

Chapter 04
Proposed
Scheme
Description

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4. Proposed Scheme Description

4.1 Introduction

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

Article 5(1)(a) of 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)) 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 Number 14 of 1993 - 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 this 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 will be approximately 11km in length and will be comprised of two main alignments in terms of the route it will follow, from Ballymun to the City Centre (the Ballymun Section) and from Finglas to Phibsborough (the Finglas Section).

The Ballymun Section of the Proposed Scheme will commence on R108 Ballymun Road at its junction with St. Margaret's Road, just south of M50 Motorway Junction 4, and will be routed along the R108 on Ballymun Road, St. Mobhi Road, Botanic Road, Prospect Road, Phibsborough Road, Constitution Hill and R132 Church Street as far as R148 Arran Quay at the River Liffey on the western edge of Dublin City Centre. Priority for buses will be provided along the entire route, consisting primarily of dedicated bus lanes in both directions, where feasible, with alternative measures proposed at particularly constrained locations such as at R108 St. Mobhi Road. A complementary cycle route along quiet streets is proposed along Royal Canal Bank in Phibsborough, which will extend southwards from the Royal Canal to Western Way, parallel a short distance to the east of R108 Phibsborough Road, and also through the Markets Area at the southern end of the Proposed Scheme.

The Finglas Section of the Proposed Scheme will commence on the R135 Finglas Road at the junction with R104 St. Margaret's Road and will be routed along the R135 Finglas Road as far as Hart's Corner in Phibsborough, where it will join the Ballymun Section of the Proposed Scheme. Priority for buses will be provided along the entire route, consisting of dedicated bus lanes in both directions. Continuous segregated cycle tracks will be provided from the Church Street Junction in Finglas to Hart's Corner. No cycle tracks are proposed along the Finglas Bypass at the northern end of the Proposed Scheme, where more suitable routes are available along local streets.

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

provided to enhance the pedestrian experience. Examples of this include the proposed works at Glasnevin Village, Broadstone Pocket Park and the entrance to Clearwater Shopping Centre.

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

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

Features	Existing (km)	Proposed Scheme (km)
Bus Lanes		
Inbound	5.6	10.5
Outbound	5.2	9.6
Bus Priority through Traffic Management		
Inbound	0	0.4
Outbound	0	1.3
Bus Measures		
Total Bus Priority (both directions)	10.8	21.8
Proportion of Route with Bus Priority Measures	49%	100%
Cycle Facilities – Segregated		
Inbound	3.5	10
Outbound	4	10.2
Cyclist Facilities – Non-Segregated		
Inbound	2.6	0
Outbound	2.9	0
Cyclist Facilities		
Total Cyclist Facilities (both directions)	13	20.2 (+55%)
Proportion Segregated (including Quiet Street Treatment)	60%	93%
Other Features		
Number of Traffic Signal Controlled Junctions	40	41
Number of Signal Crossings	18	44 (+26)
Number of Private Properties (Residential and Commercial) with Land Acquisition	18 properties	

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 this EIAR, and these should be read in conjunction with this Chapter.

Table 4.2: List of Drawings

Drawing Series Number	Description
BCIDD-ROT-SPW_ZZ-0304_XX_00-DR-CR-9001	Site Location Plan
BCIDD-ROT-GEO_GA-0304_XX_00-DR-CR-9001	General Arrangement
BCIDD-ROT-GEO_HV-0304_ML_00-DR-CR-9001	Mainline Plan and Profile
BCIDD-ROT-GEO_CS-0304_XX_00-DR-CR-9001	Typical Cross Sections
BCIDD-ROT-ENV_LA-0304_XX_00-DR-LL-9001	Landscaping General Arrangement
BCIDD-ROT-PAV_PV-0304_XX_00-DR-CR-9001	Pavement Treatment Plans
BCIDD-ROT-SPW_BW-0304_XX_00-DR-CR-9001	Fencing and Boundary Treatment
BCIDD-ROT-TSM_GA-0304_XX_00-DR-CR-9001	Traffic Signs and Road Markings
BCIDD-ROT-LHT_RL-0304_XX_00-DR-EO-9001	Public Street Lighting
BCIDD-ROT-TSM_SJ-0304_XX_00-DR-TR-9001	Junction System Design
BCIDD-ROT-STR_ZZ-0304_XX_00-DR-SS-9001	Structures
BCIDD-ROT-DNG_RD-0304_XX_00-DR-CD-9001	Proposed Surface Water Drainage Works
BCIDD-ROT-UTL_UD-0304_XX_00-DR-CU-9001	IW Foul Sewer Asset Alterations
BCIDD-ROT-UTL_UE-0304_XX_00-DR-CU-9001	ESB Asset Alterations
BCIDD-ROT-UTL_UG-0304_XX_00-DR-CU-9001	GNI Asset Alterations
BCIDD-ROT-UTL_UW-0304_XX_00-DR-CU-9001	IW Water Asset Alterations
BCIDD-ROT-UTL_UL-0304_XX_00-DR-CU-9001	Telecommunications Asset Alterations
BCIDD-ROT-UTL_UC-0304_XX_00-DR-CU-9001	Combined Existing Utility Records

4.3 Design Iteration

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), undertaken throughout the option selection and design development process has been incorporated, where appropriate.

Examples of how the design evolved are as follows:

- Additional on-street parking was provided on Ballymun Main Street and on R108 Ballymun Road south of Collins Avenue to address the need for local parking and to protect the bus lanes and cycle tracks from obstruction;
- At Hart's Corner, at the southern end of R135 Finglas Road, the design was developed to greatly reduce the need for road widening into private properties;
- A continuous segregated cycle route was developed along the full length of the Proposed Scheme with no gaps, as had been proposed in earlier designs; and
- The junction layouts were modified over the course of the design process to provide more protection for cyclists along the length of the Proposed Scheme, including the addition of separately signalled stages for cyclists at large junctions.

