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 Swords to City Centre Core Bus Corridor (CBC) Scheme (hereafter referred to as the Proposed Scheme).

Article 5(1)(a) of the EIA Directive[1] 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 Scheme has an overall length of approximately 12km and commences south of Swords at Pinnock Hill Junction and travels in a southerly direction along the R132 Swords Road past Airside Retail Park, Dublin Airport and Santry Park. The route continues on the R132 past Santry Demesne, where the Swords Road joins the R104 at Coolock Lane. The route continues on the R132 in a southerly direction through Santry Village. It continues along the Swords Road past Whitehall to Griffith Avenue. The route follows Drumcondra Road Upper past the Dublin City University (DCU) St Patrick's Campus to the River Tolka. It continues through Drumcondra, on Drumcondra Road Lower to Binns Bridge on the Royal Canal. From there it continues on Dorset Street Lower as far as Eccles Street, from where it continues on Dorset Street Upper to North Frederick Street.

The Proposed Scheme includes an upgrade of the existing bus priority and cycle facilities. 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, and cycle facilities will be substantially improved with segregated cycle tracks provided along the links and protected junctions with enhanced signalling for cyclists provided at junctions.

Moreover, pedestrian facilities will be upgraded, and additional signalised crossings be provided. In addition, urban realm works will be undertaken at key locations with higher quality materials, planting and street furniture provided to enhance pedestrians' experience; an example of this can be seen at the Frank Flood Bridge in Drumcondra.

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

[1] Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment, as amended by Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (hereafter collectively referred to as the Environmental Impact Assessment (EIA Directive))

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

Total Length of Proposed Scheme	12km	
Bus Priority	**Existing (km)**	**Proposed Scheme (km)**
Bus Lanes		
Inbound	9.3	11.3
Outbound	8.0	11.8
Bus Priority through Traffic Management		
Inbound	0	0.33
Outbound	0	0.3
Total Bus Priority (both directions)	17.3	23.7 (+39%)
Bus Measures		
Proportion of Route with Bus Priority Measures	72%	100%
Cycle Facilities – Segregated		
Inbound	2.7	9.4
Outbound	4.1	9.4
Cyclist Facilities – Non-segregated		
Inbound	3.1	1.3 (Quiet Street)
Outbound	4.2	1.3 (Quiet Street)
Cyclist Facilities – Overall		
Total Cyclist Facilities (both directions)	14	21.6 (+54%)
Proportion Segregated (including Quiet Street Treatment)	48%	100%
Other Features		
Number of Pedestrian Signal Crossings	86	125
Number of Residential Properties with Land Acquisition	Not applicable	62

The description of the Proposed Scheme (Section 4.5) is supported by a series of drawings (listed in Table 4.2), 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
BCIDB-JAC-SPW_ZZ-0002_XX_00-DR-CR-9001	Site Location Plan
BCIDB-JAC-GEO_GA-0002_XX_00-DR-CR-9001	General Arrangement
BCIDB-JAC-GEO_HV-0002_ML_00-DR-CR-9001	Mainline Plan and Profile
BCIDB-JAC-GEO_CS-0002_XX_00-DR-CR-9001	Typical Cross Sections
BCIDB-JAC-ENV_LA-0002_XX_00-DR-LL-9001	Landscaping General Arrangement
BCIDB-JAC-PAV_PV-0002_XX_00-DR-CR-9001	Pavement Treatment Plans
BCIDB-JAC-SPW_BW-0002_XX_00-DR-CR-9001	Fencing and Boundary Treatment
BCIDB-JAC-TSM_GA-0002_XX_00-DR-CR-9001	Traffic Signs and Road Markings
BCIDB-JAC-LHT_RL-0002_XX_00-DR-EO-9001	Street Lighting
BCIDB-JAC-TSM_SJ-0002_XX_00-DR-TR-9001	Junction System Design
BCIDB-JAC-DNG_RD-0002_XX_00-DR-CD-9001	Proposed Surface Water Drainage Works
BCIDB-JAC-UTL_UD-0002_XX_00-DR-CU-9001	IW Foul Sewer Asset Alterations
BCIDB-JAC-UTL_UE-0002_XX_00-DR-CU-9001	ESB Asset Alterations
BCIDB-JAC-UTL_UG-0002_XX_00-DR-CU-9001	GNI Asset Alterations
BCIDB-JAC-UTL_UW-0002_XX_00-DR-CU-9001	IW Water Asset Alterations
BCIDB-JAC-UTL_UX-0002_XX_00-DR-CU-9001	Telecommunications Asset Alterations

Drawing Series Number	Description
BCIDB-JAC-UTL_UC-0002_XX_00-DR-CU-9001	Combined Existing Utility Records
BCIDB-JAC-STR_GA-0002_BR_00-DR-CB-9001	Frank Flood Bridge General Arrangement
BCIDB-JAC-STR_GA-0002_XX_00-DR-SS-9001	Structures General Arrangement

4.3 Design Iterations

The design of the Proposed Scheme has evolved through comprehensive design iteration, 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 & Environmental Impact Assessment Process), undertaken throughout the option selection and design development process has been incorporated, where appropriate.

Examples of how the design evolved are as follows:

- Alternative access arrangements to the Veterinary Clinic at Pinnock Hill;
- Reduction in the number of traffic lanes between the Pinnock Hill and Airside junctions;
- Signalisation of the junction of Kettles Lane and the R132 to permit right turning traffic movements;
- Continuation of the two-way cycle track adjacent to the northbound carriageway from the Green Long Term Car Park junction to the South Corballis Road junction;
- Connection with the Santry Greenway at Northwood junction;
- An alternative layout of the northbound diverge ramp after Whitehall Church to avoid impacts on the adjacent green area;
- Provision of a new pedestrian crossing at the junction between Drumcondra Road Upper and Millmount Avenue;
- General introduction of BusConnects protected junction layouts to improve safety for non-motorised users;
- General rationalisation of bus stop locations, with some bus stops relocated or removed to achieve a better spacing between stops, while also ensuring that each stop is sited in the best location to serve surrounding neighbourhoods. Minor reconfiguration of the proposed north and south approaches to the Airport roundabout;
- Provision of a new pedestrian crossing at Santry Close, near the Northwood junction;
- Provision a terminus for the D4 Route in the green space at the junction of Coolock Lane and the Swords Road;
- Provision of a dedicated left turn lane from Santry Avenue;
- More detailed provision of off-street residential parking in Santry Village, to offset loss of on-street parking;
- Provision of a new pedestrian crossing adjacent to the Comet bar in Santry;
- Reduction in cycle track width in the vicinity of Plunkett College and Highfield Hospital, to reduce impacts on adjacent mature trees;
- Further development of the Griffith Avenue junction layout, to tie in with the Griffith Avenue Cycle Scheme;
- Segregation between pedestrians and cyclists on the new bridge over the River Tolka;
- Provision of a new segregated cycle track outbound between St Alphonsus Road Lower and Hollybank Road in order to avoid conflict with pedestrians;
- Further optimisation of parking and loading bay provision along Drumcondra Road Lower;
- Provision of a two-way cycle track on the west side of Parnell Square East in order to avoid interface with pedestrians and buses at the bus stops along the east side of Parnell Square East; and
- Further rationalisation of bus stop locations, with some bus stops relocated or removed to achieve a better spacing between stops, while also ensuring that each stop is sited in the best location to serve surrounding neighbourhoods.

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) (National Transport Authority (NTA)) – 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 urban realm, which include the following:

- The Design Manual for Urban Roads and Streets (DMURS) (Government of Ireland 2013);
- National Cycle Manual (NCM) (NTA 2011);
- Transport Infrastructure Ireland (TII) National Road Design Standards;
- The Traffic Signs Manual (TSM) (Department of Transport, Tourism and Sport 2019);
- Guidance on the Use of Tactile Paving Surfaces (UK Department for Transport (DfT) 2007);
- Building for Everyone: A Universal Design Approach (National Disability Authority (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 Pinnock Hill junction south of Swords, where an existing large roundabout facilitates the movement of vehicles, but provides poor facilities for pedestrians, cyclists and buses. Pedestrians have to walk a significant distance off of their desire line to cross the road at an uncontrolled crossing of a dual carriageway, resulting in unsafe conditions for these vulnerable road users. Buses entering from the side road can often be delayed due to traffic flow on the main line.

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.

Accessibility for mobility impaired users is a core element of the Proposed Scheme design and it has been informed by the principles of DMURS, Building for Everyone: A Universal Design Approach (NDA 2020), How Walkable is Your Town? (NDA 2015), Shared Space, Shared Surfaces and Home Zones from a Universal Design Approach for the Urban Environment in Ireland (NDA 2012), Best Practice Guidelines, Designing Accessible Environments (Irish Wheelchair Association 2020), Inclusive Mobility (UK DfT 2005), Guidance on the Use of Tactile Paving Surfaces (UK DfT 2007), and BS8300-1:2018 Design of an Accessible and Inclusive Built Environment – External Environment – Code of Practice (British Standards Institution (BSI) 2018). Accessibility is also addressed in Chapter 12 of the PDGB. 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 the aim and objectives for the Proposed Scheme, 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 by Section

For the purpose of describing the Proposed Scheme it has been split into five sections as follows:

- Section 1: Pinnock Hill Junction to Airside Junction;
- Section 2: Airside Junction to Northwood Avenue;
- Section 3: Northwood Avenue to Shantalla Road;

- Section 4: Shantalla Road to Botanic Avenue; and
- Section 5: Botanic Avenue to Granby Row.

4.5.1 Section 1 – Pinnock Hill to Airside Junction

4.5.1.1 General Overview of the Proposed Scheme

The Proposed Scheme commences south of Swords on the R132 Swords Road at Pinnock Hill. The existing roundabout at Pinnock Hill will be modified to a fully signalised junction with pedestrian and cyclist facilities. New access arrangements are proposed at Swords Veterinary Hospital, while the proposed fully signalised junction has been designed to integrate with the aspirations of the Fosterstown Local Area Plan which recognises the requirement for the provision of the Fosterstown Link Road.

Between the Pinnock Hill and Airside junctions, the existing bus lanes will be maintained, the existing footpath will be upgraded, and segregated cycle lanes provided. These proposals can be provided by eliminating one inbound traffic lane and narrowing the existing carriageway. The existing signalised junction at Airside is proposed to be upgraded to provide improved infrastructure for pedestrians and cyclists.

4.5.1.2 Deviations from Standard Cross-Sections

There are no deviations from the standard BusConnects cross-sectional elements as outlined in Section 4.6.1.

4.5.1.3 Bus Lane Provision

An overview of the bus lane provision being proposed as part of the Proposed Scheme is provided in Section 4.6.4. Full bus priority through the use of dedicated bus lanes is provided to Swords throughout Section 1 – Pinnock Hill to Airside Junction. No Signal Controlled Priority is used in Section 1.

4.5.1.4 Bus Stops

The different types of bus stop (Island, Shared Landing, In-Line and Layby) are described in Section 4.6.4. All of the proposed bus stops within this section of the Proposed Scheme are Island Bus Stops. The bus stop locations and types are outlined in Table 4.3.

Table 4.3: Proposed Bus Stop Locations

Inbound/ Outbound	Bus Stop Name	Bus Stop Number	Chainage	Bus Stop Type	Bus Shelter
Inbound	Pinnock Hill	3694	A 200	Island	Standard bus shelter
Outbound	Pinnock Hill	5073	A 40	Island	Standard bus shelter
Inbound	Airside	7115	A 780	Island	New standard bus shelter proposed
Outbound	Boroimhe, Maples	5030	A820	Island	New standard bus shelter proposed
Outbound	N1 Business Park	3675	A 750	Island	New standard bus shelter proposed

4.5.1.5 Cycling Provision

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

New segregated cycle tracks will be provided in both directions along the whole of this section of the Proposed Scheme.

4.5.1.6 Junctions 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 – Pinnock Hill to Airside Junction of the Proposed Scheme are outlined in Table 4.4.

Table 4.4: Major and Moderate Junctions (Signalised) within Section 1 of the Proposed Scheme

Junction Location	Summary	Signal Operation
Major Junctions (Signalised)		
Pinnock Hill Jn (Swords (R132) Rd/Dublin Rd)	New traffic signal crossroads replacing roundabout	The Pinnock Hill junction is proposed to be upgraded to a 4 arm signalised junction as per the BusConnects Preliminary Design Guidance Booklet to enhance pedestrian, cyclist and bus priority infrastructure. The design rationale was to provide pedestrian crossing facilities on all arms of the junction, provide protected cycle infrastructure and crossing facilities, whilst improving bus priority. Full policy outcomes for CBC route can be achieved by Junction Type 1 and signal operation, giving priority to bus and improved facilities for pedestrians and cyclists.
Swords Road (R132)/Boroimhe Road (L2300)/Access to Airside	Modified and fully refurbished traffic signal crossroads.	The existing 4 arm signalised junction is proposed to be upgraded as per the BusConnects Preliminary Design Guidance Booklet to enhance pedestrian, cyclist and bus priority infrastructure. The key design rationale was to introduce pedestrian crossing facilities on all arms of the junction, remove existing left turn slip lanes, provide protected cycle infrastructure and crossing facilities, whilst improving bus priority. Full policy outcomes for CBC route can be achieved by Junction Type 2 and signal operation, giving priority to bus and improved facilities for pedestrians and cyclists.
Moderate Junctions (Signalised)		
NA	NA	

4.5.1.7 Parking and Loading Bays

There will be no changes to the parking and loading provisions along Section 1 of the Proposed Scheme.

4.5.1.8 Landscape and Urban Realm

For an overview of the landscape design principles and approach please refer to Section 4.6.12. The following sections provide a description of specific landscape and urban realm design works in Section 1 of the Proposed Scheme.

4.5.1.8.1 Pinnock Hill Roundabout to Airside Junction

The existing roundabout is proposed to be redesigned as a fully signalised junction with pedestrian and cycle facilities. This design creates more space for landscaped areas at the edges, especially towards the Swords entrance and facilitates a gateway area to be created with the relocated sculpture to be placed on a plinth and a new and enhanced 'Welcome to Swords' sign. These landscaped areas would feature block planting of varied heights and seasonal planting or wildflower meadows. Clumps of trees reflecting woodland planting are proposed where highway visibility splays and utilities allow. The footways and cycle ways are in asphalt with concrete kerbs to match existing.

The eastern arm of the R132, which is designed by external parties, is proposed to have a grass verge median or planting to enhance the area.

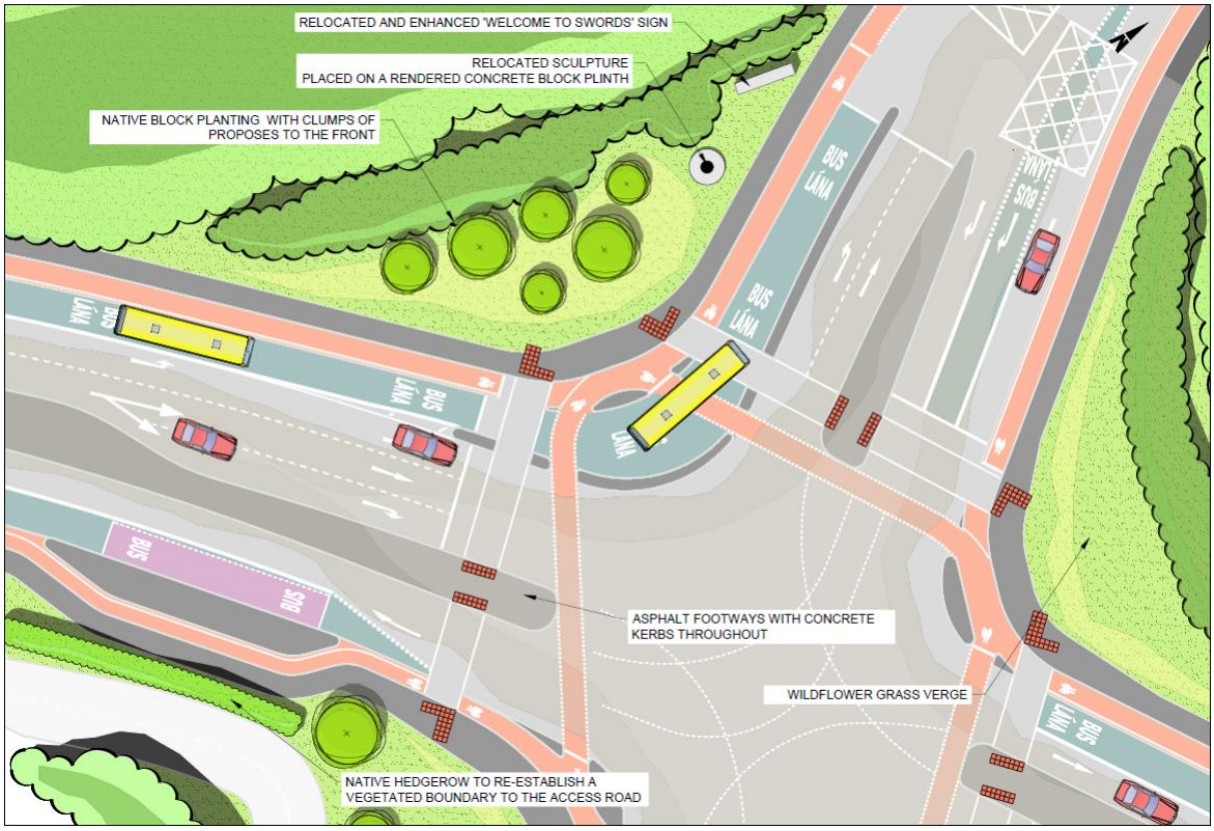


Image 4.1: Pinnock Hill Junction Indicative Design

4.5.1.9 Land Acquisition and Use

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

Permanent land acquisition is also required within this Section in order to allow for cross-section widening. There are also areas to be acquired permanently for the installation of new access arrangements at Swords Veterinary Hospital. To accommodate this improved infrastructure, it will be necessary to acquire limited land take at the following locations:

- Swords Veterinary Hospital;
- Land adjacent to the existing bus stop 3695;
- Development Property to the north of Boroimhe Road; and
- Airside Retail Park, Swords.

The impacts on residential amenity arising from land acquisition in Section 1 of the Proposed Scheme 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).

4.5.1.10 Rights of Way

The existing access to the Swords Veterinary Hospital at Pinnock Hill roundabout will be extinguished and a new alternative access is provided which will serve the business and residential property.

4.5.2 Section 2 – Airside Junction to Northwood Avenue

4.5.2.1 General Overview of the Proposed Scheme

Between the Airside and Cloghran junctions, the existing bus lanes will be maintained, the existing footpaths will be upgraded and extended, and segregated cycle tracks provided. The junction of the R132 with Kettles Lane will be modified to a fully signalised junction, permitting right turn movements. The existing Cloghran roundabout will be modified to a fully signalised junction with pedestrian and cyclist facilities. South of the Cloghran junction, current provision for cars and buses northbound will remain and a new bus lane provided southbound. Segregated one-way cycle facilities are provided on both sides of the R132. Southbound cyclists cross the R132 at the Coachman's Inn to a two-way cycle track on the western side of the R132.

It is proposed to maintain the Airport Roundabout as a signalised junction with some amendments. To provide bus priority southbound through the Airport junction, it is proposed to provide a new signal-controlled priority on the northern approach to the roundabout. The cycle facilities through the Airport junction will be upgraded and cyclists will be accommodated in a two-way cycle track on the western side of the junction, crossing the airport access road via a signalised toucan crossing.

South of the Airport Roundabout the existing northbound shared cycle lane and pedestrian lane is converted to a dedicated footpath and two-way cycle track as far as the South Corballis Road and from this point the cyclists will cross the R132 to return to the eastern side of the road.

Between Collinstown Cross Industrial Estate and Northwood Avenue, improved cycle facilities will be provided. Localised footpath and cycle track narrowing is required to mitigate land acquisition at the Thatch Cottage, which is a protected structure.

The existing signalised junctions of the Swords Road with Old Airport Road, Turnapin Lane and Northwood Avenue are proposed to be upgraded to provide improved infrastructure for pedestrians and cyclists.

4.5.2.2 Deviations from Standard Cross-Sections

The width of the cross-sectional elements as outlined in Section 4.6.1 have been reduced at a number of constrained locations across the Proposed Scheme. The deviations within Section 2 – Airside Junction to Northwood Avenue are detailed in Table 4.5.

Table 4.5: Reduced Standard Cross-Sections on Section 2 – Airside Junction to Northwood Avenue

Location	Design Element	Required DMURS/NCM Standard	Length	Design	Justification
Ch. A2935 – A2993	Cycle Track (two-way)	2.5m	58m	2.5m	The two-way cycle track width in front of the recently constructed office building (Corballis Hall) is reduced locally to avoid the building. The width provided is still meeting the minimum width required per the NTA (2011) NCM.
Ch. A3190 – A3215	Cycle Track (two-way)	2.5m	25m	2.5m	The cycle track widths reduce cyclist speeds for safety through the junction. The width provided is still meeting the minimum width required per the NTA (2011) NCM.
Ch. A3215 – A4035	Cycle Track	1.5m	8200m	1 7m	Existing shared paths inbound and outbound of 3.5m are changed to a cycle track/footpath by adding the white line to separate the cycle track.

Location	Design Element	Required DMURS/NCM Standard	Length	Design	Justification
Ch. A3215 – A4035	Footpath	1.8m	820m	1 8m	Existing shared paths inbound and outbound of 3.5m are changed to a cycle track/footpath by adding the white line to separate the cycle track.
Ch. A4195 – A4230 (citybound)	Cycle Track	1.5m	35m	1.5m	The cycle track width at this section is reduced locally to mitigate land take from the adjacent protected structure (Thatched Cottage and its curtilage).
Ch. A42200 – A4230 (outbound)	Footpath	1.8m	10m	1 85m	The footpath width at this section is reduced locally to mitigate land take from the adjacent protected structure (Thatched Cottage and its curtilage).

4.5.2.3 Bus Lane Provision

An overview of the bus provision being proposed as part of the Proposed Scheme is provided in Section 4.6.4. Full bus priority through the use of dedicated bus lanes is provided throughout Section 2. No Signal Controlled Priority is used in Section 2.

4.5.2.4 Bus Stops

The different types of bus stop (Island, Shared Landing, In-Line and Layby) are described in Section 4.6.4. Most of the proposed bus stops within this section of the Proposed Scheme are Island Bus Stops. The bus stop locations and types are outlined in Table 4.6.

