Chapter 04
Proposed Scheme Description

Contents

4. Proposed Scheme Description

4.1 Introduction

This Chapter of the Environmental Impact Assessment Report (EIAR) provides a description of the Blanchardstown to City Centre Core Bus Corridor Scheme (hereafter referred to as the Proposed Scheme).

Article 5(1)(a) of the 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 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 Scheme 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 Scheme (Section 4.4). Following this, there is a detailed description of the Proposed Scheme (Section 4.5) and a Section describing the key infrastructure elements associated with the Proposed Scheme (Section 4.6). These Sections should be read in their entirety in order to gain a full understanding of the Proposed Scheme and its associated key infrastructure elements.

4.2 Proposed Scheme Overview

The Proposed Core Bus Corridor has an overall length of approximately 10.9km and will commence at Junction 3 (Blanchardstown / Mulhuddart) southbound off-slip from the N3. The Proposed Scheme proceeds along the R121 Blanchardstown Road South into the Blanchardstown Shopping Centre. From a new terminus to the north-west of Blanchardstown Shopping Centre the Proposed Scheme is routed onto the N3 Navan Road via the Snugborough Road junction and will follow the N3 and Navan Road as far as the junction with the Old Cabra Road. From here, the Proposed Scheme will be routed along Old Cabra Road, Prussia Street, Manor Street and Stoneybatter to the junction with King Street North. The Proposed Scheme will proceed via Blackhall Place as far as the junction with Ellis Quay, where it will join the prevailing traffic management regime on the North Quays. At the Stoneybatter / Brunswick Street North junction, cyclists proceed along Brunswick Street North, George's Lane and Queen Street as far as Ellis Quay/Arran Quay.

The route of the Proposed Scheme is shown in Image 1.1 in Chapter 1 (Introduction). The Proposed Scheme includes an upgrade of the existing bus priority and cycle facilities associated with the corridor. The Proposed Scheme includes a substantial increase in the level of bus priority provided along the corridor, including the provision of additional lengths of bus lane, resulting in improved journey time reliability. Throughout the Proposed Scheme bus stops will be enhanced to improve the overall journey experience for bus passengers.

Throughout the Proposed Scheme 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. The proposed route of the cycle track will integrate with route 4A of the GDA Cycle Network Plan via Castleknock Manor and the cycle track will recommence at Snugborough Road junction.

Moreover, pedestrian facilities will be upgraded and additional signalised crossings will be provided. In addition, public realm works will be undertaken at key locations with higher quality materials, planting and street furniture provided to enhance the pedestrian experience. An example of this is the proposed landscape design at Prussia Street / Manor Street / Aughrim Street junction.

Table 4.1 summarises the changes which will be made to the existing corridor as a result of the Proposed Scheme.

Table 4.1: Summary of Changes as a result of the Proposed Scheme

Total Length of Proposed Scheme	10.9km	
Bus Priority	**Existing (km)**	**Proposed Scheme (km)**
Bus Lanes		
Inbound	4.4	9.1
Outbound	1.1	9
Bus Priority through Traffic Management		
Inbound	0	1.5
Outbound	0	1.6
Total Bus Priority (both directions)	5.5	21.2 (+289%)
Bus Measures		
Proportion of Route with Bus Measures	25%	97%
Cycle Facilities – Segregated		
Inbound	0.8	7.8
Outbound	1.2	8.7
Cyclist Facilities – Non-segregated Online (NS) / Offline Quiet Street (QS)		
Inbound	3.4 (NS)	0.5 (QS)
Outbound	4 (NS)	0.5 (QS)
Cyclist Facilities - Overall		
Total Cyclist Facilities (both directions)	9.4	17.1 (+82%)
Proportion Segregated	9%	78%
Other Features		
Number of Traffic Signal Controlled Junctions	27	41
Number of Signal Crossings	77	125
Number of Properties with Potential Land Take	(139)	

The description of the Proposed Scheme is supported by a series of drawings (listed in Table 4.2 below), which are contained in Volume 3 of the EIAR and these should be read in conjunction with this chapter.

Table 4.2: List of Drawings

Drawing Series Number	Description
BCIDC-ARP-SPW_ZZ-0005_XX_00-DR-CR-9001	Site Map and Site Location Plan
BCIDC-ARP-GEO_GA-0005_XX_00-DR-CR-9001	General Arrangement
BCIDC-ARP-GEO_HV-0005_XX_00-DR-CR-9001	Mainline Plan and Profile
BCIDC-ARP-GEO_CS-0005_XX_01-DR-CR-9001	Typical Cross Sections
BCIDC-ARP-ENV_LA-0005_XX_00-DR-LL-9001	Landscaping General Arrangement
BCIDC-ARP-PAV_PV-0005_XX_00-DR-CR-9001	Pavement Treatment Plans
BCIDC-ARP-SPW_BW-0005_XX_00-DR-CR-9001	Fencing and Boundary Treatment
BCIDC-ARP-TSM_GA-0005_XX_00-DR-CR-9001	Traffic Signs and Road Markings
BCIDC-ARP-LHT_RL-0005_XX_00-DR-EO-9001	Street Lighting
BCIDC-ARP-TSM_SJ-0005_XX_00-DR-TR-9001	Junction Systems Design
BCIDC-ARP-DNG_RD-0005_XX_00-DR-CD-9001	Proposed Surface Water Drainage Works
BCIDC-ARP-UTL_UD-0005_XX_00-DR-CU-9001	IW Foul Sewer Asset Alterations
BCIDC-ARP-UTL_UE-0005_XX_00-DR-CU-9001	ESB Asset Alterations
BCIDC-ARP-UTL_UG-0005_XX_00-DR-CU-9001	GNI Asset Alterations
BCIDC-ARP-UTL_UW-0005_XX_00-DR-CU-9001	IW Water Asset Alterations
BCIDC-ARP-UTL_UL-0005_XX_00-DR-CR-9001	Telecommunications Asset Alterations
BCIDC-ARP-UTL_UC-0005_XX_00-DR-CU-9001	Combined Existing Utilities Records
BCIDC-ARP-STR_GA-0005_XX_00-DR-CB-9001	Bridges and Major Retaining Structures
BCIDC-ARP-BLD_AR-0005_IN_00-DR-AA-9001	Buildings / Architecture

4.3 Design Iteration

The design of the Proposed Scheme 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 Scheme are attained. In addition, feedback received from the comprehensive consultation programme, described in Chapter 1 (Introduction), undertaken throughout the option selection and design development process have been incorporated, where appropriate.

Examples of how the design changed include:

- The proposed layout at Mulhuddart junction has been changed, with cycle tracks modified and bus lanes removed from the N3 Overbridge at this location. Cycle tracks are now proposed on the nearside of the carriageway and cycle crossings alongside pedestrian crossings to minimise conflict between cyclists and motorists. The layout for Blanchardstown Road South has also been modified with the removal of the eastbound bus lane and provision of a bus layover. These changes improve cycle safety;
- A left turn filter lane has been introduced on the Old Navan Road leading to the N3 eastbound on-slip, south of the Mulhuddart junction which improves integration with the road network;
- The Blakestown Way Roundabout has been amended to a signalised crossroads junction. This improves connectivity for pedestrians between the Shopping Centre and Millennium Park, with a widened footpath and additional trees provided at Millennium Park;
- The previously proposed two-way cycle track westbound along the R147 Navan Road to Auburn Avenue Junction is modified with cyclists routed from the R147 to an on-street 'Quiet Street' cycle route along Castleknock Manor. This change improves cyclist safety and integration with the cycle network whilst retaining the existing landscaping between Castleknock Manor and R147 Navan Road.
- At the Navan Road/Ashtown Road junction, the Proposed Scheme modifies the existing roundabout to a signal-controlled crossroads. This junction arrangement provides enhanced pedestrian and cyclist safety;
- Land take requirement removed at Cabra Library due to redesign of the junction at Navan Road/Old Cabra Road;
- New traffic signal controls are proposed at the Old Cabra Road/Glenbeigh Road junction, which will enable general traffic flows turning left or right onto Old Cabra Road (local access only) to be controlled (mitigating the risk of general traffic using Glenbeigh Road as a short-cut route);
- On Old Cabra Road, the previously proposed two-way cycle track along Old Cabra Road is replaced by two one-way cycle tracks on either side of the road, and the northbound bus lane approaching the Navan Road junction is reduced in length. These measures would reduce the need for land take in areas along Old Cabra Road;
- Widening of the Old Cabra Road overbridge over the Heuston Station / Connolly Station railway line is no longer required. It is now proposed to accommodate the bus/bicycle infrastructure within the existing road bridge width;
- The revised proposals include making St Joseph's Road one-way towards Prussia Street at its eastern end, to avoid general traffic using this street as a short-cut route;
- The junction of Manor Street/Prussia Street with Aughrim Street at Stoneybatter is proposed to be signalised and includes a bus gate in both directions. All northbound general traffic will be required to turn left onto Aughrim Street. In the southbound direction, any general traffic on Prussia Street at this location will be required to turn right onto Aughrim Street. This change removes through-traffic, allows for enhanced footpath widths and associated urban realm improvements;
- The Manor Street/Kirwan Street/Manor Place junction is proposed to be signalised, and Kirwan Street general traffic (which is westbound only) are proposed to be limited to 'left-turns only' at its junction with Manor Street (mitigating the risk of northbound general traffic using Grangegorman Lower to Aughrim Street as a short-cut route);
- The revised proposals along Manor Street results in a reduction from three lanes (two bus lanes and a southbound general traffic lane) to two general traffic lanes. The modified design also includes a northbound and southbound cycle track, wider footpaths and enhanced urban realm as a result of the reduction in carriageway width;

- At the north end of George's Lane, the revised proposals have a signal-controlled junction at Grangegorman Street Lower/Brunswick Street North as a means of limiting general traffic flow entering and leaving Grangegorman Street Lower;
- A northbound bus lane on Blackhall Place (at its junction with King Street North) is proposed and all northbound general traffic would be required to turn right into King Street North. Northbound general traffic would be required to travel via George's Lane and Brunswick Street North to reach Manor Street. Traffic signals at the Brunswick Street North/Stoneybatter junction will enable the level of flow of northbound general traffic to be controlled, and limited to a level which will ensure that buses are able to travel without delay along this section. The revised proposal for George's Lane removes the southbound traffic lane and includes a two-way cycle track, resulting in wider footpaths;
- A two-way cycle track will be provided along the eastern side of Queen Street from King Street to Ellis Quay/Aaron Quay, with two southbound traffic lanes from George's Lane to Blackhall Street, and a reduction to one traffic lane from Blackhall Street to Ellis Quay/Arran Quay. These changes improve integration with the wider cycle network and provides wider footpaths for pedestrians;
- On Blackhall Street, the proposed road layout is revised to include one lane for general traffic, a two-way cycle track, and angled parking. These changes reduce the impact on parking, and provide better cyclist facilities; and
- Offline traffic management measures have been introduced to minimise general traffic levels on local side streets.

4.4 Design Principles

The design of the Proposed Scheme was developed with reference to the Preliminary Design Guidance Booklet for BusConnects Core Bus Corridors (PDGB) (NTA 2021) – refer to Appendix A4.1 in Volume 4 of this EIAR. This guidance document was prepared to ensure that a consistent design approach for the Core Bus Corridor Infrastructure Works was adopted based on the objectives of the Proposed Scheme. The project objectives are described in full in Chapter 2 (Need for the Proposed Scheme).

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 public realm, which include the following:

- The Design Manual for Urban Roads and Streets (DMURS) (Government of Ireland 2013);
- The National Cycle Manual (NCM) (NTA 2011);
- TII National Road Design Standards;
- The Traffic Signs Manual (TSM) (DoT 2019);
- Guidance on the use of Tactile Paving (UK DfT 2007);
- Building for Everyone: A Universal Design Approach (NDA 2020), and
- Greater Dublin Strategic Drainage Study (GDSDS) (Irish Water 2005).

An example of the application of the design principles for the Proposed Scheme can be seen at the junction of Navan Road and Ashtown Road where an existing large roundabout facilitates the movement of vehicles, and also provides facilities for pedestrians and cyclists which are of a type that are less than desirable. In addition, the roundabout does not facilitate bus priority.

Having considered the objectives for the Proposed Scheme and using the principles set out in the PDGB a traffic signal controlled junction arrangement was developed to address the issues outlined above. This layout could be used to control the flow of traffic and provide a high level of priority for buses. In addition, high quality signal controlled pedestrian crossing facilities can be provided on all arms of the junction, close to the pedestrian desire lines. For cyclists, taking into account the high traffic volumes and speeds, a fully segregated facility is provided where cyclists are segregated in both space and time from moving vehicles, which significantly enhances the safety of these vulnerable road users. The revised layout is typical of junctions along the corridor that have been developed to meet the objectives of the Proposed Scheme.

The assessment of the existing street infrastructure and its ability to support access for disabled users has been based mainly on the Irish Wheelchair Association [IWA] 'Best Practice Guidelines, Designing Accessible Environments' and The National Disability Authority's [NDA] 'Building for Everyone: A Universal Design Approach'.

In addition, the Bus Interchange has been designed in accordance with BS8300:2009 +A1:2010 Design of buildings and their approaches to meet the needs of disabled people – Code of practice.

Accessibility for mobility impaired users is a core element of the Proposed Scheme design and it has been informed by the principles of Best Practice Guidelines, Designing Accessible Environments (Irish Wheelchair Association 2020) and Building for Everyone: A Universal Design Approach (NDA 2020). In addition, the Bus Interchange has been designed in accordance with BS8300:2009 +A1:2010 Design of buildings and their approaches to meet the needs of disabled people – Code of practice. Accessibility is also addressed in Chapter 12 of the PGDB. Further detail on accessibility for mobility impaired users is given in Section 4.6.5.

The Proposed Scheme, which has been developed after the consideration of reasonable alternatives, and which achieves its aim and objectives, is described in detail in Section 4.5. Further detail on the key infrastructure elements that comprise the Proposed Scheme is provided in Section 4.6.

4.5 Description of the Proposed Scheme

The Proposed Scheme is described in the following five geographical sections as follows:

- Section 1: N3 Blanchardstown Junction to Snugborough Road;
- Section 2: Snugborough Road to N3 / M50 Junction;
- Section 3: N3 / M50 Junction to Navan Road / Ashtown Road Junction;
- Section 4: Navan Road / Ashtown Road junction to Navan Road / Old Cabra Road Junction; and
- Section 5: Navan Road / Old Cabra Road junction to Ellis Quay.

4.5.1 Section 1: N3 Blanchardstown Junction to Snugborough Road

4.5.1.1 General overview of the Proposed Scheme

The Proposed Scheme will commence at Junction 3 (Blanchardstown / Mulhuddart) eastbound off-slip from the N3. It is proposed to alter the existing off-slip road from the N3, from two general traffic lanes to one general traffic lane and one bus lane. At the junction of Blanchardstown Road North / Old Navan Road, it is proposed to introduce a protected style junction to enhance safety for cyclists. Proposals for the N3 on-slip junction, immediately to the south of this junction, include for the provision of a left turn filter lane with the northbound cycle track being moved to alongside the verge.

In the vicinity of the N3 overbridge, cycle tracks will be relocated alongside footpaths, which cross adjacent to pedestrian crossings at slip-roads to avoid conflict with vehicular traffic.

After crossing the N3 overbridge, the Proposed Scheme will provide a westbound bus lane alongside a general traffic lane along Blanchardstown Road South towards the Blanchardstown Shopping Centre via the Blakestown Way junction. Two eastbound general traffic lanes will also be provided along Blanchardstown Road South. A cycle track will be provided along each side of Blanchardstown Road South. A new retaining wall will be required between the cycle track / footpath and the shopping centre, extending from the westbound bus stop to the N3 off-slip junction and further south towards the Crowne Plaza hotel. The existing small retaining wall and railing between Whitestown Grove and Blanchardstown Road South will be replaced due to a reduction in footpath levels. The new wall and railing will match existing.

A new bus layover 'layby' and driver welfare facility will be located north of the shopping centre on Blanchardstown Road South.

A new access, in the form of a signalised junction, will be provided from Blanchardstown Road South into the northern car park at Blanchardstown Shopping Centre.

The Blanchardstown Road South / Blakestown Way junction will be converted from a roundabout to a signal controlled junction. The proposals for the road linking the Blanchardstown Road South / Blakestown Way junction to the western junction of the Bus Interchange include a bus lane and general traffic lane in each direction, with an additional left turn filter lane into the shopping centre. A single cycle track along the eastern side of this road becomes a two-way cycle track on the approach to the shopping centre. The area adjacent to the western junction of the Bus Interchange will facilitate 35 bicycle stands.

The existing roundabouts in the vicinity of the Blanchardstown Shopping Centre will be converted to signalised junctions.

Within the Blanchardstown Shopping Centre site, the existing bus laydown will be upgraded to a more formal Bus Interchange with improved passenger waiting facilities. The new Bus Interchange will include six bays for boarding / alighting and an additional seven alighting bays for buses. The interchange will also include six bus shelters with roof canopies of two different heights providing shelter for external circulation.

An existing entrance into the northern car park at the Shopping Centre will be removed as a result of the proposed Bus Interchange.

A two-way cycle track is proposed and will continue along the southern side of the new Bus Interchange.

The existing northbound bus lane on the northern corner of Blanchardstown Shopping Centre site (adjacent to the Crowne Plaza Hotel) will be maintained. This will merge with a new northbound bus lane on the N3 off-slip leading to Blanchardstown Road South. The Proposed Scheme will also provide a two-way cycle track adjacent to the northbound bus lane.

A new bus stop for inter-urban buses will be provided on the Northbound N3 off-slip adjacent to the Crowne Plaza Hotel.

Between the junction adjacent to the Crowne Plaza Hotel entrance and the Liberty Insurance building, a bus lane and general traffic lane will be provided in each direction with a two-way cycle track along the southern edge of the carriageway. Retaining walls are required between the southern footpath and the adjacent car park between chainage A200 and A400 approximately as indicated in the General Arrangement Drawings BCIDC-ARP-GEO_GA-0005_XX_00-DR-CR-9001 in Volume 3 of this EIAR. New bus stops will be provided in each direction in this area, including modification of an existing bus stop layby to accommodate inter-urban buses.

The existing roundabout junction adjacent to the Liberty Insurance Building on the L3020 will be modified to a fully signalised crossroads junction, allowing for bus lanes in both directions each side of this junction. The road between the existing junction and the tie-in with the Snugborough Interchange Upgrade scheme will be widened to accommodate improved cycling, pedestrian and bus stop facilities. A new bus layby (for inter-urban buses) will be provided on the westbound carriageway on the L3020, which will require a short section of retaining wall to be constructed to the rear of the proposed cycle track at this location.

Following this Section, it is intended to route the bus lane through the Snugborough Road junction. The Proposed Scheme will be coordinated with the Snugborough Interchange Upgrade scheme which is currently being undertaken by Fingal County Council (FCC). The Snugborough Interchange Upgrade scheme involves the widening of the Snugborough Road bridge and the L3020 to accommodate additional bus lanes and general traffic lanes, and new cycle tracks.

The scheme proposals include for five proposed bus stops with four existing bus stops to be retained and four existing bus stops to be removed along this section of the route (Table 4.4). This does not include for the existing bus stops at the location of the proposed Bus Interchange. There is also one existing bus stop layby to be retained and one proposed bus stop layby for inter-urban buses.

4.5.1.2 Deviations from Standard Cross Sections

The Proposed Scheme has been designed in accordance with the PDGB. However, at a number of constrained locations across the Proposed Scheme, the width of the cross-sectional elements has been designed below the desirable minimum identified in the PDGB guidance (Section 4.6.1). The deviations within Section 1 are detailed in Table 4.3.

Table 4.3: Reduced Standard Cross Sections along Section 1

Chainage	Design Element	Desirable Minimum	Design	Justification
Ch.A0000 to Ch.A0580	Cycle Track	3.25m	3.0m	A two-way cycle track 3.0m in width will be provided to reduce impact on the existing retail/service delivery yard boundary wall and embankment. It should be noted that the PDGB acknowledges a reduction in cycle track width can be considered on a case-by-case basis in consultation with the national cycle manual. The cycle track will be provided with a 0.5m buffer to the carriageway while a 2.0m min width footpath will be provided to the rear.
Ch.A0620 to Ch.A750	Cycle Track	3.25m	3.0m	A two-way cycle track 3.0m in width will be provided to reduce impact on existing trees and embankment. It should be noted that the PDGB acknowledges a reduction in cycle track width can be considered on a case-by-case basis in consultation with the national cycle manual. The cycle track will be provided to the rear of a 2m wide footpath.
Ch.B0660 to Ch.B0760 (Overbridge)	Lane width	3.0m	2.5m	Cross section has been developed to match the existing across the overbridge structure to minimise any impact. It should be noted that the PDGB acknowledges a reduction in lane width to 2.75m is permitted as the absolute minimum. The minimum lane width provided is 2.5m and this is assigned to a right-turn filter lane on the overbridge. In conjunction, a single lane width of 2.75m is provided. All other lane widths are 3.0m in width as a minimum.
Ch.B0660 to Ch.B0760 (Overbridge)	Southern Cycle Track	2.0m	1.5m	Cross section has been developed to match the existing across the overbridge structure to minimise any impact. It should be noted that the PDGB acknowledges a reduction in cycle track width to 1.5m is permitted as the absolute minimum.
Ch.B0660 to Ch.B0760 (Overbridge)	Footpath	2.0m	1.8m – 2.0m	Cross section has been developed to match the existing across the overbridge structure to minimise any impact. It should be noted that the PDGB acknowledges a reduction in footpath width to 1.8m is permitted as the absolute minimum.
Ch.B0875 to Ch.B0895	Southern Footpath	2.0m	2.0m - 1.5m	Existing boundary and footpath width will be retained along this section of the Proposed Scheme, as tying into existing width of 1.5m.
Ch.B0825 to Ch.B0895	Northern Cycle Track	2.0m	1.8m	Existing boundary and cycle track width will be retained along this section of the Proposed Scheme, as tying into existing. A 0.25m buffer will be introduced alongside the cycle track to provide segregation where this does not currently exist. It should be noted that the PDGB acknowledges a reduction in cycle track width to 1.5m is permitted as the absolute minimum.
Ch.B0825 to Ch.B0895	Southern Cycle Track	2.0m	Varies 1.8m to 1.5m	Existing boundary and cycle track width will be retained along this section of the Proposed Scheme, as tying into existing. A 0.25m buffer will be introduced alongside the cycle track to provide segregation where this does not currently exist. It should be noted that the PDGB acknowledges a reduction in cycle track width to 1.5m is permitted as the absolute minimum.
Ch.E0190 to Ch.E0350	Cycle Track	3.25m	3.0m	A two-way cycle track 3.0m in width will be provided to reduce impact on the existing shopping centre carpark. It should be noted that the PDGB acknowledges a reduction in cycle track width can be considered on a case-by-case basis in consultation with the national cycle manual. The cycle track will be provided with a 0.5m buffer to the carriageway while a 2.0m min width footpath will be provided to the rear.
Ch.F0000 to Ch.F0340	Cycle Track	3.25m	3.0m	A two-way cycle track 3.0m in width will be provided to reduce impact on the existing footpath, service yard access and shopping centre car park. It should be noted that the PDGB acknowledges a reduction in cycle track width can be considered on a case-by-case basis in consultation with the national cycle manual. The cycle track will be provided with a 0.5m buffer to the carriageway while a 2.0m min width footpath will be provided to the rear.

Chainage	Design Element	Desirable Minimum	Design	Justification
Ch. L0+040 to Ch. L0+200	Traffic Lane Width	3.65m	3.5m	In accordance with the 'TII Standards Commission - Bus Lanes on Dual Carriageways and Motorways -Literature and Scheme Review Note – Draft', traffic lane widths of 3.5m are provided in both directions along the N3 Dual Carriageway including the associated Junction Slip Roads and the N3 Link Roads between River Road Junction and Auburn Avenue Junction. This width of 3.5m is less than the stated lane widths of 3.65m for a Dual 2/Dual 3 Lane Urban All-Purpose Road, DN-GEO-03036 Table 4.4. This reduced lane width, in conjunction with reduced 3.5m bus lane widths minimises the impact from scheme widening on adjacent land boundaries and the existing structures along the route.
Ch. L0+040 to Ch. L0+200	Bus Lane Width	3.65m	3.5m	In accordance with the 'TII Standards Commission - Bus Lanes on Dual Carriageways and Motorways -Literature and Scheme Review Note – Draft', a bus lane width of 3.5m is provided in both directions along the N3 Dual Carriageway including the associated Junction Slip Roads (with the exception of the N3 westbound merge at the Navan Road/ Old Navan Road junction) and the N3 Link Roads between Navan Road/ Old Navan Road Junction and Auburn Avenue Junction. In addition, a 0.3m separation is provided between the bus lane and adjacent traffic lane. This width of 3.5m is less than the stated lane widths of 3.65m for a Dual 2/Dual 3 Lane Urban All-Purpose Road, DN-GEO-03036 Table 4.4. This reduced lane width, in conjunction with reduced 3.5m traffic lane widths minimises the impact from scheme widening on adjacent land boundaries and the existing structures along the route.