4.4 Design Principles

The design of the Proposed Scheme was developed with reference to the Preliminary Design Guidance Booklet for BusConnects Core Bus Corridors (PDGB) (NTA 2021) (refer to Appendix A4.1 in Volume 4 of this EIAR). This guidance document was prepared to ensure that a consistent design approach for the Core Bus Corridor Infrastructure Works (hereafter referred to as the CBC Infrastructure Works) was adopted based on the objectives of the Proposed Scheme. The scheme 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);
- The National Transport Authority (NTA) National Cycle Manual (NCM) (NTA 2011);
- Transport Infrastructure Ireland (TII) National Road Design Standards;
- The Department of Transport (DoT) The Traffic Signs Manual (TSM) (DoT 2019);
- The UK Department for Transport (UK DfT) Guidance on the Use of Tactile Paving Surfaces (UK DfT 2007);
- The National Disability Authority (NDA) Building for Everyone: A Universal Design Approach (NDA 2020); and
- Greater Dublin Strategic Drainage Study (GSDS) (Irish Water 2005).

An example of the application of the design principles for the Proposed Scheme can be seen at all of the major junctions along the route where the pedestrian crossings have been simplified and shortened through the removal of left-slip lanes, road narrowing where possible, and straight crossings without staggers in median islands that require further waiting by pedestrians. At many existing junctions, pedestrian crossings are not currently available on all arms which requires pedestrians to go around the long way and to cross the junction in stages. In the Proposed Scheme, additional pedestrian crossings will be provided at all arms for more convenience and directness. Between junctions, additional pedestrian signal crossings will be provided in numerous locations for increased accessibility across the main roads.

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, 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, and the British Standards Institution (BSI) BS8300-1:2018 Design of an accessible and inclusive built environment - External environment – Code of practice (BSI 2018). Accessibility is also addressed in Chapter 12 of the PGDB. Further detail on accessibility for mobility impaired users is given in Section 4.6.5.

The Proposed Scheme, which has been developed after the consideration of reasonable alternatives and which achieves the aims 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

For the purposes of describing the Proposed Scheme, it has been split into the following seven sections (Section 1 to Section 4 comprise the Ballymun Section of the Proposed Scheme and Section 5 to Section 7 comprise the Finglas Section of the Proposed Scheme):

- Section 1 – Ballymun Road from St. Margaret’s Road to Griffith Avenue;
- Section 2 – St. Mobhi Road and Botanic Road from Griffith Avenue to Hart’s Corner;
- Section 3 – Prospect Road, Phibsborough Road from Hart’s Corner to Western Way;
- Section 4 - Constitution Hill and Church Street to Arran Quay;
- Section 5 – Finglas Road from St. Margaret’s Road to Wellmount Road;
- Section 6 – Finglas Road from Wellmount Road to Ballyboggan Road; and
- Section 7 – Finglas Road from Ballyboggan Road to Hart’s Corner.

4.5.1 Section 1 – Ballymun Road from St. Margaret’s Road to Griffith Avenue

4.5.1.1 General Overview of Section 1 of the Proposed Scheme

Section 1 of the Proposed Scheme will commence on R108 Ballymun Road at its junction with St. Margaret’s Road, just south of M50 Motorway Junction 4. This section of the Proposed Scheme will extend along R108 Ballymun Road to the junction with R102 Griffith Avenue.

Priority for buses will be provided along the entire length of this section of the Proposed Scheme, with dedicated bus lanes in both directions. Segregated cycle tracks will be provided in both directions.

In Section 1 there are 12 existing signal-controlled junctions, of which 11 are on the Ballymun Road dual carriageway, which are large in scale with long crossing distances for pedestrians. The Proposed Scheme will reduce the footprint of these junctions through narrower traffic lanes and tighter corners and through the removal of most left-turn slip lanes. This will provide more direct pedestrian crossings on all junction arms, where in some cases there may only be signal crossings on some but not all arms. Protected cycle tracks are proposed at each junction to maintain segregation from traffic to the greatest degree possible.

In Ballymun Town Centre, on Ballymun Main Street, the street layout will be altered from two general traffic lanes to one general traffic lane and one dedicated bus lane in each direction between the Shangan Road Junction and the Gateway Crescent Junction to provide permanent on-street parking at the commercial and civic premises along Ballymun Main Street. New street trees will be provided to improve the urban realm along Ballymun Main Street.

South of the R103 Collins Avenue Junction, the road layout in the northbound direction will be altered from two general traffic lanes to one general traffic lane and one dedicated bus lane on the western side of the carriageway north of the junction at St. Pappin Road to accommodate on-street parking spaces, which will serve frequent drop-off activity related to the Our Lady of Victories National School.

At the gyratory junction of R108 Ballymun Road / R102 Griffith Avenue / R108 St. Mobhi Road, the traffic system will be modified to divert southbound left-turn traffic on R108 St. Mobhi Road turning east onto R102 Griffith Avenue. This traffic will instead circulate around the western and southern arms of the triangular road system which will be modified to two-way movement on those arms. Likewise, eastbound traffic from the western section of R102 Griffith Avenue will continue directly along the southern side of the gyratory instead of diverting around the northern end of it. This arrangement will remove a significant traffic conflict at the corner of R108 St. Mobhi Road and R102 Griffith Avenue which will benefit buses and cyclists.

Segregated cycle tracks will be provided through the traffic gyratory, plus a two-way cycle track along R102 Griffith Avenue on the southern side to facilitate the cycle connection from Griffith Avenue West (where there is a primary school and sports ground) to R108 St. Mobhi Road, without the need for eastbound cyclists to cross the road twice.

4.5.1.2 Deviations from Standard Cross Sections in Section 1

The width of the cross-sectional elements, as outlined in Section 4.6.1, have been fully adhered to in Section 1 of the Proposed Scheme.

4.5.1.3 Bus Lane Provision in Section 1

An overview of the bus lane provision as part of the Proposed Scheme is set out in in Section 4.6.4. Full bus priority through the use of dedicated bus lanes will be provided along the length of Section 1.

4.5.1.4 Bus Stops in Section 1

The different types of bus stops (Island, Shared Landing, Inline and Layby) are described in Section 4.6.4. Thirteen of the proposed bus stops in Section 1 of the Proposed Scheme will be Island Bus Stops. Of the existing 21 bus stops in Section 1, four will be removed to provide more consistent stop spacing. Another three bus stops will be relocated to better positions. The bus stop locations are outlined in Table 4.3 and shown in the General Arrangement series of drawings (BCIDD-ROT-GEO_GA-0304_XX_00-DR-CR-9001) in Volume 3 of this EIAR. Further detail of bus stop design is included in the PDGB in Appendix A4.1 in Volume 4 of this EIAR.