Table 4.6: Proposed Bus Stop Locations

Inbound/ Outbound	Bus Stop Name	Bus Stop Number	Chainage	Bus Stop Type	Bus Shelter
Inbound	N1 Business Park	3696	A 850	Island	New standard bus shelter proposed
Inbound	Equestrian Centre	3697	A 1220	Island	New standard bus shelter proposed
Inbound	Kettles Lane	3698	A 1720	Island	New standard bus shelter proposed
Inbound	Stockhole Lane	3699	A 2310	In-Line	New standard bus shelter proposed
Inbound	Airport Parking	3885	A 2930	Island	New standard bus shelter proposed
Inbound	ALSAA Sports Club	1631	A 3350	Island	Standard bus shelter
Inbound	Swords Road	5053/ 1632	A 3740	Island	New standard bus shelter proposed
Inbound	Dardistown Cemetery	1633	A 3980	Island	Standard bus shelter
Inbound	Collinstown Park	1634/ 1635	A 4560	Shared Landing	New standard bus shelter proposed
Inbound	Turnapin Lane	1636	A 5280	Island	Standard bus shelter

Inbound/ Outbound	Bus Stop Name	Bus Stop Number	Chainage	Bus Stop Type	Bus Shelter
Inbound	Santry Close	1637	A 5650	Island	Standard bus shelter
Outbound	Equestrian Centre	3674	A 1100	Island	New standard bus shelter proposed
Outbound	-	-	A 1640	Island	New standard bus shelter proposed
Outbound	Stockhole Lane	3672	A 2250	Island	New standard bus shelter proposed
Outbound	Airport Parking	3670	A 3110	Island	Standard bus shelter
Outbound	ALSAA Sports Club	1630	A 3450	Island	New standard bus shelter proposed
Outbound	Dardistown Cemetery	1629	A 4020	Island	New standard bus shelter proposed
Outbound	Collinstown Park	1628	A 4530	Island	New slimline bus shelter proposed
Outbound	Santry Retail Park	1627	A 5170	Island	New standard bus shelter proposed
Outbound	Santry Close	1626	A 5590	Island	Standard bus shelter

4.5.2.5 Cycling Provision

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

New segregated cycle tracks will be provided in both directions along the whole of this section of the Proposed Scheme.

Localised narrowing is necessary in the locations below:

- Swords Road (R132), Corballis Hall (recently developed office building, south of Airport Roundabout): The two-way cycle track width in front of the recently constructed office building is reduced locally to avoid land take; and
- Thatch Cottage: Providing a standard width would require additional land take, impacting the adjacent protected structure (Thatch Cottage and its curtilage).

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 – Airside Junction to Northwood Avenue of the Proposed Scheme are outlined in Table 4.7.

Table 4.7: Major and Moderate Junctions (Signalised) within Section 2 of the Proposed Scheme

Junction Location	Summary	Signal Operation
Major Junctions (Signalised)		
Stockhole Road to east Naul Road to west R132 to north and south	New traffic signal junction replacing roundabout at Cloghran	The existing Cloghran Roundabout is proposed to be upgraded to a 4 arm signalised junction as per the BusConnects Preliminary Design Guidance Booklet to enhance pedestrian, cyclist and bus priority infrastructure. The design rationale was to introduce more direct and compact pedestrian crossing facilities on all arms of the junction, provide protected cycle infrastructure and crossing facilities, whilst improving bus priority. Full policy outcomes for CBC route can be achieved by Junction Type 1 and signal operation, giving priority to buses and provide improved facilities for pedestrians and cyclists.
M1 to east Dublin Airport to west R132 to north and south	Modified and fully refurbished traffic signal roundabout	Dublin Airport roundabout is proposed to be upgraded as per the BusConnects Preliminary Design Guidance Booklet to enhance pedestrian, cyclist and bus priority infrastructure. The design rationale was to improve cycle facilities and provide bus priority on the CBC mainline. Bus Connects Junction Type 1 on the southbound approach and Junction Type 2 on the northbound approach to provide greater bus priority reliability. Bi-directional cycle crossing facilities are provided across the west approach improving connectivity for cycle facilities on the CBC.
Green Long-Term Car Park to east R132 to north and south	Modified and fully refurbished traffic signal T-junction	The existing 3 arm signalised junction, with left turn slips, is to be retained due to low pedestrian count and also to maintain access to the long term car park considering the strategic location of the junction. Bi-directional cycle track proposed along the R132 west side to facilitate north-south cyclists and to avoid cycles having to cross the slip lanes at the junction. Existing staggered toucan crossing are to be straightened to address the pedestrians crossing in between the traffic stream.
South Corballis Road to east South Corballis Road to west R132 to north and south	Modified and fully refurbished traffic signal T-junction	The existing 4 arm signalised junction layout, with left slip lanes, is to be maintained due to low pedestrian counts. Bi-directional cycle track proposed along the west side of R132 section north of the junction. South of the junction, southbound and northbound direction cycle tracks are provided on the east and west side of the R132 respectively.
Old Airport Road to west Collinstown Avenue to east R132 to north and south	Modified and fully refurbished traffic signal crossroads	The existing 4 arm signalised junction and slip road is proposed to be upgraded as per the BusConnects Preliminary Design Guidance Booklet to enhance pedestrian, cyclist and bus priority infrastructure. Removal of the existing left turn slip and splitter island on Old Airport Road will provide improved pedestrian crossing opportunities. The key design rationale was to enhance pedestrian crossing facilities on all arms of the junction, provide protected cycle infrastructure and crossing facilities, whilst improving bus priority. Full policy outcomes for CBC route can be achieved by Junction Type 1 and signal operation, giving priority to bus and improved facilities for pedestrians and cyclists.
Turnapin Lane to west Turnapin Lane to east R132 to north and south	Modified and fully refurbished traffic signal crossroads	The existing 4 arm signalised junction, with left turn slip roads, is proposed to be upgraded as per the BusConnects Preliminary Design Guidance Booklet to enhance pedestrian, cyclist and bus priority infrastructure. Removal of the existing left turn slips and splitter islands on Turnapin Lane. Improved pedestrian crossing opportunities with removal of side road splitter island. The key design rationale was to improve pedestrian crossing facilities on all arms of the junction, provide protected cycle infrastructure and crossing facilities, whilst improving bus priority.
Moderate Junctions (Signalised)		
Kettles Lane to east R132 to north and south	Converting from priority junction to a signalized T-junction.	The existing 3 arm junction is proposed to be upgraded as a signalised junction per the BusConnects Preliminary Design Guidance Booklet to enhance pedestrian, cyclist and bus priority infrastructure. The key design rationale was to minimise rat running of general traffic via Kettle's Lane, provide cycle infrastructure and crossing facilities, whilst improving bus priority. Full policy outcomes for CBC route can be achieved by Junction Type 1 and signal operation, giving priority to bus and improved facilities for pedestrians and cyclists.
Quick Park to west R132 to north and south	Modified and fully refurbished traffic signal T-junction	The existing 3 arm signalised junction, with left turn slip road, is proposed to be upgraded as per the BusConnects Preliminary Design Guidance Booklet to enhance pedestrian, cyclist and bus priority infrastructure. The key design rationale was to remove the left-turn lane from the Quick Park Access arm of the junction and provide an upgraded junction with enhanced pedestrian and cycle crossing facilities, and bus priority.
Northwood Avenue to west R132 to north and south	Modified and fully refurbished traffic signal T-junction	The existing 3 arm signalised junction is proposed to be upgraded as per the BusConnects Preliminary Design Guidance Booklet to enhance pedestrian, cyclist and bus priority infrastructure. The key design rationale was to improve pedestrian crossing facilities on all arms of the junction, provide protected cycle infrastructure and crossing facilities, whilst improving bus priority. Full policy outcomes for CBC route can be achieved by junction layout by giving priority to bus and cycles, and with improved facilities for pedestrians.

4.5.2.7 Parking and Loading Bays

Changes to the parking and loading provisions along Section 2 – Airside to Northwood Avenue as a result of the Proposed Scheme are shown in Table 4.8 and Table 4.9 respectively.

Table 4.8: Section 2 – Airside to Northwood Avenue: On-Street Parking Change Impact Summary

Location	Type of Parking		Existing	Proposed	Change
The Coachman's Inn Swords Road/Old Stockhole Road	Designated Paid	Commercial	0	0	0
	Informal	Residential	42	29	-13
	Disabled	Commercial	0	0	0
Paddy Shanahan Cars, Swords Road/Old Airport Road	Designated Paid	Commercial	46	32	-14
	Informal	Residential	0	0	0
	Disabled	Commercial	0	0	0
Total			88	61	-27

Table 4.9: Section 2 – Airside to Northwood Avenue: Existing and Proposed Loading Bays

Location	Type of Parking		Existing	Proposed	Change
The Coachman's Inn Swords Road/Old Stockhole Road	Loading Bay	Commercial	0	0	0
Paddy Shanahan Cars, Swords Road/Old Airport Road	Loading Bay	Commercial	0	0	0
Total			0	0	0

4.5.2.8 Landscape and Urban Realm

For an overview of the landscape design principles and approach please refer to Section 4.6.12. The following sections provide a description of specific landscape and urban realm design works in Section 2 of the Proposed Scheme.

4.5.2.8.1 Airside Junction to Cloghran Roundabout

Replacement of ornamental planting, proposed tree planting and reinstatement of grass verge proposed for boundary with Airside Retail Park that is impacted by kerb realignments. Boundary walls impacted at Airside junction proposed to be reinstated to match existing rendered walls. A low boundary wall and reinstated grass verge proposed at the Texaco boundary. Replacement ornamental planting proposed at the entrance of Glenmore House and replacement boundary fence and hedge proposed along the western boundary impacted by kerb realignment. Proposed priority crossing in concrete blocks proposed at the entrance to Kilronan House. Restoration of verges as needed along the Metro Point boundary. Footways impacted by kerb realignments in this section finished in asphalt with concrete kerbs to match existing.

4.5.2.8.2 Cloghran Roundabout to Airport Roundabout

Cloghran Roundabout is proposed to be redesigned as a junction. Existing young trees planted along the boundary of the National Show Centre will be lifted stored and re-planted to be back of the new re-aligned footway. Behind this, a large Sustainable Drainage System (SuDS) feature is proposed together with species rich grass to enhance biodiversity. On the western side of the junction management of the planting edge is required together with strips of new native planting and hedgerows tom to reinstate vegetated boundaries. Grass verges will be reinstated. A local intervention is proposed at the Coachman's Inn including reinstating the boundary wall with a low stone wall and concrete paving blocks at the entrance to the car park.

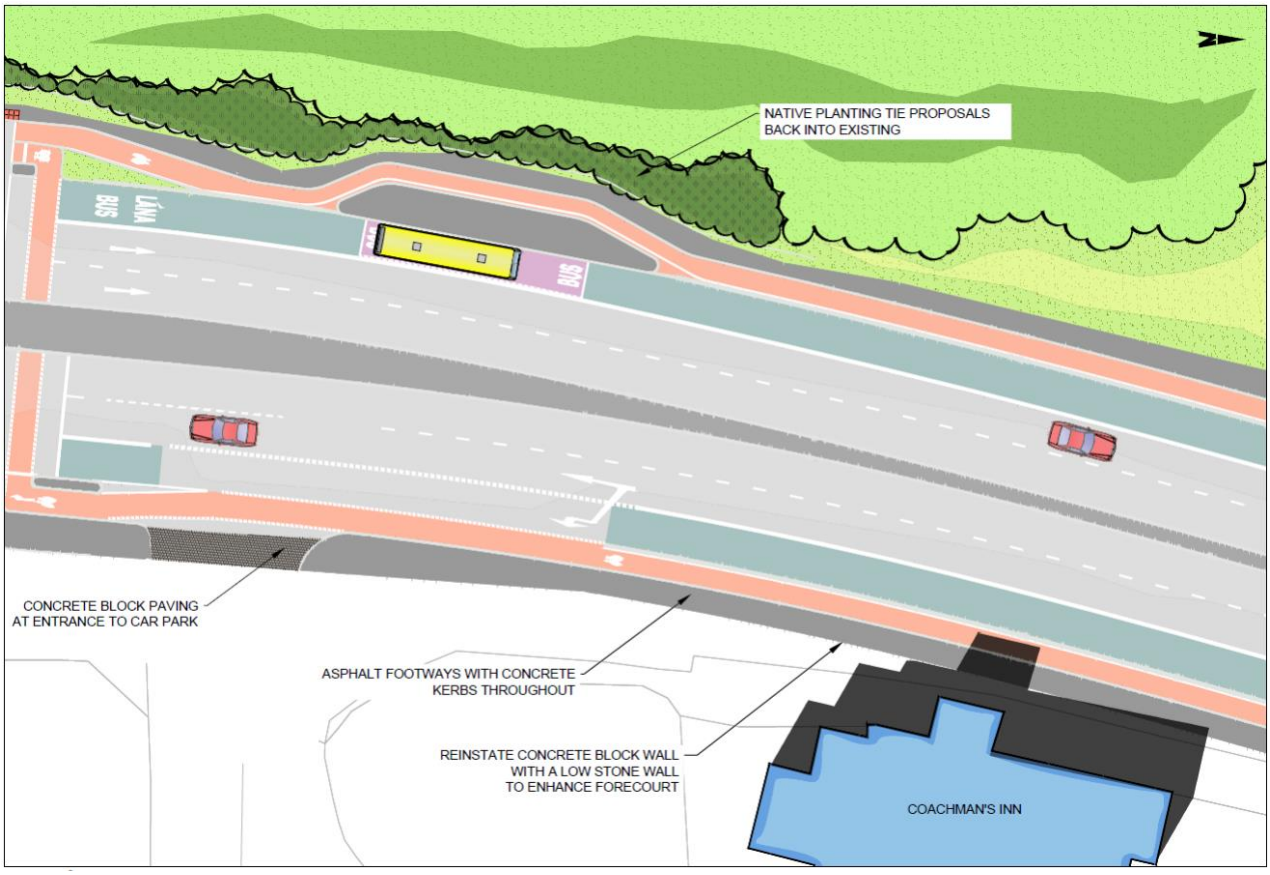


Image 4.2: Coachman's Inn Area Indicative Design

Footways impacted by kerb realignments in this section finished in asphalt with concrete kerbs to match existing.

4.5.2.8.3 Airport Roundabout to Old Airport Road

Minor changes to road alignment proposed at the Airport Roundabout. Reinstatement of larger areas of grass verges will be treated with species rich grass. Where kerb realignment is necessary, the footway materials and kerb types shall match the existing materials. Edge planting management, crown lifting, and replacement tree planting is proposed on the western side of the roundabout approaches. Asphalt and concrete kerbs are proposed for footways and on traffic islands which are changed by the realignment.

Proposed footways materials in the rest of this section are also finished in asphalt with concrete kerbs. Driveways and access points are to be reinstated with materials to match existing.

4.5.2.8.4 Old Airport Road to Northwood Avenue

The south-western area of Old Airport junction has been identified for a proposed local landscape planting feature. The landscape area consists of new native planting and feature trees set within seasonal or wildflower meadow planting. The existing trees are proposed to be retained and managed.

The boundary of Collinstown Cross Industrial Estate is proposed to be reinstated in discussion with the landowners and their plans for the redevelopment of the site.

Image 4.3: Old Airport Junction/Collinstown Cross Indicative Design

The setting of the buildings with thatched roofs with heritage significance south of the junction has been considered in the design with boundary walls reinstated with rendered walls (with railings along western side) and with hedge with garden restoration to match the existing. Replacement of low concrete wall, hedge and trees Just south of the junction, a building with a thatched roof has some heritage significance. It is proposed to adjust the boundary wall by setting it back slightly to suit the realigned footway. The wall reinstatement is to be rendered walls, with railings and garden restoration to match the existing. South-east of the Quick Park entrance road, the boundaries are to be replaced 'like for like' consisting of a low concrete wall, hedge and trees.

The entrance to the Carlton Hotel is proposed as a priority crossing in concrete setts along with reinstated ornamental planting and flagpole relocation as needed in discussion with the landowners. The footway along the boundary is proposed to be surfaced in poured concrete and concrete kerbs in discussion with landowners. The boundary wall with railing will be reinstated in a style to match the existing.

The boundary opposite the GreatGas Express which has an existing low mound, is proposed to have a new fence with a hedge behind it in discussion with the landowner.

The proposals include rebuilding the gates and wall to the Royal College of Surgeons Ireland (RCSI) Sports Ground to match existing in discussion with the landowners. After demolition of the two derelict cottages owned by the RCSI, the boundary fence will be extended along the full frontage of the property as far as the Whitehall Colmcille GAA Club.

Along the Whitehall Colmcille GAA Club boundary, the unattractive steel railing is proposed to be replaced with a low stone wall and railings in discussion with landowners to enhance the street scene.

Along the boundary with Annesley Williams, a low wall with a rendered finish is proposed in order to enhance the street scene. A new pedestrian priority crossing of reduced width is proposed at the entrance finished in concrete setts.

At the Santry Business Park boundary the proposal is to replace the existing palisade fence with a low stone wall and paladin railings above, in discussion with landowners, in order to achieve a consistent appearance of boundary treatment along the road and enhance the street scene. Grass verge restoration is required to areas affected by the Proposed Scheme.

South-east of the Turnapin Lane junction, a new hedge is proposed to be set back to replace the existing hedge forming the boundary with the industrial estate.

Footways in this section are proposed to be finished in poured concrete with concrete kerbs to match existing.

As the route approaches the Santry River interface, a no-dig construction method is to be adopted to protect the existing trees along the east side just north of the river.

The area immediately north of Santry River has been identified as a location for a local enhancement. The entrance to Santry Riverside Walk will be enhanced by existing vegetation being partly cleared to open views to the river. New concrete paving and a seating area will create a gateway and link to the walk. The footpath outside Little Venice is proposed to be enhanced with concrete paving slabs and concrete kerbs with concrete setts at the driveway, as well as a low stone wall along the forecourt. Replacement wall, hedge and garden reinstatement planting as required along the boundary south of the river.

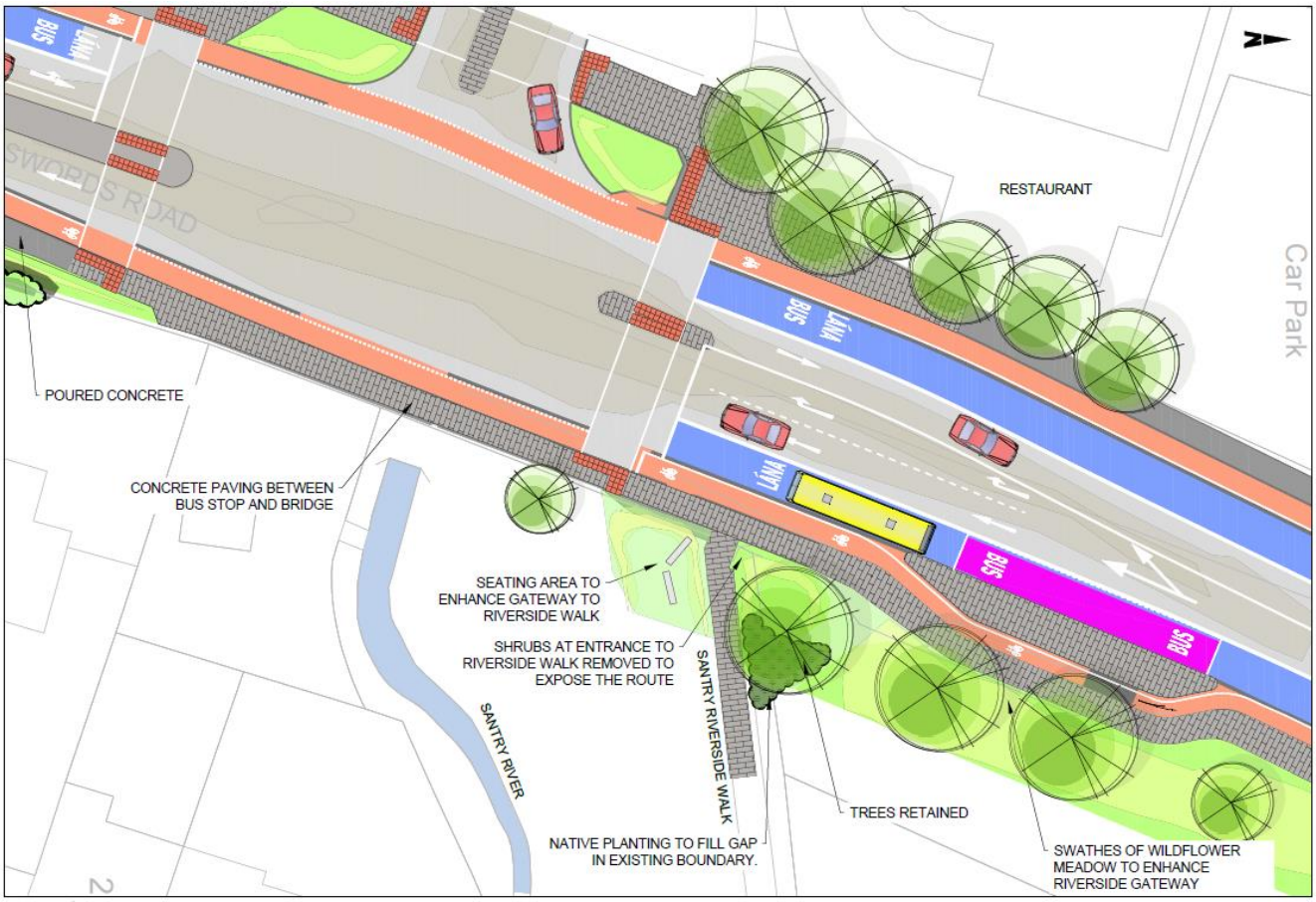


Image 4.4: Area North of Santry River Indicative Design

4.5.2.9 Land Acquisition and Use

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

Permanent land acquisition is also required within this Section in order to allow for cross-section widening. To accommodate this improved infrastructure, it will be necessary to acquire limited land take at the following locations:

- Hollytree House;
- Airside Texaco Garage;
- Nevinstown Lane;
- Kilronan Equestrian Centre;
- Parfit – The Old School House;
- Dublin Airport Authority;
- The Coachman's Inn;
- McMonagle Stone;
- Dardistown Cemetery and Crematorium;
- Collinstown Cross Industrial Estate;
- The Thatch Cottage, Dardistown;
- J.J. Gillan and Co. Ltd, Old Airport Road;
- Paddy Shanahan Cars, Old Airport Road;
- Quick Park;
- Dardistown House;
- Derryloam, Swords Road;
- Carlton Hotel, Swords Road;
- Value Van Rental, Old Airport Road;
- Carey House, Swords Road;
- Lima House, Swords Road;
- RCSI Sports Ground;
- Collinstown Lodge/Cottages;
- Whitehall GAA Sports Ground;
- Annesley Williams;
- North Ring Business Park;
- Airways Industrial Estate;
- Woodford Business Park;
- Furry Park Industrial Estate;
- Airport Business Campus; and
- Little Venice.