4.5.1.3 Bus Lane Provision

An overview of the bus lane provisions as part of the Proposed Scheme is provided in Section 4.6.4. As outlined within that section, full bus priority is proposed along the entire length of the Proposed Scheme.

4.5.1.4 Bus Stops

The different types of bus stop (island, shared landing, inline and lay-by bus stops) are described in Section 4.6.4.5. The bus stop locations and types on Section 1 of the Proposed Scheme are outlined in Table 4.4 and shown in the General Arrangement series of drawings (BCIDA-ARP-GEO_GA-0005_XX_00-DR-CR-9001) in Volume 3 of this EIAR. Further details of bus stop design are included in the PDGB (NTA 2021) – Appendix A4.1 in Volume 4 of this EIAR.

Table 4.4: Proposed Bus Stop Locations along Section 1 N3 Blanchardstown Junction to Snugborough Road

Inbound / Outbound	Bus Stop Name	Bus Stop Number	Chainage	Bus Stop Type	Bus Shelter
Outbound	New stop - Blanchardstown Town Centre	New Stop	Ch.A420	Island	Yes
Inbound	Old Navan Road (Slip Rd Eastbound)	Unknown	Ch.C250	Shared	Yes
Inbound	Blanchardstown Road South (relocated)	7475	Ch.B450	Island	Yes
Inbound	Blanchardstown Road South	4362	Ch.B50	Shared	Yes
Outbound	Blanchardstown Road South	1882	Ch.B000	Shared	Yes
Inbound	Blanchardstown Town Centre (relocated)	2960	Ch.A360	Inline	Yes
Inbound	New Stop (at location of existing stop 2960)	New Stop	Ch.A340	Layby	Yes
Inbound	Westend Office Park	1545	Ch.A660	Inline	Yes
Inbound	Blanchardstown Town Centre	4747	Interchange	Interchange	Yes
Outbound	Blanchardstown Town Centre	7025	Interchange	Interchange	Yes
Outbound	Westend Office Park (relocated)	661	Ch.A675	Inline	Yes
Outbound	New Stop - Westend Office Park	New Stop	Ch.A700	Layby	Yes
Outbound	New Stop - Crowne Plaza Off-slip	New Stop	Ch.D000	Inline	Yes

4.5.1.5 Cycling Provision

The specific proposals for cycling facilities in Section 1 of the Proposed Scheme are described below. Provisions for cyclists at the signal-controlled junctions are described in Section 4.6.3.5.

New segregated cycle tracks will be provided where the Proposed Scheme begins on Old Navan Road and Blanchardstown Road North (Secondary Route 5D of the GDA Cycle Network Plan), which will continue across the N3 Overbridge at Mulhuddart (where existing bridge deck details necessitate the use of industry-standard cycle lane separators ('Armadillos') instead of the segregated kerbs). The cycle tracks will then continue along Blanchardstown Road South to the Blakestown Way Junction and will continue until the Proposed Scheme tie-in points on Blanchardstown Road South and Blakestown Way (Secondary Routes 5 and 5D of the GDA Cycle Network Plan).

From this point the new segregated cycle tracks will be provided on the road linking the Blanchardstown Road South / Blakestown Way junction to the western junction of the Bus Interchange until its relocated Toucan crossing, where a two-way cycle track will be provided on the northern side of the road connecting to the western junction of the Bus Interchange. The two-way cycle track will continue along the southern side of the new Bus Interchange.

Between the junction adjacent to the Crowne Plaza Hotel entrance and the Liberty Insurance building a two-way cycle track will be provided. The two-way cycle track then continues along the L3020 to the Proposed Scheme's tie in to the Snugborough Junction Upgrade Scheme.

A two-way cycle track will also be provided along the northern Blanchardstown Town Centre Road to its connection with Blanchardstown Road South.

4.5.1.6 Junction Information

An overview of the approach to junction review and design is provided in Section 4.6.7. The major and moderate junctions (signalised) within Section 1 of the Proposed Scheme are outlined in Table 4.5.

Table 4.5: Major and Moderate Junctions within Section 1 of the Proposed Scheme

Junction Location	Note
Major Junctions	
Crowne Plaza_ N3 off-slip	The junction is proposed to be modified to provide signal priority for buses entering the slip road, and a short bus lane will also be provided on the slip road.
Blanchardstown Road South / Shopping Centre car park	A new signal-controlled access junction will be provided to Blanchardstown Shopping Centre's northern car park – in order to divert car park traffic away from the existing entrance (which will tend to reduce congestion and allow buses to travel freely in and out of the Bus Interchange). The junction will operate as a three-stage signal junction. Left turning vehicles on the mainline will cross the bus lane path on Blanchardstown Road South, 20m from the junction and will operate in the same stage as buses. Crossings of Blanchardstown Road South for pedestrians and cyclists will be provided within the signal staging.
Blanchardstown Road / Blakestown Way	The roundabout junction of the Blanchardstown Road South and Blakestown Way is proposed to be modified to a four-arm signal-controlled junction. Left turning vehicles will cross the outbound bus lane path on Blakestown Way (south), 20m from the junction. A segregated left turn lane and separate bus lane are to be provided for the movement from Blanchardstown Road South heading south towards Bus Interchange.
Bus Interchange Western Access	The roundabout junction immediately to the west of the Bus Interchange is proposed to be modified to a four-arm signal-controlled junction. Bus lanes will be provided on the access road to the west of the junction. A two way cycle track will be set adjacent to the inbound bus lane. Shared areas will be provided at toucan crossing points for both cyclists and pedestrians to use.
Bus Interchange Eastern Access	The existing car park access junction will be upgraded to a signal controlled junction which will incorporate bus lanes in and out of the proposed Bus Interchange. Pedestrian crossings to the interchange will also be provided.
Crowne Plaza Junction	The junction adjacent to the access to Crowne Plaza hotel is proposed to be modified to a four-arm signal-controlled junction. A bus lane to the stop line will be provided on the approach arm from the L3020 / Liberty Insurance junction. The bus lane on

Junction Location	Note
	the interchange access road will be curtailed 20m prior to the junction to manage capacity at the junction. Cycle facilities will be provided by a dedicated off road two-way cycle track which comes from the Bus Interchange area and heads towards Snugborough Road junction. Shared space will be provided at the crossing areas for pedestrians and cyclists.
L3020 / Liberty Insurance	The junction adjacent to the Liberty Insurance Building is proposed to be modified to a four-arm signal-controlled junction. Bus lanes will be provided on the eastern and western approaches to the junction, which will be curtailed 20m prior to the junction to manage capacity at the junction. A two-way cycle track will be provided along the southern side of the road. The side roads will be provided with cycle lanes to lead users in / out of the main cycle track, via the toucan crossings.
Moderate Junctions / Priority Junctions	
Old Navan Road - Mulhuddart Slip Road	The signal-controlled junction where the N3 off-slip meets Old Navan Road will be modified to reallocate the left lane as a bus lane, with a separate bus lane signal stage.
Blanchardstown Road North / Old Navan Road	The existing signal-controlled junction will be modified by removing the left-turn slip lane from Old Navan Road, while retaining the segregated left-turn lane from Blanchardstown Road North towards the N3 slip road on Old Navan Road. Realigned cycle track crossings will be provided, with signal-controlled crossings across the left-turn slip roads. Maintaining the flow of buses through the junction will be achieved by the presence of a bus lane on the Blanchardstown Road North approach, a bus lane on the access from Blanchardstown Bus Interchange past the Crowne Plaza Hotel, and allowing buses from the west (on Old Navan Road) to turn right from the straight ahead traffic lane.
Blanchardstown Road South / N3 off-slip	The existing signal-controlled junction will be modified to include a left-turn bus lane on the approach from the Crowne Plaza / N3 westbound off-slip – connecting directly to the bus layover layby. Nearside cycle tracks will be provided through the junction on both directions on Blanchardstown Road South.

4.5.1.7 Structures

4.5.1.7.1 Bridges

There are no bridge works proposed along Section 1 of the Proposed Scheme.

4.5.1.7.2 Retaining Walls

Table 4.6 sets out the proposed principal retaining walls along Section 1 of the Proposed Scheme.

Table 4.6: Summary of Principal Retaining Walls in Section 1 N3 Blanchardstown Junction to Snugborough Road of the Proposed Scheme

Structure Ref	Structure Type	Chainage Start - Chainage End (m)	Length (m)	Max Retained Height (m)	Comment
RW01	Spreadfoot cantilever wall	Blanchardstown Road South Ch.B453.00 to Ch.A40.00	270	3	Retains vegetated berm adjacent Blanchardstown Road South.

4.5.1.8 Parking and Loading Bays

The Proposed Scheme will have no impact to on-street parking/loading in this Section as there are no proposed changes to existing designated parking/loading.

4.5.1.9 Landscape and Urban Realm

The existing bus lane to the northeast of Blanchardstown Shopping Centre and leading along Blanchardstown Road South will be upgraded together with pedestrian and cycle facilities. The additional space required will necessitate removal of sections of perimeter woodland planting at the shopping centre, however, new street trees will be introduced to upgrade the amenity value of the street and the edges of the mixed woodland group along the shopping centre boundary will be replanted so as to mitigate impacts on existing landscape. A new dedicated

bus lane will be provided from Blanchardstown Road South into the shopping centre. The junction at Blanchardstown Road South will be converted from a roundabout to a signalised junction, with new street trees around the junction to enhance the presentation and amenity of the entrance to the western shopping centre.

Within the shopping centre, the new Bus Interchange (Image 4.1) provides a public realm opportunity between the existing Blanchardstown Shopping Centre and the northern retail outlets with strong pedestrian connections to and from both. The new Bus Interchange will establish an accessible and attractive location at Blanchardstown Shopping Centre with convenient access to and from public transport services.

The new Bus Interchange is designed as a dedicated public transport island providing sheltered passenger waiting areas centrally within a double-sided bus stop gyratory. The location and layout optimises passenger access to the full range and frequency of bus services at the centre. The central area is designed as a pedestrian plaza with high quality hard and soft landscaping providing an attractive, comfortable and convenient facility for passengers within the shopping centre. A distinctive curved canopy system will over sail the entire interchange to provide cover for pedestrians and will also be illuminated from ground recessed uplighters in the pavement to provide uniform illumination of the structure.

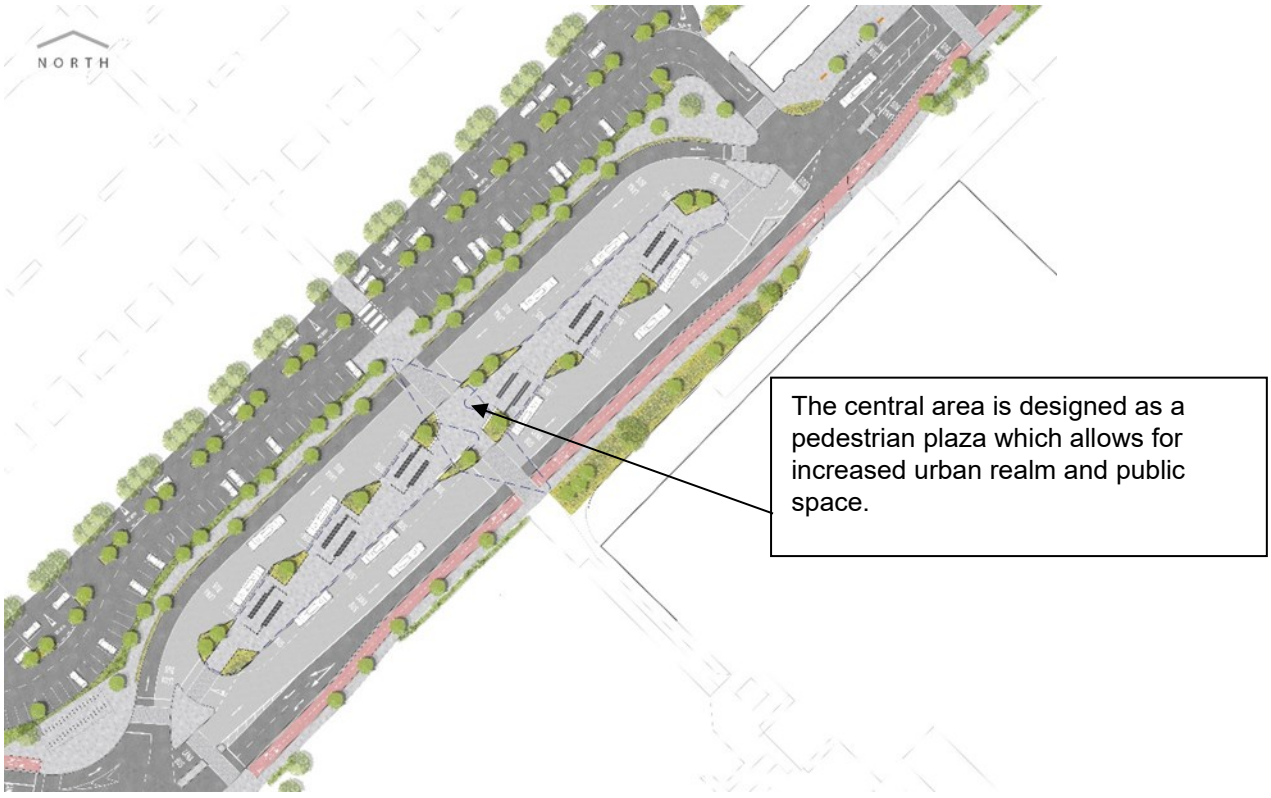

Image 4.1: Blanchardstown Shopping Centre Bus Interchange

Development of this new Bus Interchange will necessitate alterations of existing internal carriageways and perimeter tree and hedge planting however; the interchange includes new tree and hedge planting as an integral part of the design as well as reinstatement tree planting at the interface with the existing carparking areas.

The eastern access road will be widened to provide the dedicated bus lanes, cycle and pedestrian facilities and bus stops. The additional facilities will encroach into the existing roadside tree screening, however new street tree planting and grass verges will be introduced to establish a more pedestrian friendly streetscape in place of the existing vehicle dominated roadway.

This revised access road is designed to tie into the separate Snugborough Interchange Upgrade Scheme (currently being undertaken by Fingal County Council) to the southeast of Blanchardstown Shopping Centre and

will upgrade public transport, pedestrian and cycle facilities from the shopping centre to the eastern side of the N3.

4.5.1.10 Land Acquisition and Use

The Proposed Scheme will commence at Junction 3 (Blanchardstown / Mulhuddart) eastbound off-slip from the N3. The Proposed Scheme will be routed through the Blanchardstown Shopping Centre and will provide a new Bus Interchange. The shopping centre is surrounded by the N3 to the north and east, leisure facilities to the south and housing estates to the north-west. The Proposed Scheme will continue towards the Snugborough Road via L3020 which is bordered by the N3 to the east and commercial and leisure units to the west.

Land acquisition will be required through this section to facilitate the Proposed Scheme, including junction reconfiguration, a new car park access from Blanchardstown Road South, provision of bus layover spaces, a new Bus Interchange, widening of carriageway between the Crowne Plaza junction and the tie-in with the Snugborough junction upgrade scheme, widening of a footpath adjacent to Millennium Park and the construction of retaining walls (RW01, RW10, RW11, RW12 and RW13).

Temporary land take is required within this section to facilitate:

- Footpath works and new left turn filter lane along the Old Navan Road;
- The construction of retaining walls RW01, RW10, RW11, RW12 and RW13;
- The reconfiguration and regrading of Blanchardstown Shopping centre bus and car parking;
- Regrading works in Blanchardstown shopping centre at the Blakestown Way /Blanchardstown Road South junction and along Blanchardstown Road South;
- Widening of carriageway between Crowne Plaza junction and the junction adjacent to the Liberty Insurance building (Ch A0+200 to Ch A0+600) see General Arrangement drawings (BCIDC-ARP-GEO_GA-0005_XX_00-DR-CR-9001); and
- Construction of a new boundary wall at Millennium Park.

The impacts on residential amenity arising from land acquisition in Section 1 of the Proposed Scheme and are addressed in Chapter 10 (Population). Similarly, the impacts on landscape amenity arising from land acquisition in Section 1 of the Proposed Scheme are addressed in Chapter 17 (Landscape (Townscape) & Visual).

4.5.1.11 Rights of Way

Table 4.7 outlines the locations where existing rights of way which will be affected by the Proposed Scheme.

Table 4.7: Existing Rights of Way affected

Location	Chainage	Existing Situation	Proposed Change
Vehicular Entrance to Blanchardstown Shopping Centre car park (Northern Car Park)	F85	There is an existing vehicular entrance to Blanchardstown Shopping Centre (Northern Car Park) in this location, accessible to traffic heading eastbound on the internal Blanchardstown Shopping Centre road network.	Due to the proposal to construct a new bus interchange in this location, it is proposed to remove this entrance in its entirety. Following the implementation of the Proposed Scheme, vehicular traffic (including bicycles) will no longer be able to use this entrance. Other entrances to the car park will be maintained and a new entrance off Blanchardstown Road South will be provided.
Vehicular Exit from Blanchardstown Coach Parking	A415	There is an existing vehicular exit from the Coach parking area within Blanchardstown Shopping Centre in this location, by which buses currently egress the coach parking area onto the internal Blanchardstown Shopping Centre road network.	Due to the proposal to construct a new bus stop in this location, it is proposed to remove this exit in its entirety. Following the implementation of the Proposed Scheme, buses will no longer be able to use this exit. A revised exit from the coach parking area will be included in the scheme.

4.5.2 Section 2: Snugborough Road to N3 / M50 Junction

4.5.2.1 General overview of the Proposed Scheme

This Section of the Proposed Scheme will commence at the tie-in with the Snugborough Junction Upgrade scheme on the N3 citybound slip-road. A bus lane will be provided along the N3 Snugborough Road junction on-slip and off-slip ramps. The Proposed Scheme will provide bus lanes on the N3 corridor in both directions which will require the widening of the BR01 River Tolka Bridge beneath the N3 off-slip and also BR02 Mill Road Bridge.

An emergency refuge layby and two maintenance laybys will be provided alongside the outbound carriageway and two maintenance laybys will be provided alongside the inbound carriageway of the N3.

On the N3 inbound carriageway, the Proposed Scheme will relocate the overhead variable messaging sign, modify an existing overhead sign gantry, provide a new overhead sign gantry and remove an existing overhead sign gantry. On the N3 outbound carriageway, the Proposed Scheme will provide two new overhead sign gantries.

Additional inbound and outbound bus stops will be provided on the N3 with pedestrian access to and from Mill Road. Access from Mill Road to the new bus stops will be via pedestrian ramps and steps. Retaining walls will be constructed to support the pedestrian ramps and steps.

Retaining walls will be required at the back of verge along sections of both the inbound and outbound N3 carriageways. This includes a retaining wall to the rear of a new bus stop layby on the inbound carriageway between River Road and the M50 roundabout. A section of new retaining wall will also be required between the inbound and outbound N3 carriageways immediately to the west of the M50 roundabout.

Existing noise barriers will be relocated along the outbound carriageway at the back of the verge.

The speed limit will be 60km/h for the inbound and outbound bus lane of the N3 carriageway section.

The inbound bus lane will be directed onto the Connolly Hospital off-slip road and onto the N3 Navan Road.

The Proposed Scheme will provide a bus lane in both the eastbound and westbound directions on the gyratory over the M50 (Junction 6).

The scheme proposals include for four proposed bus stops (one being a layby) with an existing bus stop layby to be removed along this section of the route. There is also one existing bus stop layby to be retained and one proposed bus stop layby for inter-urban buses.

4.5.2.2 Deviations from Standard Cross Sections

The Proposed Scheme has been designed in accordance with the PDGB and the TII publications referenced within the PDGB. However, at a number of constrained locations across the Proposed Scheme, the width of the cross-sectional elements has been designed below the desirable minimum identified in the PDGB guidance and TII publications (4.6.1). The deviations within Section 2 are detailed in Table 4.8.

Table 4.8: Reduced Standard Cross Sections along Section 2

Chainage	Design Element	Desirable Minimum	Design	Justification
Ch. A1050 to Ch. A2865	Bus Lane Width	3.65m	3.5m	In accordance with the 'TII Standards Commission - Bus Lanes on Dual Carriageways and Motorways -Literature and Scheme Review Note – Draft', a bus lane width of 3.5m is provided in both directions along the N3 Dual Carriageway including the associated Junction Slip Roads (with the exception of the N3 merge at River Road) and the N3 Link Roads between River Road Junction and Auburn Avenue Junction. In addition, a 0.3m separation is provided between the bus lane and adjacent traffic lane. This

Chainage	Design Element	Desirable Minimum	Design	Justification
				width of 3.5m is less than the stated lane widths of 3.65m for a Dual 2/Dual 3 Lane Urban All-Purpose Road, DN-GEO-03036 Table 4.4. This reduced lane width, in conjunction with reduced 3.5m traffic lane widths minimises the impact from scheme widening on adjacent land boundaries and the existing structures along the route.
Ch. A1800 to Ch. A1975	Bus Lane Width	3.65m	3.25m	In accordance with the 'TII Standards Commission - Bus Lanes on Dual Carriageways and Motorways - Literature and Scheme Review Note – Draft', a bus lane width of 3.25m is provided along the N3 Slip Road Merge at River Road. It should be noted that this draft document acknowledges that bus lane widths of 3.25m may be provided as an absolute minimum at constrained locations. In addition, a 0.3m separation is provided between the bus lane and adjacent traffic lane. This width of 3.25m is less than the stated lane widths of 3.65m for a Dual 2/Dual 3 Lane Urban All-Purpose Road, DN-GEO-03036 Table 4.4. The reduced lane width is provided through a constrained location where, in conjunction with reduced 3.5m traffic lane widths minimises the impact from scheme widening on adjacent residential properties at Catherine's Well and the existing gantry structure.
Ch. A1025 to Ch. A2865	Traffic Lane Width	3.65m	3.5m	In accordance with the 'TII Standards Commission - Bus Lanes on Dual Carriageways and Motorways -Literature and Scheme Review Note – Draft', traffic lane widths of 3.5m are provided in both directions along the N3 Dual Carriageway including the associated Junction Slip Roads and the N3 Link Roads between River Road Junction and Auburn Avenue Junction. This width of 3.5m is less than the stated lane widths of 3.65m for a Dual 2/Dual 3 Lane Urban All-Purpose Road, DN-GEO-03036 Table 4.4. This reduced lane width, in conjunction with reduced 3.5m bus lane widths minimises the impact from scheme widening on adjacent land boundaries and the existing structures along the route.

4.5.2.3 Bus Lane Provision

An overview of the bus lane provision as part of the Proposed Scheme is set out in Section 4.6.4. As outlined within that section, full bus priority is proposed along the entire length of the Proposed Scheme.

4.5.2.4 Bus Stops

The different types of bus stop (island, shared landing, inline and lay-by bus stops) are described in Section 4.6.4.4. The bus stop locations and types are outlined in Table 4.9.

Table 4.9: Proposed Bus Stop Locations along Section 2 Snugborough Road to N3 / M50 Junction

Inbound / Outbound	Bus Stop Name	Bus Stop Number	Chainage	Bus Stop Type	Bus Shelter
Inbound	New stop – Mill Road	New Stop	Ch.A1590	Inline	Yes
Inbound	Junction 6	New Stop (at location of existing stop 7374)	Ch.A2250	Layby	Yes
Inbound	Blanchardstown Bypass (relocated)	7374	Ch.A2300	Inline	Yes

Inbound / Outbound	Bus Stop Name	Bus Stop Number	Chainage	Bus Stop Type	Bus Shelter
Outbound	New stop – Mill Road	New Stop	Ch.A1850	Inline	Yes
Outbound	Navan Road (relocated)	7389	Ch.A1925	Layby	Yes
Outbound	New Stop - Navan Road (adjacent to stop 7389)	New Stop	Ch.A1925	Layby	Yes

4.5.2.5 Cycling Provision

There is no cycling provision along the existing N3 Navan Road dual carriageway. There are no changes to cycling provision on Section 2 of the Proposed Scheme, due to the following:

- engineering constraints of realigning a section of N3 to facilitate an additional 3 metres of cycle track with an associated safety buffer;
- the higher speeds of vehicles;
- the lack of trip attractors along Section 2 for cyclists; and
- safety concerns for cyclists.

4.5.2.6 Junction Information

An overview of the approach to junction review and design is provided in Section 4.6.7. The major and moderate junctions (signalised) within Section 2 of the Proposed Scheme are outlined in Table 4.10.