Table 4.3: Proposed Bus Stop Locations within Section 1

Direction	Bus Stop Name	Bus Stop Number	Chainage	Bus Stop Type	Bus Shelter
Inbound	Northwood Avenue	7113	A-310	Island Bus Stop	Existing: No Proposed: Yes
Inbound	Nursing Home	127	A-730	Island Bus Stop	Existing: Yes Proposed: Yes
Inbound	Ballymun Civic Centre	112	A-1065	Island Bus Stop	Existing: Yes Proposed: Yes
Inbound	Trinity Comprehensive School	113	A-1500	Island Bus Stop	Existing: Yes Proposed: Yes
Inbound	Ballymun Road	114	A-1600	n/a – to be removed	Existing: No
Inbound	Ballymun Road Church (Our Lady of Victories)	115	A-1980	Island Bus Stop	Existing: Yes Proposed: Yes
Inbound	DCU Ballymun Road	37	A-2290	Island Bus Stop	Existing: Yes Proposed: Yes
Inbound	Hampstead Avenue	38	A-2640	Island Bus Stop	Existing: Yes Proposed: Yes
Inbound	The Rise	39	A-2940	Shared Landing Bus Stop	Existing: Yes Proposed: Yes
Outbound	Ballymun Road	27	C-50	Shared Landing Bus Stop	Existing: Yes Proposed: Yes
Outbound	Hampstead Avenue	28	A-2705	Shared Landing Bus Stop	Existing: Yes Proposed: Yes
Outbound	Albert College Park	29	A-2490	n/a – to be removed	Existing: No
Outbound	DCU (Set Down Only)	4680	A-2240	Shared Landing Bus Stop	Existing: No Proposed: Yes
Outbound	Albert College Court	90	A-2170	n/a – to be removed	Existing: No
Outbound	Ballymun Road NS	91	A-1945	Island Bus Stop	Existing: No Proposed: Yes
Outbound	Ballymun Library	92	A-1775	n/a – to be removed	Existing: No
Outbound	Gateway Avenue	93	A-1480	Island Bus Stop	Existing: Yes Proposed: Yes
Outbound	Civic Centre	94	A-1095	Island Bus Stop	Existing: Yes Proposed: Yes
Outbound	Ballymun Nursing Home	126	A-745	Island Bus Stop	Existing: No Proposed: Yes
Outbound	Santry Cross	6182	A-450	Island Bus Stop	Existing: No Proposed: Yes
Outbound	Gulliver's Retail Park	322	A-150	Island Bus Stop	Existing: No Proposed: Yes

4.5.1.5 Cycling Provision in Section 1

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

There are existing segregated cycle tracks which will be retained along the northern section of R108 Ballymun Road between the junctions at St. Margaret's Road and R104 Santry Avenue at Santry Cross. From Santry Cross southwards, there are existing narrow advisory cycle lanes at road level within or beside the bus lanes over most of the length. These will be upgraded to wider segregated cycle tracks over the full length of Section 1, with a raised kerb separator from the bus lane, or proposed parking laybys.

4.5.1.6 Junction Information for Section 1

An overview of the approach to junction review and design is provided within Section 4.6.7, with the specific junctions within Section 1 of the Proposed Scheme outlined in Table 4.4.

Table 4.4: Junctions within Section 1 of the Proposed Scheme

Junction Location	Junction Category	Description	Note
St. Margaret's Road / Ballymun Road	Moderate Junction	3-arm signal junction	Northbound bus lane with left-turn to St. Margaret's Road. Left-slip lanes removed, and pedestrian crossings shortened. Cycle tracks through the junction.
Northwood Avenue / Ballymun Road	Moderate Junction	3-arm signal junction	Southbound bus lane starts downstream of the junction. Left-slip lanes removed, and pedestrian crossings shortened. Additional pedestrian crossing on northern arm. Cycle tracks through the junction.
Santry Cross: Ballymun Road / Santry Avenue	Major Junction	4-arm signal junction	Pedestrian crossings shortened on the east and west arms. New pedestrian crossing on north arm. Protected cycle tracks. Bus Lanes to the stop line.
Shangan Road / Ballymun Road	Moderate Junction	4-arm signal junction	General traffic reduced from 2 through lanes to 1 on Ballymun Road. Pedestrian crossings shortened. Bus lanes to the stop lines. Cycle tracks through the junction.
Gateway Crescent / Ballymun Road	Minor Junction	3-arm signal junction	General traffic reduced from 2 through lanes to 1 on Ballymun Road. Pedestrian crossings shortened. Bus lanes to the stop lines. Cycle tracks through the junction.
Collins Avenue / Ballymun Road	Major Junction	4-arm signal junction	Left-slip lanes removed on east side. Segregated left-turn lanes on Ballymun Road. Protected cycle tracks. Bus Lanes to the stop line – not shared with left-turn traffic.
St. Pappin Road / Ballymun Road	Minor Junction	3-arm signal junction	Ballymun Road pedestrian crossing moved from north to south arm.
St. Canice's Road / Ballymun Road	Minor Junction	3-arm priority junction	New traffic signals
Ballymun Road / St. Mobhi Road	Major Junction	3-arm signal junction	New southbound right-turn to the western side of the traffic gyratory. Crossings for cyclists. Northbound bus lane.
Ballymun Road / Griffith Avenue	Major Junction	4-arm signal junction	New southbound entry on north arm. New eastbound exit on east arm. Bus lane outbound on east arm. Two-way east-west cycle route with protected corners
St. Mobhi Road / Griffith Avenue	Major Junction	4-arm signal junction	No left-turn southbound. Traffic diverted around the western and southern sides of the traffic gyratory system. Proposed northbound bus gate here, no through general traffic except buses, taxis and bicycles. Two-way east-west cycle route.

4.5.1.7 Parking and Loading Bays

Changes to parking and loading provision along Section 1 as a result of the Proposed Scheme are shown in Table 4.5 and Table 4.6, respectively.