The impacts on residential amenity arising from land acquisition in Section 2 of the Proposed Scheme 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).

4.5.2.10 Rights of Way

There are no existing rights of way which will be affected in this section of the Proposed Scheme.

4.5.3 Section 3 – Northwood Avenue to Shantalla Road

4.5.3.1 General Overview of the Proposed Scheme

Signal Controlled Bus Priority as well as localised narrowing of the cycle track will be provided between Northwood Avenue and Coolock Lane to mitigate impact on properties and the Santry Demesne historical wall and proposed National Heritage Area. A new bus terminus will be provided in the green space opposite the group of retail premises at the junction of the Swords Road and Coolock Lane.

Between Coolock Lane and the entrance to Omni Park Shopping Centre, it is proposed to extend continuous bus lanes and cycle tracks in both directions. This will require some limited land take from adjacent properties on both sides of the existing road and the removal of existing on-street car parking.

Between the Omni Park Shopping Centre entrance and the Shantalla Road junction it is proposed to maintain the two-way general traffic lanes and introduce continuous bus lanes in both directions. A segregated footpath will be maintained on either side. This will require some land take from adjacent properties on both sides of the existing road in Santry Village and the removal of existing on-street car parking. Off street parking is proposed at residential properties between the shopping centre and Shanowen Road to offset the loss of on-street parking.

It is proposed to redirect cyclists through Lorcan Road and Shanrath Road as a Quiet Street. This cycle route commences at the junction with Omni Park Shopping Centre and connects with the Swords Road at the junction with Shantalla Road. A two-way cycle track is proposed to connect the Quiet Street from Shanrath Road through the Shanrath junction, connecting to the existing Quiet Street west of the off-slip.

A dedicated bus lane is proposed inbound along the Shantalla Road Bridge and a general traffic lane is maintained in both directions. The Shantalla Road junction will be upgraded to accommodate the bus lane and cycle and pedestrian movements.

4.5.3.2 Deviations from Standard Cross-Sections

The width of the cross-sectional elements as outlined in Section 4.6.1 have been reduced (from published guidance, e.g. DMURS), at a number of constrained locations across the Proposed Scheme. The deviations within Section 3 are detailed in Table 4.10.

Table 4.10: Reduced Standard Cross-Sections on Section 3 – Northwood Avenue to Shantalla Road

Location	Design Element	Required DMURS/NCM Standard	Length	Design	Justification
Ch. A6040-A6320 (outbound)	Cycle Track	1.5m	280m	1.5m	Providing a standard width would require additional land take, impacting the ground of Santry Demesne and the adjacent historical wall.
Ch. A6145 – A6290 (outbound)	Footway	1.8m	145m	1.8m	Providing a standard width would require additional land take, impacting the ground of Santry Demesne and the adjacent historical wall.
Ch. A5950 – A6320 (citybound)	Cycle Track	1.5m	370m	1.5m	Providing a standard width would require additional land take, impacting the ground of Santry Demesne, the adjacent historical wall and proposed Natural Heritage Area (pNHA).
Ch. A6094 – A6145 (citybound)	Footway	1.8m	151m	1.8m	Providing a standard width would require additional land take, impacting the ground of Santry Demesne, the adjacent historical wall and pNHA.

4.5.3.3 Bus Lane Provision

An overview of the bus provision being proposed 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 infrastructure is used instead. The proposed locations of Signal-Controlled Priority infrastructure along Section 3 are outlined in Table 4.11.

Table 4.11: Signal Controlled Bus Priority Locations

Location	Reason for Mitigation
Inbound between Northwood Avenue and the mid-block crossing near the Morton Stadium entrance	Providing a Southbound Bus Lane would require additional land take, impacting the ground of Santry Demesne, the adjacent historical wall. Approximate Chainage A5700 to A6050, Southbound.
Outbound between Coolock Lane Avenue and the mid-block crossing near the Morton Stadium entrance.	Providing a Northbound Bus Lane would require additional land take, impacting the ground of Santry Demesne, the adjacent historical wall or domestic entrances. Approximate Chainage A6050 to A6350, Northbound

4.5.3.4 Bus Stops

The different types of bus stop (Island, Shared Landing and In-Line) are described in Section 4.6.4. Most of the proposed bus stops within this section of the Proposed Scheme are In-Line Bus Stops. The bus stop locations and types are outlined in Table 4.12.

Table 4.12: Proposed Bus Stop Locations

Inbound/ Outbound	Bus Stop Name	Bus Stop Number	Chainage	Bus Stop Type	Bus Shelter
Inbound	Morton Stadium	1638	A 6050	Shared Landing	Slimline bus shelter
Inbound	-	-	A 6400	Island	New standard bus shelter proposed
Inbound	Schoolhouse Lane	1639	A 6780	Island	Standard bus shelter
Inbound	Omni Park SC	1640	A 7050	In-Line	Standard bus shelter
Inbound	Shanvarna Road East	231	A 7400	In-Line	No shelter
Outbound	Morton Stadium	1625	A 5950	Shared Landing	New slimline bus shelter proposed
Outbound	-	-	A 6450	Island	New standard bus shelter proposed
Outbound	Schoolhouse Lane	1624	A 6660	Island	Standard bus shelter
Outbound	Omni Park SC	1623	A 7100	In-Line	Standard bus shelter
Outbound	Shanowen Road	1622	A 7310	In-Line	Slimline bus shelter
Outbound	Swords Road	220	A 7570	In-Line	Slimline bus shelter

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 4.6.3.6.

New segregated cycle tracks will be provided in both directions along the whole of this section of the Proposed Scheme, with the exception of Santry Village, where Quiet Street Treatment is required through Lorcan Road and Shanrath Road.

More significant localised narrowing is necessary in the locations below:

- Santry Demesne: Providing a standard width would require additional land take, impacting the ground of Santry Demesne, the adjacent historical wall and proposed Natural Heritage Area (pNHA).

4.5.3.6 Junctions 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 – Northwood Avenue to Shantalla Road of the Proposed Scheme are outlined in Table 4.13.

Table 4.13: Major and Moderate Junctions (Signalised) within Section 3 of the Proposed Scheme

Junction Location	Description	Signal Operation
Major Junctions (Signalised)		
Coolock Lane to east Santry Park to west R132 to north and south	Modified and fully refurbished traffic signal crossroads	The existing 4 arm signalised junction, with left turn slip roads, is proposed to be upgraded as per the BusConnects Preliminary Design Guidance Booklet to enhance pedestrian, cyclist and bus priority infrastructure. The key design rationale was to enhance pedestrian crossing facilities on all arms of the junction, provide protected cycle infrastructure and crossing facilities, whilst improving bus priority. Removal of the existing left turn slips and splitter islands on CBC north and Coolock Lane arms of the junction will provide enhanced pedestrian crossing opportunities. Full policy outcomes for CBC route can be achieved by Junction Type 1 and signal operation, giving priority to bus and improved facilities for pedestrians and cyclists.
Omni Park Shopping Centre to west Lorcan Road to east R132 to north and south	Modified and fully refurbished traffic signal crossroads	The existing 4 arm signalised junction and slip road is proposed to be upgraded as per the BusConnects Preliminary Design Guidance Booklet to enhance pedestrian, cyclist and bus priority infrastructure. The left slip with splitter island on the CBC south arm will be removed. Improved pedestrian crossing opportunities with removal of side road splitter island. The key design rationale was to enhance pedestrian crossing facilities on all arms of the junction, provide protected cycle infrastructure and crossing facilities, whilst improving bus priority. Full policy outcomes for CBC route can be achieved by Junction Type 1 and signal operation, giving priority to bus and improved facilities for pedestrians and cyclists.
Larkhill Road to west Shanrath Road to north-east Shantalla Road to east R132 to north and south	Modified and fully refurbished traffic signal crossroads	The existing 5 arm signalised junction is proposed to be upgraded as per the BusConnects Preliminary Design Guidance Booklet to enhance pedestrian, cyclist and bus priority infrastructure. The junction creates the transition of the route from the Swords Road R104 to the Swords Road N1. The key design rationale was to introduce bus priority on the mainline CBC route, improved pedestrian crossing facilities and infrastructure in place to direct cyclists through the Shanrath Road 'Quiet Street' towards Lorcan Road on-street cycle facilities.
Moderate Junctions (Signalised)		
Santry Avenue to west Church Lane to east R132 to north and south	Modified and fully refurbished traffic signal crossroads	The existing 4 arm signalised junction, with left turn slip on the side road, is proposed to be upgraded as per the BusConnects Preliminary Design Guidance Booklet to enhance pedestrian, cyclist and bus priority infrastructure. Removal of the existing left turn slip and splitter island on Santry Avenue. Improved pedestrian crossing opportunities with removal of side road splitter island. The key design rationale was to enhance pedestrian crossing facilities on all arms of the junction, provide protected cycle infrastructure and crossing facilities, whilst improving bus priority. Full policy outcomes for CBC route can be achieved by Junction Type 1 and signal operation, giving priority to bus and improved facilities for pedestrians and cyclists.
Magenta Crescent to east R132 to north and south	Modified and fully refurbished traffic signal T-junction	The existing 3 arm junction, with signal controlled pedestrian crossing on the CBC north arm, is proposed to be upgraded to a full signalised junction per the BusConnects Preliminary Design Guidance Booklet to enhance pedestrian, cyclist and bus priority infrastructure. The key design rationale was to enhance pedestrian crossing facilities on all arms of the junction, provide protected cycle infrastructure and crossing facilities, whilst improving bus priority.
Shanowen Road to east R132 to north and south	Modified and fully refurbished traffic signal T-junction	The existing 3 arm signalised junction is proposed to be upgraded per the BusConnects Preliminary Design Guidance Booklet to enhance pedestrian, cyclist and bus priority infrastructure. There will be no major physical changes required.

4.5.3.7 Parking and Loading

Changes to the parking and loading provisions along Section 3 – Northwood Avenue to Shantalla Road as a result of the Proposed Scheme are shown in Table 4.14 and Table 4.15 respectively.

Table 4.14: Section 3 – Northwood Avenue to Shantalla Road: On-Street Parking Change Impact Summary

Location	Type of Parking		Existing	Proposed	Change
Swords Road/ Schoolhouse Lane	Designated Paid	Commercial	0	0	0
	Informal	Residential	6	3	-3
	Disabled	Commercial	0	0	0
Swords Road/ Shanowen Road	Designated Paid	Commercial	0	0	0
	Informal	Residential	7	12	+5
	Disabled	Commercial	0	0	0
Swords Road/ The Comet	Designated Paid	Commercial	0	0	0
	Informal	Residential	0	0	0
	Disabled	Commercial	0	0	0
Approximate adjacent informal parking within 200-250m			69	59	-10
Total			82	74	-8

Table 4.15: Section 3 – Northwood Avenue to Shantalla Road: Existing and Proposed Loading Bays

Location	Type of Parking		Existing	Proposed	Change
Swords Road/ Schoolhouse Lane	Loading Bay	Commercial	1	1	0
Total			1	1	0

4.5.3.8 Landscape and Urban Realm

For an overview of the landscape design principles and approach please refer to Section 4.6.12. The following sections provide a description of specific landscape and urban realm design in Section 3 of the Proposed Scheme.

4.5.3.8.1 Northwood Avenue to Coolock Lane

The design proposes concrete paving slabs with concrete kerbs from the Santry River threshold to Shanrath Road – Larkhill Road junction. The entrance to Santry Park is proposed to be enhanced with granite setts and all the islands enhanced with concrete setts to improve overall image of the area. The existing trees in the park are retained with proposed new tree planting to be discussed with Local Authorities and stakeholders. The wall along the park south of the junction to be reinstated to match existing. A low stone wall and railings along the south-eastern side of the junction is to be reinstated to suit the realignment and materials are to match the existing (Image 4.5).

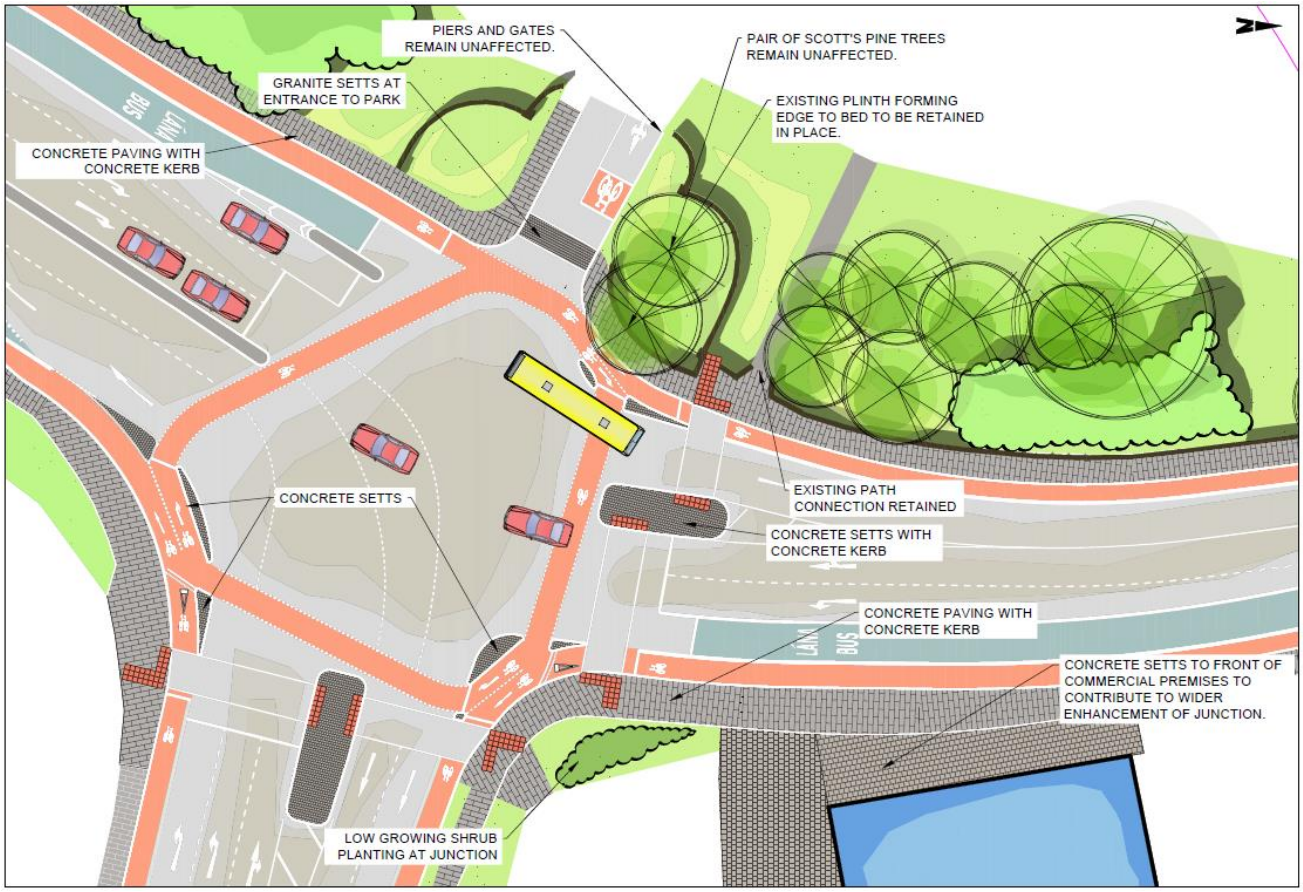


Image 4.5: Coolock Lane and Entrance to Santry Park Indicative Design

4.5.3.8.2 Coolock Lane to Omni Park

The urban realm of the shopping parade opposite Heiton Buckley is proposed to be enhanced with concrete paving and concrete kerbs to improve the street scene.

The Swiss Cottage interface boundary is to be designed in discussion with landowner in line with new development at future design stages.

South of Swiss Cottage redevelopment site, the boundary proposal is for a low wall with railings at the Trade Electric Group building along the eastern edge and a rendered wall with railing along the western edge, reinstated to match the existing style.

Along the Magenta Hall residential area, along both the western and eastern edges, the design proposes to replace multiple fence types with a unified design to provide a more consistent style to the street in this area. Along the residential edge it is proposed to reposition the newly planted trees and replace the ornamental or seasonal planting as required. The proposed fence design is to consider views from the residential area in order to screen the road. The current fence along Santry Hall Industrial Estate is proposed to be replaced with a fence that complements the residential fence style in order to provide a unified street scene.

The park entrance at the north-eastern corner of Lorcan Road is to be reinstated using concrete slab paving and concrete kerbs. The existing asphalt ramp within the park is to be extended and realigned. New stepped feature planting is incorporated to highlight this park corner along with new park trees as replacements for local tree losses and seasonal planting in a wave form to replace affected planting. The 'Magenta Hall' sign is re-positioned, and an advisory sign is to be located for the Quiet Street Treatment along Lorcan Road (Image 4.6).

Image 4.6: North-Eastern Corner of Lorcan Road Indicative Design

Footways are to be resurfaced with concrete paving slabs and concrete kerbs to enhance the street scene along this residential and mixed-use area.

4.5.3.8.3 Omni Park to Shantalla Road

The design proposes enhancing the footways with concrete paving slabs and concrete kerbs with new driveways to be detailed in concrete setts to enhance the overall street scene. Where boundaries are affected, front gardens are to be restored as needed in consultation with the landowners. Some properties are to incorporate new parking provision within front gardens.

The proposals seek to unify the design of all affected residential boundaries with two types of boundary designs, one which is a free-standing wall and one which is a retaining wall with railings above.

- Free-standing – This type of wall treatment replaces existing walls that has a singular wall component with coping detail on top. The proposed design includes a concrete block wall rendered in cream or off-white to match existing walls. The wall is detailed with a recess at the bottom to address the changes in the footway levels and to create a consistent straight base while the pre-cast coping complements the main wall and unifies the boundaries along the street.
- Retaining – This type of wall replaces existing walls that act as retaining structures to front gardens and includes a concrete block base for the retaining structure rendered in cream or off-white. New railings to match existing railing style. The wall is detailed with a recess at the bottom to address the changes in the footway levels and create a consistent straight base. Pillars with pre-cast coping complements the main wall and unifies the boundaries along the street.

Image 4.7: Sketch View of New Property Boundaries Along Swords Road

The area in front of The Comet and the retail area on the eastern side of the route is proposed to have surface treatment enhancements. This includes a wider pedestrian footway in concrete paving and the vehicular forecourt in concrete setts. The pedestrian footway along the western retail area near the Comet is also proposed to be enhanced with concrete paving and the parking area in concrete setts along with a replacement low rendered wall off-white or cream to match the residential walls. The Centra forecourt proposes to be de-cluttered and reorganised. The footways along these retail areas to be resurfaced in concrete paving slabs and concrete kerbs to match the rest of the residential footways to the northern part of this section.

Image 4.8: Sketch View Looking Towards The Comet

The eastern corner of the Shanrath Road-Larkhill Road junction has been identified as a cycle route with cycle tracks through the green space. The proposed design includes crown lifting of existing trees, feature concrete paving in the widened footway with seating and lighting along cycle lanes.

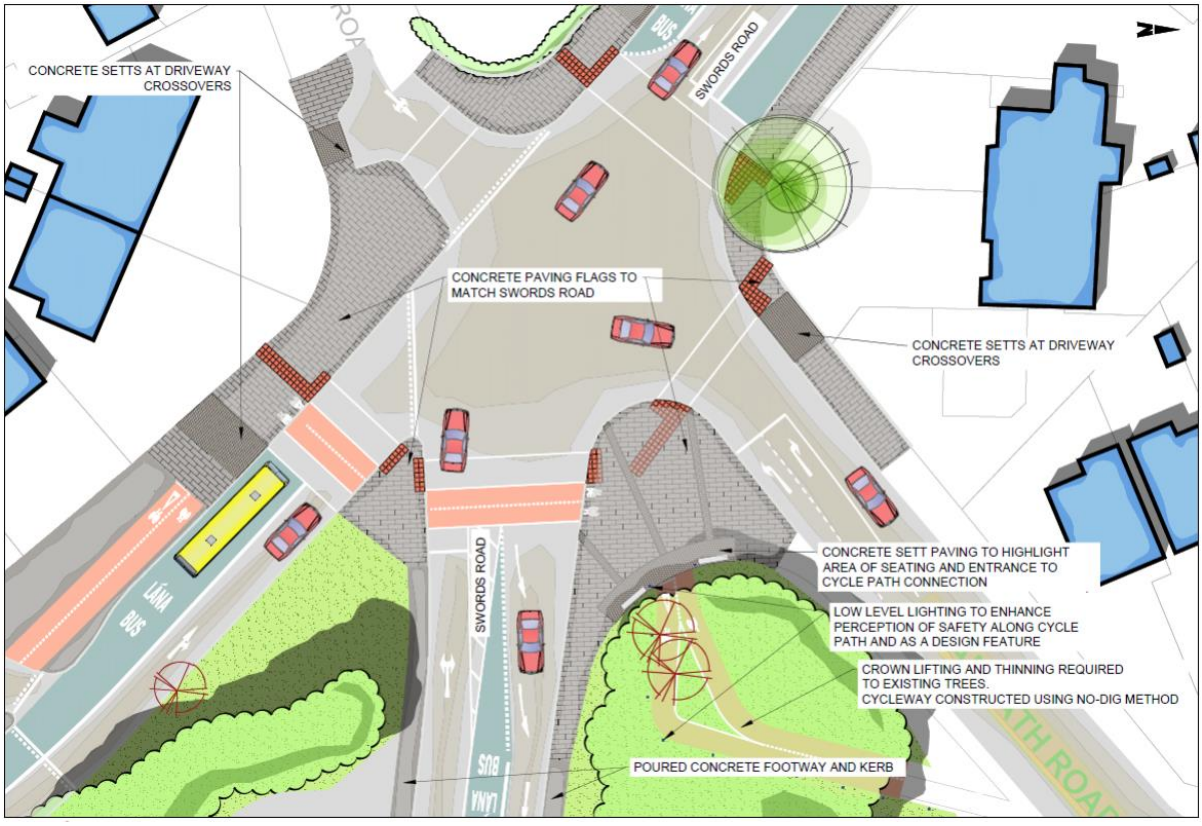


Image 4.9: Eastern Corner of the Shanrath Road-Larkhill Road Junction Indicative Design

4.5.3.9 Land Acquisition and Use

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

Permanent land acquisition is also required within this Section in order to allow for cross-section widening at all of the locations listed above.