Table 4.10: Major and Moderate Junctions within Section 2 of the Proposed Scheme

Junction Location	Note
Major Junctions	
N/A	N/A
Moderate Junctions / Priority Junctions	
N3 eastbound off slip / Connolly Hospital Access	The existing signal-controlled junction will be modified to provide an additional lane for buses on the nearside of the N3 off-slip road, on the approach and exit carriageway.
Navan Road / Old Navan Road	The existing signal-controlled junction has a proposed additional outbound bus lane on the nearside of the outbound carriageway. A pedestrian footpath will be provided on the south side of the N3 to provide access on foot to the bus stop east of the Connolly Hospital access junction. A left-turn lane on the outbound approach to the junction will be retained outside the new bus lane – accessed by general traffic crossing the bus lane east of the junction.
Navan Road / N3 Eastbound off-slip	The existing signal-controlled junction will be modified by addition of a left-turn bus lane on the nearside of the hospital access road, and an outbound bus lane (as an additional lane alongside three general traffic lanes) on the nearside of the outbound N3 carriageway. A signal-controlled pedestrian crossing of the N3 will be provided to improve pedestrian access to the inbound bus stop from areas to the south.
Navan Road / M50 Junction 6	The existing gyratory interchange is signal-controlled. Bus lanes are proposed as additional lanes on the nearside of outbound and inbound roundabout entry junctions from Navan Road to the east and west, with bus lanes to the stop line. On the gyratory carriageway, one of the three existing lanes will be allocated for use as a bus lane.

4.5.2.7 Structures

4.5.2.7.1 Bridges

Table 4.11 provides a description of the location and type of works to existing bridges along Section 2 of the Proposed Scheme.

Table 4.11: Summary of Major Structures in Section 2 Snugborough Road to N3 / M50 Junction

Identity	Irish OS Grid	Chainage	Description
BR01 Tolka River Bridge	X: 707820 Y: 739011	Ch.A1110	The existing bridge sized culvert is located at the northern crossing of the River Tolka beneath the N3. The construction of the Proposed Scheme will require the bridge to be widened at the southern end by approximately 2m.
BR02 Mill Road Bridge	X: 707820 Y: 739011	Ch.A1605	The eastbound and westbound carriageways of the N3 cross Mill Road on twin bridges. The construction of the Proposed Scheme will require the bridge to be widened along both the southern and northern sides, as well as closing up of the opening within the central median.

4.5.2.7.2 Retaining Walls

Table 4.12 sets out the proposed principal retaining walls along Section 2 of the Proposed Scheme.

Table 4.12: Summary of Principal Retaining Walls in Section 2 Snugborough Road to N3 / M50 Junction

Structure Ref	Structure Type	Chainage Start - Chainage End (m)	Length (m)	Max Retained Height (m)	Comment
RW07A	Spreadfoot cantilever wall	Ch.A1604 – Ch.A1653	100	1.5	This structure includes the pedestrian ramp and the associated retaining wall to service bus stop on southern side of N3. Includes ramp and stair access.
RW07B	Spreadfoot cantilever wall	Ch.A1476 - Ch.A1609	250	3.0	This structure includes the pedestrian ramp and the associated retaining wall to o service bus stop on northern side of N3. Includes ramp and stair access.
RW09	Spreadfoot cantilever wall	Ch.A2219 - Ch.A2321	90	4.0	Retains N3 embankment adjacent to M50 Junction 6 Castleknock health & leisure village.

4.5.2.8 Parking and Loading Bays

The Proposed Scheme will have no impact to on-street parking/loading in this Section as there are no proposed changes to existing designated parking /loading.

4.5.2.9 Landscape and Urban Realm

The Proposed Scheme will tie-in to the Snugborough Junction Upgrade Scheme (by Fingal County Council) which is a separate scheme and will provide an additional bridge crossing over the N3 alongside the existing bridge and revised and upgraded junction connectivity with the adjoining roads.

Beyond the Snugborough Junction, the Proposed Scheme will generally utilise the existing N3 and associated road infrastructure with modifications to carriageway allocation to provide dedicated bus lanes. New bus stops will be provided on the N3 at the Mill Road overbridge and will require widening of the N3 to accommodate segregated bus stops on the N3. Ramps and steps will be constructed from Mill Road to the elevated east and westbound carriageways of the N3 to provide pedestrian connections to the new bus stops. Construction will require clearance of tree screening from the N3 embankments on the northern and southern side of the carriageway. Post construction, new trees will be planted to mitigate tree removal and to integrate the new construction with the adjoining landscaped embankments and provide an attractive and safe environment for pedestrian commuters.

Elsewhere, there will be localised areas of tree removal to accommodate new bus stop and kerb line adjustments. Trees will be reinstated where practicable and new areas of tree planting, grass verges and species rich grassland will be introduced where practicable to enhance amenity and biodiversity characteristics along the N3.

4.5.2.10 Land Acquisition and Use

The Proposed Scheme follows the N3 dual carriageway from Snugborough Road to the M50 motorway junction. To the north of the N3, the Proposed Scheme is bordered by Tolka Valley Park and Waterville Park, along with an Annex 1 habitat and woodland. To the south of the N3, land use consists of rural grassland to the western side and extensive modern suburban residential developments further east

In addition to permanent land take, the existing grass median on the N3 will be narrowed to facilitate the Proposed Scheme. Elements of the Proposed Scheme for which permanent land take is required includes the following:

- The widening of the BR01 Tolka River Bridge;
- The pedestrian ramps and associated bus stops encroaching into Millstead Estate to the south of the N3 and woodlands to the north;
- Relocation of a variable messaging sign (GY04) and three (GY02, GY07 GY08) overhead sign gantry locations on the N3;
- Outbound bus stop at Old River Road;
- Emergency Refuge layby and maintenance layby on the N3 outbound to the north of Herbert Road;
- Widening of BR02 Mill Road Bridge; and
- Widening to junction approach from Connolly hospital overbridge over N3.

Temporary land take will be required for the regrading of slopes, construction of retaining walls at Junction 6 Castleknock (RW 09) and at No. 3 Catherine's Well, and to facilitate the elements listed above which require permanent land take.

The impacts on residential amenity arising from land acquisition in Section 2 of the Proposed Scheme and are addressed in Chapter 10 (Population). Similarly, the impacts on landscape amenity arising from land acquisition in Section 2 of the Proposed Scheme are addressed in Chapter 17 (Landscape (Townscape) & Visual).

4.5.2.11 Rights of Way

Table 4.13 outlines the locations where existing rights of way which will be affected by the Proposed Scheme.

Table 4.13: Existing Rights of Way affected

Location	Chainage	Existing Situation	Proposed Change
Old River Road / N3 junction	A1930	Currently cyclists and motorcyclists can access Old River Road from the N3 Navan Road and vice-versa.	As part of the proposed scheme, due to provision of a footpath, two bus stops and two bus shelters, it is proposed to restrict cyclists and motorcyclists from gaining access to Old River Road from the N3 Navan Road and vice-versa. Access to Old River Road from the N3 Navan Road and vice-versa will still be available via the surrounding road network.

4.5.3 Section 3: N3 / M50 Junction to Navan Road / Ashtown Road Junction

4.5.3.1 General overview of the Proposed Scheme

It is intended to construct a new section of inbound bus lane between the eastern side of the N3/M50 gyratory and the Auburn Avenue junction.

New bus stops will be provided immediately to the east of Auburn Avenue junction with the R147 Navan Road, along both the inbound and outbound carriageways. A short retaining wall will be provided to the rear of the outbound bus stop.

A new bus lane will operate along the existing inner lane of the inbound and outbound R147 Navan Road. The bus lane will terminate on the inbound carriageway between Morgan Place and the Navan Parkway off-slip junction which will allow left turning vehicles to enter the nearside lane to leave the main carriageway. At the Navan Road Parkway junction, buses will be routed off the mainline and along the on and off slip roads (widened to carry bus lanes) to the junction overbridge.

As part of measures to improve road safety, the inbound carriageway cross-section will be reduced from four general traffic lanes and a bus lane to two general traffic lanes and a bus lane before the existing pedestrian crossing west of Morgan Place. This will reduce potential conflict in vehicle movements, between Morgan Place and the Navan Parkway off-slip junction.

Commensurate with the suburban nature of Navan Road between Auburn Avenue and Phoenix Park Avenue junctions, a consistent 60kph speed limit will be implemented, to reflect the presence of bus stops and pedestrian crossings, and the need for general traffic to carry out merging and weaving actions to access side roads. East of Phoenix Park Avenue junction, Navan Road enters an urbanised environment (including pedestrian crossings), a 50km/h speed limit will be implemented, which is consistent with the speed limit on Navan Road east of Ashtown Road. The existing 50km/h speed limit along the Navan Parkway on and off-slip ramps will remain in place, with their proposed extents adjusted slightly.

Due to a proposed change in lane positions on Navan Road between Phoenix Park Avenue and Auburn Avenue, the three existing overhead sign gantries on the outbound carriageway of the R147 will be modified.

New bus stop lay-bys for inter-urban buses will be provided on both the inbound and outbound Navan Parkway off-slip ramps, with a new inline bus stop located on the inbound on-slip ramp, replacing the existing inline bus stop located on the inbound off-slip ramp. A retaining wall will be required to the rear of the outbound bus stop lay-by. New inbound and outbound bus stop lay-bys and relocated bus stops will also be provided adjacent to Phoenix Park Avenue junction.

The Proposed Scheme will provide Quiet Street Treatment for cyclists on Castleknock Manor to integrate with secondary route 4A of the Greater Dublin Area (GDA) Cycle Network Plan. The Auburn Avenue / Castleknock Manor roundabout will be modified to provide enhanced pedestrian and cyclist crossing facilities.

Between Castleknock Manor and Ashtown Road junction, a two-way cycle track along the outer edge of the westbound (outbound) carriageway will be provided and will provide good connectivity for cyclists from existing and planned residential areas.

At the Ashtown Road junction, the two-way cycle track will be terminated west of the junction, and will transition to a one-way cycle track on each side of the Navan Road carriageway east of the junction.

The two left-in / left-out junctions on opposite sides of Navan Road at Phoenix Park Avenue will be amended to operate as a staggered signal-controlled junction, which will allow left and right turns out of the side roads, left turns into the side roads and right-turns from the west into Phoenix Park Avenue.

The central median between Phoenix Park Avenue junction and Ashtown Road junction will be removed to provide additional space for footpath and cyclist facilities and landscaped verges.

At the Navan Road / Ashtown Road junction, the existing roundabout will be modified to a signal-controlled crossroads, with separate pedestrian and cyclist crossings.

The Blackhorse Avenue / Ashtown Gate Road junction, located to the south of the Ashtown Road junction, will be signalised to allow improved traffic management, and in particular to minimise use of side roads by through traffic.

The scheme proposals include for five proposed bus stops with three existing bus stops to be retained and two existing bus stops to be removed along this section of the route. There are also four proposed bus stop laybys for inter-urban buses.

4.5.3.2 Deviations from Standard Cross Sections

The Proposed Scheme has been designed in accordance with the PDGB and the TII publications referenced within the PDGB. However, at a number of constrained locations across the Proposed Scheme, the width of the cross-sectional elements has been designed below the desirable minimum identified in the PDGB guidance and TII publications (Section 4.6.1). The deviations within Section 3 are detailed in Table 4.13.

Table 4.13: Reduced Standard Cross Sections along Section 3 N3 / M50 Junction to Navan Road / Ashtown Road Junction

Chainage / Location	Design Element	Desirable Minimum	Design	Justification
Ch.A2700 to Ch.A2780	Lane Widths	3.65m	3.25m	Reduced lane widths of 3.25m will be provided at this location to minimise the impact of widening on an existing overbridge structure. This width of 3.25m is less than the stated lane widths of 3.65m for a Dual 2/Dual 3 Lane Urban All-Purpose Road, DN-GEO-03036 Table 4.4 and is applied to both the traffic lane and bus lane at this location. In accordance with the 'TII Standards Commission - Bus Lanes on Dual Carriageways and Motorways - Literature and Scheme Review Note – Draft', a bus lane width of 3.25m is provided. It should be noted that this draft document acknowledges that bus lane widths of 3.25m may be provided as an absolute minimum at constrained locations. Carriageway widening will facilitate the provision of a bus lane between the M50 roundabout junction and Auburn Avenue Junction. As a result, widening will be required to the nearside carriageway edge resulting in a 1.5m min. offset to the bridge pier at this location. As a result, to minimise impact to the existing structural pier, a reduced lane width of 3.25m is required in conjunction with a reduced VRS setback of 0.5m, a carriageway hard strip width of 0.6m and a speed limit of 50 km/h which reflects the constrained nature of the location.
Ch.A2700 to Ch.A2780	VRS setback	0.6m	0.5m	The nearside VRS at this location will be set back 0.5m from the carriageway edge to facilitate a W2 working width in front of the structure pier to the overbridge. A reduced lane width of 3.25m will be provided at this location to minimise the impact of widening on an existing overbridge structure. Carriageway widening is required to facilitate the provision of a bus lane between the M50 roundabout junction and Auburn Avenue Junction. As a result, the widening is required to the nearside carriageway edge resulting in a 1.5m min. offset to the bridge pier at this location. As a result, a reduced lane width of 3.25m is provided in conjunction with a reduced VRS setback of 0.5m, a carriageway hard strip width of 0.6m and a speed limit of 50 km/h which reflects the constrained nature of the location. The bus lane width through this section of carriageway is also 3.25m wide in accordance with TII's Draft Publication on Bus Lanes on Dual Carriageways and Motorways.
R147 Navan Parkway Interchange Eastbound Diverge	Footpath	2.0m	1.80m	A localised reduction in footpath width to 1.8m occurs over a 50m length to mitigate impact on an existing land boundary. It should be noted that DN-PAV-03026 recommends a minimum footway width of 2m however, it permits a reduction to 1.3m.
R147 Navan Parkway Overbridge	Footpath	2.0m	1.70m	To minimise impact on the existing overbridge structure, the footpath layout will match existing across the structure in both directions. It should be noted that DN-PAV-03026 recommends a minimum footway width of 2m however, it permits a reduction to 1.3m.
R147 Navan Parkway Overbridge	Cycle Track	2.0m	1.75m	To minimise impact on the existing overbridge structure, the cycle track layout will match existing across the structure in both directions. In addition, no separation buffer is provided to the carriageway to match the existing scenario. It should be noted that DN-GEO-03036 accepts a width of 1.75m as one step below desirable minimum for a one way cycle facility.
Ch.A2900 to Ch.A4500	Lane Width	3.5m	3.25m	The lane widths along the R147 Navan Road will be reduced from 3.65m existing to 3.25m. This reduction will be applied to all traffic lanes and bus lanes along the R147 Navan Road between Auburn Ave Junction and Phoenix Park Ave Junction. The 'TII Standards Commission - Bus Lanes on Dual Carriageways and Motorways - Literature and Scheme Review Note – Draft' document acknowledges that bus lane widths of 3.25m may be provided as an absolute minimum at constrained locations. The reduction in lane widths ensures a consistent lane width for drivers along this stretch of the regional road network areas while facilitating carriageway widening to provide a continuous bus lane in each direction in addition to pedestrian and cycleway facilities. The reduction in lane widths is supported by a reduction in the speed limit to 60km/h. The R147 Navan Road is considered to be an Urban Dual Carriageway Relief Road linking the urban environment of the Navan Road with the N3 national road network. It is therefore considered appropriate to reduce the cross-section and implement a more constrained cross-section in nature to encourage drivers to maintain a lower speed in an area where pedestrian and cyclist facilitates are provided in close proximity to the live carriageway. This width of 3.25m is less than the stated lane widths of 3.5m for an Urban Dual Carriageway Relief Road, DN-GEO-03036 Table 4.4.

Chainage / Location	Design Element	Desirable Minimum	Design	Justification
Ch.A2960 to Ch.A3630	Footpath	2.0m	1.5m	The footpath width is generally retained as existing in the eastbound/ inbound direction. The footpath width is locally reduced over short distances to a minimum width of 1.5m to match the existing situation at the side road junctions of the Travelodge entrance, Morgan Place and adjacent Service Station. It should be noted that DN-PAV-0326 recommends a minimum footway width of 2m however, it permits a reduction to 1.3m.
Ch.A3400 to Ch.A4500	Cycle Track	3.25m	3.0m	A two-way cycle track 3.0m in width will be provided to reduce impact on the boundary to existing properties and a proposed large development site at this location. It should be noted that the PDGB acknowledges a reduction in cycle track width can be considered on a case-by-case basis in consultation with the national cycle manual. The design of the R147 Navan Road along this section has taken cognisance of the TII Publications. It should be noted that the desirable minimum two-way cycle track width of 3.0m as stated in DN-GEO-03036 has been achieved here. The cycle track will be provided with a 0.5m buffer to the carriageway while a 2.0m min width footpath is provided to the rear.
Ch.A4520 to Ch.A4850	Cycle Track	3.25m	3.0m	A two-way cycle track 3.0m in width will be provided to reduce impact on the existing boundary to a residential estate. It should be noted that the PDGB acknowledges a reduction in cycle track width can be considered on a case-by-case basis in consultation with the national cycle manual. The design of the R147 Navan Road along this section has taken cognisance of the TII Publications. It should be noted that the desirable minimum two-way cycle track width of 3.0m as stated in DN-GEO-03036 has been achieved here. The cycle track will be provided with a 0.5m buffer to the carriageway while a 2.0m min width footpath is provided to the rear.

4.5.3.3 Bus Lane Provision

An overview of the bus lane provision as part of the Proposed Scheme is set out in Section 4.6.4. As outlined within that section, full bus priority is proposed along the entire length of the Proposed Scheme.

4.5.3.4 Bus Stops

The different types of bus stop (island, shared landing, inline and lay-by bus stops) are described in Section 4.6.4.4. The bus stop locations and types are outlined in Table 4.14.

Table 4.14: Proposed Bus Stop Locations along Section 3: N3 / M50 Junction to Navan Road / Ashtown Road Junction

Inbound / Outbound	Bus Stop Name	Bus Stop Number	Chainage	Bus Stop Type	Bus Shelter
Inbound	New stop – Auburn Avenue	New Stop	Ch.A2950	Inline	Yes
Inbound	Morgan's Place	1845	Ch.A3270	Inline	Yes
Inbound	Parkway Station (relocated)	7166	Ch.A3920	Inline	Yes
Inbound	New stop – Parkway Station	New Stop	Ch.A3790	Layby	Yes
Inbound	New stop – Phoenix Park Avenue	New Stop	Ch.A4400	Layby	Yes
Inbound	Phoenix Pk Avenue (relocated)	1847	Ch.A4550	Inline	Yes
Outbound	Phoenix Park Avenue (relocated)	1807	Ch.A4440	Island	Yes
Outbound	New stop – Phoenix Park Avenue	New Stop	Ch.A4550	Layby	Yes
Outbound	New stop – Navan Road Parkway Station	New Stop	Ch.A3950	Layby	Yes
Outbound	Parkway Station	7167	Ch.A3920	Island	Yes
Outbound	Peck's Lane	1808	Ch.A3200	Inline	Yes
Outbound	New stop - Auburn Avenue	New Stop	Ch.A2975	Inline	Yes

4.5.3.5 Cycling Provision

The specific proposals for cycling facilities in Section 3 of the Proposed Scheme are described below. Provision for cyclists at the signal-controlled junctions are described in Section 4.6.3.5.

A quiet street cycle route is proposed along Castleknock Manor which connects to the two-way cycle track on the R147 Navan Road. This links directly with the GDA Cycle Network Plan Secondary Route 4A. this two-way cycle track continues along the southern side of the Navan Road until its junction with Ashtown Roundabout.

4.5.3.6 Junction Information

An overview of the approach to junction review and design is provided in Section 4.6.7. The major and moderate junctions (signalised) within Section 3 of the Proposed Scheme are outlined in Table 4.15.

Table 4.15: Major and Moderate Junctions within Section 3 of the Proposed Scheme

Junction Location	Note
Major Junctions	
Navan Road / Phoenix Park Avenue	The Phoenix Park Avenue staggered junction with the Ashtown Business Centre access is proposed to be signalised (instead of the present left-in / left-out junction). Signalising will allow right turns out of the side roads, and into Phoenix Park Avenue, but will prevent right-turn movements into Ashtown Business Centre from Navan Road. Bus lanes will be provided on both Navan Road approaches and will be curtailed 20m from the junction. Cyclist facilities will be provided via a two-way cycle track to the south of Navan Road.
Navan Road / Ashtown Road	The existing roundabout is proposed to be converted to a signalised junction. Bus lanes are proposed on the Navan Road approaches; these will be curtailed 20m from the junction to allow for left turning movement. A shared area will be provided on the south west corner where the two way cycle track (from the west) will split to become a one-way track on the east side of the junction.
Moderate Junctions / Priority Junctions	
Navan Road / Auburn Avenue	The existing signal-controlled junction is proposed to be modified by provision of an additional lane for buses in the inbound direction, and to replace the existing left-turn lane with a bus lane in the outbound direction. Pedestrian crossing facilities are proposed across Navan Road on the east side of the junction.
R147 Eastbound off-slip / Parkway Bridge (northern junction)	The existing signal-controlled junction is proposed to be modified by extending the bus lane on the eastbound off-slip road to the stop line. An inline bus stop and a bus stop layby (for long distance buses) is proposed each side of the junction.
R147 Westbound off-slip / Parkway Bridge (southern junction)	The existing signal-controlled junction is proposed to be modified by extending the bus lane on the westbound off-slip road to the stop line. An inline bus stop and separate bus stop layby (for long distance buses) is proposed on the slip road approach to the junction.

4.5.3.7 Structures

4.5.3.7.1 Bridges

There are no bridge works proposed along Section 3 of the Proposed Scheme.

4.5.3.7.2 Retaining Walls

Table 4.16 sets out the proposed principal retaining walls along Section 3 of the Proposed Scheme.

Table 4.16: Summary of Principal Retaining Walls in Section 3 N3 / M50 Junction to Navan Road / Ashtown Road Junction

Structure Ref	Structure Type	Chainage Start - Chainage End	Length (m)	Max Retained Height (m)	Comment
RW03	Soil nail wall	Ch.A2926 - Ch.A3027	100	4.0	RW03 will be constructed adjacent to Navan Road, close to Auburn Avenue. RW03 is required to retain the cut slope to accommodate widening for a bus stop.

4.5.3.8 Parking and Loading Bays

The Proposed Scheme will have no impact to on-street parking/loading in this Section as there are no proposed changes to existing designated parking /loading.

4.5.3.9 Landscape and Urban Realm

For much of this section, changes will consist of localised interventions and reallocation of existing road space. A new dedicated citybound bus lane will be constructed immediately east of the M50 interchange to provide bus priority to the Auburn Avenue / Dunsink Lane. Intermediate lands between the Royal Canal, N3 and various slip lanes will be planted with new mixed woodland planting.

A two-way shared surface cycle facility (Quiet Street treatment) will be introduced along Castleknock Manor and the Auburn Avenue roundabout will be rationalised to provide continuous pedestrian and cycle facilities with new tree planting, grass verges and species rich grasslands introduced to enhance amenity and biodiversity.

New amenity grass planting is proposed in the modified N3 median. East and west of the Parkway Station overbridge, sections of the existing median hedge will be removed and replanted more centrally within the median together with new grass planting within the median.

Continuous footpaths and cycle tracks will be provided from this junction eastwards along the Navan Road and will include upgraded bus stops. These facilities will encroach onto existing roadside woodland tree planting, however new tree planting will be provided where practicable to reinstate the boundary screening. Approaching the Ashtown roundabout, localised boundary realignments will be required including the removal of some boundary and street trees. Following construction, new trees will be planted where practicable.

The Ashtown roundabout currently incorporates Monterey Pine trees and presents as a well-known landmark when approaching or departing the city along the N3.

The roundabout will be reconfigured as a signalised junction (see Image 4.2) and this change presents an urban realm opportunity. The revised junction will greatly improve pedestrian and cycle facilities at the junction and conversion from a roundabout will provides substantial additional pedestrian space around the junction. This additional space will incorporate high quality hard and soft landscaping that establishes a contemporary landscape character at the junction that will become a new gateway landmark while also facilitating local pedestrian and cyclist movements. Low level shrub planting will provide a buffer between pedestrians and the junction and new trees, ornamental planting, species rich grass areas and high-quality paving will provide an attractive public space. New trees will include semi-mature Monterey Pine referencing the existing trees on the roundabout.

Image 4.2: Ashtown Road Junction

4.5.3.10 Land Acquisition and Use

From the M50 Junction to Phoenix Park Avenue junction, this section is characterised by dual carriageway infrastructure with a mix of residential developments, commercial and sporting uses together with areas of undeveloped land to the north and south of the Proposed Scheme.