Table 4.5: Section 1: On-Street Parking Spaces Change Impact Summary

Location	Type of Parking	Existing	Proposed	Change
Ballymun Road, 65m south of Santry Cross - East	Informal (Layby)	3	0	-3
Ballymun Road, 130m south of Santry Cross – East	Informal (Layby)	3	0	-3
Ballymun Road, 50m south of Santry Cross – West	Parking	3	0	-3
Ballymun Road, 130m south of Santry Cross – West	Informal (Layby)	2	0	-2
Ballymun Main Street (both sides)	Pay and Display short-term	14 part-time spaces (10:00 to 16:00)	50 full-time spaces	+36
Ballymun Main Street (east side)	Disabled	3	3	0
Ballymun Road, south of Collins Avenue – west side	Pay and Display short-term	None	11 full-time spaces	+11
Ballymun Road, Albert College Park, south of DCU Entrance	Informal	10	0	-10
St. Mobhi Road, west-side at shops	Free, 1 hour max in layby	3	3	0
Ballymun Road at Griffith Avenue, shops on east side	Free, 1 hour max in layby	8	8	0
Griffith Avenue Link, south	Informal	4	0	-4
Total		53 (incl. 14 part-time)	75	+22

Table 4.6: Section 1: Existing and Proposed Loading Bays

Location	Type of Parking	Existing	Proposed	Change
Ballymun Road, 50m south of Santry Cross – West	Loading	3	0	-3

4.5.1.8 Structures in Section 1

4.5.1.8.1 Major Structures

There are no existing major structures within this section of the Proposed Scheme and there are no structures proposed as a result of the Proposed Scheme.

4.5.1.8.2 Retaining Walls

There are no existing retaining walls and no new retaining walls proposed within this section of the Proposed Scheme.

4.5.1.9 Landscape and Urban Realm in Section 1

For an overview of the landscape design principles and approach, reference should be made to Section 4.6.12. The following sections provide a description of specific landscape and urban realm design in Section 1 of the Proposed Scheme.

4.5.1.9.1 Ballymun Main Street (Ballymun Civic Centre)

This important civic and commercial centre will undergo an extensive change in the configuration of Ballymun Main Street (see Image 4.1). One of the general traffic lanes will be removed on both sides of the carriageway, which will allow for the introduction of continuous cycle lanes, parking, and double tree alignments on each side. New street trees will be provided in the Ballymun Main Street (Ballymun Civic Centre) area of Section 1.

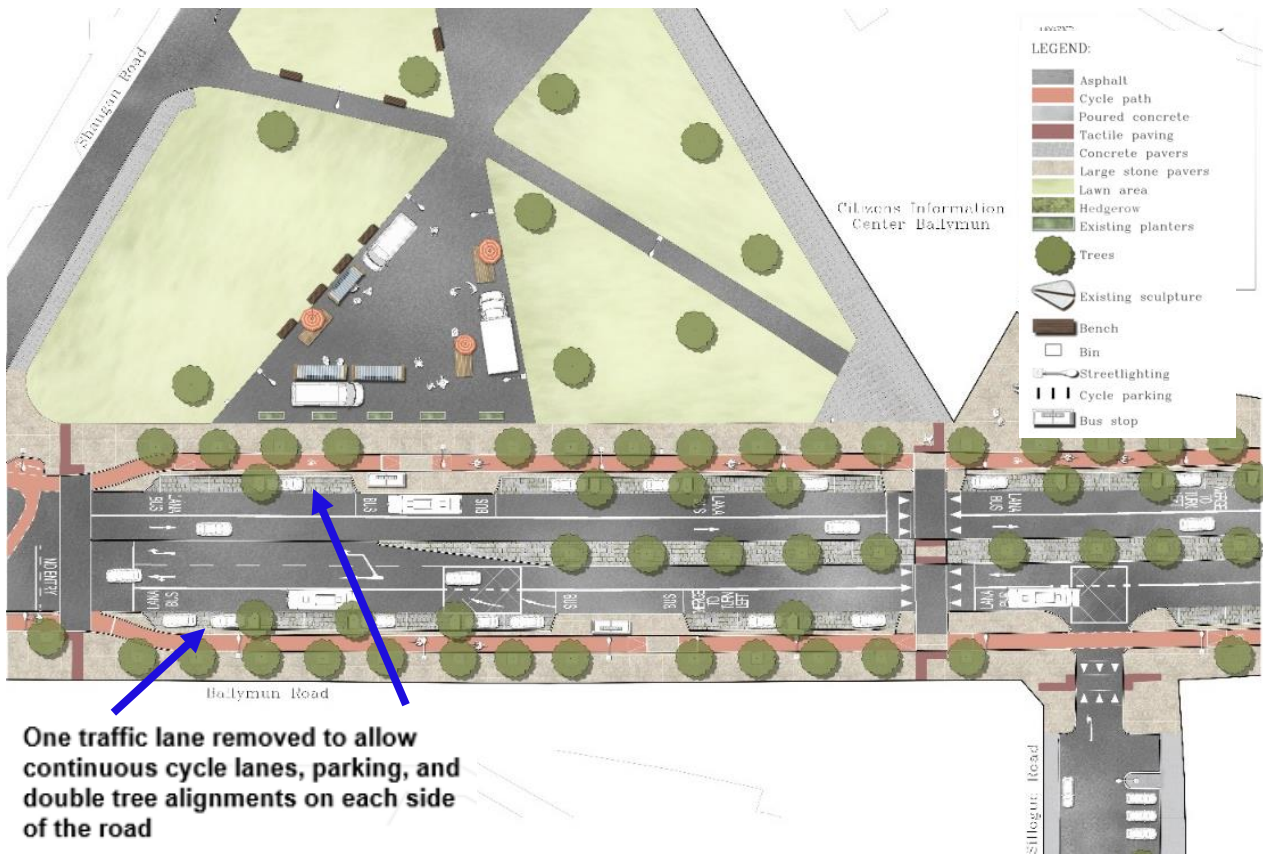


Image 4.1: Urban Realm Upgrade at Ballymun Main Street (Ballymun Civic Centre)

4.5.1.10 Land Acquisition and Use in Section 1

Additional land is required from public open spaces along the edges of the road within Section 1 at a number of locations, including Construction Compound B1 at the R108 Ballymun Road / R104 Santry Avenue Junction and for working space at seven other locations for boundary works where footpaths will be realigned to suit the proposed road layout at island bus stops.