To facilitate these transport infrastructure improvements, it will be necessary to acquire limited land take at the following locations:

- Morton Stadium;
- Santry Villas;
- Santry Park;
- Airvista Office Park;
- T O'Reilly Building;
- Swiss Cottage;
- AIB, Swords Road;
- 1 Magenta Crescent;
- Magenta Hall;

- Santry Hall Industrial Estate; and
- 45 residential properties along Swords Road.

The impacts on residential amenity arising from land acquisition in Section 3 of the Proposed Scheme 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).

4.5.3.10 Rights of Way

There are no existing rights of way which will be affected by the Proposed Scheme in this section of the Proposed Scheme.

4.5.4 Section 4 – Shantalla Road to Botanic Avenue

4.5.4.1 General

From Shantalla Road to the Botanic Avenue, a continuous bus lane will be provided in both directions. It is proposed to retain the existing bus lanes and provide a segregated cycle track and footpath between Shantalla Road and Millmount Avenue in both directions. Between Shantalla Road and Collins Avenue the main north/south cycle route and pedestrian route will continue via a Quiet Street Treatment along the Swords Road. An additional south bound segregated cycle track will be provided adjacent to the south bound slip lane of the Shantalla Road junction. A short section of this cycle track is reduced to 1.5m wide in front of the Church of the Holy Child in addition to a reduction of the existing 3.5m wide footpath to 2m wide.

Localised narrowing of the cycle track is also required at Plunket College and Highfield Hospital to avoid land take and impacting a row of high-quality trees along the boundary of Plunket College. Narrowing is also required outbound along Drumcondra Road Upper between St Patrick's College and Griffith Avenue, where providing a standard width would result in significant loss of mature trees.

It is proposed to upgrade the Collins Avenue junction to better facilitate bus priority and provide dedicated, segregated bus lanes to the stop lines with signal-controlled priority. The other key junctions, at Griffith Avenue, Richmond Road/Millmount Avenue and Botanic Avenue, will be upgraded to improve cyclist provision and bring bus lanes closer to the stop lines.

In Drumcondra, an independent pedestrian and cycle bridge over the River Tolka is being provided as part of the Proposed Scheme to allow the proposed bus lanes to be accommodated over the existing bridge. The proposed bridge would require the removal of two Poplar trees within Our Lady's Park while four new smaller-sized trees have been proposed surrounding the square paved area, subject to underground utilities. Three new small canopy trees are proposed at the west end of the bridge adjacent to Millmount Terrace. The existing square area of paving surrounding the statue on the south side of the river will be replaced and enhanced with a combination of stone and concrete paving together with new seating as a local area enhancement. The path close to the river will be re-aligned and re-surfaced to meet with the new paved square. Additional planting is to be provided on the eastern side of the path to prevent access to the narrow embankments leading to the river side beneath the structure.

4.5.4.2 Deviations from Standard Cross-Sections

The width of the cross-sectional elements as outlined in Section 4.6.1 have been reduced at a number of constrained locations across the Proposed Scheme. The deviations within Section 4 – Shantalla Road to Botanic Avenue are detailed in Table 4.16.

Table 4.16: Reduced Standard Cross-Sections on Section 4 – Shantalla Road to Botanic Avenue

Location	Design Element	Required DMURS/NCM Standard	Length	Design	Justification
Ch. A7650 – A8050 (citybound)	Cycle Track	1.5m	400m	1.5m	Providing a standard width would require additional land take, impacting the ground of Santry Demesne and the adjacent historical wall.
Ch. A8615 – A8830 (outbound)	Cycle Track	1.5m	215m	1.7m	Existing shared path of 3.5m is changed to a cycle track/footpath by adding the white line to separate the cycle track.
Ch. A8645 – A8785 (citybound)	Cycle Track	1.5m	140m	1.7m	Providing a standard width would require additional land take, impacting the row of high-quality trees planted along the boundary of the Plunket College. Extensive length of retaining wall is also required if standard width cycle track is provided.
Ch. A8880 – A8950 (outbound)	2-way Cycle Track	3.25m	70m	2.5m	
Ch. A9254 – A9450 (outbound)	Cycle Track	1.5m	196m	1.5m	Providing a standard width would require additional land take, impacting the ground of Highfield Hospital, with the need for retaining wall. The boundary wall of the Gas station will also be affected if standard cycle track width is provided.
Ch. A9300 – A9353 (outbound)	Footway	1.8m	53m	1.8m	Existing kerb line to be retained where possible. Providing a standard width would result in significant loss of mature trees along Drumcondra Road Upper.
Ch. A9930 – A10030 (outbound)	Cycle Track	1.5m	100m	1.5 – 1.7m	Existing kerb line to be retained where possible. Providing a standard width would result in significant loss of mature trees along Drumcondra Road Upper.

4.5.4.3 Bus Lane Provision

An overview of the bus provision being proposed as part of the Proposed Scheme is provided in Section 4.6.4. Full bus priority through the use of dedicated bus lanes is provided throughout Section 4.

4.5.4.4 Bus Stops

The different types of bus stop (Island, Shared Landing and In-Line) are described in Section 4.6.4. Most of the proposed bus stops within this section of the Proposed Scheme are Island Bus Stops. The bus stop locations and types are outlined in Table 4.17.

Table 4.17: Proposed Bus Stop Locations

Inbound/ Outbound	Bus Stop Name	Bus Stop Number	Chainage	Bus Stop Type	Bus Shelter
Inbound	Ellenfield Park	1641	A 7760	Shared Landing	New slimline bus shelter proposed
Inbound	White Church	1642/10433	A 8060	Island	Standard bus shelter
Inbound	Collins Ave	7851	B150	In-Line	Standard bus shelter
Inbound	Collins Ave	237	B220	In-Line	Standard bus shelter
Inbound	Iveragh Road	213	A 8290	Island	Standard bus shelter
Inbound	Highfield Hospital	214	A 8610	Island	New standard bus shelter proposed
Inbound	Griffith Downs	4432	A 8870	Island	Standard bus shelter
Inbound	The Village	119	A 9160	Island	Standard bus shelter

Inbound/ Outbound	Bus Stop Name	Bus Stop Number	Chainage	Bus Stop Type	Bus Shelter
Inbound	Skylon Hotel	44	A 9410	Island	Standard bus shelter
Inbound	St. Patrick's College	7603	A 9570	Shared Landing	Standard bus shelter
Inbound	St. Patrick's College	45	A 9740	Shared Landing	Standard bus shelter
Outbound	Whitehall	1620/100141	A 8170	In-Line	Standard bus shelter
Outbound	Iveragh Road	212	B410	In-Line	Standard bus shelter
Outbound	Iveragh Road	205	A 8370	Island	Standard bus shelter
Outbound	Highfield Hospital	204	A 8730	Island	Standard bus shelter
Outbound	Whitehall College/ Whitehall Garda St	203/104351	A 9000	Island	Standard bus shelter
Outbound	Wellpark Avenue	85	A 9310	Island	Standard bus shelter
Outbound	DCU/St. Patrick's College	7602	A 9610	Shared Landing	Standard bus shelter
Outbound	DCU/St. Patrick's College	21	A 9760	Shared Landing	Standard bus shelter

4.5.4.5 Cycling Provision

The specific proposals for cycling facilities in Section 4 of the Proposed Scheme are described below. Provision for cyclists at the signal-controlled junctions are described in Section 4.6.3.6.

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

More significant localised narrowing is necessary in the locations below:

- Plunket College: Providing a standard width would require additional land take, impacting the row of high-quality trees along the boundary of the Plunket College. Extensive length of retaining wall is also required if standard width cycle track is provided. Providing a standard width would require additional land take, impacting the ground of Highfield Hospital, with the need for retaining wall. The boundary wall of the NI AGI will also be affected if standard cycle track width is provided.
- Drumcondra Road Upper: Existing kerb line to be retained where possible. Providing a standard width would result in significant loss of mature trees along Drumcondra Road Upper.

4.5.4.6 Junctions Information

An overview of the approach to junction review and design is provided in Section 4.6.7. The major and moderate junctions within Section 4 – Shantalla Road to Botanic Avenue of the Proposed Scheme are outlined in Table 4.18.

Table 4.18: Major and Moderate Junctions (Signalised) within Section 4 of the Proposed Scheme

Junction Location	Description	Signal Operation
Major Junctions (Signalised)		
Shantalla Road to west Shantalla Road to east R132 to north and south	Modified and fully refurbished traffic signal T-junction	The existing 3 arm junction is proposed to be upgraded to a full signalised junction and in line with the BusConnects Preliminary Design Guidance Booklet to enhance pedestrian, cyclist and bus priority infrastructure. The key design rationale was to introduce bus priority for the southbound buses re-joining the CBC mainline on the R132 Swords Road.
Collins Avenue to west Collins Avenue to east R132 to north and south	Modified and fully refurbished traffic signal crossroads	The existing 4 arm signalised junction, with left turn slip road, is proposed to be upgraded as per the BusConnects Preliminary Design Guidance Booklet to enhance pedestrian, cyclist and bus priority infrastructure. Removal of the existing left turn slip and splitter island on Collins Avenue east arm will provide improved pedestrian crossing opportunities. Junction Type 1 is proposed inbound, on the CBC north arm, and Junction Type 3 outbound on the CBC south arm. Junction layout has been adopted to reduce junction delays and provide a balanced approach and capacity for all modes. The key design rationale was to enhance pedestrian crossing facilities on all arms of the junction, provide protected cycle infrastructure and crossing facilities, whilst improving bus priority.
Griffith Avenue to east Griffith Avenue to west R132 to north and south	Modified and fully refurbished traffic signal crossroads	The existing 4 arm signalised junction is proposed to be upgraded as per the BusConnects Preliminary Design Guidance Booklet to enhance pedestrian, cyclist and bus priority infrastructure. The key design rationale was to introduce pedestrian crossing facilities on all arms of the junction, provide protected cycle infrastructure and crossing facilities.
Moderate Junctions (Signalised)		
Iveragh Road to west R132 to north and south	Modified and fully refurbished traffic signal crossroads	The existing 3 arm junction, with signal controlled pedestrian crossing on the CBC north arm, is proposed to be upgraded to a full signalised 4-arm junction per the BusConnects Preliminary Design Guidance Booklet to enhance pedestrian, cyclist and bus priority infrastructure. Junction layout amended to facilitate a new access to permitted development on land to the east of the junction. The key design rationale was to enhance cycle infrastructure and crossing facilities, whilst improving bus priority.
Seven Oaks to east R132 to north and south	Modified and fully refurbished traffic signal T-junction	The existing 3 arm junction is proposed to be upgraded as per the BusConnects Preliminary Design Guidance Booklet to enhance pedestrian, cyclist and bus priority infrastructure. The key design rationale was to provide improved cycle and bus priority. Full policy outcomes for CBC route can be achieved by junction layout by giving priority to bus and cycles, and with improved facilities for pedestrians.
Home Farm Road to west R132 to north and south	Modified and fully refurbished traffic signal T-junction	The existing 3 arm junction is proposed to be upgraded as per the BusConnects Preliminary Design Guidance Booklet to enhance pedestrian, cyclist and bus priority infrastructure. The key design rationale was to provide improved cycle and bus priority. Full policy outcomes for CBC route can be achieved by junction layout by giving priority to bus and cycles, and with improved facilities for pedestrians.
Millmount Avenue to west Richmond Road to east Drumcondra Road Upper	Modified and fully refurbished traffic signal T-junction	The existing 4 arm signalised junction and slip road is proposed to be upgraded as per the BusConnects Preliminary Design Guidance Booklet to enhance pedestrian, cyclist and bus priority infrastructure. The key design rationale was to introduce bus priority on the mainline CBC route, provide protected cycle infrastructure and improved pedestrian crossing facilities. Full policy outcomes for CBC route can be achieved by junction layout.
Cian Park to west Botanic Avenue to east Drumcondra Road Upper to north and south	Modified and fully refurbished traffic signal crossroads	The existing signalised 4 arm junction is proposed to be upgraded as per the BusConnects Preliminary Design Guidance Booklet to enhance pedestrian, cyclist and bus priority infrastructure. The key design rationale was to introduce bus priority on the mainline CBC route, provide protected cycle infrastructure and improved pedestrian crossing facilities. Full policy outcomes for CBC route can be achieved by junction layout.

4.5.4.7 Parking and Loading

There will be no changes to the parking and loading provisions along Drumcondra Road Upper in this section of the Proposed Scheme.

4.5.4.8 Landscape and Urban Realm

For an overview of the landscape design principles and approach please refer to Section 4.6.12. The following sections provide a description of specific landscape and urban realm design in Section 4 of the Proposed Scheme.

4.5.4.8.1 Shantalla Road to Griffith Avenue

The pedestrian and cycle crossings at the Collins Avenue junction are proposed to be improved. The local green space with trees and shrubs on the west side of the junction is to be retained and protected during the works where new footway connections and cycle paths pass through.

The shopping parade near Iveragh Road has been identified as a local enhancement to improve the setting and appearance of the local shops. Concrete paving slabs and concrete kerbs are proposed for footways and concrete setts for the parking areas. The bus stop area is enhanced with a widened area for pedestrians and shop fronts. Pedestrian crossings are improved as part of the re-aligned junction along with a continuous cycle track to both sides.

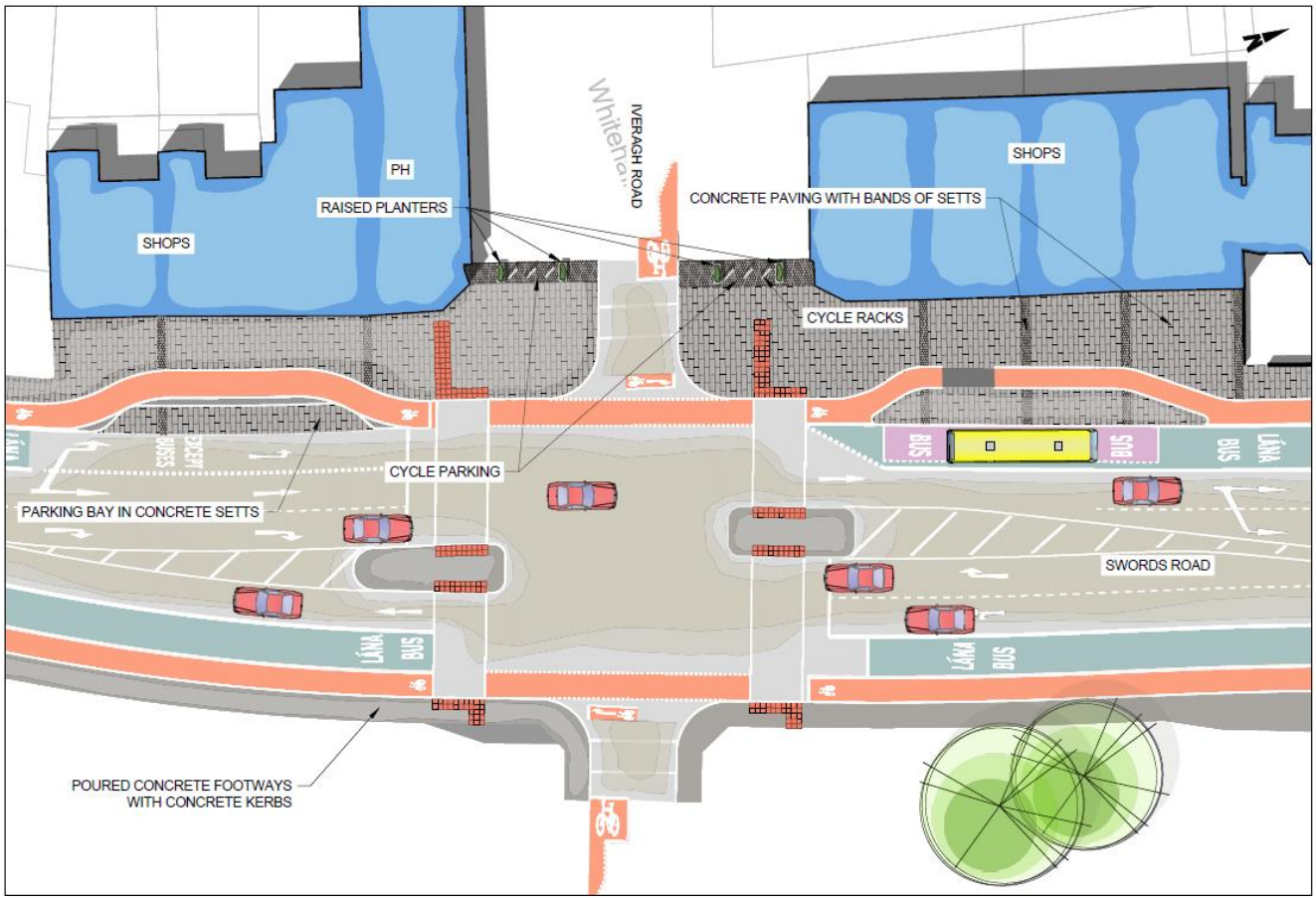


Image 4.10: The Shopping Parade Near Iveragh Road Indicative Design

The boundary wall along Whitehall Colmcille GAA club main pitch is proposed to be reinstated as a rendered block work wall to improve the appearance of the existing boundary. The potential to include low walls with railings to open up views is to be discussed with landowners in future design stages.

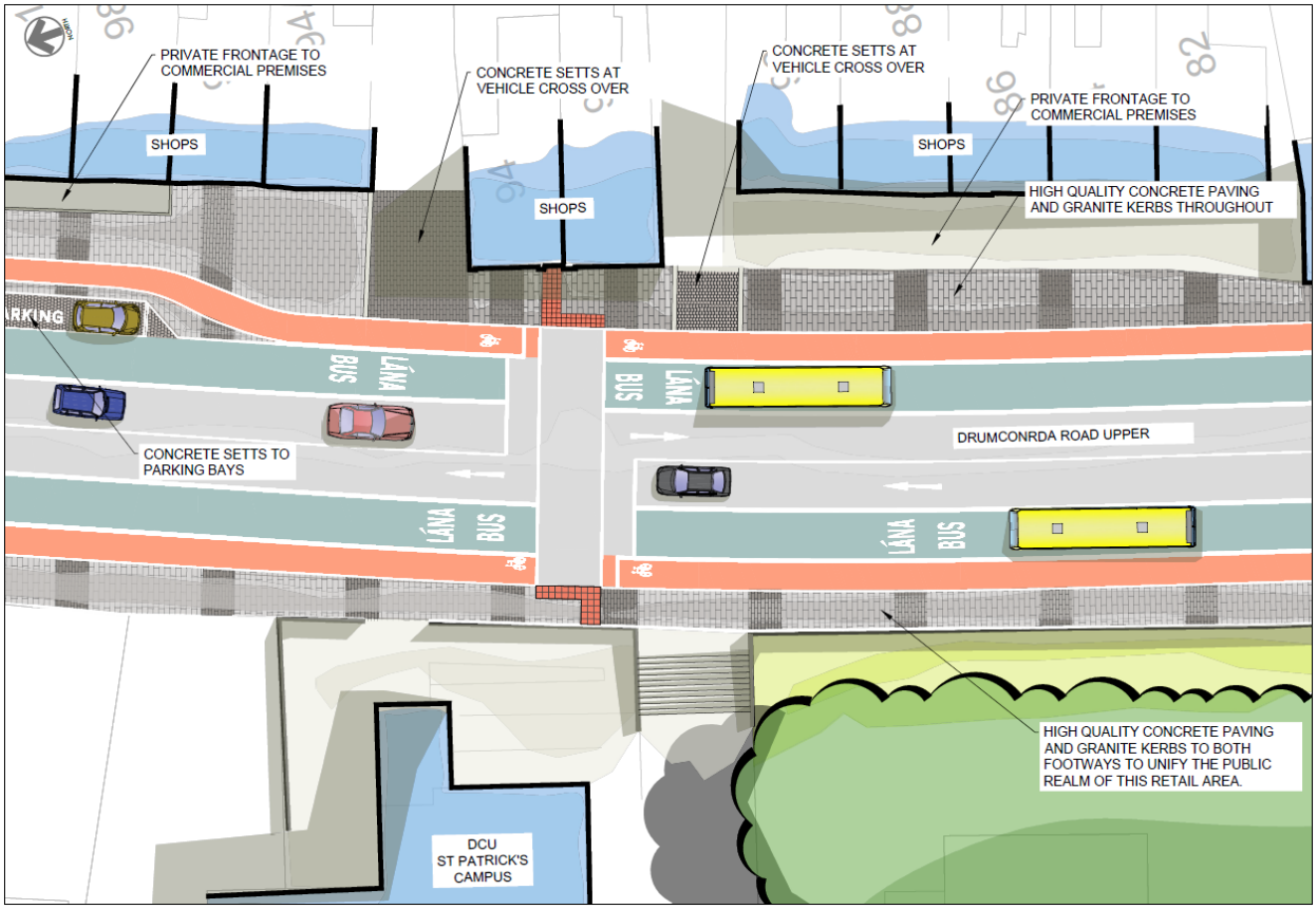
Along the Plunket College boundary, a new bus stop requires a small amount of land take with a new hedge and retaining wall reinstated to match the existing. Priority crossings across side roads are proposed to promote pedestrian priority. Gardens and planting are re-instated along affected boundaries with no-dig construction methods to be utilised near existing trees to avoid impacts to roots. Pedestrian and cycle crossings are to be enhanced across the Griffith Avenue junction.

Footways impacted by kerb realignments in this section are proposed to be resurfaced with poured concrete and concrete kerbs to match the existing.

4.5.4.8.2 Griffith Avenue to Botanic Avenue

Along Drumcondra Road Upper, the design proposes to make footway surfaces consistent in appearance using poured concrete and concrete kerbs with repairs to match existing as needed. Reinstatement of grass verges and enlarging existing tree surrounds is proposed to support future tree health. No-dig construction methods are to be utilised where works could otherwise impact on existing tree roots.