The Royal Canal and a railway line also runs along the north of the Proposed Scheme.

From Phoenix Park Avenue junction to the Ashtown Road junction, there is a mix of residential and commercial properties alongside the Proposed Scheme.

It is proposed that works will be contained within the R147 boundary with the exception of:

- Widening being provided for a new bus stop along the southern side at Navan Road Parkway westbound off-slip ramp;
- Widening to provide the general Proposed Scheme cross-section at localised locations;
- Providing a two way cycle track in the south east quadrant at the Auburn Avenue/Auburn Park junction; and
- Provision of a signalised staggered junction at Phoenix Park Avenue / Ashtown Business Centre junction

Temporary land take is required to facilitate the above works and the construction of a new section of stone wall.

The impacts on residential amenity arising from land acquisition in Section 3 of the Proposed Scheme and are addressed in Chapter 10 (Population). Similarly, the impacts on landscape amenity arising from land acquisition in Section 3 of the Proposed Scheme are addressed in Chapter 17 (Landscape (Townscape) & Visual).

4.5.3.11 Rights of Way

Table 4.17 outlines the locations where existing rights of way which will be affected by the Proposed Scheme.

Table 4.17: Existing Rights of Way affected

Location	Chainage	Existing Situation	Proposed Change
Castleknock Road / Blackhorse Avenue junction	n/a	Currently vehicular traffic can turn right from Castleknock Road onto Blackhorse Avenue and Ashtown Gate Road.	As part of the proposed scheme, to minimise general traffic levels on local side streets, it is proposed to restrict vehicular traffic from turning from Castleknock Road onto Blackhorse Avenue and Ashtown Gate Road. Access to Blackhorse Avenue and Ashtown Gate Road will still be available via the surrounding road network.

4.5.4 Section 4: Navan Road / Ashtown Road Junction to Navan Road / Old Cabra Road Junction

4.5.4.1 General overview of the Proposed Scheme

From Ashtown Road junction to the Navan Road / Old Cabra Road junction (also referred to as Ratoath Road junction), the Proposed Scheme will generally consist of a bus lane and general traffic lane in each direction, with one-way cycle tracks alongside the proposed inbound and outbound bus lanes. Permanent and temporary land take will be required from a number of properties, with the majority being residential, along this Section to accommodate these facilities. Boundary treatment will generally match existing.

Enhanced cyclist and pedestrian facilities will be provided at each junction along this Section of the Proposed Scheme.

Junction layouts will be amended to include the removal of the right turn filter lane from Navan Road (westbound) into Kempton Avenue and Ashtown Grove, although the right turn movement is permitted.

The scheme proposals include for four proposed bus stops with nine existing bus stops to be retained and seven existing bus stops to be removed along this section of the route.

4.5.4.2 Deviations from Standard Cross Sections

The Proposed Scheme has been designed in accordance with the PDGB. However, at a number of constrained locations across the Proposed Scheme, the width of the cross-sectional elements has been designed below the desirable minimum identified in the PDGB guidance (Section 4.6.1). The deviations within Section 4 are detailed in Table 4.18.

Table 4.18: Reduced Standard Cross Sections along Section 4 Navan Road / Ashtown Road Junction to Navan Road / Old Cabra Road Junction

Chainage	Design Element	Desirable Minimum	Design	Justification
Ch.A5190 to Ch.A5400	Footpath	2.0m	1.6m - 1.8m	To retain existing trees along this stretch of the Proposed Scheme, the existing footpath and verge will be retained at this location. The width varies from 1.6m to 1.8m.
Ch.A6200	Parking layby	Parking Layby = 2.1m min. Cycle track width = 2.0m Buffer = 0.75m Footpath width = 2.0m	Parking Layby = 2.4m min. Cycle track width = 1.5m Footpath width = 1.8m	To facilitate the existing junction with a school and nearby pedestrian crossing, the existing parking layby layout has been retained with the cycle track aligned alongside the road, with the parking layby located behind the cycle track. This layout is not in accordance with the PDGB which requires the cycle track to be deflected to the rear of the parking layby with a 0.75m buffer provided. In addition, minimum footpath width achieved behind layby is 1.8m at pinch point.

4.5.4.3 Bus Lane Provision

An overview of the bus lane provision as part of the Proposed Scheme is set out in Section 4.6.4. As outlined within that section, full bus priority is proposed along the entire length of the Proposed Scheme.

4.5.4.4 Bus Stops

The different types of bus stop (island, shared landing, inline and lay-by bus stops) are described in Section 4.6.4.4. The bus stop locations and types are outlined in Table 4.19.

Table 4.19: Proposed Bus Stop Locations along Section 4 Navan Road / Ashtown Road Junction to Navan Road / Old Cabra Road Junction

Inbound / Outbound	Bus Stop Name	Bus Stop Number	Chainage	Bus Stop Type	Bus Shelter
Inbound	Ashtown Roundabout	1696	Ch.A5010	Shared Landing Area	Yes
Inbound	Ashtown Grove	1698	Ch.A5485	Shared Landing Area	Yes
Inbound	Kinvara Avenue (relocated 20m east)	1700	Ch.A5970	Shared Landing Area	Yes
Inbound	Our Lady's Church	1701	Ch.A6270	Shared Landing Area	Yes
Inbound	Nephin Road	1703	Ch.A6700	Shared Landing Area	Yes
Inbound	Skreen Road	1905	Ch.A7040	Shared Landing Area	Yes
Outbound	Dunard (relocated)	1805	Ch.A7350	Shared Landing Area	Yes
Outbound	Hampton Green	1806	Ch.A7070	Shared Landing Area	Yes
Outbound	Nephin Road	1660	Ch.A6560	Island	Yes
Outbound	Our Lady's Church (relocated)	1661	Ch.A6300	Shared Landing Area	Yes
Outbound	Kinvara Avenue (relocated 40m east)	1662	Ch.A6000	Shared Landing Area	Yes
Outbound	Ashtown Grove	1664	Ch.A5500	Shared Landing Area	Yes
Outbound	Ashtown Roundabout	1666	Ch.A4980	Shared Landing Area	Yes

4.5.4.5 Cycling Provision

The specific proposals for cycling facilities in Section 4 of the Proposed Scheme are described below. Provisions for cyclists at the signal-controlled junctions are described in Section 4.6.3.

New segregated cycle tracks will be provided on both sides of the Navan Road from Ashtown Road junction for the entirety of this section on the Proposed Scheme (Secondary Route 4A as annotated in the GDA Cycle Network Plan).

New Toucan crossings, and a two-way cycle crossing will be provided at the Navan Road / Old Cabra Road junction.

4.5.4.6 Junction Information

An overview of the approach to junction review and design is provided in Section 4.6.7. The major and moderate junctions (signalised) within Section 4 of the Proposed Scheme are outlined in Table 4.20.

Table 4.20: Major and Moderate Junctions within Section 4 of the Proposed Scheme

Junction Location	Note
Major Junctions	
N/A	N/A
Moderate Junctions / Priority Junctions	

Junction Location	Note
Navan Road / Kempton Avenue	Nearside bus lanes will be provided in both directions through the junction, with the inbound bus lane curtailed 20m from the junction to allow for left turn traffic. Cyclist and pedestrian crossing facilities will be provided, and an advanced stop line for cyclists will be provided on the side road.
Navan Road / Ashtown Grove	Nearside bus lanes will be provided in both directions through the junction, with the inbound bus lane curtailed 20m from the junction to allow for left tun traffic. Cyclist and pedestrian crossing facilities will be provided, and an advanced stop line for cyclists will be provided on the side road.
Navan Road / Baggot Road	Nearside bus lanes will be provided in both directions through the junction, with the inbound bus lane curtailed 20m from the junction to allow for left turn traffic. Cyclist and pedestrian crossing facilities will be provided, and an advanced stop line for cyclists will be provided on the side roads due to space constraints. A right-turn pocket will be provided on Navan Road for traffic turning in to Kinvara Avenue.
Navan Road / Nephin Road	The existing signal-controlled junction is proposed be modified by extending existing nearside bus lanes in both directions up to the stop line. Right turns from Navan Road (east) will be banned (as existing). The constrained junction location will require the use of right turn pockets and non-protected kerbed cycle lanes on the southern side of the junction in order to maintain the consistent cycle route throughout. An advanced stop line will be provided for cyclists on each arm of Nephin Road.
Navan Road / Skreen Road	This existing T-junction is proposed to be signal-controlled – with nearside bus lanes being provided in both directions (up to the stop line). Cycle tracks will be provided adjacent to bus lanes, with separate cycle and pedestrian crossing facilities proposed.
Navan Road / Hampton Green	This existing signal-controlled junction will be modified to provide nearside bus lanes in both directions, with the inbound lane brought to the junction stop line and the outbound curtailed 20m to provide for left turn movements. Cycle tracks will be provided adjacent to bus lanes, with separate cycle and pedestrian crossing facilities proposed
Navan Road / Cabra Library	This existing signal-controlled junction will be modified to provide nearside bus lanes in both directions, with the inbound lane brought to the junction stop line and the outbound curtailed 20m short of the stop line to provide for left turn movements. Cycle tracks will be provided adjacent to bus lanes, with separate cyclist and pedestrian crossing facilities proposed.
Navan Road / Old Cabra Road	The existing signal-controlled junction will be modified to include a ban on general traffic turning from Navan Road into Old Cabra Road. An outbound bus lane will be provided from Old Cabra Road to Navan Road. One way cycle tracks will be provided north and south of the junction with a two-way crossing proposed across the junction. Toucan crossings will be provided alongside shared space areas to enable pedestrians and cyclists to cross together.

4.5.4.7 Structures

4.5.4.7.1 Major Bridges

There are no bridge works proposed along Section 4 of the Proposed Scheme.

4.5.4.7.2 Retaining Walls

There are no principal retaining walls proposed along Section 4 of the Proposed Scheme.

4.5.4.8 Parking and Loading Bays

Changes to the parking and loading provisions along Section 4 as a result of the Proposed Scheme are shown in Table 4.21. There are no changes to loading provision along Section 4.

Table 4.21: Parking Impact Summary – Section 4

Location	Parking Provision	Existing	Proposed	Proposed Change
Ashtown Road to Old Cabra Road	Informal Parking Spaces (on-street)	24	4	-20

4.5.4.9 Landscape and Urban Realm

The Proposed Scheme will require removal of existing verge planted street trees and realignment of property boundaries. Modified boundaries will be reinstated to match existing, and continuous footpaths and cycle tracks will be constructed along both sides of the road to facilitate local and commuting pedestrians and cyclists. Junctions will also be upgraded to provide proper pedestrian crossings. Pavements will be renewed throughout, and high-quality paving and new soft landscaping will be provided at the Church and Public Library. Where

practicable, new street trees will be planted to reinstate some of the tree planting and existing character of the road. The Old Cabra Road junction will be rationalised (see Image 4.3) and provides an urban realm opportunity. Some of the existing slip lanes will be removed to facilitate reconfiguration of the junction to provide dedicated bus lanes and to substantially improve pedestrian and cycle facilities throughout the junction. New hard and soft landscaping will be introduced to enhance the presentation, amenity and biodiversity value of the junction and to create a more pedestrian friendly and distinctive character. Some existing street trees will need to be removed to facilitate the revised layout, however new tree planting will be provided within the Navan Road median and within peripheral landscape areas that will create an attractive pedestrian environment.

Image 4.3: Old Cabra Road Junction

4.5.4.10 Land Acquisition and Use

This section of the Proposed Scheme progresses through an established residential area with education, retail, employment and community uses along the Navan Road. In this area, permanent land take is required from properties to accommodate widening required for the Proposed Scheme, resulting in the need to relocate boundary walls and gates at these properties. In this section temporary land take will be needed at these properties to construct new boundaries walls. Temporary land take is also required from properties to allow driveways and accesses to be regraded. Temporary and permanent land take is identified in Section 4.6.15.

The impacts on residential amenity arising from land acquisition in Section 4 of the Proposed Scheme and are addressed in Chapter 10 (Population). Similarly, the impacts on landscape amenity arising from land acquisition in Section 4 of the Proposed Scheme are addressed in Chapter 17 (Landscape (Townscape) & Visual).

4.5.4.11 Rights of Way

Table 4.22 outlines the locations where existing rights of way which will be affected by the Proposed Scheme.

Table 4.22: Existing Rights of Way affected

Location	Chainage	Existing Situation	Proposed Change
Driveway at 151 Navan Road	A6545	The existing driveway access to 151 Navan Road is located at the easternmost extent of the plot fronting on to Navan Road.	It is proposed to relocate the driveway at 151 Navan Road closer to the centre of the plot, to facilitate improved access to this property. It is noted that these works are still pending agreement with the property owner. Following the implementation of the Proposed Scheme, vehicular traffic would no longer be able to use the original access, however a new access would be provided in close proximity.
Driveway at 263 Navan Road	A5920	The existing driveway access to 263 Navan Road is located close to the centre of the plot fronting on to Navan Road.	Due to the proposed pedestrian crossing in this location, it is proposed to relocate the driveway at 263 Navan Road to the easternmost extent of the plot. Following the implementation of the Proposed Scheme, vehicular traffic will no longer be able to use the original access, however a new access will be provided in close proximity.
Access at 72 Navan Road	A6975	The existing access at 72 Navan Road is located close to the junction with Skreen Road.	Due to the proposed pedestrian crossing in this location, it is proposed to relocate the access at 72 Navan Road to the southernmost extent of the plot. Following the implementation of the Proposed Scheme, vehicular traffic will no longer be able to use the original access, however a new access will be provided in close proximity.

4.5.5 Section 5: Navan Road / Old Cabra Road Junction to Ellis Quay

4.5.5.1 General overview of the Proposed Scheme

The Proposed Scheme will limit the use of Old Cabra Road to local access traffic, buses, taxis and cyclists as follows:

- No through traffic in the southbound direction at the northern end of Old Cabra Road (at its junction with Navan Road), except for buses, taxis and cyclists, which precludes general traffic from Navan Road travelling to Stoneybatter along Old Cabra Road;
- No through traffic in the northbound direction except for buses, taxis and cyclists, due to proposed introduction of a Bus Gate at the railway overbridge on the Old Cabra Road, which precludes general traffic from Stoneybatter and the North Circular Road from travelling along Old Cabra Road through to Navan Road. Local traffic in the northbound direction will have access as far as the Bus Gate.

On Old Cabra Road, the extent of the outbound bus lane will be limited to an approximate 110m section just south of the Navan Road junction.

Glenbeigh Road / Old Cabra Road junction will become a signal-controlled junction, with the introduction of toucan crossings on the Old Cabra Road.

The Proposed Scheme will provide two one-way cycle tracks on each side of Old Cabra Road. The traffic lanes, bicycle infrastructure and footpaths will be accommodated within the existing road bridge width over the Heuston Station / Connolly Station railway line.

To provide an alternative route for general traffic to and from the City Centre (along Cabra Road, North Circular Road, Infirmary Road and Conyngham Road), the Cabra Road (Dalymount) / North Circular Road junction will be modified to allow right turns from Cabra Road (Dalymount) to North Circular Road and left turns from North Circular Road onto Cabra Road (Dalymount).

On Prussia Street, between North Circular Road and the entrance to the Park Shopping Centre, the Proposed Scheme will provide:

- One southbound general traffic lane;

- One northbound 'straight-ahead only' lane for local traffic, taxis and buses travelling to Old Cabra Road; and
- One left turn lane from Prussia Street to North Circular Road;

Right turn movement from Prussia Street to North Circular Road will be removed.

The junction of Prussia Street and North Circular Road will be upgraded to a signalised junction to provide separate crossing facilities for cyclists and pedestrians, and to ban right turns from Prussia Street to minimise delay to buses travelling straight ahead (to Old Cabra Road).

Along Prussia Street, a traffic lane will be provided in both directions, carrying buses and local traffic only. St Joseph's Road will be modified to include a one-way section at its eastern end (i.e. one-way in an eastbound direction). This will restrict traffic using St Joseph's Road as a means of avoiding the Bus Gate at Prussia Street / Manor Street junction.

A short section of southbound cycle track will be provided on Prussia Street from its junction with North Circular Road before cyclists merge with general traffic just north of Park Shopping Centre. In the northbound direction, the cycle track will commence approximately 50m south of the junction with St Joseph's Road.

At the junction of Manor Street / Prussia Street with Aughrim Street, the Proposed Scheme will provide the following:

- In the northbound direction, a Bus Gate will be located on Prussia Street just north of Aughrim Street junction, such that all northbound general traffic will be required to turn left onto Aughrim Street;
- In the southbound direction, a Bus Gate will be located on Prussia Street / Manor Street just south of the Aughrim Street junction – and any general traffic travelling southbound on Prussia Street at this location will be required to turn right onto Aughrim Street;
- The loading bay outside Kavanagh's Public house will be retained.

The Manor Street / Prussia Street / Aughrim Street junction will be modified to include a signal-controlled cycle crossing, along with urban realm improvements at this junction The junction layout will include raised carriageway paving (i.e. raised table) to assist pedestrians crossing. The junction will include a southbound Bus Gate on Aughrim Street, preventing any general traffic from travelling from Aughrim Street onto Manor Street.

South of the Aughrim Street junction with Manor Street and Prussia Street, traffic signal controls will be included at the Manor Street / Kirwan Street / Manor Place staggered junction. The signal-controlled junction also includes a pedestrian crossing of Manor Street. Movements out of Kirwan Street will be restricted to left turn only, which will remain one-way westbound as at present. At the junction with Manor Street, Manor Place will be altered to a one-way street (i.e. one-way eastbound towards Manor Street), to limit use of Manor Place and Oxmantown Road by through traffic.

On Manor Street and Stoneybatter, the Proposed Scheme will provide two general traffic lanes and a cycle track in both directions to the junction with Brunswick Street North. The Proposed Scheme will provide protected parking bays on both sides of the road, and two loading bays.

In the northbound direction on Blackhall Place, the Proposed Scheme will provide a bus lane and a single general traffic lane, as far as the junction with King Street North. Northbound general traffic wishing to progress onto Manor Street will turn right onto King Street North (which will remain one-way eastbound), and then turn left onto George's Lane to travel westbound along Brunswick Street North.

The Proposed Scheme will include signal controlled priority for northbound buses at the Stoneybatter / Brunswick Street North junction.

The Proposed Scheme will provide a cycle track in each direction along Brunswick Street North.

The Proposed Scheme will allow for general traffic exiting Arbour Hill to turn right only at the Stoneybatter junction. General traffic into Arbour Hill will be from Manor Street direction or Brunswick Street North only.

A southbound general traffic lane will be provided along Stoneybatter between Brunswick Street North and King Street North, with general traffic being required to turn left into King Street North as a result of a southbound Bus Gate at Blackhall Place / King Street North junction. Bus services will continue travelling straight ahead along a southbound bus lane on Blackhall Place. This matches the current situation.

A loading bay will be provided along the northern side of King Street North.

On Blackhall Place between Blackhall Street and Arran Quay, the carriageway arrangement will consist of a bus lane and general traffic lane in each direction.

On Blackhall Street, the road layout will be revised to include one lane for general traffic, a two-way cycle track, and angled parking.

George's Lane will have one northbound general traffic lane, with proposed new signal controls at the junction of Grangegorman Street Lower and Brunswick Street North.

Westbound general traffic from the City Centre on the eastern section of King Street North (east of George's Lane) will be restricted to left turns only, into Queen Street.

On Queen Street, the Proposed Scheme will provide two southbound general traffic lanes. From King Street North, the layout will reduce to one southbound general traffic lane from Blackhall Street to Ellis Quay / Arran Quay. The Proposed Scheme will provide a two-way cycle track on the eastern side of Queen Street from King Street North to Ellis Quay / Arran Quay.

The Proposed Scheme in Section 5 includes for five proposed bus stops with six existing bus stops to be retained and six existing bus stops to be removed along this Section. Four existing bus stops at the Cabra Road (Dalymount) / North Circular Road junction will be retained.

Traffic management measures such as one-way streets and / or turn bans will be required to minimise traffic impacts on side roads due to diverted traffic (which may occur due to the priority given on the Proposed Scheme to pedestrians, cyclists and buses).

A short one-way northbound section will be required on Annamoe Road at its junction with Annamoe Terrace and on Charleville Road at its junction with North Circular Road.

No access is proposed from Phibsborough Road onto Phibsborough and Monck Place, along with the introduction of right turn bans onto Phibsborough Road.

A short one-way southbound section is also proposed at the northern end of Cowper Street, with Aughrim Place becoming one-way southbound. There is also a short one-way westbound section at the western end of Swilly Road.

4.5.5.2 Deviations from Standard Cross Sections

The Proposed Scheme has been designed in accordance with the PDGB. However, at a number of constrained locations across the Proposed Scheme, the width of the cross-sectional elements has been designed below the desirable minimum identified in the PDGB guidance (Section 4.6.1). The deviations within Section 5 are detailed in Table 4.23.

Table 4.23: Reduced Standard Cross Sections along Section 5 Navan Road / Old Cabra Road Junction to Ellis Quay

Chainage / Location	Design Element	Desirable Minimum	Design	Justification
Ch.A7630 to Ch.A7660	Cycle track	2.0m	1.75m	The eastbound/inbound cycle track width will be reduced to provide 2m wide footpath and a cycle track of consistent width on approach to Glenbeigh Road Junction and railway bridge. It should be noted that the PDGB acknowledges a reduction in cycle track width to 1.5m is permitted as the absolute minimum.
Ch.A7660 to Ch.A7820	Cycle track	2.0m	1.5m	The eastbound/inbound cycle track width will be reduced to provide 2m wide footpath and a cycle track of consistent width through Glenbeigh

Chainage / Location	Design Element	Desirable Minimum	Design	Justification
				Road Junction and across the railway bridge. It should be noted that the PDGB acknowledges a reduction in cycle track width to 1.5m is permitted as the absolute minimum.
Ch.A7700 to Ch.A7840	Cycle track	2.0m	1.75m	The westbound/outbound cycle track width will be reduced to maintain existing footpath width and to negate impact on railway bridge. It should be noted that the PDGB acknowledges a reduction in cycle track width to 1.5m is permitted as the absolute minimum.
Ch.A7650 to Ch.A7670	Footpath	2.0m	1.8m	It should be noted that the PDGB acknowledges a reduction in footpath width to 1.8m is permitted as the absolute minimum.
Ch.A7750 to Ch.A7790	Footpath	2.0m	1.3m – 1.8m	To minimise impact on the existing railway bridge, the footpath layout in the westbound/ outbound direction will match existing across the structure. Width varies from 1.3m to 1.5m over a distance of 5m.
Ch.A7990 to Ch.A8200	Cycle track	2.0m	1.5m	The cycle track width in both directions will be reduced along this stretch, in conjunction with footpath width, to reduce impact to existing residential access steps and footpath widths. It should be noted that the PDGB acknowledges a reduction in cycle track width to 1.5m is permitted as the absolute minimum.
Ch.A8000 to Ch.A8170	Western Footpath	2.0m	Varies 1.7m – 2.0m	The footpath width will be reduced in conjunction with cycle track width to a minimum of 1.7m to reduce impact to existing residential access steps.
Ch.A8000 to Ch.A8030 & Ch.A8140 to Ch.A8145	Footpath	2.0m	Varies 1.7m – 2.0m	The footpath width will be reduced in conjunction with cycle track width to a minimum of 1.7m to reduce impact to existing property boundaries.
Ch.A8240 to Ch.A8250	Cycle track	2.0m	1.5m	A short length of cycle track / cycle lane, 1.5m in width, will be provided to facilitate cyclist priority at North Circular Rd. Junction in the eastbound/inbound direction. A 2m wide footpath will be provided along this stretch. It should be noted that the PDGB acknowledges a reduction in cycle track width to 1.5m is permitted as the absolute minimum.
Ch.A8920 to Ch.A8950	Cycle track	2.0m	1.5m	The cycle track width in the eastbound/ inbound direction will be reduced behind a proposed disabled parking bay. It should be noted that the PDGB acknowledges a reduction in cycle track width to 1.5m is permitted as the absolute minimum.
Ch.A9050 to Ch.A9100	Cycle track	2.0m	1.75m	The cycle track width in the eastbound/ inbound direction will be reduced behind a proposed loading lay-by to provide 2m wide footpath. It should be noted that the PDGB acknowledges a reduction in cycle track width to 1.5m is permitted as the absolute minimum.
Full length of Brunswick St North	Cycle track	2.0m	1.5m	Cycle track width in both directions will be reduced to minimise impact on footpath widths and achieve 3m traffic lane.
Brunswick St North Ch H0100 to Ch H0150	Footpath	2.0m	Varied 1.5m-2.0m	The southern footpath will be retained as existing due to property boundaries, width varies from 1.5m to 2.0m, in conjunction with reduced cycle track width and 3m traffic lane.
Full length of Blackhall St	Cycle track	3.25m	3.0m	A two-way cycle track 3.0m in width will be provided to minimise impact on footpath width through this area. It should be noted that the PDGB acknowledges a reduction in cycle track width can be considered on a case-by-case basis in consultation with the national cycle manual. The cycle track will be provided with a 0.5m buffer to the carriageway while a 2.0m min width footpath is provided to the rear.
Blackhall St	Footpath	2.0m	1.5m	The footpath width is locally reduced to a minimum of 1.5m at two locations where there is existing pedestrian ramps (both approximately 7m in length). The footpath width along the rest of Blackhall Street meets the minimum width of 2m.