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).

4.5.1.10.1 Rights of Way

No public rights of way are affected in Section 1 of the Proposed Scheme.

4.5.2 Section 2 – St. Mobhi Road and Botanic Road from Griffith Avenue to Hart’s Corner

4.5.2.1 General Overview of Section 2 of the Proposed Scheme

Section 2 of the Proposed Scheme will commence at the R108 St. Mobhi Road / R102 Griffith Avenue Junction and will extend for 1.5km to Hart’s Corner north of Phibsborough, where it will meet the Finglas Section of the Proposed Scheme.

A northbound Bus Gate will be provided on R108 St. Mobhi Road at the southern arm of the junction with R102 Griffith Avenue to provide appropriate priority for bus services where no bus lane is provided in the northbound direction due to width constraints. Segregated cycling tracks will be provided on each side of the street generally, with a two-way cycle track section proposed on part of the eastern side of R108 St. Mobhi Road to cater for higher flow of pedestrians and cyclists accessing a cluster of schools and sports clubs on that side of the road. Northbound through-traffic will be diverted at Hart’s Corner via R135 Finglas Road instead of R108 Botanic Road. This traffic may then traverse eastward at Old Finglas Road to re-join R108 Ballymun Road at R102 Griffith Avenue. A second local traffic diversion route will divert away from R108 St. Mobhi Road along Botanic Road, Glasnevin Hill, Old Finglas Road, Cremore Villas and R102 Griffith Avenue to re-join R108 Ballymun Road. To the west of R108 St. Mobhi Road, a short section of Ballymun Road Lower between Claremont Avenue and Church Avenue will be restricted to a one-way southbound general traffic lane where the road is too narrow for two-way traffic alongside on-street parking, which will be formalised to accommodate the parking needs of residents at houses without driveways.

An offline segregated two-way cycle track will be provided through the public open space on the southern side of St. Mobhi Drive along the north bank of the River Tolka. Eastbound traffic access to R108 St. Mobhi Road from St. Mobhi Drive will be prohibited to reduce traffic flows along this narrow residential street.

On R108 Botanic Road, south of the junction with R108 St. Mobhi Road, there is a narrow section of street where bus lanes cannot be accommodated. Instead, bus priority will be provided by signal controls at the upstream approaches to this section in both directions. Segregated cycle tracks will be provided on R108 Botanic Road as an upgrade of the existing advisory cycle lanes. Once R108 Botanic Road becomes wider at the former print-works, bus lanes will be provided in both directions.

In Section 2 there are four traffic signal junctions. Protected cycle tracks are proposed at each junction to maintain segregation from traffic to the greatest degree possible.

4.5.2.2 Deviations from Standard Cross Sections in Section 2

The Proposed Scheme has been designed in accordance with the PDGB (refer to Appendix A4.1 in Volume 4 of this EIAR) and the TII publications referenced within the PDGB. However, at a number of constrained locations across the Proposed Scheme, the widths of the cross-sectional elements have been designed below the desirable minimum identified in the PDGB (as outlined in Section 4.6.1). The deviations for Section 2 are detailed in Table 4.7.

Table 4.7: Reduced Standard Cross-Section Along Section 2

Location	Design Element	Required Standard	Design	Justification
St. Mobhi Road A-3040 to A-3360 eastern side.	Single direction Cycle Track Width	2m	1.25m	On R108 St. Mobhi Road there is between 3.2m and 3.5m of space available between the existing street trees that will be retained, and the property boundary walls on each side. This is not wide enough to accommodate a standard 2m wide footpath combined with a standard 2m wide cycle track on the eastern side of the road, while retaining the mature trees which were strongly requested to be retained during public consultation. The proposed cycle track will reduce in width to 1.5m or 1.25m generally along this section. The footpath will be approximately 1.8m wide as a minimum.
St. Mobhi Road A-3130 to A-3680 western side –	Footpath Width	2m	1.8m	
St. Mobhi Road A-3710 to A-3800 both sides	Single direction Cycle Track Width	2m	1.5m	
	Footpath Width	2m	1.8m	
St. Mobhi Road A-3830 to A-4010 both sides	Single direction Cycle Track Width	2m	1.25m	
	Footpath Width	2m	1.9m	
A-3360 to A-3690 St. Mobhi Road Eastern side	Two-way Cycle track	3.25m	2.5m	Cycle track behind mature street trees. Width reduced to allow 2.5m footpath width and to minimise encroachment into properties. There is a separate northbound Cycle track provided on the western side. Demand will be tidal associated with arrivals and departures from the schools adjoining.
A-4010 to A-4390 Botanic Road both sides	Single direction Cycle Track Width	2m	1.5m	To fit within available road space without land acquisition from small front gardens.
A-4410 to A-4550 Botanic Road eastern side	Two-way Cycle track	3.25m	2.5m	To fit within the available 3m as replacement of an existing traffic lane without land acquisition from small front gardens.

4.5.2.3 Bus Lane Provision in Section 2

An overview of the bus lane provision as part of the Proposed Scheme is set out in Section 4.6.4. As outlined within that section, full bus priority through the use of dedicated bus lanes is not possible at all locations along the Proposed Scheme, and Signal Controlled Priority will be used at a number of locations, as well as a Bus Gate in one location, as set out in Table 4.8.

Table 4.8: Proposed Signal Controlled Priority Junctions within Section 2

Junction Location	Priority Type	Note
St. Mobhi Road / Botanic Road	Southbound bus Signal Controlled Priority	No southbound bus lane downstream for 230m
Botanic Road at 120m north of Prospect Way Junction	Northbound bus Signal Controlled Priority	No northbound bus lane downstream for 230m

4.5.2.4 Bus Stops in Section 2

The different types of bus stop (Island, Shared Landing, Inline and Layby) are described in Section 4.6.4. One of the bus stops in Section 2 will be an Island Bus Stop. One of the existing bus stops will be removed. The bus stop locations and types are outlined in Table 4.9 and shown in the General Arrangement series of drawings (BCIDD-ROT-GEO_GA-0304_XX_00-DR-CR-9001) in Volume 3 of this EIAR. Further detail of bus stop design is included in the PDGB in Appendix A4.1 in Volume 4 of this EIAR.