The DCU area is proposed as a local area of enhancement with the proposed design including high-quality grey concrete slabs interspaced with darker grey linear bands of paving that continue along the DCU boundary to the west for visual continuity. Granite kerbs are proposed along this area utilising existing granite kerbs where possible. A general declutter and unified street furniture use is proposed for this area. Parking bays are proposed to be finished in concrete setts to visually integrate with pedestrian areas, or as inset parking bays at footway level to provide wider footways when not in use. The private forecourts have the potential to be repaved in concrete block paving in consultation with landowners. Edge kerbs are proposed to mark the boundary of private forecourts. The commemorative flower post features are to be retained or relocated in consultation with Local Authorities.



The footway in front of Cat and Cage pub to be finished in concrete paving slabs and granite kerbs. The banding feature starts at the edge of the pub. The pedestrian crossing at the side street is finished in concrete setts to enhance pedestrian priority. The residential area footways are to feature concrete paving slabs and granite kerbs of the same type as the retail area but without the banding feature.

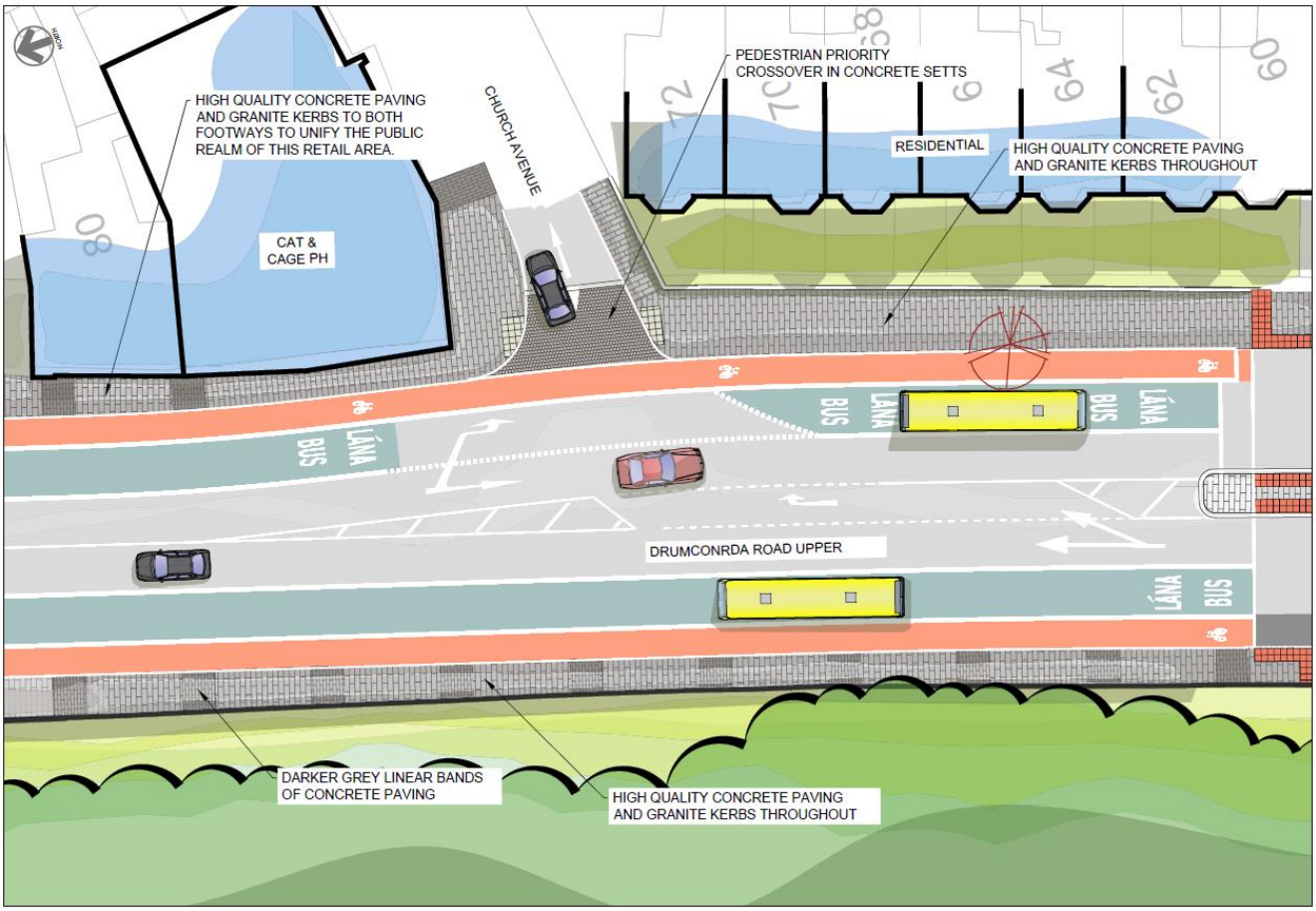


Image 4.11: Footways in the Vicinity of the Cat and Cage Pub Indicative Design

The Drumcondra Road Upper shopping parade is also identified as a local enhancement opportunity to improve the image of the urban realm. The design proposed is to reflect the same design style and materials as the DCU area in order to make the two retail areas visually unified. The design includes footway enhancements with high-quality grey concrete slabs interspaced with darker grey linear paving units as feature bands. Granite kerbs are proposed along this area reusing exiting granite kerbs where possible. The refreshed paving and banding are proposed in the private forecourt areas up to the edge of the shops but will need to be agreed with landowners. Parking bays are proposed to be finished in concrete setts to visually integrate with adjacent pedestrian areas or as inset parking bays at footway level to provide wider footways when not in use. The commemorative flower post features are to be retained or relocated within the darker banding feature paving in consultation with Local Authorities.

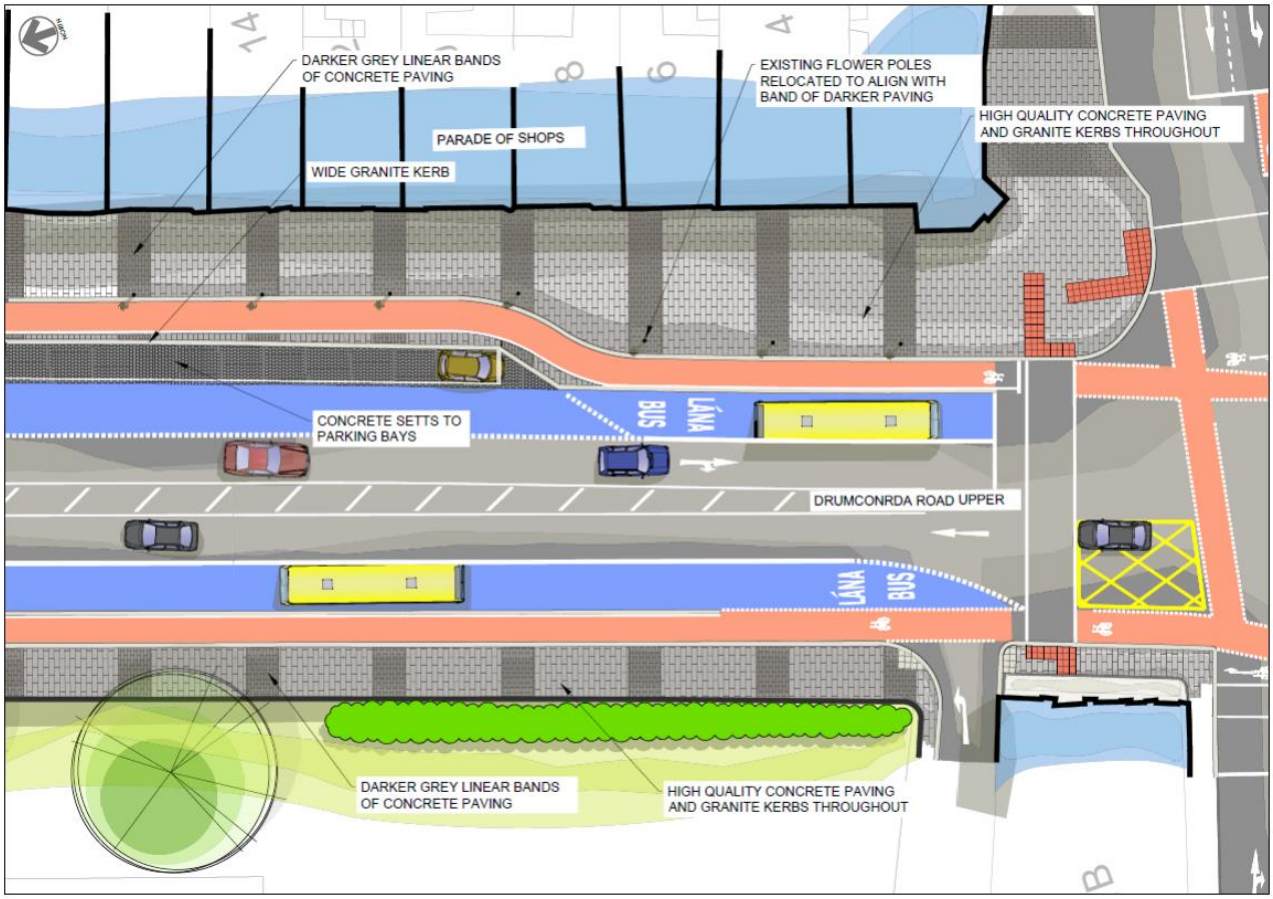


Image 4.12: Drumcondra Road Upper Shopping Parade Indicative Design

A new pedestrian and cycle bridge is proposed along the western edge of Frank Flood Bridge leading into Our Lady's Park.

The proposed bridge would require the removal of two Poplar trees within Our Lady's Park which are a different variety to one another and six Silver Birch trees adjacent to Millmount Terrace. Six new smaller-sized trees have been proposed surrounding the square paved area in Our Lady's Park, subject to underground utilities. Three new small canopy trees are proposed at the west end of the bridge adjacent to Millmount Terrace.

The existing square area of paving surrounding the statue on the south side of the river will be replaced and enhanced with a combination of stone and concrete paving together with new seating as a local area enhancement. The path close to the river will be re-aligned and re-surfaced to meet with the new paved square. Additional planting is to be provided on the eastern side of the path to prevent access to the narrow embankments leading to the river side beneath the structure.

The bridge structure and its parapets have been designed to be slender and visually 'light' to enable views of the existing road bridge to be retained. A two-tone colour scheme has been adopted which will create distinction between the central girder and the edge member preventing it appearing monolithic. The parapet top rail, posts and edge member are proposed to be painted light grey. The central girder is to be coloured oxide red which reflects the dark red brick colour in some of the buildings in proximity to the bridge. The proposed mesh panel of the parapet is to be stainless steel. The soffit of the bridge shall be painted black to create a shadow effect further improving the slender appearance of the edge member.

The bridge deck is proposed to be an anti-slip surface consisting of aggregate bonded together with an epoxy resin. This surface continues to the junction with Millmount Terrace to provide a consistent application of the same material. The cycle way section will be coloured 'Tuscan Terracotta' resin or similar in order that it appears as a tone that complements the standard cycle ways. The footway section will be coloured in a grey resin in order that it complements the new paved footways in the area (Image 4.13).

The space between the bridge soffit and ground is to feature pebbles set in mortar to discourage anti-social behaviour.

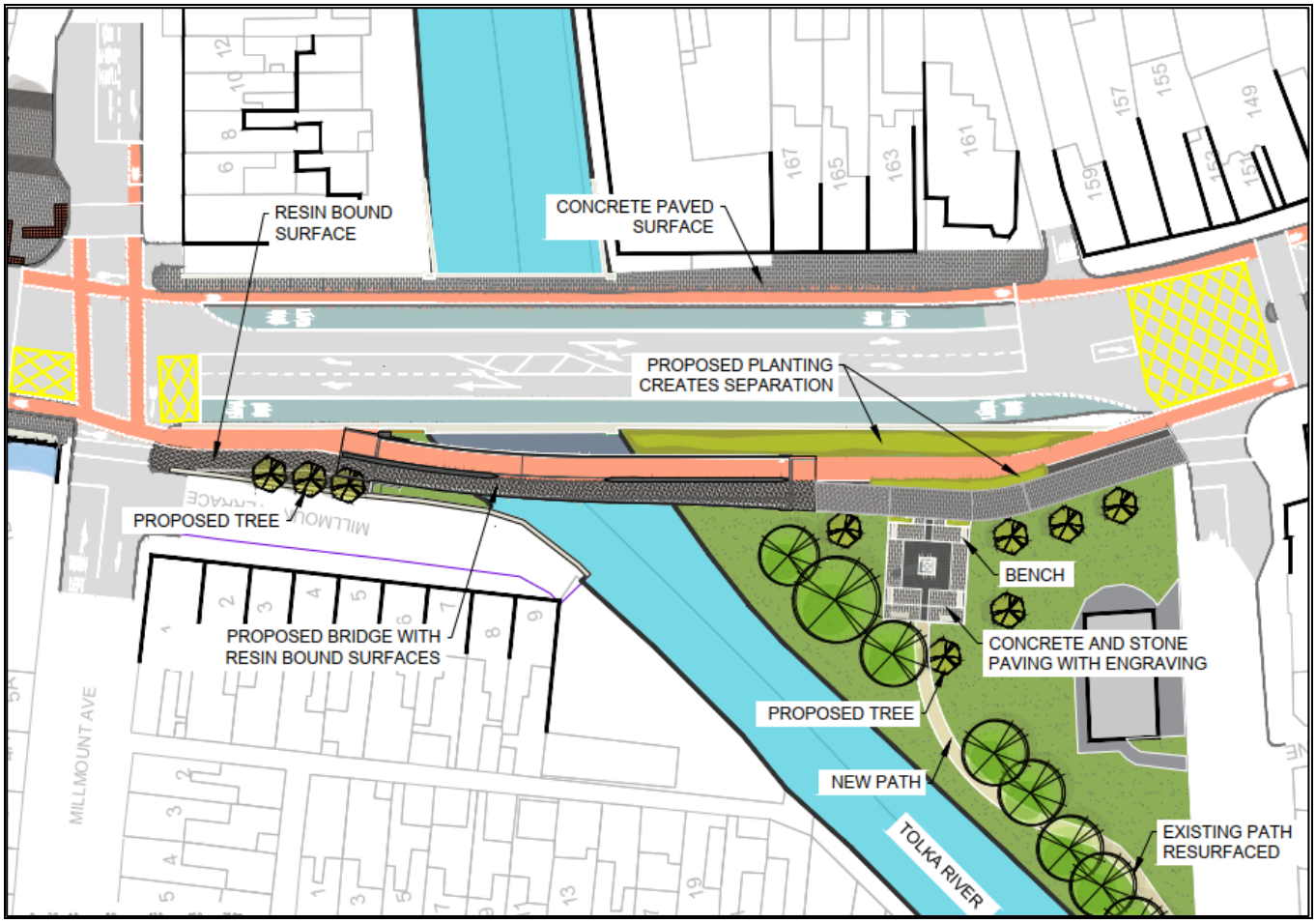


Image 4.13: Frank Flood Bridge Indicative Design

4.5.4.9 Land Acquisition and Use

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

Permanent land acquisition is also required within this Section in order to allow for cross-section widening at all of the locations listed above.

To facilitate these transport infrastructure improvements, it will be necessary to acquire limited land take at the following locations:

- Clúid Development, Collins Avenue;
- Whitehall Colmcille GAA;
- Plunket College;
- Highfield Health Care;
- 2 properties on Drumcondra Road;
- 1 property on Griffith Avenue;
- Millmount Terrace; and
- Our Lady's Park.

The impacts on residential amenity arising from land acquisition in Section 4 of the Proposed Scheme 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).

4.5.4.10 Rights of Way

There are no existing rights of way which will be affected by the Proposed Scheme in this section of the Proposed Scheme.

4.5.5 Section 5 – Botanic Avenue to Granby Row

4.5.5.1 General

To facilitate bus lanes and cycle tracks in each direction it is necessary to remove one inbound and one outbound traffic lane between Clonliffe Road and Eccles Street. In addition, the landscaped central reserve will be removed between Portland Avenue and Belvedere Road to facilitate the required cross-section. South of Belvidere Road, the existing landscaped central reserve will be maintained.

Continuous bus lanes will be provided throughout, with the exception of a short section of signalised bus priority inbound between Whitworth Place and Portland Place. On Dorset Street Lower, south of Eccles Street, some minor kerb realignments are proposed to provide bus, cycle and a single traffic lane in each direction. The painted central reserve will be removed to facilitate this. Four existing cellars are affected by the Proposed Scheme. The cellars will be acquired and infilled with concrete.

It is proposed to provide new turning restrictions at the following junctions:

- Left turn ban from Dorset Street to Synott Place;
- Right turn ban from Dorset Street Lower inbound to Eccles Street, and
- Left turn ban from Dorset Street to Hardwicke Place.

On North Frederick Street, the existing bans on left-turning traffic from Dorset Street Lower and straight through traffic from Blessington Street will be maintained. North Frederick Street is restricted to one southbound traffic lane and one northbound traffic lane from the junction of Dorset Street with Gardiner Row.

South of Gardiner Row the existing southbound traffic lane and bus lane will be maintained. This section of the Proposed Scheme ties into the existing street layout at Parnell Street. Two-way cycle facilities will be provided on the west side of Parnell Square East. The right turn slip lane from Parnell Square North will be closed to facilitate the two-way cycle track.

Outbound buses will use Parnell Street, Parnell Square West and Granby Row to access Dorset Street Upper. A bus lane will be provided along these roads to facilitate outbound buses.

The existing signalised junctions at Clonliffe Road; Whitworth Road; Belvedere Road, North Circular Road, Gardiner Street Upper, Eccles Street and North Frederick Street/Blessington Street are proposed to be upgraded to provide improved infrastructure for pedestrians and cyclists.

At-grade cycle tracks have been utilised in order to maintain the existing kerb lines as the route approaches the city centre. The cycle tracks will be at carriageway level and segregated from general traffic using slip formed kerbs. At-grade cycle tracks have been proposed at Drumcondra Road Lower, southbound and Dorset Street Lower, between Portland Place Junction and Eccles Street Junction.

4.5.5.2 Deviations from Standard Cross-Sections

The width of the cross-sectional elements as outlined in Section 4.6.1 have been reduced at a number of constrained locations across the Proposed Scheme. The deviations within Section 5 – Botanic Avenue to Granby Row are detailed in Table 4.19.

Table 4.19: Reduced Standard Cross-Sections on Section 5 – Botanic Avenue to Granby Row

Location	Design Element	Required DMURS/ NCM Standard	Length	Design	Justification
Ch. A10030 – A11500 (citybound)	Cycle Track	1.5m	470m	1.5m	Minimum cycle track width is provided due to space constraint.
Ch. A11332 – A11500 (outbound)	Cycle Track	.5m	168	1.5m	Minimum cycle track width is provided due to space constraint.

4.5.5.3 Bus Lane Provision

An overview of the bus provision being proposed as part of the Proposed Scheme is provided in Section 4.6.4. Signal-Controlled Priority infrastructure is located in one area in Section 5 of the Proposed Scheme, for buses travelling southbound between Whitworth Place and Portland Place as listed in Table 4.20.

Table 4.20: Signal Controlled Bus Priority Locations

Location	Reason for Mitigation
Inbound between Whitworth Place and Portland Place	Providing a southbound Bus Lane would require widening of the Binns Bridge. *Approximate Chainage A10770 – A10800, Southbound*

4.5.5.4 Bus Gate

There is an existing arrangement on North Frederick Street which, although not demarcated as a bus lane, performs as a Bus Gate, and will be maintained.

4.5.5.5 Bus Stops

The different types of bus stop (Island, Shared Landing and In-Line) are described in Section 4.6.4. Most of the proposed bus stops within this section of the Proposed Scheme are In-Line Bus Stops. The bus stop locations and types are outlined in Table 4.21.

Table 4.21: Proposed Bus Stop Locations

Inbound/ Outbound	Bus Stop Name	Bus Stop Number	Chainage	Bus Stop Type	Bus Shelter
Inbound	Botanic Avenue	46	A 10100	Island	Standard bus shelter
Inbound	Botanic Avenue	47	A 10450	Coach Stop	Standard bus shelter
Inbound	Fitzroy Avenue	48/100861	A 10630	Shared Landing	New standard bus shelter proposed
Inbound	Dorset Street Lower	49	A 10970	Shared Landing	Standard bus shelter
Inbound	Temple Street	51/52	A 11260	Shared Landing	Standard bus shelter
Inbound	-	261	C 260	In-Line	No shelter
Inbound	-	262	C 280	In-Line	No shelter
Inbound	-	263	C 300	In-Line	No shelter
Inbound	-	264	C 310	In-Line	No shelter
Inbound	-	265	C 330	In-Line	No shelter
Outbound	Botanic Avenue	19	A 10120	Island	New standard bus shelter proposed
Outbound	Dargle Road	18	A 10250	Island	Standard bus shelter
Outbound	Drumcondra Rail Station	17/100121	A 10650	Shared Landing	Standard bus shelter
Outbound	Innisfallen Parade	15	A 10960	Shared Landing	Standard bus shelter
Outbound	Dorset Street Lower	14	A 11180	Shared Landing	Standard bus shelter
Outbound	Dorset Street Lower	11	A 11420	Shared Landing	Standard bus shelter

Inbound/ Outbound	Bus Stop Name	Bus Stop Number	Chainage	Bus Stop Type	Bus Shelter
Outbound	Parnell Square West	10	D 140	In-Line	No shelter
Outbound	Parnell Square West	8	D 160	In-Line	No shelter
Outbound	Parnell Square West	7	D 240	In-Line	No shelter
Outbound	Parnell Square West	6	D 260	In-Line	No shelter
Outbound	Granby Place	7615	D 260	In-Line	No shelter
Outbound	Parnell Square West	4	D 270	In-Line	No shelter
Outbound	Parnell Square West	3	D 320	In-Line	No shelter
Outbound	Parnell Square West	2	D 340	In-Line	No shelter

4.5.5.6 Cycling Provision

The specific proposals for cycling facilities in Section 5 of the Proposed Scheme are described below. Provision for cyclists at the signal-controlled junctions are described in Section 4.6.3.6.

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

At-grade cycle tracks (as per NCM Section 4.3.4) have been utilised in order to maintain the existing kerb lines as the route approaches the city centre. The cycle tracks will be at carriageway level and segregated from general traffic using slip formed kerbs. At-grade cycle tracks have been proposed in the following locations:

- Drumcondra Road Upper – outbound at St Patrick's College;
- Drumcondra Road Lower – inbound from Clonliffe Road to Hardwicke Place;
- Dorset Street Lower – outbound from Eccles Street to Whitworth Road;
- Dorset Street Upper – outbound from Blessington Street to Eccles Street; and
- North Frederick Street and Parnell Square East.