4.5.5.3 Bus Lane Provision

An overview of the bus lane provisions as part of the Proposed Scheme is provided in Section 4.6.4. As outlined within that section, full bus priority through the use of dedicated bus lanes is not possible at all locations, and Signal Controlled Priority is used in Section 5 of the Proposed Scheme as listed in Table 4.24.

Table 4.24: Signal Controlled Bus Priority Junctions in Section 5

Junction Location	Priority Type	Note
Blackhall Place/ Brunswick St North/ Manor St junction (Outbound)	Unopposed bus movement for Northbound buses on mainline corridor. Bus Lane up to stop line for Northbound buses on mainline corridor.	To provide priority for buses in the Stoneybatter Village area, while providing wider footpaths, cycle tracks and reducing overall general traffic in this area.

4.5.5.4 Bus Stops

The different types of bus stop (island, shared landing and inline) are described in Section 4.6.4.4. The bus stop locations and types on Section 5 of the Proposed Scheme are outlined in Table 4.25.

Table 4.25: Proposed Bus Stop Locations along Section 5 Navan Road / Old Cabra Road Junction to Ellis Quay

Inbound / Outbound	Bus Stop Name	Bus Stop Number	Chainage	Bus Stop Type	Bus Shelter
Inbound	Stanhope Street Convent	1713	A8890	Island	Yes
Inbound	Cabra Cross	1906	A7475	Island	Yes
Inbound	Railway Bridge	1907	A7750	Shared Landing Area	Yes
Inbound	North Circular Road (relocated)	1909	A8250	Shared Landing Area	Yes
Inbound	Brunswick Street (relocated 100m south)	1714	A9175	Inline	Yes
Inbound	Blackhall Place	1715	A9400	Inline	Yes
Outbound	Aughrim Street (relocated)	1649	A8800	Island	Yes
Outbound	Drumalee	1911	A8280	Shared Landing Area	Yes
Outbound	Glenbeigh Road (relocated 150m south)	1914	A7820	Shared Landing Area	Yes
Outbound	Law Society	1647	A9350	Inline	Yes
Outbound	Arbour Place (relocated 115m south)	1648	A9125	Inline	Yes

4.5.5.5 Cycling Provision

The specific proposals for cycling facilities in Section 5 of the Proposed Scheme are described below. Provisions for cyclists at the signal-controlled junctions are described in Section 4.6.3.5.

New segregated cycle tracks will be provided along the Old Cabra Road in both directions along Primary Route 4B (as annotated in the GDA Cycle Network Plan) to its junction with North Circular Road. This will include the use of industry-standard cycle lane separators ('Armadillos') instead of the segregated kerbs along the outbound direction of the Old Cabra Railway Bridge (due to existing bridge deck details). Due to the width available, cyclists share the carriageway for the majority of the inbound direction on Prussia Street starting at Rathdown Square, and for a short section in the outbound direction starting at Kavanagh's Pub. There is also a short section in the inbound direction on Manor Street where cyclists have to share the carriageway (approximately 30m).

The rest of Manor Street has segregated cycle tracks which continue along Stoneybatter until the junction at Stoneybatter / Brunswick Street North. The cycle tracks then continue along Brunswick Street North to its junction with George's Lane. A two-way cycle track will be provided along the eastern side of George's Lane which continues along Queen Street connecting to the Primary Route 4D (as annotated in the GDA Cycle Network Plan) until the Proposed Scheme's tie-in to the Northern Quays.

4.5.5.6 Junction Information

An overview of the approach to junction review and design is provided in Section 4.6.7. The major and moderate junctions (signalised) within Section 5 of the Proposed Scheme are outlined in Table 4.26.

Table 4.26: Major and Moderate Junctions within Section 5 of the Proposed Scheme

Junction Location	Note
Major Junctions	
Old Cabra Rd / Glenbeigh Road	The Old Cabra Road / Glenbeigh Road T-junction will be signalised to enable side road traffic entering from Glenbeigh Road to be controlled and limited in volume (by use of short green times). Cycle turning will be provided by toucan crossings here rather than through specific cycle crossing points.
Manor Street / Aughrim Street	It is proposed to modify the junction to include signal control and introduce a Bus Gate, which will require all southbound and northbound general traffic to divert onto Aughrim Street. Only public service vehicles and cycles will be permitted to head south from Prussia Street to Manor Street and north from Manor Street to Prussia Street. A Bus Gate will also be introduced for buses arriving (and travelling south) on Aughrim Street; thus will effectively stop general traffic from travelling south from Aughrim Street to Manor Street.
Manor Street / Kirwan Street	This junction is proposed to be signalised to allow traffic entering from Kirwan Street and Manor Place to be controlled thereby limiting short-cutting traffic along side streets. A no-right turn ban will be introduced on Kirwan Street, and access to Manor Place from Manor Street will be restricted – to limit traffic using side roads as short cut routes.
Moderate Junctions / Priority Junctions	
Prussia Street / North Circular Road	The existing signal-controlled junction will be modified to provide more space for cyclist and pedestrian crossing facilities. General traffic movement from Prussia Street will be banned from turning right to ensure buses travelling to Old Cabra Road are not delayed.
Stoneybatter / Brunswick Street North	The existing junction will be signal-controlled. An outbound bus lane is proposed on Blackhall Place. Traffic from Brunswick Street North will turn left towards Blackhall Place or right towards Manor Street (but will be restricted by short green times to minimise through traffic on Manor Street). Segregated cycle lanes will be provided on either side of Manor Street / Stoneybatter leading to Brunswick Street North.
Blackhall Place / King Street North	The existing signal-controlled junction is proposed to be altered to provide an outbound bus lane, and an inbound bus lane on the Blackhall Place (south) exit. All outbound general traffic from Blackhall Place will turn right into King Street North. All inbound general traffic from Stoneybatter will turn left into King Street North.
Brunswick Street North / Grangegorman Lower	The existing signal-controlled junction is proposed to be modified such that Brunswick Street North is an exit only for one-way traffic (westbound) and with added cycle track provision from Brunswick Street North to George's Lane and improved crossings for cyclists and pedestrians.
King Street North / Queen Street	The existing signal-controlled junction is proposed to be modified to remove the turning movement for general traffic from King Street North to George's Lane. A proposed two-way cycle track will connect through the junction to Queen Street.
Blackhall Place / Blackhall Street	The existing junction is proposed to be altered by realignment of the bellmouth from Blackhall Street to remove the existing central splitter island. The junction will continue to operate as a signal-controlled junction, with pedestrian crossings proposed on all arms of the junction.
Queen Street / Blackhall Street	The existing junction is proposed to be altered by replacement of a traffic lane with a two-way cycle track on the eastern side of Queen Street. Access to the Blackhall Street cycle route will be via a Toucan crossing.
Blackhall Place / Benburb Street	The existing signal-controlled junction is proposed to be modified by provision of a northbound bus lane (in addition to the existing southbound bus lane).
Queen Street / Benburb Street	The existing signal-controlled junction is proposed to be modified by removal of two (of three) southbound traffic lanes on Queen Street, and will be replaced by a two-way cycle track and wider footpaths.

4.5.5.7 Structures

4.5.5.7.1 Bridges

There are no bridge works proposed along Section 5 of the Proposed Scheme.

4.5.5.7.2 Retaining Walls

There are no principal retaining walls along Section 5 of the Proposed Scheme.

4.5.5.8 Parking and Loading Bays

Changes to the parking and loading provisions along Section 5 as a result of the Proposed Scheme are shown in Table 4.27.

Table 4.27: Parking and Loading Impact Summary – Section 5

Location	Parking Provision	Existing	Proposed	Proposed Change
Prussia Street, Manor Street, Stoneybatter, Manor Place and Aughrim Street	Designated Paid & Permit Parking Spaces	80	16	-64
	Disabled Permit Parking Spaces	2	2	-0
	Loading / Unloading Spaces (in Designated Loading Bays)	6	7	+1
Blackhall Place and adjacent streets	Designated Paid & Permit Parking Spaces	54	42	-12
	Loading / Unloading Spaces (in Designated Loading Bays)	3	4	+1
Total Change		145	71	-74

4.5.5.9 Landscape and Urban Realm

The Proposed Scheme will introduce traffic management measures that will substantially reduce through traffic at Stoneybatter and provide opportunities to further develop the public realm to create an even stronger pedestrian priority urban neighbourhood character.

The carriageway width will be reduced in many locations and the footpaths widened to match the existing urban realm works. New and upgraded bus stops will be installed and continuous cycle tracks will be provided on both sides of the street. The junction at Aughrim Street will be reduced to a single lane only and the existing public spaces either side of the junction will be extended and further developed to increase the public amenity value of these spaces (see Image 4.4). The existing mature trees will be retained, and the revised layout will facilitate planting of additional new trees and other landscaping. Along the main streetscape, the existing established urban realm will be extended to incorporate wider footpaths and new cycle tracks.

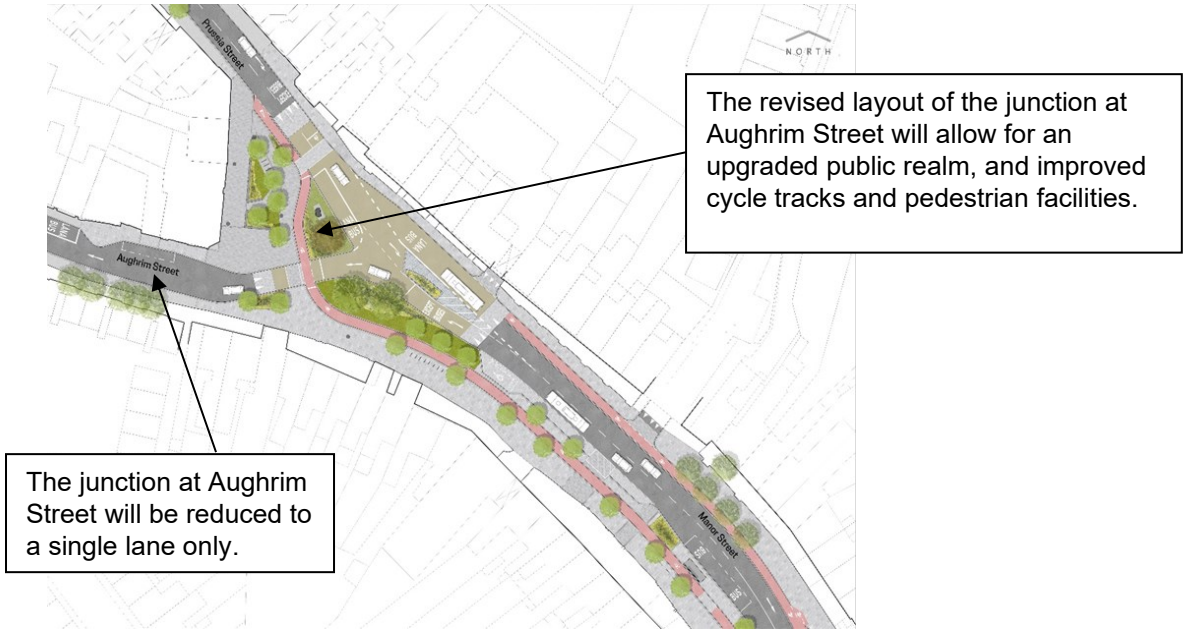

Image 4.4: Stoneybatter Village

After Brunswick Street North, Stoneybatter becomes particularly narrow. Brunswick Street North will become one-way westbound for general traffic and will incorporate widened footpaths and dedicated cycle tracks. The public realm along Brunswick Street North will be upgraded to match Stoneybatter and to connect to that along George's Lane which will be further upgraded and will incorporate two-way cycle facilities and new tree planting (see Image

4.5). The pedestrian route between Stoneybatter and the River Liffey will be upgraded in width, amenity and quality, and will incorporate continuous high quality cycle facilities bringing additional life and animation to these streets.

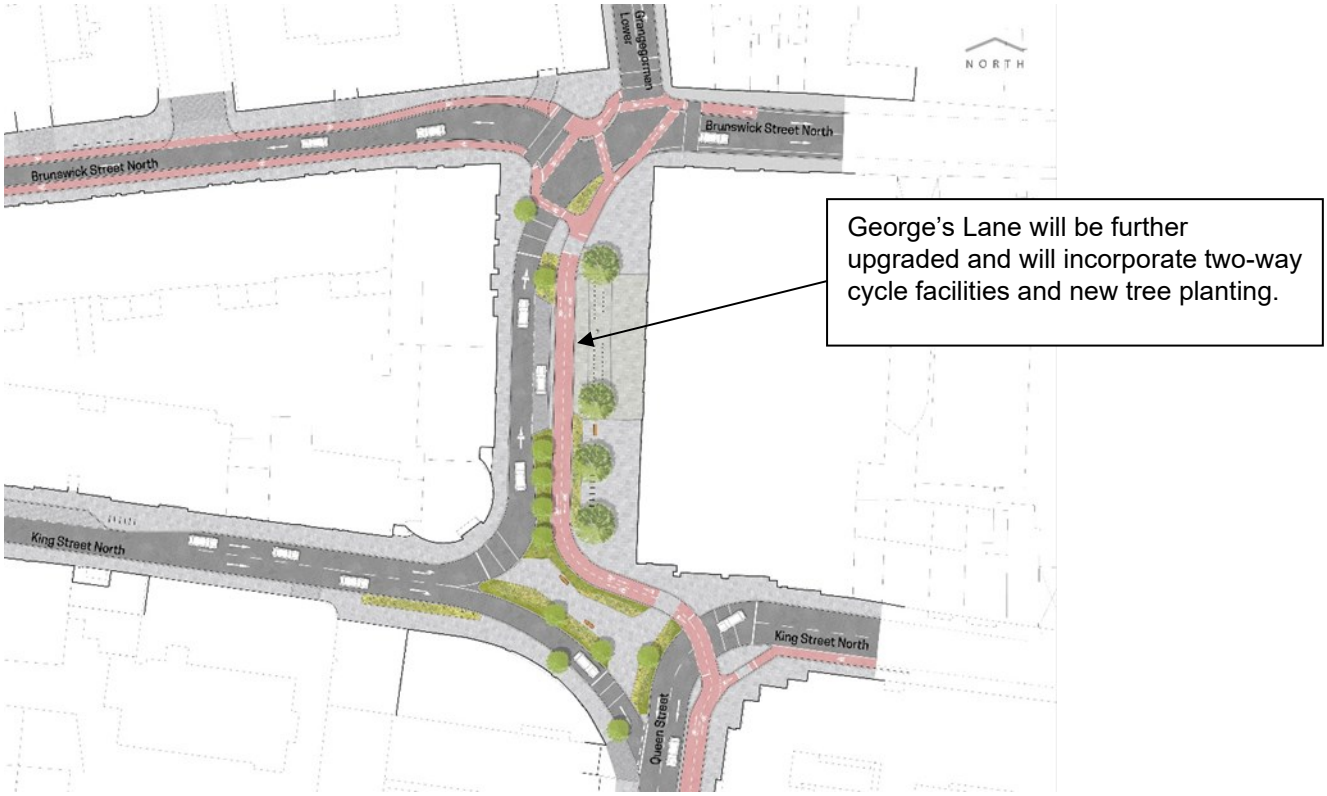

Image 4.5: Brunswick Street North and George's Lane

4.5.5.10 Land Acquisition and Use

The Proposed Scheme in Section 5 follows the R805 (Old Cabra Road, Prussia Street, Manor Street, Stoneybatter and Blackhall Place) to where the scheme terminates at Ellis Quay. Cycle tracks will be provided along Blackhall Street, George's Lane and Queen Street.

Old Cabra Road is characterised as an established residential road with private dwellings and garden fronting onto the road.

South of North Circular Road, the route consists of a cluster of modern residential and retail developments, and transitions to the narrower, more traditional streetscape character. Through Stoneybatter, there is a distinctive traditional mixed use urban neighbourhood providing residential, commercial, retail, community and other uses.

The land use changes at the intersection of Blackhall Place/ Blackhall Street and Ellis Quay to medium rise apartments and commercial premises.

The works within this section generally sit within the existing road boundary. Permanent land take is required in the vicinity of the Park Shopping Centre on Prussia Street to facilitate the scheme.

The impacts on residential amenity arising from land acquisition in Section 5 of the Proposed Scheme and are addressed in Chapter 10 (Population). Similarly, the impacts on landscape amenity arising from land acquisition in Section 5 of the Proposed Scheme are addressed in Chapter 17 (Landscape (Townscape) & Visual).

4.5.5.11 Rights of Way

Table 4.28 outlines the locations where existing rights of way which will be affected by the Proposed Scheme.

Table 4.28: Existing Rights of Way affected

Location	Chainage	Existing Situation	Proposed Change
Paved Laneway linking Aughrim Street and Prussia Street (outside Kavanagh's Pub)	A8650	There is an existing paved laneway outside of Kavanagh's pub which links Aughrim Street to Prussia Street. This laneway is currently open to vehicular traffic in both directions and effectively acts as a slip lane at the junction between Aughrim Street and Prussia Street. There are also a number of public car parking spaces accessed from this laneway.	As part of the proposed scheme it is proposed to remove this laneway and replace it with footpath, public realm and landscaped areas. As such, following the implementation of the Proposed Scheme, vehicular traffic (except bicycles) would no longer be able to travel over this area. Access to both Aughrim Street and Prussia Street will still be available via the surrounding road network.
Junction of King Street North and George's Lane	K000	Currently, vehicular traffic heading west on King Street North can turn right to travel north on George's Lane.	As part of the proposed scheme it is proposed to remove the section of carriageway linking King Street North and George's Lane and replace it with footpath, cycle track, public realm and landscaped areas. Following the implementation of the Proposed Scheme, vehicular traffic (except bicycles) would no longer be able to travel over this area. Access to George's Lane will still be available via the surrounding road network.
St. Joseph's Road / Prussia Street junction	A8480	Currently vehicular traffic can turn from Prussia Street onto St. Joseph's Road.	As part of the proposed scheme, to prevent through movements of general traffic on St. Joseph's Road, it is proposed to restrict vehicular traffic (except bicycles) from turning from Prussia Street to St. Joseph's Road. Access to St. Joseph's Road will still be available via the surrounding road network.
Brunswick Street North	A9100	Currently vehicular traffic can travel in both directions on Brunswick Street North.	As part of the proposed scheme, to discourage through movements of general traffic in Stoneybatter, it is proposed to restrict vehicular traffic (except bicycles) from travelling eastbound on Brunswick Street North. Access to Brunswick Street North will still be available via the surrounding road network.
Ratoath Road / Swilly Road junction	n/a	Currently vehicular traffic can turn from Ratoath Road onto Swilly Road.	As part of the proposed scheme, to minimise general traffic levels on local side streets, it is proposed to restrict vehicular traffic (except bicycles) from turning from Ratoath Road to Swilly Road. Access to Swilly Road will still be available via the surrounding road network.
Cowper Street (between Lucky Lane and Aughrim Street)	n/a	Currently vehicular traffic can access Aughrim Street from Cowper Street.	As part of the proposed scheme, to minimise general traffic levels on local side streets, it is proposed to restrict vehicular traffic (except bicycles) from travelling northbound on Cowper Street between Lucky Lane and Aughrim Street, and by extension from accessing Aughrim Street from Cowper Street. Access to Aughrim Street will still be available via the surrounding road network.
Annamoe Road / Annamoe Terrace junction	n/a	Currently vehicular traffic can travel southbound along Annamoe Road from Annamoe Terrace.	As part of the proposed scheme, to minimise general traffic levels on local side streets, it is proposed to restrict vehicular traffic (except bicycles) from travelling southbound from Annamoe Terrace to Annamoe Road. Access to Annamoe Road (south of Annamoe Terrace) will still be available via the surrounding road network.

Location	Chainage	Existing Situation	Proposed Change
Charleville Road	n/a	Currently vehicular traffic can travel southbound along Charleville Road between Annamoe Parade and North Circular Road.	As part of the proposed scheme, to minimise general traffic levels on local side streets, it is proposed to restrict vehicular traffic (except bicycles) from travelling southbound along Charleville Road between Annamoe Parade and North Circular Road. Access to North Circular Road will still be available via the surrounding road network.
Phibsborough	n/a	Currently vehicular traffic heading northbound on Phibsborough Road can turn onto Phibsborough.	As part of the proposed scheme, to minimise general traffic levels on local side streets, it is proposed to restrict vehicular traffic (except bicycles) from turning from Phibsborough Road onto Phibsborough. Access to Phibsborough will still be available via the surrounding road network.
Monck Place	n/a	Currently vehicular traffic can turn from Phibsborough Road onto Monck Place.	As part of the proposed scheme, to minimise general traffic levels on local side streets, it is proposed to restrict vehicular traffic (except bicycles) from turning from Phibsborough Road onto Monck Place. Access to Monck Place will still be available via the surrounding road network.

4.6 Key Infrastructure Elements

The following sections provide a description of the main infrastructure elements of the Proposed Scheme. It has been designed following guidance relating to the design principles for urban streets, bus facilities, cycle facilities and public realm as outlined in Section 4.4.

4.6.1 Mainline Cross-Section

Traffic lane widths (including bus lanes) will follow the guidance outlined in DMURS, with the preferred width of traffic lanes on the Proposed Scheme 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 width of 2.75m is permissible but not desirable and should only be permitted on straight road sections with very low Heavy Goods Vehicles (HGV) percentage and where all desirable minimum widths for footpaths, cycle tracks, parking, bus lanes are not achievable without impacting on third-party lands. if appropriate, taking all design factors into account in the context of the Proposed Scheme objectives.

The desirable minimum width for a single direction, with flow, raised adjacent cycle track is 2.0m. Based on the National Cycle Manual (NCM) this allows for overtaking within the cycle track. The minimum width is 1.5m. The desirable width for a two way cycle track is 3.25m 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 an absolute 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 Image 4.6.

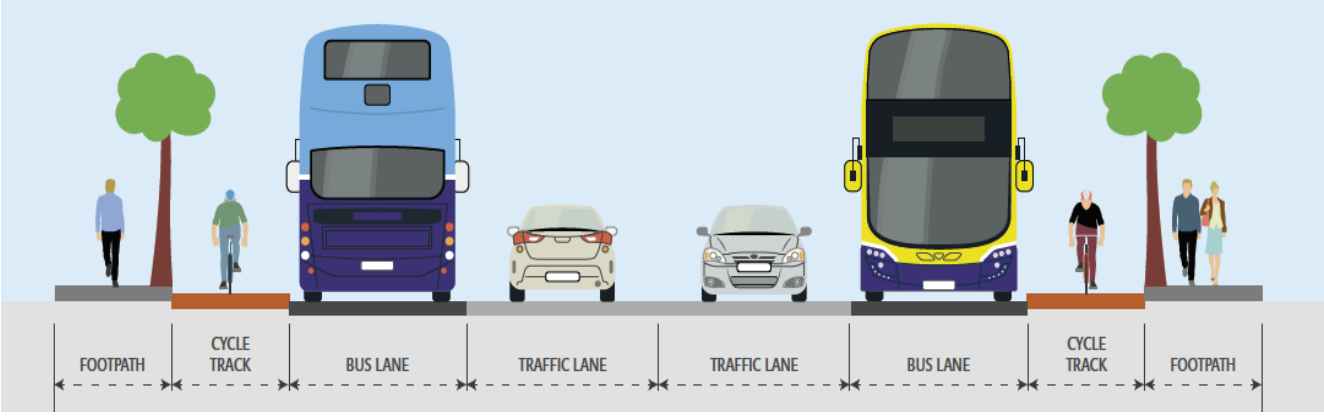

Image 4.6: Typical BusConnects Road Layout

The cross-sectional design of the mainline has been developed to achieve the desirable width criteria contained within the PDGB and TII Publications wherever reasonably practicable as outlined in Table 4.29, Table 4.30 and Table 4.31. Where these criteria are not achievable, for instance due to physical constraints at pinch points, deviations from standards are outlined for each section of the Proposed Scheme in Section 4.5.