Table 4.9: Bus Stop Locations within Section 2 of the Proposed Scheme

Direction	Bus Stop Name	Bus Stop Number	Chainage	Bus Stop Type	Bus Shelter
Inbound	Stella Avenue	40	A-3140	Shared Landing Bus Stop	Existing: No Proposed: Yes
Inbound	Na Fianna GAA Club	146	A-3435	Shared Landing Bus Stop	Existing: No Proposed: Yes
Inbound	Tolka Bridge	147	A-3635	Shared Landing Bus Stop	Existing: No Proposed: Yes
Inbound	Botanic Road	184	A-4055	Shared Landing Bus Stop	Existing: No Proposed: Yes
Inbound	St. Teresa's Place	185	A-4300	Inline Bus Stop	Existing: Yes Proposed: Yes
Outbound	Prospect Way	200	A-4400	Layby Bus Stop (Existing)	Existing: Yes Proposed: Yes
Outbound	Botanic Road	201	A-4215	Shared Landing Bus Stop	Existing: No Proposed: Yes
Outbound	Fairfield Road (moved to Botanic Road north of the junction)	202	A-4080	n/a – to be removed	Existing: No
Outbound	St. Mobhi Road	148	A-3970	Island Bus Stop	Existing: Yes Proposed: Yes
Outbound	Tolka Bridge	149	A-3635	Shared Landing Bus Stop	Existing: No Proposed: Yes
Outbound	Na Fianna GAA Club	150	A-3435	Shared Landing Bus Stop	Existing: No Proposed: Yes

4.5.2.5 Cycling Provision in Section 2

The specific proposals for cycling facilities in Section 2 of the Proposed Scheme are described below. Provision for cyclists at the signal-controlled junctions is described in Section 4.6.3.5.

There are some existing segregated cycle tracks along R108 St. Mobhi Road north of the junction at Botanic Avenue, with an uphill northbound cycle track beside the footpath on the western side initially, which then crosses to the eastern side just north of St. Mobhi Drive and continues as far as the junction at Home Farm Road. South of Botanic Avenue, there is an on-road cycle lane in the southbound uphill direction and no facility in the northbound downhill direction. From the junction with R108 Botanic Road southwards to Prospect Way there are advisory on-road cycle lanes in both directions.

In the Proposed Scheme, the following extended and adjusted cycle tracks will be provided as follows:

- Continuous segregated cycle tracks will be provided on both sides of R108 St. Mobhi Road over the full length from R102 Griffith Avenue to R108 Botanic Road. These will be located behind the existing large street trees that are to be retained. Because of the limited width available behind the trees, the cycle tracks will be reduced to 1.25m width for single-file cycling, with the adjoining footpath narrowed to 1.8m. A vertical segregation strip will be provided between the cycle track and footpath;
- A 2.5m wide two-way cycle track will be provided along the eastern side of R108 St. Mobhi Road from the River Tolka (where an east-west greenway is separately proposed) to the entrance of Scoil Chaitríona 340m to the north. This facility will provide better access for cyclists to the two schools and the two sports clubs in this section from the south. Land will be acquired from the adjoining sports grounds for this widening;
- On R108 Botanic Road, the existing cycle lanes will be upgraded to 1.5m wide segregated cycle tracks with upstand kerbs along the outer edges to separate cyclists from the adjoining traffic; and
- A 2.5m wide two-way cycle track with a 0.5m separation buffer will be provided along the eastern side of R108 Botanic Road from the junction at Prospect Way to Hart's Corner at the junction with Lindsay Grove.

4.5.2.6 Junction Information for Section 2

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

Table 4.10: Junctions within Section 2 of the Proposed Scheme

Junction Location	Junction Category	Description	Note
St. Mobhi Road / Botanic Avenue	Moderate Junction	4-arm signal junction	Southbound bus lane to the stop line Cycle tracks through the junction.
St. Mobhi Road / Botanic Road	Major Junction	4-arm signal junction	Southbound signal controlled priority for bus. New pedestrian crossing on south arm. Left slip lane removed at south-west corner and shorter pedestrian crossing. Protected cycle tracks.
Botanic Road / Prospect Way	Major Junction	3-arm signal junction	Existing pedestrian crossings moved from the central island and replaced with direct crossings on each entry arm. Two-way cycle route from Botanic Road (south) to Prospect Way (west). Northbound signal controlled priority for bus.
Hart's Corner (Botanic Road / Lindsay Grove / Prospect Road / Finglas Road)	Major Junction	4-arm priority junction with signal pedestrian crossings	Northbound bus lane extended along Finglas Road. New pedestrian crossings on northern arms of junction. Two-way cycle route on eastern side.

4.5.2.7 Parking and Loading Bays in Section 2

Changes to parking and loading provision along Section 2 as a result of the Proposed Scheme are shown in Table 4.11 and Table 4.12, respectively.

Table 4.11: Section 2: On-Street Parking Spaces Change Impact Summary

Location	Type of Parking	Existing	Proposed	Change
St. Mobhi Road, south of Whitehall College of Further Education	Informal	5	5	0
St. Mobhi Drive	Informal	20	20	0
Ballymun Road South, north of Claremont	Informal	18	25	7
Ballymun Road South, south of Claremont	Informal	17	17	0
Glasnevin Hill, northern side	Informal	10	10	0
Glasnevin Hill, northern side	Disabled	1	1	0
Glasnevin Hill, western side, outside Tolka House	Informal	14	14	0
Botanic Road, south of Botanic Avenue	Pay and Display	14	14	0
Total		99	106	7

Table 4.12: Section 2: Existing and Proposed Loading Bays

Location	Type of Parking	Existing	Proposed	Change
Botanic Road, south of Botanic Avenue	Loading	1	1	0

4.5.2.8 Structures in Section 2

4.5.2.8.1 Major Structures

There is one existing bridge structure in Section 2 of the Proposed Scheme. The location and details are outlined in Table 4.13.

Table 4.13: Existing Bridge Structure in Section 2 of the Proposed Scheme

ID	Chainage	Description
Dean Swift Bridge	A-3720	Concrete solid slab bridge over the River Tolka. No works are proposed.