4.5.5.7 Junction Information

An overview of the approach to junction review and design is provided in Section 4.6.7. The major and moderate junctions within Section 5 – Botanic Avenue to Granby Row of the Proposed Scheme are outlined in Table 4.22.

Table 4.22: Major and Moderate Junctions (Signalised) within Section 5 of the Proposed Scheme

Junction Location	Description	Signal Operation
Major Junctions (Signalised)		
N/A	N/A	
Moderate Junctions (Signalised)		
Clonliffe Road to east Drumcondra Road Lower to north and south	Modified and fully refurbished traffic signal T-junction	The existing 3 arm signalised junction is proposed to be upgraded as per the BusConnects Preliminary Design Guidance Booklet to enhance pedestrian, cyclist and bus priority infrastructure. The key design rationale was to introduce bus priority on the mainline CBC route, provide protected cycle infrastructure and improved crossing facilities.
Whitworth Road to west Whitworth Road to east Drumcondra Road Lower to north and south	Modified and fully refurbished traffic signal T-junction	The existing 4 arm signalised junction is proposed to be upgraded as per the BusConnects Preliminary Design Guidance Booklet to enhance pedestrian, cyclist and bus priority infrastructure. The key design rationale was to introduce bus priority on the mainline CBC route, provide

Junction Location	Description	Signal Operation
		protected cycle infrastructure and improved crossing facilities.
Innisfallen Parade to west Belvidere Road to east Dorset Street Lower to north and south	Modified and fully refurbished traffic signal crossroads	The existing 4 arm signalised junction is proposed to be upgraded as per the BusConnects Preliminary Design Guidance Booklet to enhance pedestrian, cyclist and bus priority infrastructure. The key design rationale was to introduce bus priority on the mainline CBC route, provide protected cycle infrastructure and improved crossing facilities.
North Circular Road to west North Circular Road to east Dorset Street Lower to north and south	Modified and fully refurbished traffic signal crossroads	The existing 4 arm signalised junction is proposed to be upgraded as per the BusConnects Preliminary Design Guidance Booklet to enhance pedestrian, cyclist and bus priority infrastructure. The key design rationale was to introduce bus priority on the mainline CBC route, provide protected cycle infrastructure and improved crossing facilities.
Synott Place to west Gardiner Street Upper to east Dorset Street Lower to north and south	Modified and fully refurbished traffic signal crossroads	The existing 4 arm signalised junction is proposed to be upgraded as per the BusConnects Preliminary Design Guidance Booklet to enhance pedestrian, cyclist and bus priority infrastructure. The key design rationale was to introduce bus priority on the mainline CBC route, provide protected cycle infrastructure and improved crossing facilities.
Eccles Street to west Eccles Street to east Dorset Street Upper to north and south	Modified and fully refurbished traffic signal crossroads	The existing 4 arm signalised junction is proposed to be upgraded as per the BusConnects Preliminary Design Guidance Booklet to enhance pedestrian, cyclist and bus priority infrastructure. The key design rationale was to introduce bus priority on the mainline CBC route, provide protected cycle infrastructure and improved crossing facilities.
North Fredrick Street to east Blessington Street to west Dorset Street Upper to north and south	Modified and fully refurbished traffic signal crossroads	The existing 4 arm signalised junction is proposed to be upgraded as per the BusConnects Preliminary Design Guidance Booklet to enhance pedestrian, cyclist and bus priority infrastructure. The key design rationale was to introduce bus priority on the mainline CBC route, provide protected cycle infrastructure and improved crossing facilities.
Gardiner Row to east Parnell Square North to west North Fredrick Street to north and south	Modified and fully refurbished traffic signal crossroads	The existing 4 arm signalised junction is proposed to be upgraded as per the BusConnects Preliminary Design Guidance Booklet to enhance pedestrian, cyclist and bus priority infrastructure. The key design rationale was to introduce bus priority on the mainline CBC route, provide protected cycle infrastructure and eliminate conflict between eastbound buses and cyclists.
St. Mary's Place to west Granby Row to east Dorset Street Upper to north and south	Modified and fully refurbished traffic signal crossroads	The existing 4 arm signalised junction is proposed to be upgraded as per the BusConnects Preliminary Design Guidance Booklet to enhance pedestrian, cyclist and bus priority infrastructure. Full policy outcomes for CBC route can be achieved by junction layout and signal operation, giving priority to mainline buses and cyclists. No significant physical changes required to junction layout.

4.5.5.8 Parking and Loading

Changes to the parking and loading provisions along Section 5 – Botanic Avenue to Granby Row as a result of the Proposed Scheme are shown in Table 4.23 and Table 4.24 respectively.

Table 4.23: Section 5 – Botanic Avenue to Granby Row: On-Street Parking Change Impact Summary

Location	Type of Parking		Existing	Proposed	Change
Drumcondra Road Lower/Clonliffe Road	Designated Paid	Commercial	9	6	-3
	Informal	Residential	0	0	0
	Disabled	Commercial	0	0	0
	Designated Paid	Commercial	19	4	-15

Location	Type of Parking		Existing	Proposed	Change
Frederick Street North/ Parnell Square	Informal	Residential	0	0	0
	Disabled	Commercial	2	1	-1
Approximate adjacent informal parking within 200-250m			315	315	0
Total			345	326	-19

Table 4.24: Section 5 – Botanic Avenue to Granby Row: Existing and Proposed Loading Bays

Location	Type of Parking		Existing	Proposed	Change
Drumcondra Road Lower/Clonliffe Road	Loading Bay	Commercial	9	9	0
Frederick Street North/ Parnell Square	Taxi Rank	Commercial	0	0	0
Total			9	9	0

4.5.5.9 Landscape and Urban Realm

For an overview of the landscape design principles and approach please refer to Section 4.6.12. The following sections provide a description of specific landscape and urban realm design in Section 5 of the Proposed Scheme.

The remaining footways along this section south of Botanic Avenue are proposed to be resurfaced in asphalt and concrete kerbs to match existing. The footways along the residential area in Drumcondra Road Lower repaired and resurfaced as needed. Maintenance works are proposed for the existing brick structure at the northern end of Drumcondra Road Lower to remove the graffiti which will in turn enhance the street scene and perception of safety in the area.

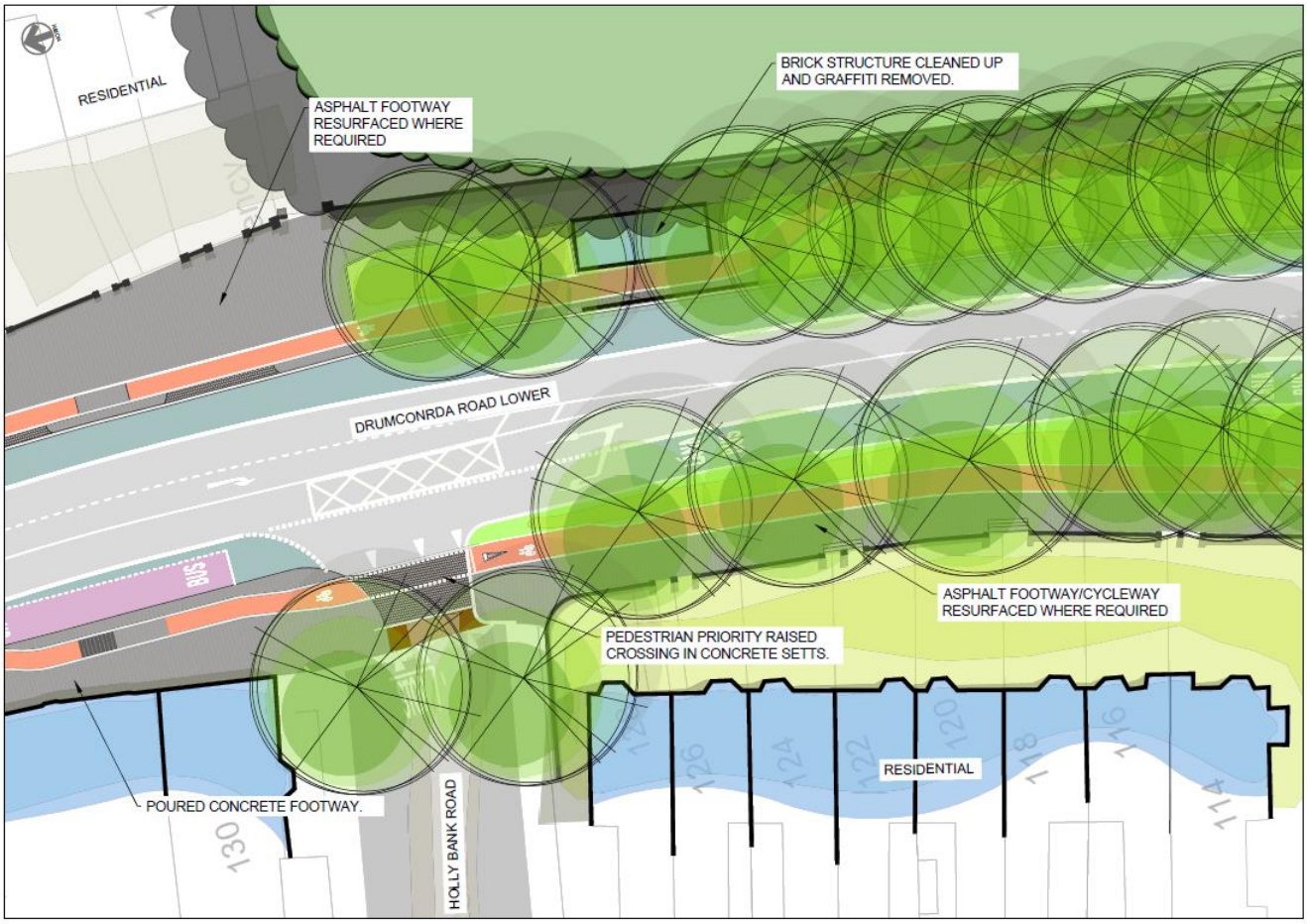


Image 4.14: Northern End of Drumcondra Street Lower Indicative Design

Although not required to deliver the Proposed Scheme, there is the potential to include a local area enhancement to the paved area outside the café in the residential area west of Drumcondra Road Lower. The concept proposal includes high quality grey concrete paving and granite kerbs.

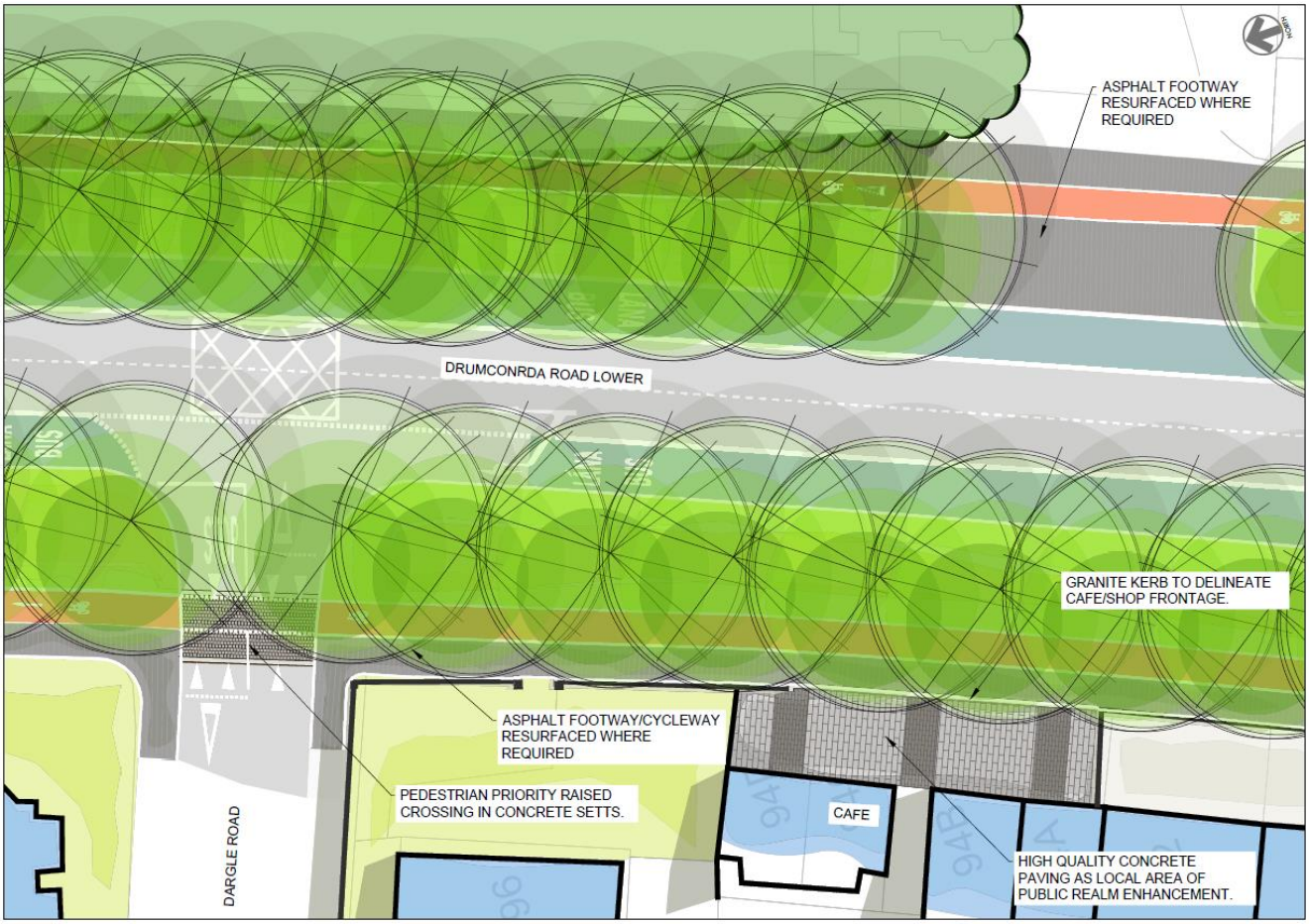


Image 4.15: Café and Footways in the Residential Area West of Drumcondra Street Lower Indicative Design

The urban realm in the Drumcondra Rail Station and Bridge area is to be improved by de-cluttering the footways. Any realignment to footways due to proposed works would be reinstated with materials to match the existing materials. The retention and reuse of paving and quality kerb materials is proposed where possible.

4.5.5.9.1 Drumcondra Station to Parnell Square including Dorset Street Upper and Frederick Street North

Any footways affected by kerb realignments are proposed to be resurfaced in materials to match the existing footways using high quality granite paving and kerbs as required with the retention and reuse of paving and kerb materials proposed in this section.

The redesigned median at the northern part of the section is proposed to be finished in materials to match the existing scheme. Existing tree species and tree pits will be reviewed as a result of recent failures. Replanting of these tree avenues with a more appropriate resilient species is proposed and will be detailed in consultation with the authority. Pruning for maintenance is also proposed to other existing street trees.

Good quality concrete paving and granite kerbs are proposed for North Frederick Street and Granby Row. Retention and reuse of existing granite kerbs are proposed where possible.

4.5.5.10 Land Acquisition and Use

Permanent acquisition of cellars and private landings is required within this Section along Dorset Street Upper.

4.5.5.11 Rights of Way

There are no existing rights of way which will be affected by the Proposed Scheme in this section of the Proposed Scheme.

4.6 Key Infrastructure Elements

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

4.6.1 Mainline Cross-section

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

The desirable minimum width for a single direction, with flow, raised adjacent cycle track is 2.0m. Based on the NCM (NTA 2011) 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 a minimum width at pinch points.

An example of the typical BusConnects road layout (without multiple traffic lanes in each direction or median) is shown in Image 4.16.

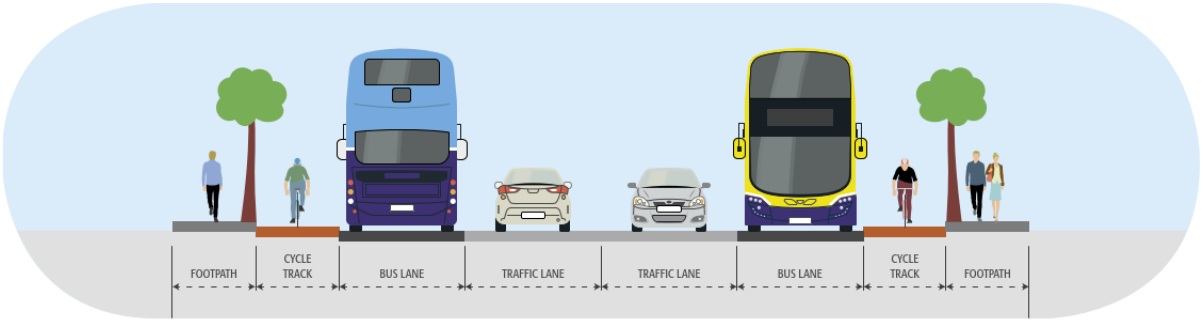


Image 4.16: Typical BusConnects Road Layout (PDGP)-Section

The cross-sectional design of the mainline has been developed to achieve the desirable width criteria contained within the PDGB wherever reasonably practicable. Where these criteria are not achievable, for instance due to physical constraints at pinch points, the widths have been reduced as shown in Table 4.25.

Table 4.25: DMURS Cross-Sectional Design Parameters

Design Element	Desirable Minimum Standard	Minimum Width	Permitted Reductions at Constraints
Footpath	2.0m	1.8m	1.2m (over distances <2m as per Preliminary Design Guidance Booklet in Appendix A4.1 in Volume 4 of this EIAR)
Cycle Track (one-way)	2.0m	1.5m	1.2m (over distances <2m as per Preliminary Design Guidance Booklet in Appendix A4.1 in Volume 4 of this EIAR)
Cycle Track (two-way)	3.25m + 0.5m (buffer)	Refer to NCM (NTA 2011) Width Calculator 0.3m (buffer)	Reduced at bus stops.
Bus Lane	3.0m	3.0m	N/A
Traffic Lane	3.0m (<60kph)	3.0m	2.75m (low Heavy Goods Vehicle flow)

For the Proposed Scheme the width of the bus lanes and traffic lanes have not been reduced below 3.0m. The width of the cross-sectional elements detailed in Table 4.25 have been reduced at a number of constrained locations across the Proposed Scheme. These deviations from the standards are outlined for each section of the Proposed Scheme in Section 4.5.

4.6.2 Pedestrian Provision

4.6.2.1 Footpath Widths

The desirable minimum width for a footpath is 2.0m. This width should be increased in areas catering for significant pedestrian volumes where space permits. DMURS defines the absolute minimum footpath width for road sections as 1.8m based on the width required for two wheelchairs to pass each other. 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

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

Refuge islands should be a minimum width of two metres. Larger refuge islands should be considered by designers in locations where the balance of place and movement is weighted towards vehicle movements, such as areas where the speed limit is 60kph or greater, in suburban areas or where there is an increased pedestrian safety risk due to particular traffic movements. Where a refuge island is provided, straight crossings are desirable, and the refuge island has been designed to be 4m wide or more. At a staggered crossing, islands of less than 4m in width may be provided, and these have been designed to have a minimum effective width of 2m between obstacles such as signal poles.

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

At signalised junctions and standalone pedestrian crossings, the footpath is to be ramped down to carriageway level to facilitate pedestrians who require an unobstructed crossing. At minor junctions, raised tables are provided to raise the road level up to footpath level and facilitate unimpeded crossing. Tactile paving is provided at the mouth of each pedestrian crossing and audio units will be provided on each traffic signal push button to assist mobility impaired users. Pedestrian crossings are indicated in the Landscaping General Arrangement drawings (BCIDB-JAC-ENV_LA-0002_XX_00-DR-LL-9001) in Volume 3 of this EIAR. 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 (BCIDB-JAC-ENV_LA-0002_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 NCM (NTA 2011) and the PDGB.

The desirable minimum width for a single-direction, with-flow, raised-adjacent cycle track is 2m. 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 will provide fully segregated cycle tracks throughout 99% of the Proposed Scheme which is approximately 12km in length. 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 cycle lane which is physically segregated from the adjacent traffic lane and/or bus lane horizontally and/or vertically as shown in Image 4.17, taken from the PDGB.

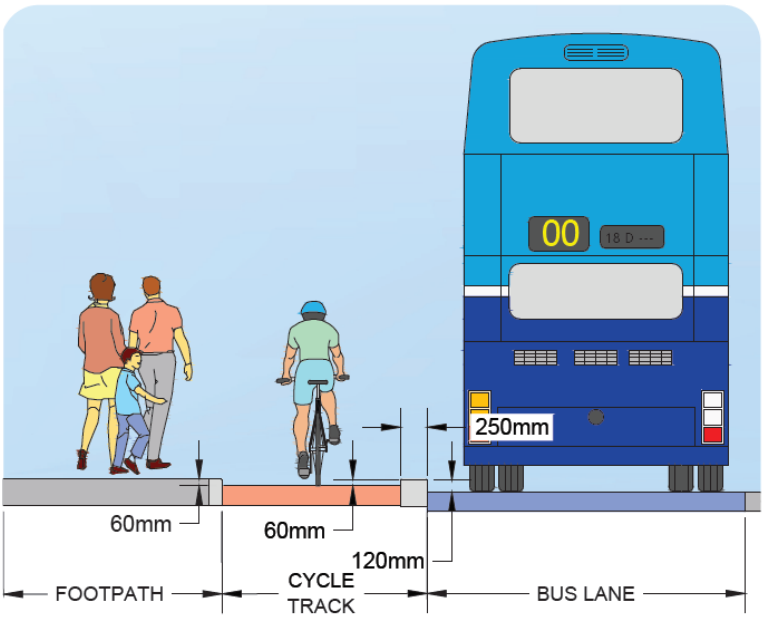


Image 4.17: Fully Segregated Cycle Track

Fully segregated cycle tracks have been provided throughout the length of the Proposed Scheme except for the sections between the Omni Shopping Centre and the Shantalla Road junction and between the Shantalla Road junction and Collins Avenue, where Quiet Street Treatments are proposed.

At-grade cycle tracks (as per NCM Section 4.3.4) have been utilised in order to maintain the existing kerb lines as the route approaches the city centre. The cycle tracks will be at carriageway level and segregated from general traffic using slip formed kerbs. At-grade cycle tracks have been proposed in the following locations:

- Drumcondra Road Lower – southbound; and
- Dorset Street Lower (between Portland Place Junction and Eccles Street Junction).