Table 4.29: Cross-Sectional Design Parameters (PDGB)

Design Element	Desirable Minimum Standard	Minimum Width	Permitted Reductions at Constraints
Footpath	2.0m	1.8m	1.2m over a 2m length of path (2)
Cycle Track (one-way)	2.0m	1.5m	Local narrowing below 1.5m may be necessary short distances to cater for local constraints
Cycle Track (two-way)	3.25m+ 0.5m (buffer)	Refer to National Cycle Manual width calculator. 0.3m (buffer)	N/A
Bus Lane	3.0m	N/A	N/A
Traffic Lane	Preferred Width: 3.0m where speed ≤ 60 km/h 3.25m where speed limit > 60 km/h	2.75m (3)	N/A
(1) Deviations from standard, for each Section on the Proposed Scheme are presented in Section 4.5.			
(2) Building for everyone: A Universal Design Approach.			
(3) Traffic lane widths of 2.75m are permissible but not desirable and should only be permitted on straight road sections with very low HGV percentage and where all desirable minimum widths for footpaths, cycle tracks, parking, bus lanes are not achievable without impacting on third-party lands.			

Table 4.30: TII Publications Cross-Sectional Design Parameters - Footway

Design Element	Recommended limits(m)	Extreme Limits(m)	Design Standard
Footway	2.0m	1.3	DN-PAV-03026 - Footway Design Jan 2005

Table 4.31: TII Publications Cross-Sectional Design Parameters -Cycle tracks and vehicle lanes

Design Element	Desirable min (m)	One step below Desirable min(m)	Design Standard
Cycle Track (two-way high volume)	3.0	2.5	DN-GEO-03036 - Cross Sections and Headroom - May 2019
Traffic Lane (Urban All-Purpose Dual 2 / Dual 3 Lane)	3.65	N/A	DN-GEO-03036 - Cross Sections and Headroom - May 2019
Traffic Lane (Urban Dual Carriageway Relief Road)	3.5	N/A	DN-GEO-03036 - Cross Sections and Headroom - May 2019

4.6.2 Pedestrian Provision

4.6.2.1 Footpath Widths

As stated in Section 4.6.1, 2.0m is the desirable minimum width for a footpath. 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. Building for Everyone: A Universal Design Approach (NDA 2020), 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.

Throughout the Proposed Scheme, 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

Pedestrian crossings have been designed to accommodate a moderate flow of foot traffic along the mainline desire line where possible, with a minimum width of 2.4m at both signalised junctions and zebra crossings. Pedestrians will share their manoeuvres with cyclists when using Toucan crossings, which are to be provided at signalised junctions which cannot accommodate segregated cycle crossings. To facilitate road users who cannot cross in a reasonable time, the desirable maximum crossing length without providing a refuge island is 19m. Where this is not possible, refuge islands at least 4m wide are to be used where possible to allow those who cannot cross in a reasonable time to make the journey in two phases.

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

Formal crossing points will be provided at bus stop islands, consisting of an on-demand signalised pedestrian crossing with appropriate tactile paving, push button units and Light Emitting Diode (LED) warning studs. Pedestrian crossings are indicated in the Landscaping General Arrangement drawings (BCIDC-ARP-ENV_LA-0005_XX_00-DR-LL-9001) in Volume 3 of this EIAR.

4.6.3 Cycling Provision

One of the objectives for the Proposed Scheme 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 (BCIDC-ARP-ENV_LA-0005_XX_00-DR-LL-9001) in Volume 3 of this EIAR.

The ‘preferred cross-section template’ developed for the Proposed Scheme 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 National Cycle Manual (NCM) (NTA 2011) and the PDGB.

The desirable minimum width for a single-direction, with-flow, raised-adjacent cycle track is two metres. This arrangement allows for two-abreast cycling, and based on the NCM Width Calculator, this also allows for

overtaking within the cycle track. The minimum width is 1.5m, which based on the NCM Width Calculator, allows for single file cycling. Localised narrowing of the cycle track below 1.5m 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 3.25m. In addition to this, a buffer of 0.5m should be provided between the two-way cycle track and the carriageway. Using the NCM 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 Scheme is approximately 10.9km long and includes approximately 7.8km of segregated cycle track inbound and 8.16km outbound. The existing segregated cycle lane provision is approximately 0.76km inbound and 1.19km outbound (see Table 4.1). Details of the proposed cycle provision throughout the extent of the Proposed Scheme are provided in the following sections.

4.6.3.1 Cycle Tracks

A cycle track is a segregated lane dedicated to cycling which is physically separated from the adjacent traffic lane and/or bus lane horizontally and/or vertically, as shown in Image 4.7, taken from the PDGB.

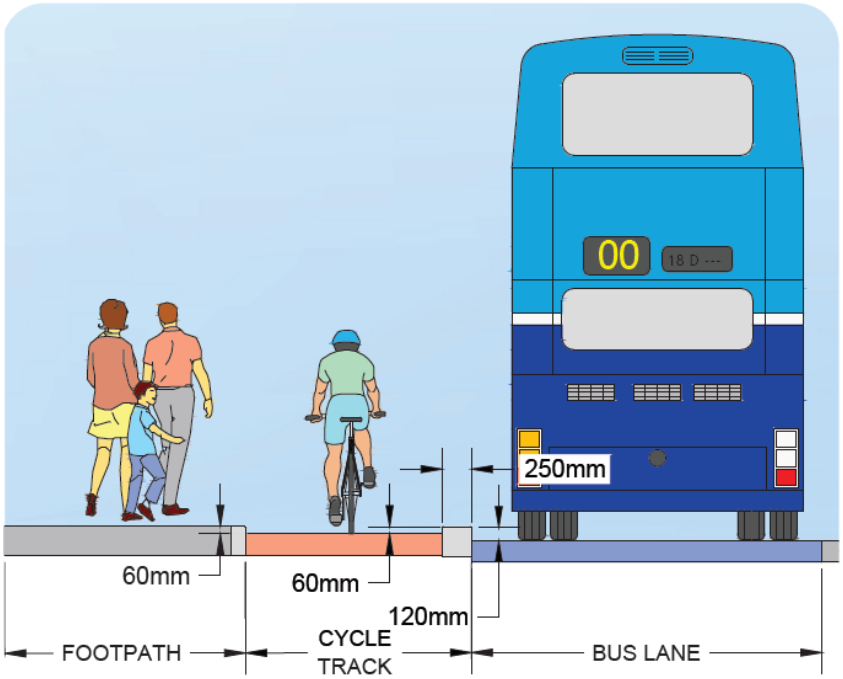

Image 4.7: Fully Segregated Cycle Track

Existing bridge deck details necessitate the use of industry-standard cycle lane separators ('Armadillos') instead of kerbed segregation at:

- N3 Overbridge at Mulhuddart; and
- Old Cabra Road Railway overbridge (western side).

4.6.3.2 Cycle Lanes

Cycle lanes do not have vertical and / or horizontal separation from adjacent traffic lanes. A short section of cycle lane is proposed on approach to a bus stop southbound at Rathdown Square / Prussia Street junction. Inbound cyclists share the carriageway beyond this point.

4.6.3.3 Quiet Street Treatment

Offline options may include directing cyclists along streets with minimal general traffic other than car users who live on the street. Guidance in this regard has been provided within the PDGB, which states:

> *"Diversions of proposed cycle facilities on to quieter parallel routes, to avoid localised narrowing of cycle tracks on the main CBC route, is to be considered in the context of the CBC route being listed as a primary cycle route as per the Greater Dublin Area Cycle Network Plan. These diversions, however, may also be considered where appropriate cycle facilities cannot be provided along the CBC route without significant impact."*

These are called Quiet Streets due to the low volume of local general traffic users, travelling at low speed, and are deemed suitable and safe for cyclists sharing the roadway with the general traffic without the need to construct segregated cycle tracks or painted cycle lanes. The Quiet Street treatment would involve appropriate advisory signage for both the general road users and cyclists.

On the Proposed Scheme, a Quiet Street Cycle Route is proposed along Castleknock Manor which connects to the two-way cycle track on the Navan Road (see General Arrangement drawing BCIDC-ARP-GEO_GA-0005_XX_00-DR-CR-9001 Sheet 16 of 40 included in Volume 3 of this EIAR). This links directly with the GDA Cycle Network Plan Secondary Route 4A, while reducing the need for land take and removal of trees.

4.6.3.4 Treatment of Constrained Areas

The existing road corridor includes 3.4km inbound and 4.0km outbound of non-segregated cycle lanes. At some locations along the Proposed Scheme, desirable minimum width of cycle tracks cannot be achieved, and localised narrowing will be required. Due to the width available, cyclists share the carriageway at the following locations along the Proposed Scheme:

- Prussia Street (inbound Ch.A8250 to Ch.A8700 and outbound Ch.A8670 to Ch.A8550); and
- Manor Street (inbound Ch.A8700 to Ch.A8730).

4.6.3.5 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 design to maximise the number of people moving through each junction and to prioritise these sustainable modes of travel. These locations are shown on the General Arrangement drawings (BCIDC-ARP-GEO_GA-0005_XX_00-DR-CR-9001) included in Volume 3 of this EIAR.

4.6.3.6 Cycle Parking Provision

Cycle stands will be provided, where practicable, at island bus stops and key additional locations as noted in the Landscaping General Arrangement Drawings (BCIDC-ARP-ENV_LA-0005_XX_00-DR-LL-9001) included in Volumes 3 of this EIAR.

4.6.4 Bus Priority Provision

One of the objectives of the Proposed Scheme 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. Over the majority of the route, as per the guidance for traffic lane widths outlined in DMURS, a 3m lane will be provided for bus use only, apart from the section between Snugborough Road and Phoenix Park Avenue junction. This is as per the guidance for traffic lane width outlined in DMURS. Larger lane widths are needed in some instances to enable buses to navigate corners, etc. ('swept path'). Bus Lanes are shown on the General Arrangement drawings (BCIDC-ARP-GEO_GA-0005_XX_00-DR-CR-9001) included in Volume 3 of this EIAR.

4.6.4.2 Signal Controlled Priority

An alternative measure for achieving bus priority at locations where the provision of bus lanes is not possible is the use of Signal Control Priority (SCP). SCP facilitates bus priority by using traffic signals to give buses priority ahead of general traffic on sections of a route with significant physical constraints or pinch-points impacting on the provision of a bus lane. Typical pinch-points arise where the existing carriageway is narrow (no bus lane or segregated cycle track) due to existing buildings or structures that cannot be demolished or modified to widen the road to make space for a bus lane. While SCP is a good alternative to a physical bus lane it is only effective for short distances. It works through the use of 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 the bus lane recommences downstream. The general traffic will be stopped at the signal to allow the bus to pass through the narrow section first. SCP will fail if downstream congestion blocks access to the downstream bus lane Image 4.8 illustrates a schematic operation of SCP.

Image 4.8: Signalised Bus Priority Schematic Operation (Source: BCPDGB)

SCP will be provided at the Stoneybatter / Brunswick St North junction (Outbound) to provide priority for buses in the Stoneybatter Village area, while providing wider footpaths, segregated cycle tracks and reducing overall general traffic in this area.

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 is directed by signage to divert towards other roads before it arrives at the Bus Gate.

The hours of operation of the bus gates will be subject to on-going review based on prevailing traffic conditions and the goal of achieving the project objectives. The NTA and local authorities will co-operate in good faith to address any issues with the hours of operation that may arise during the lifetime of the Proposed Scheme.

Bus Gates are proposed along the Proposed Scheme at the following locations:

- Navan Road at junction with Ratoath Road / Cabra Road / Old Cabra Road (inbound);
- Railway overbridge at Old Cabra Road (outbound);
- Manor St at junction with Prussia St and Aughrim St (inbound and outbound);
- Aughrim Street at junction with Prussia St and Manor St (inbound);
- Blackhall Place at junction with King Street North (outbound); and
- Stoneybatter at junction with King Street North (inbound) (existing situation).

4.6.4.4 Treatment at Pinch Points

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 pedestrian footpath is reduced. The Proposed Scheme design reflects this approach, where practicable.

4.6.4.5 Bus Stops

To improve the efficiency of the bus service along the Proposed Scheme the position and number of bus stops has been evaluated as part of a bus stop review. The main principles considered as part of the bus stop review were as follows:

- Aim to achieve a bus stop spacing of 400m in suburban locations, and 250m in urban centres;
- Locate bus stop as close as possible to nearest junction/pedestrian crossing;
- Locate bus stop downstream of junction rather than upstream;
- Consider space requirements to provide bus stop including shelter, waiting area, cycle lane and footpath provision and information displays;
- Review existing and proposed boarding and alighting volumes to determine the usage of the bus stop; and
- Consider the potential for interchange with orbital bus services proposed as part of the New Dublin Area Bus Network.

The above principles were considered to determine whether a bus stop should remain where it is, be relocated or be removed. The following bus stop designs were considered for use on the Proposed Scheme:

- Island Bus Stop;
- Shared Landing Zone:
- Inline Bus Stop; and
- Lay-by Bus Stop.

4.6.4.5.1 Island Bus Stops

Where sufficient space allows Island Bus Stops are the preferred bus stop option for the Proposed Scheme.

This option will reduce conflict between cyclists and stopping buses by deflecting cyclists behind the bus stop. To address the pedestrian and cyclist conflict pedestrian priority crossings accompanied by on-call signals will be

provided, with narrowing of the cycle track from 2.0m to 1.5m to prevent cyclists overtaking through the bus stop. An example of an island bus stop is shown on Image 4.9 and Image 4.10.

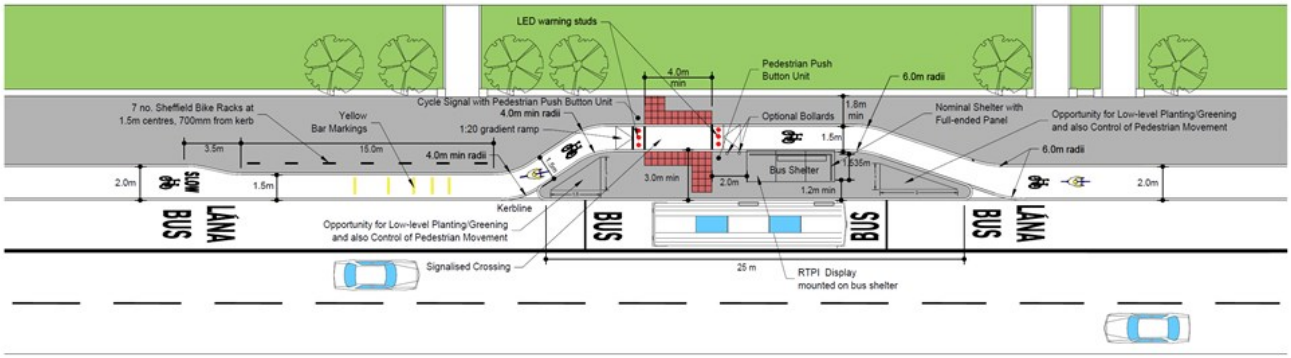

Image 4.9: Island Bus Stop

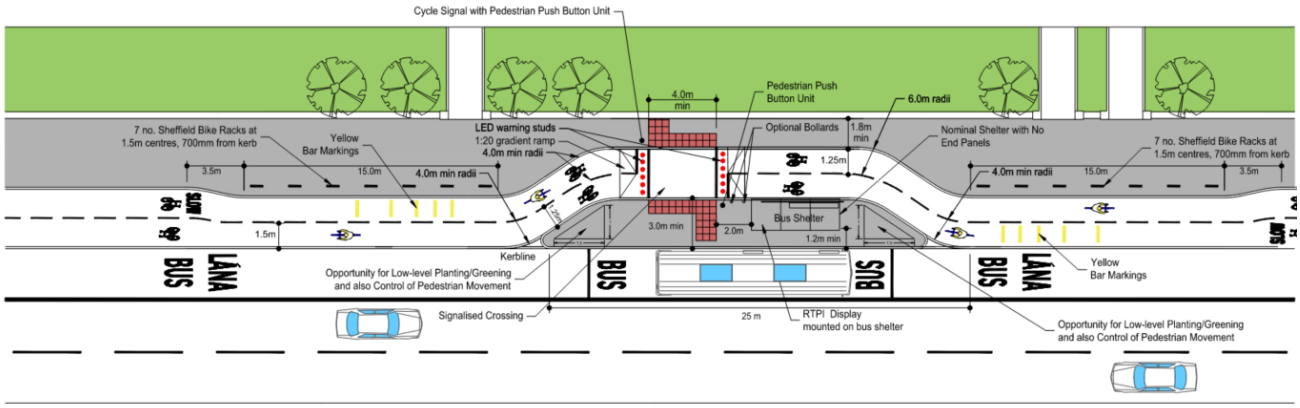

Image 4.10: Island Bus Stop – Two way Cycle Track

4.6.4.5.2 Shared Landing Zone

Where space constraints do not allow for an island bus stop, an option consisting of a Shared Bus Stop Landing Zone is proposed. It is designed to reduce conflict between cyclists and stopping buses by ramping cyclists up to footpath level where they continue through the stop. The cycle track will also be narrowed when level to the footpath and tactile paving provided to prevent pedestrian/cyclist conflict. An example of a shared landing zone bus stop is shown in Image 4.11.

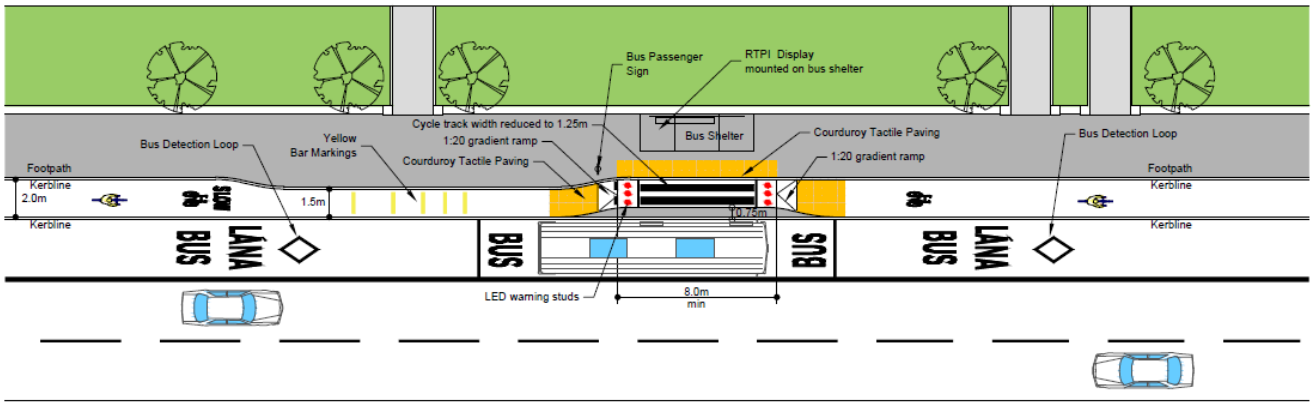

Image 4.11: Shared Bus Stop Landing Zone Arrangement

4.6.4.5.3 Inline Bus Stop

Where there are no cycle tracks provided, inline bus stops are used, where the users departing the bus exit straight on the footway. Inline bus stops are typically found in constrained sections of the Proposed Scheme.

4.6.4.5.4 Lay-by Bus Stop

Lay-by bus stops can provide an effective solution for coaches with long dwell times at bus stops, allowing other buses to pass the stopped bus. These are important on routes where the frequency of buses is high and where bunching can occur if inline bus stops are provided along the entire length of the scheme.

An example of a lay-by bus stop arrangement is shown in Image 4.12.

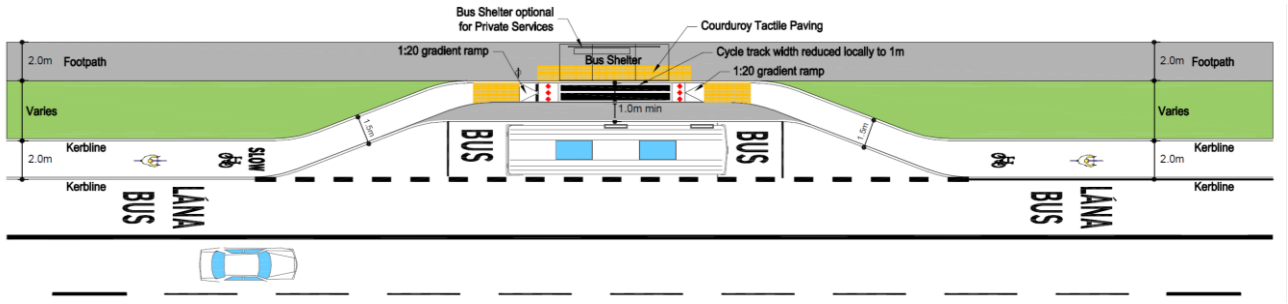

Image 4.12: Layby Bus Stop Arrangement

4.6.4.6 Bus Stop Shelters

As a general policy, shelters will be provided at all bus stops on the Proposed Scheme. This will improve the comfort of passengers awaiting a bus during poor weather, as well as providing shade on sunny days. In some locations, such as those designated as Architectural Conservation Areas, it may however not be appropriate to provide a bus shelter in front of a building of heritage value to minimise visual impact. Such deviations from the standard arrangement are noted in Section 4.5.

4.6.5 Accessibility for Mobility Impaired Users

The aim of the Proposed Scheme is to provide enhanced walking, cycling and bus infrastructure. In achieving this aim, the Proposed Scheme has 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 Scheme:

- Preliminary Design Guidance Booklet for BusConnects Core Bus Corridors (NTA 2020);
- Building for Everyone: A Universal Design Approach (NDA 2020);
- UK DfT Guidance on the use of tactile paving surfaces; and
- BS8300:2009 +A1:2010 Design of buildings and their approaches to meet the needs of disabled people – Code of practice.

The Disability Act 2005 (as amended) places a statutory obligation on public service providers to consider the needs of disabled people. An Accessibility Audit of the existing environment and proposed draft preliminary design for the corridor was undertaken. The Accessibility Audit provided a description of the key accessibility features and potential barriers to mobility impaired people based on the Universal Design standards of good practice. The Accessibility 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 Proposed Scheme which was highlighted as a potential mobility constraint in the Accessibility Audit. 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 Scheme has implemented the use of island bus stops, including signal call button for crossing of cycle tracks, to manage the interaction between the various modes with the view to providing a balanced safe solution for all modes.

4.6.6 Integration

4.6.6.1 Integration with Existing and Proposed Public Transport Network

One of the objectives of the Proposed Scheme is to enhance interchange between the various modes of public transport operating in Dublin City and wider metropolitan area. The Proposed Scheme facilitates improved existing and new interchange opportunities with other transport services including:

- Existing LUAS (Red Line) on Benburb Street;
- Existing bus services at numerous locations along the route, including bus routes 37, 38, 39, 70, NX, 105 and 111 (operated by Dublin Bus and Bus Eireann);
- Future Bus service proposals including B-Spine etc. associated with the new Dublin Area Bus Network;
- Future Navan Parkway Rail Station;
- Future Rail public transport services including DART+ and MetroLink; and
- Greater Dublin Area Cycle Network Plan (GDACNP) (NTA 2013).

4.6.6.2 Integration with Other Road Users

Local access will generally be maintained along the Proposed Scheme corridor although there will be impacts on vehicle capacity along the route due to the reallocation of road space to bus priority and cycle tracks 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 overall along the route, without removing the option for general traffic to use the majority of the corridor. 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.

4.6.6.3 Integration with Ballymun/Finglas to City Centre Core Bus Corridor Scheme

The Ballymun/Finglas to City Centre CBC scheme proceeds along the Phibsborough Road and interacts with proposed implementation of traffic management measures for the Blanchardstown to City Centre Core Bus Corridor scheme at Monck Place and Phibsborough junctions.

Works proposed to the junctions include the introduction of short one-way sections, kerbline realignment and uncontrolled raised crossings, along with landscaping and a cycle track at Monck Place junction.

The design teams of both schemes have coordinated the respective scheme designs to provide flexibility in the proposals such that construction sequencing and physical works can be coordinated or delivered in sequence should both schemes be implemented.

The traffic management measures to be implemented by the Proposed Scheme are located at R108 Phibsborough Road / Phibsborough junction and R108 Phibsborough Road / Monck Place junction as shown on the General Arrangement drawings (BCIDC-ARP-GEO_GA-0005_XX_00-DR-CR-9001) included in Volume 3 of this EIAR. Once in place, both Core Bus Corridor Schemes will provide increased capacity, faster journey times and improved reliability for buses which should lead to considerable mode shift from car transport to public transport, which will reduce traffic levels generally across the road network in and around both corridors.