There are no new bridge structures proposed in Section 2 of the Proposed Scheme.

4.5.2.8.2 Retaining Walls

There is an existing retaining wall within this section of the Proposed Scheme at Home Farm Football Club, as outlined in Table 4.14. This retaining wall will be demolished and replaced with a new similar wall pushed further back into the grounds of Home Farm Football Club as part of the Proposed Scheme to accommodate widening for a two-way cycle track and a wider footpath linking to the nearby schools and sports clubs.

Table 4.14: Summary of Retaining Structure in Section 2 of the Proposed Scheme

Wall Reference	Structure Type	Retained Height (m)	Chainage Start	Chainage End	Length (m)
Home Farm FC	Reinforced concrete	0m to 2.5m	A-3600	A-3685	85

4.5.2.9 Landscape and Urban Realm in Section 2

For an overview of the landscape design principles and approach, reference should be made 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.

4.5.2.9.1 R108 St. Mobhi Road / R108 Botanic Road Junction

This small commercial area at the junction will be upgraded with higher quality paving, new street trees, planters, benches, and bins. The scope of this urban realm refurbishment will also include the area in front of the bank on the corner of Fairfield Road.



Image 4.2: Urban Realm Upgrade at R108 St. Mobhi Road / R108 Botanic Road Junction

It is proposed to provide urban realm improvement at Glasnevin Village at the junction of Botanic Road and Botanic Avenue. The footprint of the junction will be greatly reduced to create a small new plaza area in front of the row of shops on the southern side. The difference in levels will be used to create a wall bench and planter with small trees that will be sunnier than the footpath areas closer to the shop fronts. New benches, street trees, a planter and concrete pavers will be included.



Image 4.3: Urban Realm Upgrade at Glasnevin Village (Junction of Botanic Road and Botanic Avenue)

4.5.2.10 Land Acquisition and Use in Section 2

Land acquisition (both temporary (for the construction space to build new boundaries) and permanent) is required within Section 2, as follows:

- Acquisition on R108 St. Mobhi Road at Scoil Chaitríona, CLG Na Fianna sports club, Home Farm Football Club pitches and Whitehall College of Further Education for widening works for a footpath and cycle tracks;
- Acquisition of private landing areas (both temporary and permanent) in front of a group of four businesses (No. 163 to 169, St. Mobhi Road) at the junction of R108 St. Mobhi Road and R108 Botanic Road, to provide an Island Bus Stop with a cycle track and footpath around the rear; and
- Acquisition at the former Cahill printworks and adjoining Daneswell Place residential development on the eastern side of R108 Botanic Road just north of Prospect Way to accommodate a new northbound bus lane and segregated cycle tracks on both sides.

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).

4.5.2.10.1 Rights of Way

Table 4.15 outlines the locations where existing public rights of way will be affected by the Proposed Scheme.

Table 4.15: Existing Rights of Way Affected

Location	Chainage	Existing Situation	Proposed Change
St. Mobhi Drive, Glasnevin	N/A	Currently, St. Mobhi Drive operates as a two-way road with no turning restrictions at junctions at either end of the road.	<p>It is proposed to impose a traffic restriction for one-way westbound at the eastern end of St. Mobhi Drive, with a narrowed road area at the junction with St. Mobhi Road. This is intended to reduce the volume of west to east traffic that would join the bus corridor briefly before turning left at Botanic Avenue where it would conflict with southbound buses and cyclists.</p> <p>There will be no impact to cyclists / pedestrians and vehicular access from St. Mobhi Drive will still be available via the surrounding road network.</p>
Ballymun Road South, Glasnevin	N/A	Currently, Ballymun Road South operates as a two-way road for its entire length.	<p>It is proposed to impose a traffic restriction for one-way southbound between the junctions at Claremont Avenue and Church Avenue with a narrowed road area. This is intended to resolve the problem of two-way traffic flow on the street that is unsuitably narrow, in locations where there is on-street parking.</p> <p>There will be no impact to cyclists / pedestrians and vehicular access to Ballymun Road South will still be available via the surrounding road network.</p>

4.5.3 Section 3 – Prospect Road, Phibsborough Road from Hart’s Corner to Western Way

4.5.3.1 General Overview of Section 3 of the Proposed Scheme

Section 3 of the Proposed Scheme will commence at the R108 Prospect Road / Lindsay Road Junction at the southern apex of Hart’s Corner and will extend through Phibsborough over a length of 1.2km to the R135 Western Way Junction.

Priority for buses will be provided along the entire length of this section of the Proposed Scheme, with dedicated bus lanes in both directions over most of the length, apart from three short sections, as described later where signal controlled priority for buses will be provided.

A two-way segregated cycle track will be provided along the eastern side of R108 Prospect Road to the Royal Canal, where the cycle route will deviate a short distance eastwards to join the Royal Canal Bank, an infilled former canal branch, bypassing Phibsborough Village. The existing railway bridge on the Connolly railway line to the south of Lindsay Grove will be widened, and two new cycle / pedestrian bridges will be provided:

- One over the Docklands railway line adjacent to Whitworth Road; and
- One over the Royal Canal.

Heading southward from the Royal Canal, the cycle route will largely avail of the existing quiet street along Royal Canal Bank. The cycle route will pass around the eastern side of Phibsboro Library and will then cross underneath R101 North Circular Road, where a new bridge will be provided to enable the north to south cycle route to pass through without the climb and delay of a traffic signal crossing.

4.5.3.2 Deviations from Standard Cross Sections in Section 3

The Proposed Scheme has been designed in accordance with the PDGB (refer to Appendix A4.1 in Volume 4 of this EIAR) and the TII publications referenced within the PDGB. However, at a number of constrained locations across the Proposed Scheme, the widths of the cross-sectional elements have been designed below the desirable

minimum identified in the PDGB (as outlined in Section 4.6.1). The deviations for Section 3 are detailed in Table 4.16.