4.6.3.2 Cycle Lane

Cycle lanes do not have vertical and/or horizontal separation from adjacent traffic lanes. There are no sections of cycle lane proposed as part of the Proposed Scheme, with cycle tracks being preferred where practicable.

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

- Transitions to existing cycle lanes, typically on side roads of the main corridor alignment;
- At-grade junction crossings; and
- For side road crossings where the cycle track is locally reduced to road level.

4.6.3.3 Offline Cycle Track

Offline cycle tracks are fully offset from the road carriageway by a grass verge, providing a greater level of protection and comfort to cycle users. There are existing sections of offline cycle track between Griffith Avenue and Home Farm Road, and between Hollybank Road and Clonliffe Road. These sections of offline cycle track will be upgraded as part of the Proposed Scheme to improve the cycle track quality of service.

4.6.3.4 Quiet Street Treatment

Where the Proposed Scheme cannot facilitate cyclists without significant impact on bus priority, alternative cycle routes are explored for short distances away from the Proposed Scheme bus route. Such 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.'*

So-called Quiet Streets (due to the low amount of general traffic) are deemed suitable 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.

A Quiet Street cycle route has been proposed from the Omni Park Shopping Centre/Lorcan Road junction, through Lorcan Road concluding at the Larkhill Road/Shantalla Road/Shanrath Road junction. This Quiet Street cycle route avoids the pinch point at Santry Village.

Another Quiet Street cycle route commences at the Larkhill Road/Shantalla Road/Shanrath Road junction and concludes at the Collins Avenue Junction where the cyclist re-joins the mainline. This Quiet Street cycle route avoids the section of N1 with high volumes of traffic.

4.6.3.5 Treatment of Constrained Areas

At some locations along the Proposed Scheme, standard width of cycleways cannot be achieved, and localised narrowing will be required. All locations where substandard widths are required have been recorded and presented in each of the sections of the Proposed Scheme as described in Section 4.5.

4.6.3.6 Cycle Provision Through Junctions

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

These locations are shown on the General Arrangement drawings (BCIDB-JAC-GEO_GA-0002_XX_00-DR-CR-9001) included in Volume 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. In general, bus lanes

will be a minimum of 3m wide. This is as per the guidance for traffic lane widths outlined in DMURS. Larger lane widths may be needed in some instances to enable buses to navigate corners, etc. ('swept path'). Bus lanes are shown on the General Arrangement drawings (BCIDB-JAC-GEO_GA-0002_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 Controlled Priority. Signal Controlled Priority 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 Signal Controlled Priority 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 pass through the narrow section first. Signal Controlled Priority will fail if downstream congestion blocks access to the downstream bus lane. Image 4.18 illustrates a schematic operation of Signal Controlled Priority.

Image 4.18: Signal Controlled Priority Schematic Operation (Source: PDGB)

The proposed locations of Signal Controlled Priority infrastructure along the length of the Proposed Scheme are outlined below:

- Buses travelling southbound between Northwood Avenue and the pedestrian crossing near the Morton Stadium entrance;
- Buses travelling northbound between Coolock Lane Avenue and the pedestrian crossing near the Morton Stadium entrance; and,
- Buses travelling southbound at Binns Bridge between Whitworth Place and Portland Place.

4.6.4.3 Bus Gates

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

There is an existing Bus Gate on North Frederick Street which, although not demarcated as a bus lane, will be maintained.

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.

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 assessment. The criteria that are considered when locating a bus stop are as follows:

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

For the Core Bus Corridor Infrastructure Works it is proposed that bus stops should be preferably spaced approximately 400m apart on typical suburban sections of route, dropping to approximately 250m in urban centres.

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

The following bus stop designs were considered for use on the Proposed Scheme: the Island Bus Stop, the Shared Landing Bus Stop, the Inline Bus Stop and the Layby Bus Stop.

Further detail on the design and locations of bus stops along the Proposed Scheme are described in Section 4.5.

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/cyclist conflict, a pedestrian priority crossing point is provided for pedestrians accessing the bus stop area. Part-time signals will enable controlled crossing. Visually impaired pedestrians may call for a fixed green signal when necessary and the cycle signal will change to red. The cycle track will narrow from 2.0m to 1.5m for single file cycling through the bus stop, as overtaking is not required in this area.

An example of an Island Bus Stop is showed in Image 4.19 (One-way Cycle Track) and Image 4.20 (Two-way Cycle Track).

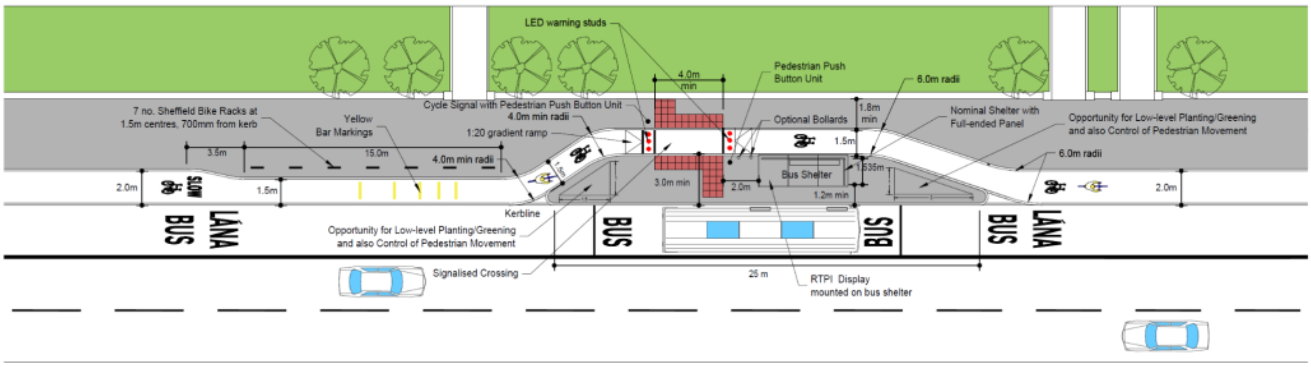


Image 4.19: Island Bus Stop Arrangement – One-Way Cycle Track

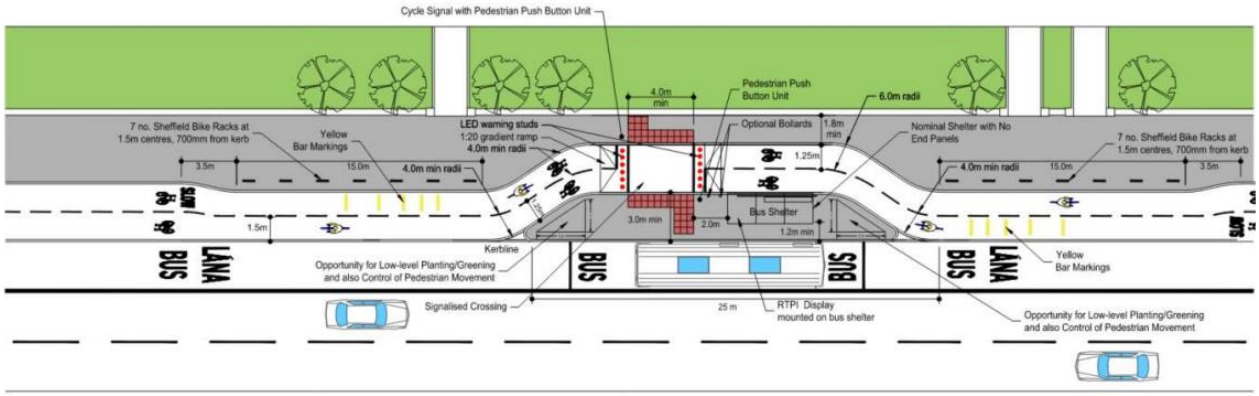


Image 4.20: Island Bus Stop Arrangement – Two-Way Cycle Track

4.6.4.5.2 Shared Landing Bus Stops

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 Bus Stop is shown in Image 4.21.

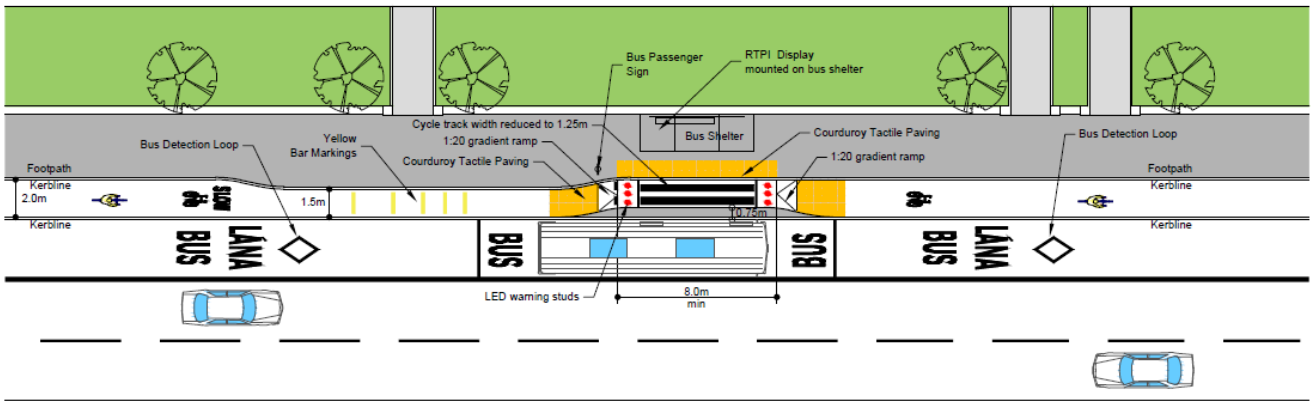


Image 4.21: Shared Landing Bus Stop

The locations of Shared Landing Bus Stops are described in Section 4.5.

4.6.4.5.3 In-Line Bus Stop

Where there are no cycle tracks provided, In-Line Bus Stops are used, where the users departing the bus exit directly onto the footway. In-Line Bus Stops are typically used in the constrained sections of the Proposed Scheme, as are recorded in Section 4.5 per Proposed Scheme section.

4.6.4.5.4 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 waiting for 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.

4.6.5 Accessibility for Mobility Impaired Users

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

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

- Preliminary Design Guidance Booklet for BusConnects Core Bus Corridors (NTA 2021);
- Building for Everyone: A Universal Design Approach (NDA 2020);
- How Walkable is Your Town? (NDA 2015);
- Shared Space, Shared Surfaces and Home Zones from a Universal Design Approach for the Urban Environment in Ireland (NDA 2012);
- Best Practice Guidelines, Designing Accessible Environments (Irish Wheelchair Association 2020);
- UK DfT Inclusive Mobility (UK DfT 2005);
- UK DfT Guidance on the Use of Tactile Paving Surfaces (UK DfT 2007); and
- BS8300:2018 Volume 1 Design of an accessible and inclusive built environment. External Environment – code of practice (BSI 2018).

Number 14 of 2005 – 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 the proposed draft preliminary design for the corridor was undertaken. The Audit provided a description of the key accessibility features and potential barriers to persons with disabilities based on the Universal Design standards of good practice. The Audit was undertaken in the early design stages with the view to implementing any key measures identified as part of the design development process.

In achieving the enhanced pedestrian facilities there has been a concerted effort made to provide clear segregation of modes at key interaction points along the Proposed Scheme which was highlighted as a potential mobility constraint in the Audit. In addressing one of the key aspects to segregation, the use of the 60mm set down kerb between the footpath 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 prioritised, where possible, 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 Interchange with Existing and Proposed Public Transport Network

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

- Drumcondra DART station;
- Existing and future Dublin Bus services at numerous locations along the route;
- Future bus service proposals including Spine A associated with the New Dublin Area Bus Network;
- MetroLink high-frequency rail line running from Swords to Charlemont linking Dublin Airport, Irish Rail, DART and Luas services;
- Greater Dublin Area Cycle Network Plan;
- Future public transport proposals such as DART+ scheme at Drumcondra;
- Interface with New Dublin Area Bus Network;
- Griffith Avenue Protected Cycle Lane Scheme;
- Santry River Greenway; and
- Royal Canal Greenway.

4.6.6.2 Integration with Other Road Users

General traffic flow and local access will 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 along the route, without removing the option for general traffic to use the route. It is recognised that there is dependence by some on cars or business vehicles. Through the provision of bus priority and improved cycling and pedestrian facilities all road users get better equitable choices and associated more efficient use of the road space for people movement. The improvement provided to more reliable sustainable travel options is being balanced against the general traffic flow impacts.

4.6.6.3 Integration with Other Infrastructure Projects

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

4.6.6.3.1 MetroLink

MetroLink is a proposed high-capacity, high-frequency rail line running from Swords to Charlemont, linking Dublin Airport, Irish Rail, DART and Luas services, creating fully integrated public transport in the Greater Dublin Area. MetroLink will run along the R132, and the Fosterstown stop will be located on the east side of the R132 to the south of Pinnock Hill junction.

4.6.6.3.2 DART+ Programme

The DART+ West project which involves track upgrades and work to some stations and railway bridges will run from Connolly Station and a new Spencer Dock Station through Drumcondra over the existing rail bridge adjacent to Drumcondra train station and also under Drumcondra Road Lower at Binns Bridge. Currently available information can be found at: DART+ West Railway Order Application (dartplus.ie).

4.6.6.3.3 Fosterstown Local Area Plan

This Local Area Plan was adopted by the elected members of Fingal County Council on 13 September 2010 and subsequently extended in 2015 up to 31 December 2017.

The Local Area Plan sets out the development strategy for the proper planning and sustainable development of these residentially zoned lands, which are strategically located at the southern 'Gateway' to Swords, along the proposed MetroLink route and north of Dublin Airport. The lands are bounded by the R132 to the east side and there will be direct access from this area onto the R132.

The Local Area Plan recognises the requirement for the provision of the Fosterstown Link Road which will link Pinnock Hill roundabout with Forest Road. The proposed Pinnock Hill junction as part of the BusConnects proposals has been designed to integrate with the aspirations of the Local Area Plan.

4.6.6.3.4 Omni Plaza Strategic Housing Development

The proposed site is located to the north-west corner of the Omni Park Shopping Centre, Santry and at Santry Hall Industrial Estate, Swords Road. Planning permission for this Strategic Housing Development (SHD) (SHD0019/22) was lodged on 26 August 2022 and the last day for observations was 30 September 2022. The planning permission is for a Strategic Housing Development of 7 years in duration. The proposed development comprises the demolition of existing building and construction of a mixed use residential and commercial development ranging in height from 4 to 12 storeys over basement in four blocks, with internal residential amenity space, childcare facility, community building and two retail/café/restaurant units.

4.6.6.3.5 Omni Living Strategic Housing Development

The proposed site is located to the north-east of Omni Park Shopping Centre including a vacant warehouse on Swords Road. The site is bound by the Swords Road to the east and by a private access road to the north. Planning permission for this SHD (SHD0006/20) was lodged on 27 March 2020 and granted on 3 September 2020. The development will consist of demolition of an existing structure on-site, construction of a mixed-use development, generally ranging in height from 5 no. storeys to 12 no. storeys, incorporating apartments, commercial use, creche facility, aparthotel and public realm improvements.

4.6.6.3.6 Clúid Housing – Collins Avenue Junction

A planning application is being prepared by Clúid Housing for approximately 99 older person social housing units on the site of the Whitehall Church car park at the Swords Road/Collins Avenue junction. Access is understood to be via the existing access onto Collins Avenue.

4.6.6.3.7 PPP Social Housing Bundle 3 Collins Avenue, Whitehall, Dublin 9

A Part 8 notice for the construction of 83 residential dwellings at a site c.1.07ha at Collins Avenue was published by Dublin City Council (DCC) on the 10 May 2022. The consultation period for the proposal closed on the 21 June 2022. Planning has been granted for this site and procurement is at an early stage.

4.6.6.3.8 Hartfield Place PRS Development – Swords Road, Whitehall

This site is located south of Collins Avenue, west of Grace Park Road, north of Griffith Avenue and immediately adjacent to the eastern side of Swords Road. The site has a direct connection onto the R132 Swords Road. Full planning permission was granted for the site in 2010 (DCC Reg. Ref. 3269/10) which was subsequently appealed by a third party to An Bord Pleanála. An Extension of Duration for the permission was granted by DCC which requires the completion of the permitted works by 9 April 2022. Planning permission for an amendment to the permitted development was made during 2019 (DCC Reg. Ref. 3405/19) and was granted. A further application for an amendment to the permitted development was submitted in February 2021 and a decision is pending.

4.6.6.3.9 Clonliffe Lands Masterplan Development

Planning permission has been granted by An Bord Pleanála for a development on lands off Clonliffe Road. This involves the development of 1,000+ residential units on the remainder of the lands at the former Clonliffe Dublin Diocesan Seminary at Clonliffe College. The primary vehicular access point into the site will be from Clonliffe Road to the South.

The design has been developed with this in mind and, as far as possible, seeks to provide for improved existing or new interchange opportunities with other transport services. These are outlined below:

4.6.6.3.10 Griffith Avenue Protected Cycle Lane Scheme

The main aim of this scheme is to provide protected, safe and continuous cycling for all ages and abilities along this route. This is especially important with the numbers of schools in the area as well as the different DCU campus locations. The width of the carriageway on this section of Griffith Avenue is generous (12.3m approximately) and will allow DCC to provide a 2m wide, high quality, protected cycle lane, on both sides of the carriageway while retaining generous traffic lanes in both directions and access to existing driveways. The construction of this scheme is now completed.

This scheme interfaces with the proposed Swords to City Centre scheme at the junction of Drumcondra Road Lower and Griffith Avenue.

4.6.6.3.11 Parnell Square Cultural Quarter

Parnell Square Cultural Quarter will be a landmark destination which will complete Dublin City's Civic Spine at its northern end. Work has commenced surveying the properties to house the new City Library and other cultural facilities at Parnell Square North. It is intended that Dublin City Gallery The Hugh Lane will form part of the overall Parnell Square Cultural Quarter offering and its role and impact will be expanded by the development of the new facilities. The Parnell Square Cultural Quarter is an ambitious project encompassing places for learning, literature, music, innovation and enterprise, inter-culturalism and design.

4.6.6.3.12 Royal Canal Greenway – Phase 3

The Royal Canal Greenway Phase 3 will provide segregated cycling facilities along a 2.1km route that extends from North Strand Road (Newcomen Bridge) along the banks of the Royal Canal to Phibsborough Road (Cross Guns Bridge). The route is identified as a primary greenway route in the Greater Dublin Area Cycle Network Plan, published by the NTA in 2013. Construction commenced in Q1 of 2023 and is due for completion in Q2 of 2025.

4.6.7 Junctions

The design and modelling of junctions has 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 three categories, namely:

- Major Junctions (Signalised);
- Moderate Junctions (Signalised); and
- Minor and Priority Junctions.

The categorisations are based on:

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

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

In addition to those listed major and moderate junctions, there are a total of 36 major and minor junctions without signal control across the Proposed Scheme. Additionally, the Proposed Scheme does not include any proposed roundabouts. The route includes one major existing roundabout (the Airport Roundabout) to be modified and refurbished. The below roundabouts are to be converted to signalised junctions:

- Pinnock Hill Roundabout; and
- Cloghran Roundabout.

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 a structural assessment has been carried out to ensure the structural capacity is fit-for-purpose for the revised arrangement.

4.6.8.1 Retaining Walls

Retaining walls with a retained height greater than 1.5m are classified as principal structures. Those retaining walls that have a retained height less than 1.5m are classified as minor retaining walls Table 4.26 provides a summary of all of the proposed retaining structures on the Proposed Scheme. Refer to Structures General Arrangement Drawings (BCIDE-JAC-STR_GA-0002_XX_00-DR-SS-9001) in Volume 3 of this EIAR.

Table 4.26: Tabular Summary of Retaining Structures

Wall Reference	Structure Type Preferred Option	Retained Height (m)			Chainage Start	Chainage End	Length (m)	Category
R2-RW026	Precast RC	varies	1.25	max	1+620	1+650	30	N/A
R2-RW022	Precast RC	varies	2	max	1+940	1+990	50	1
R2-RW027	Graded Slope	varies	1.3	max	2+040	2+125	85	N/A
R2-RW008	In-situ RC	varies	0.75	max	4+380	4+420	40	N/A
R2-RW009	Precast RC	varies	1	max	4+500	4+550	50	N/A
R2-RW010	Precast RC	varies	2	max	5+550	5+620	70	1
R2-RW028	In-situ RC	varies	1	max	6+410	6+470	60	N/A
R2-RW014	In-situ RC	varies	1.2	max	6+730	6+765	35	N/A
R2-RW015	Precast RC	varies	1.4	max	6+770	6+800	30	N/A
R2-RW016	In-situ RC	varies	1.5	max	7+220	7+290	180	1
R2-RW017	In-situ RC	varies	1.5	max	7+255	7+280	25	1
R2-RW018	In-situ RC	varies	1.5	max	7+315	7+385	70	1
R2-RW019	Precast RC	varies	1	max	8+080	8+220	140	N/A
R2-RW020	Precast RC	varies	1.2	max	8+410	8+560	150	N/A

Wall Reference	Structure Type Preferred Option	Retained Height (m)			Chainage Start	Chainage End	Length (m)	Category
R2-RW029	Precast RC	varies	2	max	8+560	8+640	80	1
R2-RW021	Precast RC	varies	1.4	max	8+710	8+745	35	N/A

4.6.8.2 Frank Flood Bridge

Frank Flood Bridge (formerly known as Drumcondra Bridge) is an existing structure that carries the Proposed Scheme over the River Tolka. The proposed corridor is wider than the existing arrangement and consequently a proposed independent parallel pedestrian and cycle bridge will be provided to the west of the existing Frank Flood Bridge.

The existing bridge consists of a 3-span masonry arch with a total length of 19.48m and a width of 19.43m. The bridge was constructed in circa 1813 and is included in the Industrial Heritage Record. The new highways arrangement will result in the removal of the western footpath and the introduction of a northbound bus lane running adjacent to the western parapet. This will require strengthening of the spandrel wall to accommodate the increase in surcharge. Mitigation measures will also be introduced to reduce the risk of collision with the substandard western parapet.

Due to inclusion of the Frank Flood bridge on the Industrial Heritage Record this structure is considered sensitive to changes in appearance. Therefore, the design of the proposed pedestrian and cycle bridge is to minimise impact to the visual appearance and to retain its cultural heritage form.

The proposed pedestrian and cycle bridge consists of a 50m, 2-span steel structure comprising central varying depth box girder with a tie down arrangement at the north of the structure. The span arrangement is governed by the flood plain on the south side of the river which needs to remain open for high flow situations. The north span will be 38m and the south span will be 12m. The distance between the deck soffit and the ground varies. A minimum clearance of 1.5m is provided at the abutments.