4.6.6.4 Interaction with other Infrastructure Projects

The Proposed Scheme will interface with the following under construction or proposed developments:

- The Snugborough Interchange Upgrade scheme is being undertaken by Fingal County Council and includes the construction of a second bridge over the N3 national primary route as well as new bus lanes, footpaths, protected cycle tracks and traffic lanes giving improved accessibility to Blanchardstown Shopping Centre and the Dublin Enterprise Zone in Mulhuddart. The scheme has been designed to address network congestion issues and deliver significant improvements for pedestrians, cyclists and bus services.
- Park Shopping Centre redevelopment proposes the demolition of the existing Park Shopping Centre and construction of a new mixed-use District Centre, Student Residential Housing development. The redevelopment is planned to include a new pedestrian and bicycle street connecting Prussia Street with the emerging Grangegorman SDZ campus.
- Navan Parkway development involves the redevelopment of lands to the north and south of the R147 Navan Road at Navan Parkway on a 45.8 hectare site.

4.6.7 Junctions

The design and modelling of junctions have been an iterative process to optimise the number of people (rather than vehicles) that can pass through each junction, with priority given to pedestrian, cycle and bus movements. The design for each junction within the Proposed Scheme was developed to meet the underlying objectives of the Proposed Scheme.

Junctions have been designed to ensure a high level of comfort and priority for sustainable modes of travel e.g., walking, cycling and public transport, by prioritising the space and time allocated to these modes within the operation of a junction, and subsequently to accommodate the forecasted future year traffic volumes as safely and efficiently as possible within the remaining space and time. This has allowed the design to maximise the number of people moving through each junction and to prioritise these sustainable modes of travel.

Junction design on the Proposed Scheme falls into four categories, namely:

- Major Junctions;
- Moderate Junctions;
- Minor Junctions; and
- Priority Junctions.

The categorisations are based on:

- Size;
- The extent of physical work required to establish them; and
- The degree of change compared to the existing layout.

The junctions locations along the Proposed Scheme and the layouts that will be implemented at these locations are presented in Section 4.5.

4.6.8 Structures

Where the route interfaces with an existing structure, a visual inspection has been carried out to identify the current condition of the structure and any repair/maintenance works required. Where alterations to the existing carriageway lines, kerbs lines and verge widths are proposed to the superstructure of an existing structure an assessment has been carried out to ensure the structural capacity is capable of withstanding the revised arrangement.

A number of new structures are proposed along the length of the Proposed Scheme as listed in Table 4.32. This table includes minor retaining walls with a retention less than 1.5m.

Table 4.32: Proposed Structures

Section of Proposed Scheme	Structure Reference	Structure Type	Name / Location / Chainage	Obstacle
Bridges and Bridge Sized Culverts – see Section 4.6.8.1.1				
Section 2: Snugborough Road to N3 / M50 Junction	BR01	Bridge Widening	Tolka River Bridge Widening	River Tolka
Section 2: Snugborough Road to N3 / M50 Junction	BR02	Bridge Widening	Mill Road Bridge Widening	Mill Road
Pedestrian Ramps – see Section 4.6.8.1.2				
Section 2: Snugborough Road to N3 / M50 Junction	RW07-A	Stairs and Ramps including a Principal Retaining Wall which is a Spreadfoot Cantilever Type.	RW_07-A Stairs and Ramps located to the south of the N3 and providing pedestrian access from Mill Road to new bus stop on N3 Dual Carriageway. Including retaining wall. Ch.A1604 to Ch.A1653	Bus stop on southern side of N3
Section 2: Snugborough Road to N3 / M50 Junction	RW07-B	Stairs and Ramps including a Principal Retaining Wall which is a Spreadfoot Cantilever Type.	RW_07-B Stairs and Ramps located to the north of the N3 and providing pedestrian access from Mill Road to new bus stop on N3 Dual Carriageway. Including retaining wall. Ch.A1540 to Ch.A1609	Bus stop on northern side of N3
Principal Retaining Walls – see Section 4.6.8.1.3				
Section 1: N3 Blanchardstown Junction to Snugborough Road	RW01	Principal Retaining Wall which is a Spreadfoot Cantilever Type.	Blanchardstown Road South Ch.B453 to Ch.A40	Vegetated berm adjacent Blanchardstown Road South
Section 2: Snugborough Road to N3 / M50 Junction	RW09	Principal Retaining Wall which is a Spreadfoot Cantilever Type.	Ch.A2219 Ch.A2305	N3 embankment adjacent Castleknock health & leisure centre
Section 3: N3 / M50 Junction to Navan Road / Ashtown Road Junction	RW03	Principal Retaining Wall which is a Soil nail Wall type.	Ch.A2926 to Ch.A3027	Accommodate widening for bus stop

Section of Proposed Scheme	Structure Reference	Structure Type	Name / Location / Chainage	Obstacle
Sign Gantries – see Section 4.6.8.1.4				
Section 2: Snugborough Road to N3 / M50 Junction	GY01	Sign Gantry	Group 6 Sign Gantry Modify/Replace existing Ch.A1439	N3 Eastbound
Section 2: Snugborough Road to N3 / M50 Junction	GY02	Sign Gantry	Group 6 Sign Gantry Replace existing Existing Ch.A1745 Proposed Ch.A1799	N3 Eastbound
Section 2: Snugborough Road to N3 / M50 Junction	GY04	Sign Gantry	Variable Message Sign (VMS) Replace existing Ch.A1316	N3 Eastbound
Section 2: Snugborough Road to N3 / M50 Junction	GY07	Sign Gantry	Group 6 Sign Gantry New Ch.A1765	N3 Westbound
Section 2: Snugborough Road to N3 / M50 Junction	GY08	Sign Gantry	Group 6 Sign Gantry New Ch.A1311	N3 Westbound
Section 3: N3 / M50 Junction to Navan Road / Ashtown Road Junction	GY05	Sign Gantry	Group 6 Sign Gantry Existing retained Ch.A2818	N3 Westbound
Section 3: N3 / M50 Junction to Navan Road / Ashtown Road Junction	GY03	Sign Gantry	Group 6 Sign Gantry Modify/Replace existing Ch.A2988	R147 Outbound
Section 3: N3 / M50 Junction to Navan Road / Ashtown Road Junction	GY06	Sign Gantry	Group 6 Sign Gantry Modify/Replace existing Ch.A3316	R147 Outbound
Section 3: N3 / M50 Junction to Navan Road / Ashtown Road Junction	GY09	Sign Gantry	Group 6 Sign Gantry Modify/Replace existing Ch.A3916	R147 Outbound
Minor Retaining Walls – see Section 4.6.8.2.1				
Section 1: N3 Blanchardstown Junction to Snugborough Road	RW10	Minor Retaining Wall which is a Spreadfoot Cantilever Type.	Blanchardstown Road South adjacent to Whitestown Grove. Ch.A0304 to Ch.A0543	Retaining grass parkland.
Section 1: N3 Blanchardstown Junction to Snugborough Road	RW11	Minor Retaining Wall which is a Spreadfoot Cantilever Type.	West of Crowne Plaza Junction Ch.A0140 to Ch.A0156	Retaining service yard.
Section 1: N3 Blanchardstown Junction to Snugborough Road	RW12-1	Minor Retaining Wall which is a Spreadfoot Cantilever Type.	Westbound Approach to Crowne Plaza Junction Ch.A0229 to Ch.A0255	Retaining footpath
Section 1: N3 Blanchardstown Junction to Snugborough Road	RW12-2	Minor Retaining Wall which is a Spreadfoot Cantilever Type.	Westbound Approach to Crowne Plaza Junction Ch.A0269 to Ch.A0293	
Section 1: N3 Blanchardstown Junction to Snugborough Road	RW12-3	Minor Retaining Wall which is a Spreadfoot Cantilever Type.	Westbound Approach to Crowne Plaza Junction Ch.A0302 to Ch.A0326	
Section 1: N3 Blanchardstown Junction to Snugborough Road	RW12-4	Minor Retaining Wall which is a Spreadfoot Cantilever Type.	Westbound Approach to Crowne Plaza Junction Ch.A0339 to Ch.A0375	
Section 1: N3 Blanchardstown Junction to Snugborough Road	RW13	Minor Retaining Wall which is a Spreadfoot Cantilever Type.	L3020 adjacent to Ben Dunne Gym, Blanchardstown Ch.A0703 to Ch.A0741	Retaining embankment.
Section 2: Snugborough Road to N3 / M50 Junction	RW14	Minor Retaining Wall which is a Spreadfoot Cantilever Type.	N3 eastbound verge connecting to Mill Road Northern Pedestrian Ramp Ch.A1475 to Ch.A1545	Retaining grass verge.

Section of Proposed Scheme	Structure Reference	Structure Type	Name / Location / Chainage	Obstacle
Section 2: Snugborough Road to N3 / M50 Junction	RW15	Minor Retaining Wall which is a Spreadfoot Cantilever Type.	N3 eastbound verge at location of proposed overhead sign gantry GY02 Ch.A1793 to Ch.A1801	Retaining grass verge.
Section 2: Snugborough Road to N3 / M50 Junction	RW16	Minor Retaining Wall which is a Spreadfoot Cantilever Type.	N3 adjacent to 3 Catherine's Well, Old River Road Ch.A1854 to Ch.A1880	Retaining grass verge.
Section 2: Snugborough Road to N3 / M50 Junction	RW17	Minor Retaining Wall which is a Spreadfoot Cantilever Type.	Between N3 westbound carriageway and N3 eastbound approach to M50/N3 Interchange Ch.A2205 to Ch.A2310	Retaining carriageway.
Section 2: Snugborough Road to N3 / M50 Junction	RW18	Minor Retaining Wall which is a Spreadfoot Cantilever Type.	N3 eastbound verge on approach to M50/N3 Interchange Ch.A2308 to Ch.A2342	Retaining grass verge.
Section 3: N3 / M50 Junction to Navan Road / Ashtown Road Junction	RW19	Minor Retaining Wall which is a Spreadfoot Cantilever Type.	Off ramp at Navan Road Parkway Westbound Ch.A3939 to Ch.A3979	Retaining footpath.
Section 4: Navan Road / Ashtown Road Junction to Navan Road / Old Cabra Road Junction	RW20	Minor Retaining Wall which is a Spreadfoot Cantilever Type.	Between footpath and cycle track adjacent to pedestrian access to Aura De Paul swimming pool Ch.A5542 to Ch.A5548	Retaining footpath.
Section 4: Navan Road / Ashtown Road Junction to Navan Road / Old Cabra Road Junction	RW21	Minor Retaining Wall which is a Spreadfoot Cantilever Type.	To rear of footpath Ch.A6658 to Ch.A6693	Retaining grass area

4.6.8.1 Major Structures

4.6.8.1.1 Bridges and Bridge Sized Culverts

There are two existing bridge structures impacted by this Proposed Scheme. Both require widening as a result of the proposed carriageway works.

4.6.8.1.1.1 Existing BR01 Tolka River Bridge (FG-N03-008.00)

The existing bridge is located at the northern crossing of the River Tolka beneath the N3 (Ch A 1110m). The structure comprises a corrugated steel arch culvert, which has subsequently been widened using precast concrete girders. The proposed widening to the N3 to accommodate the Proposed Scheme requires this bridge to be widened further at its southern end. The bridge will be widened by approximately 2m using precast concrete beams and a cast in-situ deck slab. The abutments will be extended to suit.

4.6.8.1.1.2 Existing BR02 Mill Road Bridge (FG-N03-010.00)

Twin bridges carry the eastbound and westbound carriageways of the N3 over Mill Road at this location (Ch A 1605m). The bridge requires widening to accommodate works associated with the Proposed Scheme.

The existing bridge will be widened along both its southern and northern sides as well as closing up of the opening within the central median. It is proposed to extend the structure using cast in-situ arrangement, similar in form to the existing structure.

4.6.8.1.2 Pedestrian Ramps

The Proposed Scheme includes additional inbound and outbound bus stops on the N3 adjacent to Mill Road. Pedestrian access from Mill Road to the new bus stops will be via new pedestrian ramps and steps on the northern and southern sides of the N3.

4.6.8.1.3 Principal Retaining Walls

Principal retaining walls with a retained height greater than 1.5m height and are classed as principal structures. There is a requirement for five principal retaining walls, ranging from 1.5m to 4m, throughout the Proposed Scheme. Both the pedestrian ramps require principal retaining walls as part of the structure.

4.6.8.1.4 Sign Gantries

As detailed in Table 4.32, there are a number of sign gantries which will be impacted (modified/replaced) and two new sign gantries (GY07 and GY08) required as a part of the Proposed Scheme. Sign Gantry GY05 will be retained without modification.

4.6.8.2 Miscellaneous Structures

4.6.8.2.1 Minor Retaining Walls

There are fifteen minor retaining walls included in the Proposed Scheme. Minor retaining walls are less than 1.5m retained height and range between 0.3m to 1.3m. In addition, a number of residential properties, where boundary walls are being relocated, these walls are likely to incorporate retention of private gardens / frontages.

4.6.8.2.2 Bus Interchange – Canopies

The Bus Interchange at Blanchardstown Shopping Centre will require roof canopies of two heights. Up-lighting on the canopies will be provided to create a safe environment for members of the public. The canopies comprise of a concrete clad steel frame supported on circular columns. Drainage off each roof will be directed through the columns to a below ground rainwater drainage system. In addition, there will be a green roof incorporated into the roof of each canopy.

4.6.8.2.3 Bus Interchange – Bus driver welfare facility

A new bus driver welfare facility is to be located in proximity to the bus layover spaces on Blanchardstown Road South, next to the retail park delivery access. This building will be a single storey pitched roof structure with canteen, shower and bathroom facilities.

4.6.8.2.4 Noise Barriers

Existing noise barriers located on the N3 northbound carriageway adjacent to Old River Road and Herbert Road are affected by the proposed works. These barriers will be relocated to the back of the proposed verge to accommodate the Proposed Scheme, while their existing length, height and coverage will be maintained relative to the buildings they screen from the carriageway.

4.6.8.2.5 Digipoles/Digipanels

As part of the Proposed Scheme, road widening is required at locations where digital advertising panels are currently placed. The following panels or poles will be appropriately relocated to the adjacent footpath as part of the works:

- Navan Road - Belvedere sports ground - Outbound footpath; and
- Navan Road - Cabra Garda Station – Inbound footpath.

4.6.9 Other Street Infrastructure

There are a number of other elements of street infrastructure included as part of the design of the Proposed Scheme. These elements include signage, road markings and communications infrastructure. Signage and road markings will be provided along the extents of the Proposed Scheme to clearly communicate information, both regulatory and safety messages, to the road user. In addition, the existing communication equipment along the Proposed Scheme has been reviewed and proposals developed to upgrade where necessary.

4.6.9.1 Traffic Signage and Road Markings

4.6.9.1.1 Traffic Signage Strategy

A preliminary Traffic Signage design has been undertaken to identify the requirements of the Proposed Scheme, whilst allowing for further design optimisation at the detailed design phase. A combination of Information, Regulatory, and Warning signs, have been assessed taking consideration of key destinations/centres; intersections/decision points; built and natural environment; other modes of traffic; visibility of signs and viewing angles; space available for signs; existing street furniture infrastructure; and existing signs. In line with DMURS, the signage proposals have been '*kept to the minimum requirements of the [Traffic Signs Manual] TSM (DoT 2019), particularly where place values are very high'*.

On review of the existing traffic signage, it is determined that the main changes to regulatory signage will be the proposed introduction of turning bans from or to the Proposed Scheme as indicated within the Traffic Signs and Road Marking drawing series (BCIDC-ARP-TSM_GA-0005_XX_00-DR-CR-9001) in Volume 3 of this EIAR.

Additional directional signs are proposed at the junction of North Circular Road and Cabra Road (Dalymount) to direct road users to the M50 via North Circular Road, reducing the vehicular traffic within the Proposed Scheme.

In addition to the signs identified above, the existing signs within the Proposed Scheme are being revised to accommodate the change in road cross-section communicating the following:

- Information Signs to include geographical information signs, signs indicating facilities, road layout signs, traffic calming signs and cycle network signs;
- Regulatory signage –e.g. parking regulation signs, bus lanes, pedestrian and cycle facilities; and
- Warning signs – e.g. Stop and Yield Ahead.

As stated in TSM Chapter 1, in urban areas the obstruction caused by posts located in narrow pedestrian footpaths should be minimised. Therefore, where practicable, signs are to be placed on single poles, or larger signs will be cantilevered from a post at the back of the footpath using H-frames where necessary. Passively safe posts will be introduced where practicable to eliminate the need for vehicle restraint systems.

4.6.9.1.2 Gantry Signage

The gantry signage included in the Proposed Scheme is identified in Section 4.6.8.1.4.

4.6.9.1.3 Road Markings

A preliminary design of road markings has been undertaken in accordance with TSM Chapter 7 (DoT 2019). This exercise also included the preliminary road marking design of the following items:

- Bus lanes;
- Cycle tracks: the pavement will be marked according to best practice guidelines such as DMURS (Government of Ireland 2013) and the NCM (NTA 2011) with particular attention given to junctions. Advance Stacking Locations (ASLs) have been designed where possible to provide a safer passage for cyclists at signal-controlled junction for straight ahead or right turn movements; and

- Pedestrian crossings have been incorporated throughout the design to connect the network of proposed and existing footpaths. Wider pedestrian crossings have been provided in locations expected to accommodate a relatively high number of pedestrians.

4.6.10 Pavement

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

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 Scheme to the nearby road network.

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

- Widening and narrowing of the existing carriageways;
- Carriageway realignment;
- Rehabilitation and strengthening of the existing carriageways;
- Other specific trafficked areas (e.g. bus lay-bys, off-line parking and loading bays);
- New pedestrianised areas including footways; and
- New cycle facilities.

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

4.6.10.1 Design Requirements

The Proposed Scheme pavement design will include new pavement, pavement strengthening or rehabilitation works where the existing pavement will be disturbed by construction works, as indicated in the Pavement Treatment Plans BCIDC-ARP-PAV_PV-0005_XX_00-DR-CR-9001 included in Volume 3 of this EIAR. 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 Scheme pavement design is the provision of a high-quality pavement construction. Therefore, the Proposed Scheme 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 Scheme design for Kerbs, Footways and Paved Areas (KFPA) will include new improved pedestrian and cycle facilities including landscaped areas.

4.6.10.2 Design Standards

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

- Preliminary Design Guidance Booklet for BusConnects Core Bus Corridors (NTA 2021);
- TII AM-PAV-06050 Pavement Assessment, Repair and Renewal Principles (TII 2020a);
- TII AM-PAV-06045, Management of Skid Resistance (TII 2020b);
- Irish Pavement Asset Group (IPAG). Pavement Asset Management Guidance. (IPAG 2014);
- DN PAV-03021 Pavement & Foundation Design. Volume 7 Section 2 Part 2A. (TII 2010a);
- Construction Standards for Roads and Street Works in Dublin City Council (CSRSW);
- Urban Flexible Roads Manual – Pavement Surface Condition Index (DTTAS 2013a);
- Urban Concrete Roads Manual – Pavement Surface Condition Index" (DTTAS 2013b);

- TII PE-SMG-02002 Traffic Assessment (HD 24/06) (TII 2010b);
- TRL Report 615. Development of a more versatile approach to flexible and flexible composite pavement design (TRL 2004);
- TRL Report LR1132, The structural design of bituminous roads (TRL 1984);
- TII road pavement standards details;
- DN-PAV-03026 (Jan. 2005) – Footway Design;
- TII footway standard details; and
- TII Specification for Roadworks Series 600, 700, 800, 900, 1000, 1100.

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

- DN-PAV-03021 (Dec. 2010) – Pavement and Foundation Design;
- DN-PAV-03026 (Jan. 2005) – Footway Design;
- Construction Standards for Road and Street Works in Dublin City Council (May 2016) – Revision 1;
- PE-SMG-02002 (Dec. 2010) – Traffic Assessment;
- 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 (Mar. 2013) – Specification for Road Works Series 800 – Road Pavements – Unbound and Cement Bound Mixtures;
- CC-SPW-00900 (Sep. 2017) – Specification for Road Works Series 900 – 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.

4.6.10.3 New Pavement and Bus Interchange Strategy

A new section of carriageway alignment is proposed on the east side of the M50/N3 junction 6 interchange. This new road is a bus lane linking the interchange roundabout to R147 Navan Road eastbound. Providing that the pavement structure of the existing link between the interchange roundabout and the R147 is suitable for the forecasted bus traffic, it is anticipated that the pavement structure of the new road will be of similar depth and make-up.

A Bus Interchange is proposed at the Blanchardstown shopping centre (N3 junction 3). This location will be trafficked by a large volume of buses. Slow moving, stationary, vibrating and manoeuvring buses are damaging to both the pavement surface and the pavement structure.

Fully flexible (bituminous mixtures) and flexible composite (bituminous mixtures on a hydraulically bound base) pavement structure are unlikely to provide a durable and low maintenance option for this location. It is therefore proposed for the pavement to be rigid (concrete) at that location.

Rigid pavements do not rut, are highly resistant to scuffing and oil dropping and require limited maintenance (e.g. joints).

4.6.10.4 Pavement Rehabilitation Strategy

At Specimen Design stage, different pavement strategies will be developed for:

- Areas to be widened or fully reconstructed; and
- Areas to be rehabilitated (do minimum, intermediary strategies, fully reconstruct).

Additional testing requirements in line with AM-PAV-06050 will be specified for the successful Contractor to complete the Detailed Pavement Design.

The risk of tar contaminated material presence in the existing pavement is expected to be mitigated at Specimen Design stage with the delivery of the GPR survey through the testing of the calibrating cores for tar.

In order to estimate the waste quantities and the carbon emissions from the Proposed Scheme pavement works, the following assumptions were made:

- Where full depth reconstruction is anticipated (e.g. widening, traffic island relocation…), a conservative fully flexible pavement design is assumed: 350mm of bituminous mixtures on top of 150mm of subbase material and 400mm of capping material;
- Where the existing pavement is anticipated to only require rehabilitation, the assumed materials and associated depths depend on the PSCI for the pavement design:
- Fully Flexible Carriageway;
- PSCI ≥ 7: no works;
- PSCI = 5 or 6: 50mm Bituminous Inlay;
- PSCI = 3 or 4: 200mm Bituminous Inlay;
- PSCI = 1 or 2: 350mm Bituminous Inlay + 150mm Subbase Inlay + 400mm Capping Inlay;
- Rigid Carriageway;
- PSCI ≥ 5: no works; and
- PSCI ≤ 4: 200mm Concrete Inlay.

The appropriate pavement structures for footways and cycle tracks will be defined at Specimen Design stage.

4.6.10.5 Parking and Loading

As part of the design of the Proposed Scheme, an assessment has been carried out into the impact on existing parking and loading.

The number and type of parking spaces and loading were counted along the Proposed Scheme, and the proposed losses of these spaces has been quantified. Mitigation measures have been identified to reduce the impact of the Proposed Scheme in so far as is reasonably practicable, such as reducing reliance on private cars due to availability of an improved bus network with journey reliability, and by availability of improved cycling infrastructure. Improved compliance with parking and loading bay regulations, and management of loading activities will also assist in offsetting the reduction in on-street parking spaces.

Reference should be made to Chapter 6 (Traffic & Transport) for further information on the impacts on parking as a result of the Proposed Scheme.

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 to commute to/from work. The Urban Realm encompasses all streets, public spaces, junctions and other rights-of-way, whether in residential, commercial or civic use. Well-designed urban realm contributes to the identity of localities and enhances the everyday lives of local communities and those passing through. It typically relates to the space between buildings to which the public has free access and may include seating, trees, planting and other features that enhance the experience for all.

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

- they have a distinct identity;
- they are safe and pleasant;
- they are easy to move through; and
- they are welcoming.

4.6.11.1 Landscape and Character Analysis

The landscape and urban realm proposals 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 different parts of 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 Scheme. 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 Scheme.

4.6.11.2 Hardscape

4.6.11.2.1 Typical Material Typologies

Throughout the design process, a palette of materials has been developed to create a consistent yet locally relevant design response appropriate to different locations along the route. 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. Material palettes are described by reference to different typologies appropriate to different sections of the route.

The Landscaping General Arrangement drawings (BCIDC-ARP-ENV_LA-0005_XX_00-DR-LL-9001) in Volume 3 of this EIAR illustrate these elements.

The material typologies employed in the preliminary design are:

- **Poured in-situ concrete pavement** - Used extensively on existing footpaths. 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 public 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 public realm. Can be used with matching concrete kerbs or with salvaged natural stone kerbs as appropriate;
- **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 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 pedestrian pathways that are off-road and leading through informal landscaped areas; and
- **No change** - At some locations, the proposed scheme does not necessitate any alteration to the alignment of the existing footpath or roadway. These include established and more recently constructed sections of streetscape.

Other design responses include:

- The re-use of existing high-quality and natural stone kerbs 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 to improve the vitality of the trees and ensure accessible pedestrian facilities;
- 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; and
- 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.
- Sustainable Drainage Systems (SuDS) will be incorporated within hardscape areas to locally manage surface water run-off and reduce demand for piped surface water drainage infrastructure.

