment and Local Government, 1998 has been adopted, where practicable.

Where cellar and private landings are affected by the Proposed Development, preconstruction and post construction surveys will be performed by the appointed contractor. It will be determined during the detailed design stage if strengthening works are required to these existing structures.

To maintain the character and setting along the route of the Proposed Development, the approach to undertaking the new boundary treatment works is replacement on a 'like for like' basis in terms of material selection and general aesthetics, unless otherwise noted on the Proposed Development drawings, as listed at the outset of this Chapter.

4.7 References

Age Friendly Ireland and NDA (2015) How Walkable is your Town.

BS 5489-1:2020 (2020) Design of road lighting - Lighting of roads and public amenity areas. Code of practice.

BSI (2018). BS8300:2018 Volume 1 Design of an accessible and inclusive built environment. External Environment – code of practice.

British Standards Institution (2020) BS5489-1 and BS5489-2 'Code of practice for the design of road lighting.'

CIRIA (1994). CIRIA Report 142 – Control of Pollution from Highway Drainage Discharges.

CIRIA (2015) The SuDS Manual (C753).

Department of Transport, Tourism and Sport (2019). Traffic Signs Manual, as updated.

EN 13201: 2014 Road Lighting.

EPA (2022). Guidelines on the information to be contained in Environmental Impact Assessment Reports. May 2022.

ET211:2003 Code of Practice for Public Lighting Installations in Residential Areas.

Government of Ireland (2019). Design Manual for Urban Roads and Streets (DMURS).

Galway City Council (2019). Galway Public Realm Strategy

Institute of Hydrology (1994). Report No. 124 – Flood Estimation for Small Catchments.

Institution of Lighting Professionals (1992). Guidance Notes for the Reduction of Light Pollution.

Institution of Lighting Professionals (2021). Guidance Note 01/21 The Reduction of Obtrusive Light.

National Standards Authority of Ireland (2003) I.S. EN 40-7:2003 – Lighting Columns.

Irish Wheelchair Association (2020). Best Practice Guidelines, Designing Accessible Environments.

NDA (2012). Shared Space, Shared Surfaces and Home Zones from a Universal Design Approach for the Urban Environment in Ireland.

NDA (2015). How Walkable is Your Town?

NTA (2021). Preliminary Design Guidance Booklet for BusConnects Core Bus Corridors.

NTA (2023). Cycle Design Manual.

Transport Infrastructure Ireland (TII) (2015a). Design of Earthworks Drainage, Network Drainage, Attenuation & Pollution Control DN-DNG-03066.

Transport Infrastructure Ireland (TII) (2024). Drainage Systems for National Roads DN-DNG-03022.

Transport Infrastructure Ireland (TII) (2015c). Road Drainage and the Water Environment (including Amendment No. 1 dated June 2015) DN-DNG-03065.

Transport Infrastructure Ireland (TII) (2019). Technical Acceptance of Road Structures on Motorways and Other National Roads DN-STR-03001.

United Kingdom Department for Transport (UK DfT) (2021). Inclusive Mobility.

United Kingdom Department for Transport (UK DfT) (2021). Guidance on the Use of Tactile Paving Surfaces.

Directives and legislation

Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment.

Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment.

S.I. No. 279/2019 – European Union (Roads Act 1993) (Environmental Impact Assessment) (Amendment) Regulations 2019.

The Disability Act 2005, as amended.