The superstructure will consist of a central varying depth box girder to be proportioned to minimise structural depth above deck level and provide unobstructed views of the existing bridge from Our Lady's Park. The girder will increase in depth over the support locations and 'disappear' below deck level at mid span locations. Transverse members will have sufficient stiffness to distribute load into the central girder such that edge girder size can be minimised. Allowance will be made to accommodate the large number of services required below the deck. The substructure will consist of conventional bank seat abutments supported on piled foundations at the north and south end of the structure. The central support will consist of a leaf pier supported by piled foundations set back an appropriate distance from the river wall. A tie down arrangement will be created to the north of the structure with a tension connection between the central box and an independent pile group. This will limit midspan deflections allowing for a more slender structure.

The bridge deck superstructure will be continuous. It will be supported on bearings at both abutments and central pier. Additionally, the superstructure will be connected to an independent pile group via mechanical pin connections. The cross-section of the deck is governed by the need to accommodate a large number of utility diversions.

Based on available information, the general ground conditions consist of approximately 3m of made ground above a stratum of soft to firm boulder clay underlain by limestone. Bedrock level is expected to be encountered 10m to 20m below ground level. Foundations would be situated in the boulder clay and will consist of piled foundations.

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,

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 Signs 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; existing signs. In line with DMURS, the signage proposals have been '*kept to the minimum requirements of the TSM, particularly where place values are very high*'.

A review of the existing regulatory and warning signs in the vicinity of the route was carried out to identify unnecessary repetitive and redundant signage to be removed. This includes rationalising signage structures by better utilising individual sign poles and clustering signage together on a single pole.

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 possible to eliminate the need for vehicle restraint systems.

4.6.9.1.2 Gantry Signage

No gantry signage exists along the route, and the Proposed Scheme has no requirement for any new gantry signage.

4.6.9.1.3 Road Markings

A preliminary design of road markings has been undertaken in accordance with TSM Chapter 7. 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 and the NCM 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 junctions for straight ahead or right turn movements; and
- Pedestrian crossings have been incorporated throughout the design to connect the network of proposed and existing footways. Wider pedestrian crossings have been provided in locations expected to accommodate a high number of pedestrians. DMURS classifies pedestrian crossing widths in areas of low to moderate pedestrian activity as 2.5m and areas of moderate to high pedestrian activity as 3m.

4.6.10 Pavement

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

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

For the purpose of design, the pavement assets are categorised into two networks. The primary network refers to the bus corridor under consideration, while the secondary network refers to the roads impacted by the re-routing of existing traffic from the Proposed 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 of the existing carriageways;
- Carriageway realignment;
- Rehabilitation and strengthening of the existing carriageways;
- Other specific trafficked areas (e.g., bus laybys, offline parking and loading bays);
- New pedestrian areas including footpaths; and
- New cycle facilities.

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

4.6.10.1 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 (BCIDB-JAC-PAV_PV-0002_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 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:

- DN-PAV-03021 (Dec. 2010) – Pavement and Foundation Design;
- DN-PAV-03023 (Jun. 2020) – Surfacing Materials for New and Maintenance Construction for use in Ireland;
- AM-PAV-06050 (Mar. 2020) – Pavement Assessment, Repair and Renewal Principles;
- PE-SMG-02002 (Dec. 2010) – Traffic Assessment;
- 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; and
- CC-SPW-00900 (Sep. 2017) – Specification for Road Works Series 900 – Road Pavements – Bituminous Materials.

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 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 Ground Penetrating Radar (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 Pavement Surface Condition Index (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.

4.6.11 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 bays were counted along the Proposed Scheme, and the proposed losses of these parking spaces and loading bays has been quantified. Mitigation measures have been

identified to reduce the impact of the Proposed Scheme as far as is reasonably practicable, by incorporating some parking provision, and providing enhanced cycle parking facilities.

Changes to the parking and loading provisions along each section of the Proposed Scheme are described further in Section 4.5. Reference should be made to Chapter 6 (Traffic & Transport) for further information on the impacts on parking as a result of the Proposed Scheme.

4.6.12 Landscape and Urban Realm

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

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

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

4.6.12.1 Landscape and Character Analysis

The landscape and urban realm proposals are derived from analysis of the existing urban realm, including existing character, any heritage features, existing boundaries, existing vegetation and tree planting, and existing materials. For each section of the route, the design took a broad overview of typical dwelling age and style, extents of vegetation and tree cover. The predominant mixes of paving types, appearance of lighting features, fencing, walls, and street furniture was considered. The purpose of this analysis was to assess the existing character of the area and how the Proposed Scheme may alter this. The outcome of the analysis allowed the designers to consider appropriate enhancement opportunities along the route. The enhancement opportunities include key nodal locations which focus on locally upgrading the quality of the paving materials, extending planting, decluttering of streetscape and general placemaking along the route. Where possible, a SuDS approach has been taken to assist with drainage along the route.

4.6.12.2 Hardscape

4.6.12.2.1 Typical Material Typologies

Through the process of developing the Proposed Scheme, a typology and palette of proposed materials was developed to create a consistent design response for various sections of the route. The proposed materials were based on the existing landscape character, existing materials, historical materials while also identifying areas for betterment through the use of higher quality surface materials. The Landscaping General Arrangement drawings (BCIDB-JAC-ENV_LA-0002_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 footpath** – Used extensively on existing footpaths. Concrete footpaths can be laid without a kerb, can have neatly trowelled edges and textured surface for a clean, durable, slip resistant surface;
- **Asphalt footpath** – Widely used on existing footpaths and will tie in with other sections of urban realm. Laid with a road kerb, can have a smooth finish or textured aggregate surface, provides a strong flexible slip resistant surface. Opportunities to retain good quality kerbs have been explored and tie-in points considered;
- **Precast concrete unit paving** – Either concrete paving slabs or concrete block, there is a very wide variety of sizes and colours available to provide an enhanced urban realm. The use/reuse of

granite kerbs where appropriate will further enhance the urban realm. This type of material use is mostly employed in non-inner-city urban realm enhancements;

- **Natural stone paving** – Employed for high quality urban realm areas, mostly in city centre locations. This typology represents natural stone surface treatments such as granite and are used to create enhanced public spaces for major urban realm interventions;
- **Stone or Concrete setts** – Proposed for distinguishing pedestrian crossing points either on raised table or at road level;
- **Self-binding gravel** – Proposed for pedestrian paths set away from the road expected to see less traffic. Used for natural areas, for example, paths through wildflower meadows. They provide a defined informal route as an alternative to asphalt or concrete; and
- **No change** – In addition to areas with proposed material changes, there were also areas identified where no change in materials would be required. For example, where pavement has recently been laid and is in good condition. The design also explores opportunities where good quality kerbs such as granite kerbs could be reused, which would have both cost and sustainability advantages.

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 possible 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.

4.6.12.3 Softscape

4.6.12.3.1 Planting Strategy

The planting strategy has been developed to meet the needs of the Dublin City Tree Strategy and the Dublin Biodiversity Action Plan, which promotes a positive influence on the local environment to improve amongst others; air quality, stormwater runoff, health and wellbeing, and habitat provision. As a consequence, the routes have made the following:

- Where possible the initial conservation of existing biodiversity has been considered. The Arboricultural Survey identified the quality of existing trees. The information was overlaid on the proposed routes to inform the design process;
- Opportunities have been identified to enhance biodiversity through green infrastructure;
- Promote the role of street tree planting consistent with the recommendations of the Dublin City Tree Strategy; and
- Develop the role of SuDS opportunities within the Proposed Scheme in coordination with the drainage engineers. (Refer the Drainage, Hydrology and Flood Risk section of this report).

4.6.12.4 Arboricultural Survey

4.6.12.4.1 Scope of Assessment

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.

4.6.12.5 Typical Planting Typologies

Several typologies have been developed. These are discussed further below.

4.6.12.5.1 New Street Trees

As noted on the Landscaping General Arrangement (BCIDB-JAC-ENV_LA-0002_XX_00-DR-LL-9001) in Volume 3 of this EIAR, a range of urban street tree species (Image 4.22).

Six species 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.

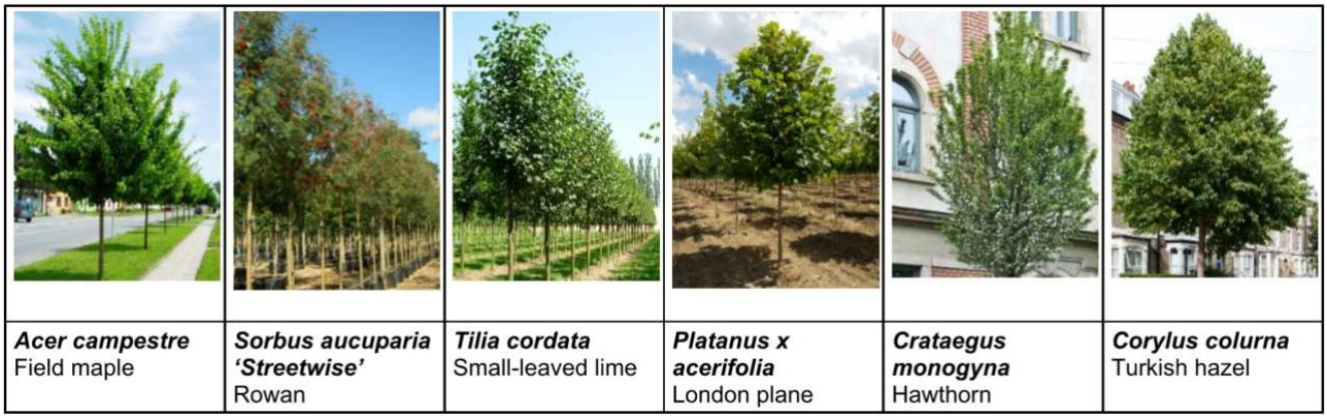


Image 4.22: Street Tree Species

4.6.12.5.2 New Woodland/Parkland Areas and Tree Groups

The Proposed Scheme corridor includes existing mature woodland/parkland, street trees and scrub areas, some of which will be impacted where the existing carriageway is to be widened or cycling infrastructure is to be provided. It is proposed to reinstate construction working areas and also to replant the edges of impacted areas to as to reinstate the streetscape or roadway character.

Woodland/parkland 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) and *Prunus spinosa* (Blackthorn).

Elsewhere along the Proposed Scheme there are a range of existing mature and immature street trees. While it is proposed to retain and protect existing trees wherever possible, some will be impacted. The Proposed Scheme includes replacement and additional planting of semi-mature street trees to mitigate the loss of existing trees and to maintain the long-term tree-lined character of streets.

The Proposed Scheme incorporates additional landscaping arising from junction reconfiguration, reinforcement of existing vegetation areas, and the establishment of new urban realm and landscape opportunity areas. Tree species will be determined by location and will comprise of either native woodland/parkland trees as set out above.

Landscaping proposals respond to the different localities and may include grass planting, hedgerows, trees, grasses, ornamental planting and swathes of bulbs.

4.6.12.5.3 Boundary Planting

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

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

4.6.13 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. Several existing columns are proposed to be relocated or replaced to accommodate the Proposed Scheme, as shown on the Street Lighting drawings (BCIDB-JAC-LHT_RL-0002_XX_00-DR-EO-9001) in Volume 3 of this EIAR.

Light Emitting Diode (LED) lanterns will be the light source for any new or relocated public lighting provided. The lighting design will involve 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 will be replaced and relocated to the rear of the footpath to eliminate conflict with pedestrians, eliminating pedestrian obstruction. For existing columns that have specific aesthetic requirements, the intent for the replacement (where applicable) of such columns will include:

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

4.6.13.1.1 New Lighting

All new public lighting will be designed and installed in accordance with the requirements of the relevant 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 5489-1:2020 Code of practice for the design of road lighting;
- Volume 1 – NRA Specification for Road Works, Series 1300 & 1400;
- Volume 4 – NRA Road Construction Details, Series 1300 & 1400;
- IS EN 40 – Lighting Columns; and
- Institution of Lighting Professionals – GN01 Guidance Notes for Reduction of Obtrusive Light.

Lighting schemes will comply with the 'Guidance notes for the Reduction of Light Pollution' issued by the Institution of Lighting Professionals (ILP).

4.6.13.1.2 Lighting at Bus Stops

The design will include for the standards and requirements for lighting at bus stops.

4.6.14 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.

4.6.14.1 Utility Diversions

Due to the extensive nature of the Proposed Scheme, there are certain areas along the route which will require utility diversions, due to localised conflicts. Identified service conflicts and recommended diversions are described and assessed in Chapter 19 (Material Assets).

4.6.15 Drainage

4.6.15.1 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, TII requirements and international best practices such as CIRIA The SuDS Manual (C753). Agencies consulted include DCC, Fingal County Council and Irish Water where applicable.

4.6.15.2 Existing Watercourses and Culverts

The Proposed Scheme crosses the following watercourses:

- Gaybrook River at Airside;
- River Sluice north of Dublin Airport;
- Cuckoo Stream at Dublin Airport;
- River Mayne south of Dublin Airport;
- Santry River at Ballymun; and
- River Tolka at Drumcondra.

4.6.15.3 Existing Drainage Description

The Proposed Scheme extends from Swords to a terminus in Dublin City Centre. The Proposed Scheme comprises widening and/or adjustment of the existing highway to accommodate segregated cycle and bus lanes, in addition to provision for pedestrians and other traffic.

The existing highway along the Proposed Scheme is served by both surface water and foul/combined drainage networks. Flows are typically collected in standard gulley grates and routed via a gravity network to outfall points. There are no SuDS/attenuation measures on the existing drainage networks to treat or attenuate runoff from the existing highway.

The existing drainage network along the Proposed Scheme can be split into the seven catchment areas based on topography and the existing pipe network supplied by Irish Water. The approximate catchment areas, existing

sewer networks, outfalls and watercourses are shown on the existing catchment drawings (refer to drawings BCIDB-JAC-DNG_RD-0002_XX_00-DR-CD-1001 to BCIDB-JAC-DNG_RD-0002_XX_00-DR-CD-1010 within Volume 3 of this EIAR) The existing catchments are summarised in Table 4.27.

Table 4.27: Proposed Scheme Existing Drainage

Existing Catchment Reference	Chainage	Approx. Drainage Catchment Area (km^2)	Existing Network Type	Existing Outfalls
Catchment 1	A000 – 0910	3.69	Surface water (storm)	Network outfalls to the River Ward
Catchment 2	A0910 – 2300	4.03	Surface water (storm)	Network outfalls to the River Sluice
Catchment 3	A2300 – 4215	3.92	Surface water (storm)	Network outfalls to the Cuckoo Stream
Catchment 4	A4215 – 4800	2.18	Surface water (storm)	Network outfalls to the Mayne River
Catchment 5	A4800 – 7245	9.07	Surface water (storm)	Network outfalls to the Santry River
Catchment 6	A7245 – 10115	31.69	Surface water (storm)	Network outfalls to the River Tolka
Catchment 7	A10115 – 11769 D0000 – D0374 C0000 – C0450	Ringsend Wastewater Treatment Plant (WwTP) Catchment	Foul/combined	Foul/combined network drains to Ringsend WwTP with sewer overflows to the River Liffey

4.6.15.4 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 urban 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, oversized pipes, silt traps and attenuation features if necessary.

Each catchment area has been broken down into sub-catchments to determine 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 4.28. In addition, the table contains a column entitled 'Net change' which takes account of the change of use from impermeable to permeable areas and vice versa.

Table 4.28: Summary of Increased Permeable and Impermeable Areas

Existing Catchment Reference	Chainage	Drainage Catchment 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 1a	A0000 – A0300	18,748	4,556	1,591	2,965	15.82%
Catchment 1b	A0300 – A0650	8,617	723	1,318	-595	-6.91%
Catchment 1c (east)	A0650 – A1000	8,525	276	78	198	2.33%
Catchment 1c (west)		8,142	1,112	310	802	9.86%
Catchment 2a	A1000 – A1450	11,464	747	284	463	4.04%
Catchment 2b (east)	A1450 – A1650	2,859	645	0	645	22.57%
Catchment 2b (west)		2,300	120	0	120	5.22%
Catchment 3a (east)	A1650 – A2150	14,954	2,167	0	2,167	14.50%

Existing Catchment Reference	Chainage	Drainage Catchment 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 3a (west)	A1650 – A2050	7,013	394	227	167	2.39%
Catchment 3b (west)	A2050 – A2150	2,519	911	214	697	27.67%
Catchment 4a (east)	A2250 – A2650	10,400	802	0	802	7.72%
Catchment 4a (west)		10,039	1,328	0	1,328	13.23%
Catchment 4b	A2650 – A2900	23,301	702	0	702	3.02%
Catchment 4c	A3050 – A3200	5,915	259	0	259	4.38%
Catchment 5a	A3200 – A3950	28,683	0	0	0	0.00%
Catchment 5b (east)	A3950 – A4100	6,814	168	65	233	3.42%
Catchment 5c (east)	A4100 – A4350	2,352	0	0	0	0.00%
Catchment 5c (west)	A4100 – A4200	1,763	98	0	98	5.56%
Catchment 5d (west)	A4300 – A4350	770	120	0	120	15.59%
Catchment 6	A4400 – A4700	7,344	479	0	479	6.53%
Catchment 7a	A4800 – A5250	7,661	343	0	343	4.48%
Catchment 7b	A5000 – A5400	11,072	1,812	47	1,765	15.95%
Catchment 8	A5400 – A5750	10,448	598	41	557	5.34%
Catchment 9	A5700 – A6100	9,732	715	151	564	5.80%
Catchment 10	A6300 – A6500	18,592	611	5	606	3.26%
Catchment 11	A6500 – A6750	6,660	510	0	510	7.66%
Catchment 12	A6750 – A7000	7,895	1,069	66	1,003	12.71%
Catchment 13a	A7200 – A7400	4,366	193	0	193	4.43%
Catchment 13b	A7700 – A7950	9,217	707	0	707	7.68%
Catchment 14	A7950 – A8050	9,714	0	0	0	0.00%
Catchment 15a	A8050 – A8250	14,415	1,649	269	1,380	9.57%
Catchment 15b	A8250 – A8350	4,141	285	0	285	6.88%
Catchment 15c	A8350 – A8800	10,659	428	0	428	4.02%
Catchment 16a	A8800 – A9500	25,536	232	32	200	0.79%
Catchment 16b	A9500 – A10150	18,796	644	0	644	3.43%
Catchment 17a	A10150 – A10500	10,566	213	0	213	2.02%
Catchment 17b	A10500 – A11764	38,776	0	0	0	0.00%
Catchment 18	C000 – C450	10,576	0	0	0	0.00%
Catchment 19	D000 – D374	7,068	0	0	0	0.00%

4.6.15.5 Proposed Drainage System

The principal objectives of 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 treatment before discharging into the existing network system; and
- Infiltration rates were assumed to be zero for calculating the required attenuation volumes for SuDS measures. This is a conservative approach and ensures SuDS measures are not knowingly undersized at this stage of the design. Where necessary, permeability tests will be completed so that infiltration rates can be considered in further design.

The following drainage types are proposed for the Proposed Scheme catchments comprising newly paved and combined existing/newly paved areas, as indicated on the Proposed Surface Water Drainage Works (BCIDB-JAC-DNG_RD-0002_XX_00-DR-CD-9001) in Volume 3 of this EIAR:

- Sealed Drainage, with 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 carriageway profile;
- Attenuation Ponds are provided for the short-term detention and treatment of stormwater runoff from the completed Proposed Scheme which allows a controlled releases from the structure downstream;
- Underground Stormwater Attenuation Tanks collect and store excess surface water runoff from the large storm events and releases it at a controlled rate, usually by a flow control device, into a local watercourse minimising the risk of localised flooding;
- Grass Surface Water Channels & Swales are provided as road edge channels. These receive flows from the sealed pipe network and are designed to convey, attenuate and treat runoff prior to discharge; and
- Filter Drains are provided as road edge channels. These comprise a perforated pipe with granular surround and are designed to convey, attenuate and treat runoff prior to discharge.

4.6.15.6 Runoff Attenuation and Sustainable Drainage Systems (SuDS)

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

4.6.15.7 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 system is shown in the Proposed Surface Water Drainage Works drawings (BCIDB-JAC-DNG_RD-0002_XX_00-DR-CD-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 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; and

- Rain gardens and bio-retention areas: 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 collected by the systems ponds temporarily on the surface and then filters through the vegetation and underlying soils.

4.6.16 Maintenance

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

Apparatus have been designed and located to allow for easy access and the safe maintenance of the Proposed 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.

4.6.17 Safety and Security

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 BCIDB-JAC-TSM_SJ-0007_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 individual plots of land along sections of the route.

The extent of the permanent land acquisition required temporarily for construction of the Proposed Scheme is shown on the General Arrangement Drawings (BCIDB-JAC-GEO_GA-0002_XX_00-DR-CR-9001) included in Volume 3 of this EIAR.

Construction of the Proposed Scheme requires land take from a number of different parties, as outlined below:

- 64 no. residential properties;
- 53 no. commercial properties; and
- 14 no. plots belonging to Fingal County Council, DCC and DAA.

The main structures to be demolished or removed along the Proposed Scheme are:

- Collinstown Cross-Part Demolition of Commercial Premises; and
- Two Semi-Detached Cottages at the Royal College of Surgeons Sports Ground.

Mitigation accommodation works are proposed in the affected locations, including reconstruction of boundary walls and fences, as required, as outlined in Section 4.6.18.1.

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 cellar and private landings are affected by the Proposed Scheme pre-construction and post construction surveys will be performed by the appointed contractor. It is anticipated that the acquired cellars will be infilled with concrete.

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

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

Construction Industry Research & Information Association (CIRIA) (1994). CIRIA Report 142 – Control of Pollution from Highway Drainage Discharges.

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

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

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

Irish Water (2005). Greater Dublin Strategic Drainage Study (GDSDS).

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

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

NDA (2015). How Walkable is Your Town?

NDA (2020). Building for Everyone: A Universal Design Approach.

NTA (2011). National Cycle Manual.

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

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

Transport Infrastructure Ireland (TII) (2015b). Drainage Systems for National Roads DN-DNG-03022.

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

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

UK DfT (2005). Inclusive Mobility.

UK DfT (2007). Guidance on the Use of Tactile Paving Surfaces.

Directives and legislation

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

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

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

Number 14 of 2005 – Disability Act 2005