4.6.11.3 Softscape

4.6.11.3.1 Planting Strategy

The planting strategy has been developed in response to the objectives set out in both the Fingal County Development Plan 2017 –2023 and the Dublin City Development Plan 2016 – 2022. The planting strategy is also in response to landscape and urban realm opportunities arising from the Proposed Scheme to integrate new infrastructure within the existing local context and to enhance the visual and amenity value of streets and spaces.

The planting strategy includes replacement of street trees and groups of trees that may be impacted by the Proposed Scheme, 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 and amenity grassland, shrub and meadow grass areas. These will be utilised to reinstate property boundaries altered by the Proposed Scheme.

The design process 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.

4.6.11.4 Arboricultural Survey

An Arboricultural Impact Assessment (AIA) Report (Appendix A17.1 in Volume 4 of this EIAR), identifies the likely direct and indirect impacts to trees of the Proposed Scheme along with suitable mitigation measures, as appropriate to allow for the successful retention of significant trees, or to compensate for trees to be removed.

4.6.11.5 Typical Planting Typologies

Several typologies were developed. These are discussed further below.

4.6.11.5.1 New Street Trees

As noted on the Landscaping General Arrangement (BCIDC-ARP-ENV_LA-0005_XX_00-DR-LL-9001) in Volume 3 of this EIAR, a range of urban street tree species (Image 4.13) have been incorporated into the design. The type of tree depends on the 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. Typically, trees will be semi-mature and where appropriate, selected for having a clear stem height to facilitate visual permeability.

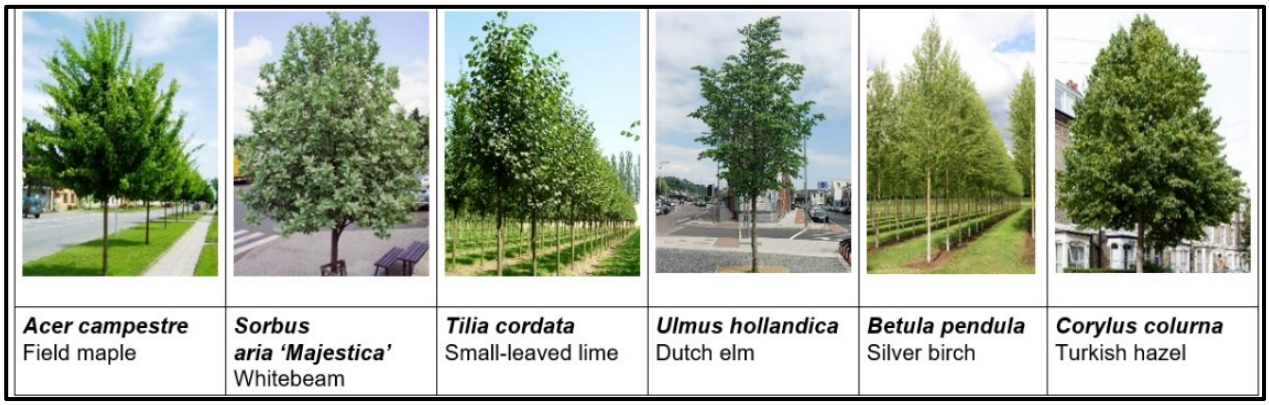

Image 4.13: Street tree species

4.6.11.5.2 New Woodland Areas and Tree Groups

The Proposed Scheme includes a range of existing mature and immature woodlands areas. Some of these will be impacted where the existing carriageway will be widened or cycling infrastructure will be provided. It is proposed to reinstate construction working areas and also to replant the edges of impacted woodland areas, so as to reinstate the streetscape or roadway character. Additionally, there are areas of land within the corridor that are presently in grass or scrub, and new woodlands areas will be established in these locations to offset the loss of woodlands elsewhere and to provide more consistent presentation along carriageway edges.

Woodland tree planting will typically comprise bare-root native tree species including *Alnus glutinosa* (Black Alder), *Salix aurita, Salix cinerea oleifolia, Salix caprea, Salix petrandra* (Willow sp.), *Betula pendula* (Silver Birch), *Pinus sylvestris* (Scots Pine), *Crataegus monogyna* (Hawthorn), *Quercus petraea* (Sessile Oak), *Prunus spinosa* (Blackthorn) and *Viburnum opulus* (Guelder Rose).

Elsewhere along the Proposed Scheme, there are smaller areas of existing and proposed woodlands and tree groups that will be retained, reinstated or established in order to provide appropriate landscaping connectivity and design interventions at a range of different spaces, including carriageway boundaries, new landscape spaces arising from junction reconfiguration, reinforcement of established vegetation areas, and also establishing new public realm and landscape opportunity areas. Tree species will be determined by location and will comprise either native woodland trees as set out above, or selected street trees. Additionally, understory planting, long grass and swathes of bulbs will be provided to reinforce the character of landscaped areas along the scheme corridor.

A number of different landscaped central median areas exist along the scheme, including those within high-capacity dual carriageway and smaller scale medians within suburban and urban settings. Landscaping proposals respond to the different localities and may include grass planting, hedgerows and trees as appropriate in medians within the larger scale roadways, and grasses, ornamental planting, hedgerows and trees within the suburban and urban medians.

4.6.11.5.3 Boundary Planting

The Proposed Scheme 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 Scheme will nonetheless require both temporary and permanent access to lands beyond the carriageway boundary.

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 scheme, 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 Scheme on lighting columns and associated infrastructure. Where existing columns conflict with the Proposed Scheme, they will be relocated. In some areas which are currently artificially lit, new lighting columns will be provided as part of the Proposed Scheme. All relocated and new lighting columns are identified as proposed lighting columns as shown on the Street Lighting drawings (BCIDC-ARP-LHT_RL-0005_XX_00-DR-EO-9001) in Volume 3 of this EIAR.

Light Emitting Diode (LED) lanterns will be the light source for all lighting columns provided.

The lighting design involves works on functional, heritage and contemporary lighting installations, on a broad spectrum of lighting infrastructure along the Proposed Scheme. This will include, but not exclusively, luminaires supplied by underground and overhead cable installations and those located on ESB Infrastructure.

In locations where road widening and/or additional space in the road margin is required, it is proposed that the public lighting columns be replaced and relocated to the rear of the footpath, and the existing lighting columns removed once the new facility is operational.

Where significant alterations are proposed to the existing carriageways, the preliminary street lighting design ensures that the current standard of public lighting is maintained or improved.

For existing columns that have specific aesthetic requirements, the intent for the replacement 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 that the electrical installation is compliant with the latest version of the *National Rules for Electrical Installations, IS 10101.*

4.6.12.1 New Lighting

All lighting columns will be designed and installed in accordance with the specific lighting and electrical items set out the following National Standards and guides, including but not limited to:

- 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 ‘Code of practice for the design of road lighting’;
- TII Publications: Specification for Road Works, Series 1300 & 1400;
- TII Publications Standard Construction Details, Series 1300 & 1400;
- IS EN 40 – Lighting Columns;
- Institution of Lighting Professionals “GN01 Guidance Notes for Reduction of Obtrusive Light”.

All lighting columns will aim to minimise the effects of obtrusive light at night and reduce visual impact during daylight. Lighting schemes will comply with the ‘Guidance notes for the Reduction of Light Pollution’ issued by the Institution of Lighting Professionals (ILP).

New low level lighting will be incorporated into the pedestrian ramps at Mill Road. It is anticipated that the new low level lighting either integrated into the handrails or another part of the structure. Lighting levels will be under 3 lux which will result in extremely limited light spill.

4.6.12.2 Lighting at Bus Stops

The design 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 (the columns at bus stops provide clearance for buses).

4.6.13 Utilities

There are a number of measures proposed to protect existing utilities during the Construction Phase of the Proposed Scheme. These are specifically outlined in Chapter 5 (Construction) and Chapter 19 (Material Assets). 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 Scheme 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

The construction of the Proposed Scheme will result in conflicts with several existing utility assets. Identified service conflicts and proposed diversions are described and assessed in Chapter 19 (Material Assets).

These conflicts have been identified, and preliminary consultation has been undertaken with the relevant service providers 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;
- Irish Water (Water & Public Sewer);
- GNI; and
- Telecommunication Services – Eir, Virgin Media, Enet & BT.

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 scheme.

4.6.14 Drainage

4.6.14.1 Relevant Standards and Guidance

The design basis statement was developed whilst taking the Greater Dublin Regional Code of Practice (GDRCoP), Greater Dublin Strategic Drainage Study (GDSDS), Planning requirements of Local Authorities within the Dublin region, Transport Infrastructure Ireland (TII) requirements and international best practices such as CIRIA The SuDS Manual (C753) (CIRIA 2015). Agencies consulted include Fingal County Council, Dublin City Council and Irish Water where applicable.

4.6.14.2 Existing Watercourses and Culverts

The location of existing watercourses and culverts has been identified from survey. Table 4.33 shows where the Proposed Scheme crosses the existing watercourses and culverts.

Table 4.33: Existing Watercourses and Culverts

Watercourse	Chainage	Crossing Detail
River Tolka	Ch.A1115	Bridge

Watercourse	Chainage	Crossing Detail
	Ch.A1485	Bridge
Royal Canal	Ch.A2500	Bridge

4.6.14.3 Existing Drainage Description

Based on the information received from Irish Water / TII / Fingal County Council / Motorway Maintenance and Renewals Contract (MMaRC), the Proposed Scheme is serviced by surface water and combined drainage networks. The surface water drainage system is managed by the Local Authorities, whilst combined sewer systems are managed by Irish Water. Flows are typically collected in standard gully grates and routed via a gravity network to outfall points. The design assumes that there are generally no SuDS/attenuation measures on the existing drainage networks to treat or attenuate run-off from the existing carriageway.

The existing drainage network along the Proposed Scheme can be split into 21 catchment areas based on topography and the existing pipe network supplied by Irish Water / TII / Fingal County Council / MMaRC. The approximate catchment areas, existing sewer networks, outfalls and watercourses are shown on the existing catchment drawings within the Surface Water Drainage Design drawing series (BCIDC-ARP-DNG_RD-0005_XX_00-DR-CR-9001) in Volume 3 of this EIAR. The existing catchments are summarised below in Table 4.34.

Table 4.34: Summary of Existing Catchments

Existing Catchment Reference	Chainage	Approx. Drainage Catchment Area (km2)	Existing Network Type	Existing Outfalls
Catchment 1	Ch.A0000–Ch.A0160 Ch.B0000–Ch.B0660 Ch.E0000–Ch.E0355	0.0979	Surface Water (Storm)	Network outfalls to the River Tolka
Catchment 2	Ch.A0160–Ch.A0600 Ch.F0000-Ch.F0352	0.3456	Surface Water (Storm)	Network outfalls to the River Tolka
Catchment 3	Ch.B0660-Ch.B0895 Ch.C0300-Ch.C0450 Ch.L0095-Ch.L0195 Ch.A0000-Ch.A0050 (left)	0.0846	Surface Water (Storm)	Network outfalls to the River Tolka
Catchment 4	Ch.C0000- Ch.C300	0.0109	Surface Water (Storm)	Network outfalls to the River Tolka
Catchment 5	Ch.A0600-Ch.A1025 Ch.A1025-Ch.A1100 (Right)	0.0477	Surface Water (Storm)	Network outfalls to the River Tolka
Catchment 6	Ch.A1025-Ch.A1100 (Left) Ch.A1100-Ch.A1325 Ch.A1325-Ch.A1+390 (Right)	0.0189	Surface Water (Storm)	Network outfalls to the River Tolka
Catchment 7	Ch.A1325-Ch.A1390 (Left) Ch.A1390-Ch.A1580	0.0101	Surface Water (Storm)	Network outfalls to the River Tolka
Catchment 8	Ch.A1580-Ch.A2400	0.0875	Surface Water (Storm)	Network outfalls to the River Tolka
Catchment 9	Ch.A2400-Ch.A2550 (left)	0.1147	Surface Water (Storm)	Network outfalls to the River Tolka
Catchment 10	Ch.A2400-Ch.A2550 (right)	0.0550	Surface Water (Storm)	Network outfalls to the River Tolka
Catchment 11	Ch.A2550-Ch.A3125 Auburn Park Roundabout	0.0712	Surface Water (Storm)	Network outfalls to the River Tolka
Catchment 12	Ch.A3125-Ch.A4830	0.0864	Surface Water (Storm)	Network outfalls to the Royal Canal
Catchment 13	Ch.A4830-Ch.A4920 Ch.A4920-Ch.A5020 (Left)	0.0059	Surface Water (Storm)	Network outfalls to the Royal Canal
Catchment 14	Ch.A4920-Ch.A5020 (Right) Ch.A5020-Ch.A5070	0.0486	Surface Water (Storm)	Network outfalls to the Royal Canal

Existing Catchment Reference	Chainage	Approx. Drainage Catchment Area (km2)	Existing Network Type	Existing Outfalls
Catchment 15	Ch.A5070-Ch.A5460 Ch.A5460-Ch.A5550 (Right)	0.0288	Surface Water (Storm)	Network discharging to surface water pipe that discharges to the existing pond/lake in Dublin Zoo. The outfall from the lake finally discharges to a combined sewer that flows to the Main Lift Pump House and partially discharges to the river Liffey through overflow pipes
Catchment 16	Ch.A5460-Ch.A5550 (left) Ch.A5550-Ch.A6390	0.1656	Surface Water (Storm) & Combined	Network discharging to surface water pipe that discharges to the existing pond/lake in Dublin Zoo. The outfall from the lake finally discharges to a combined sewer that flows to the Main Lift Pump House and partially discharges to the river Liffey through overflow pipes
Catchment 17	Ch.A6390-Ch.A6745	0.0974	Surface Water (Storm)	Surface water network discharges to a combined sewer which outfalls to Ringsend Main Lift Pumphouse which discharges to Ringsend Treatment Works with overflows to River Liffey
Catchment 18	Ch.A6745-Ch.A7400	0.0747	Surface Water (Storm) & Combined	Network outfalls to Ringsend Main Lift Pumphouse which discharges to Ringsend Treatment Works with overflows to River Liffey
Catchment 19	Ch.A7400-Ch.A9100 Ch.H0014-Ch.H0173	0.6913	Surface Water (Storm) & Combined	Network outfalls to Ringsend Main Lift Pumphouse which discharges to Ringsend Treatment Works
Catchment 20	Ch.K0000-Ch.K0070	0.0591	Surface Water (Storm) & Combined	Network outfalls to the River Liffey
Catchment 21	Ch.A9100-Ch.A9492 Ch.G0000-Ch.G0496 Ch.J0000-Ch.J0147	0.1572	Combined	Network outfalls to Ringsend Main Lift Pumphouse which discharges to Ringsend Treatment Works with overflows to River Liffey

4.6.14.4 Proposed Drainage / Runoff

Whilst in some areas the Proposed Scheme will increase the impermeable areas, additional permeable areas are also provided by the softening of public realm along the routes. 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, silt traps and attenuation features if necessary. The welfare of pedestrians and cyclists is a high priority in the consideration of the drainage system design.

Each catchment area has been broken down into sub-catchments to define the change in impermeable surface area as a result of the proposed scheme. 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 4.35. The following table contains a column entitled “Net change” which takes account of the change of use from impermeable to permeable areas and vice versa.

Table 4.35: Summary of Increased Permeable and Impermeable Areas

Existing Catchment Reference	Chainage	Road Corridor Area (m^2)	Change of use to Impermeable areas (m^2)	Change of use to Permeable areas (m^2)	Net Change (m^2)	Percentage Change (%)
Catchment 1	Ch.A0000–Ch.A0160 Ch.B0000–Ch.B0660 Ch.E0000–Ch.E0355	30,257	6,928	521	6407	21.2
Catchment 2	Ch.A0160–Ch.A0600 Ch.F0000-Ch.F0352	24,763	6,593	1252	5341	21.6
Catchment 3	Ch.B0660-Ch.B0895 Ch.C0300-Ch.C0450 Ch.L0095-Ch.L0195 Ch.A0000-Ch.A0050 (left)	15,475	6	0	6	0.0
Catchment 4	Ch.C0000- Ch.C300	6,250	388	202	186	3.0
Catchment 5	Ch.A0600-Ch.A1025 Ch.A1025-Ch.A1100 (Right)	7,165	2,295	347	1,948	27.2
Catchment 6	Ch.A1025-Ch.A1100 (Left) Ch.A1100-Ch.A1325 Ch.A1325-Ch.A1+390 (Right)	16,595	609	246	363	2.2
Catchment 7	Ch.A1325-Ch.A1390 (Left) Ch.A1390-Ch.A1580	9,766	3,144	139	3,005	30.8
Catchment 8	Ch.A1580-Ch.A2400	51,934	3,951	493	3,458	6.7
Catchment 9	Ch.A2400-Ch.A2550 (left)	2,424	0	0	0	0.0
Catchment 10	Ch.A2400-Ch.A2550 (right)	3,738	0	0	0	0.0
Catchment 11	Ch.A2550-Ch.A3125 Auburn Park Roundabout	42,656	2,382	838	1,544	3.6
Catchment 12	Ch.A3125-Ch.A4830	80,353	6,361	3247	3,114	3.9
Catchment 13	Ch.A4830-Ch.A4920 Ch.A4920-Ch.A5020 (Left)	5,998	1,074	552	522	8.7
Catchment 14	Ch.A4920-Ch.A5020 (Right) Ch.A5020-Ch.A5070	5,504	309	0	309	5.6
Catchment 15	Ch.A5070-Ch.A5460 Ch.A5460-Ch.A5550 (Right)	9,957	970	0	970	9.7
Catchment 16	Ch.A5460-Ch.A5550 (left) Ch.A5550-Ch.A6390	18,431	1,710	0	1,710	9.3
Catchment 17	Ch.A6390-Ch.A6745	7,605	458	39	419	5.5
Catchment 18	Ch.A6745-Ch.A7400	17,924	224	633	-409	-2.3
Catchment 19	Ch.A7400-Ch.A9100 Ch.H0014-Ch.H0173	41,200	54	739	-685	-1.7
Catchment 20	Ch.K0000-Ch.K0070	3,651	0	299	-299	-8.2
Catchment 21	Ch.A9100-Ch.A9492 Ch.G0000-Ch.G0496 Ch.J0000-Ch.J0147	18,037	0	48	-48	-0.3

4.6.14.5 Proposed Drainage System

The principles for the drainage design are as follows:

- All drainage structures for newly paved areas are designed with a minimum return period of no flooding in 1:30 years with a 20% climate change allowance.
- 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 treatement 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 Scheme catchments where new paved areas are indicated on the Proposed Surface Water Drainage Works (BCIDA-ARP-DNG_RD-0005_XX_00-DR-CD-9001) in Volume 3 of this EIAR:

- Sealed Drainage (SD) comprised of gullies and sealed pipes will be located within the kerb line mostly between the cycle track and bus lane and / or the footpath and the cycle track depending on the highway profile;
- Grass Surface Water Channels, Swales and Bio Retention Areas/ Rain Gardens (SW/RG) are provided as road edge/ footpath edge drainage collection systems. They will provide treatment and can provide attenuation if required;
- Filter Drains (FD) are provided as road edge channels and comprise of perforated pipes with granular surround which are designed to convey, attenuate, and treat runoff prior to discharge;
- Tree pits (TP) are provided near the road. These receive flows from the sealed pipe network and from footpaths are designed to convey, attenuate, and treat runoff prior to discharge; and
- Oversized Pipes (AT / OSP) are provided where there is insufficient attenuation volume provided by the proposed SuDS drainage measures.
- Green Roofs (GR) will be provided on the Bus Interchange roof canopy. These will discharge to downpipes located on the columns and outfall to the surface water network. The green roofs will provide a reduction in surface water runoff and also include visual benefit and ecological value.

4.6.14.6 Runoff Attenuation & Sustainable Drainage Systems

SuDS measures and/or attenuation systems will be provided to ensure no increase in existing run off rates from newly paved areas and combined existing / newly paved catchment areas. The capacity of the proposed SuDS measures and/or attenuation systems was based on the incoming flows and existing discharge rates for each catchment.

A range of storm durations was tested for each catchment from 30-minutes to 24 hours to ensure that the proposed SuDS measures have sufficient capacity.

4.6.14.7 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 SuDS. The proposed road drainage system is shown in the Proposed Surface Water Drainage Works drawings (BCIDC-ARP-DNG_RD-0005_XX_00-DR-CR-9001) in Volume 3 of this EIAR. The system incorporates a variety of pollution control measures which will provide interception and treatment as the types indicated below.

- Filter drains: Filter drains are shallow trenches filled with stone/gravel that create temporary subsurface storage for the attenuation, conveyance and filtration of surface water runoff. A perforated pipe is provided above the base of the filter drain to collect and convey water to the downstream drainage component. Filter drains can help reduce pollutant levels in runoff by filtering out sediments and biodegradation processes.
- Swales: Swales are shallow, flat bottomed, vegetated open channels designed to convey, treat and attenuate surface water runoff. They facilitate sedimentation and retention of pollutants, filtration through the root zone and soil matrix, evapotranspiration and infiltration into the underlying soil.
- Tree pits: Trees contribute to effective surface water management strategies. They also reduce annual building energy consumption by moderating the local climate, filter harmful pollutants from the air, and absorb and store atmospheric carbon dioxide (carbon sequestration). In the process of drawing water from the soil, trees also take up trace amounts of harmful chemicals, including metals, organic compounds, fuels and solvents that are present in the soil. Inside the tree, these chemicals can be transformed into less harmful substances, used as nutrients and /or stored in roots, stems and leaves.

- Rain Gardens and bio-retention systems: Bioretention systems, including rain gardens, are shallow landscaped depressions that can reduce runoff rates and volumes and treat pollution through the use of engineered soil and vegetation. They are particularly effective in delivering interception. Runoff is collected by the systems ponds temporarily on the surface and then filters through the vegetation and underlying soils.

4.6.15 Maintenance

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

Apparatus have been designed and located to allow for easy access and the safe maintenance of the Proposed Scheme 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. Products that allow for maintenance activities to be undertaken from ground level, where practicable, 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;
- Location of chambers away from pedestrian desire lines, and areas of tactile paving;
- Chambers to be placed at 180m centres, where practicable, on longitudinal duct runs to allow for the ease of installation and replacement of cables;
- Safe areas for the access and parking of maintenance vehicles, where practicable; and
- Controller, and other, cabinets located in positions that allow for safe access and clear visibility of the operation of an adjacent road 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.

4.6.17 Traffic Monitoring

In addition to public lighting, it is proposed to install traffic monitoring cameras at key locations, including junctions, to enable the monitoring of traffic flows along the Proposed Scheme 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. Junctions System Design information is included in the drawings BCIDC-ARP-TSM_SJ-0005_XX_00-DR-TR-9001 in Volume 3 of this EIAR.

These will be high-definition digital cameras with a digital communications network providing transmission of video and camera monitoring/control functionality.

4.6.18 Land Use and Accommodation Works

The Proposed Scheme 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 Scheme, it is necessary to compulsorily acquire public and private plots of land along sections of the route.

The extent of permanent land acquisition and land required temporarily for the construction of the Proposed Scheme is shown on the General Arrangement Drawings BCIDC-ARP-GEO_GA-1415_XX_01-DR-CR-9001 included in Volume 3 of this EIAR.

Construction of the Proposed Scheme requires land acquisition from several different parties, as outlined below:

- 89 residential properties; and
- 50 non-residential properties or land, including commercial, healthcare and educational institutes.

Mitigation accommodation works are proposed in the affected locations, including reconstruction of boundary walls and fences, as required, as outlined in Section 4.5.

4.6.18.1 Summary of Accommodation Works and Boundary Treatment

There are a number of areas along the extents of the route where the Proposed Scheme will result in the requirement for accommodation works and boundary treatments. Specific accommodation works are considered on a case-by-case basis.

To maintain the character and setting of the Proposed Scheme, the approach to undertaking the new boundary treatment works along the corridor is replacement on a 'like for like' basis in terms of material selection and general aesthetics, unless a section of street can benefit from urban improvement appropriate to the area.

Modifications to driveways and entrances will be guided by DCC's Parking Cars in Front Gardens Advisory Booklet (DCC 2011). Where driveways are proposed to be regraded a maximum gradient of 5% in accordance with Recommendations for Site Development Works for Housing Areas, Dept of the Environment and Local Government, 1998 has been adopted, where practicable.

Where cellar and private landings are affected by the Proposed Scheme pre-construction 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 any existing structures.

Existing gates will be reused where practicable however considerations will be required for the use of bifold gates, or other appropriate alternatives to mitigate impacts on parking in driveways. All gates will be hung such that they will open inwards onto the property, where practicable.

4.7 References

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Guidance and Legislation

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S.I. No. 600/2001 – Planning and Development Regulations (2001)