Table 4.16: Reduced Standard Cross-Section Along Section 3

Location	Design Element	Required Standard	Design	Justification
A-4550 to A-4600 Prospect Road eastern side	Two-way Cycle Track width	3.25m	2.5m	To fit within the available 3m as replacement of an existing traffic lane without land acquisition from small front gardens.
A-4690 to A-4750	Cycle Track Width	2m	1.25m	On R108 Phibsborough Road at Cross Guns Bridge where there is no southbound bus lane for a length of 60m, a 1.25m wide cycle track will be provided, which is a little narrower than the desirable minimum of 1.5m. To provide a wider cycle track would require narrowing of the footpath on the eastern side of the bridge, which would not be appropriate in a place with intense pedestrian activity. Most cyclists are expected to use the alternative Royal Canal Bank cycle route instead.
A-5250 to A-5290	Cycle Track Width	2m	1.25m	On R108 Phibsborough Road, 100m south of Doyle's Corner there will be a 40m long gap between bus lane sections on a very narrow part of the street and a 1.25m wide cycle track will be provided, which is a little narrower than the desirable minimum of 1.5m. To provide a wider cycle track would require narrowing of the footpath on the western side of the street, which would not be appropriate in the busy urban village location.
A-5710 to A-5770	Cycle Track Width	2m	1.7m	90m long link between bus lane sections on a narrow part of Phibsborough Road between retaining walls at Royal Canal Terrace.

4.5.3.3 Bus Lane Provision in Section 3

An overview of the bus lane provision as part of the Proposed Scheme is set out in Section 4.6.4. As outlined within that section, full bus priority through the use of dedicated bus lanes is not possible at all locations along the Proposed Scheme, and Signal Controlled Priority is used at a number of junctions as set out in Table 4.17.

Table 4.17: Proposed Signal Controlled Priority Junctions within Section 3

Junction Location	Priority Type	Note
Prospect Road / Whitworth Road	Southbound bus Signal Controlled Priority	No southbound bus lane downstream for 65m
Phibsborough Road, 150m south of Doyle's Corner (North Circular Road)	Northbound bus Signal Controlled Priority	No northbound bus lane downstream for 40m
Phibsborough Road, 50m north of Western Way	Northbound bus Signal Controlled Priority	No northbound bus lane downstream for 120m

4.5.3.4 Bus Stops in Section 3

The different types of bus stop (Island, Shared Landing, Inline and Layby) are described in Section 4.6.4. The majority of the proposed bus stops within Section 3 of the Proposed Scheme will be Inline Bus Stops, as there will be no cycle track provided along this section of the route due to the separate cycle route parallel to the east along Royal Canal Bank. The bus stop locations are outlined in Table 4.18 and shown in the General Arrangement series of drawings (BCIDD-ROT-GEO_GA-0304_XX_00-DR-CR-9001) in Volume 3 of this EIAR. Further detail of bus stop design is included in the PDGB in Appendix A4.1 in Volume 4 of this EIAR.

Table 4.18: Bus Stop Locations within Section 3 of the Proposed Scheme

Direction	Bus Stop Name	Bus Stop Number	Chainage	Bus Stop Type	Bus Shelter
Inbound	Lindsay Grove	186	A-4620 and A-4670	Shared Landing and Island Double Bus Stop	Existing: Yes Proposed: Yes
Inbound	Phibsborough Road	187	A-4915	Inline Bus Stop	Existing: Yes Proposed: Yes
Inbound	North Circular Road	188	A-5205	Inline Bus Stop	Existing: No Proposed: Yes
Inbound	Fire Station	189	A-5540	Inline Bus Stop	Existing: No Proposed: Yes
Inbound	Broadstone	190	A-5800	Inline Bus Stop	Existing: Yes Proposed: Yes
Outbound	Broadstone	195	A-5835	Inline Bus Stop	Existing: No Proposed: Yes
Outbound	Fire Station	196	A-5575	Inline Bus Stop	Existing: Yes Proposed: Yes
Outbound	Monck Place	197	A-5350	Inline Bus Stop	Existing: No Proposed: Yes
Outbound	Phibsborough Shopping Centre	198	A-5010	Inline Bus Stop	Existing: Yes Proposed: Yes
Outbound	Munster Street	199	A-4820	Inline Bus Stop	Existing: Yes Proposed: Yes

4.5.3.5 Cycling Provision in Section 3

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

In Section 3, the existing street along R108 Phibsborough Road is too narrow for both bus lanes and segregated cycle tracks. Instead of following the bus corridor in this section, from the junction with Whitworth Road at the northern end, the cycle route will deviate eastwards from the bus corridor along the northern bank of the Royal Canal, where it will overlap briefly with the Royal Canal Greenway. The cycle route will cross over the canal on a proposed new cycle / pedestrian bridge 70m east of Cross Guns Bridge on R108 Phibsborough Road and will then descend on a ramp along the southern bank of the canal to join the existing quiet street route at Royal Canal Bank, which is located about 100m east of R108 Phibsborough Road and will extend southwards parallel to the bus corridor. Limited works are required at the northern end of Royal Canal Bank to provide a southbound cycle track along the edge of a public open green space over a length of 180m where the road carriageway is too narrow for contraflow cycling against the one-way northbound traffic operation.

For most of Section 3, the cycle route will share the existing quiet residential streets along Royal Canal Bank beside the public park where the former canal channel was filled in. At R101 North Circular Road, an underpass will be provided to bring the cycle and pedestrian route under the very busy street rather than crossing the street at surface level. There was an old masonry arch bridge (Blaquiere's Bridge) at this location when the former canal was in operation, but this was removed when North Circular Road was widened, and the humpback bridge was flattened. The cycle route will intersect R135 Western Way 130m east of the junction with the R108 on Phibsborough Road and Constitution Hill at Broadstone. The cycle route will cross to the southern side of R135 Western Way at a Toucan crossing from where a two-way cycle track will be provided for the connection westwards back onto the bus corridor at the southern side of the Broadstone Junction.

Some short lengths of cycle track will be provided where there are three gaps in the bus lanes along R108 Phibsborough Road to accommodate cyclists who choose to remain on the bus corridor instead of taking the alternative route to the east.

4.5.3.6 Junction Information for Section 3

An overview of the approach to junction review and design is provided within Section 4.6.7. The junctions within Section 3 of the Proposed Scheme are outlined in Table 4.19.

Table 4.19: Junctions within Section 3 of the Proposed Scheme

Junction Location	Junction Category	Description	Note
Whitworth Road / Prospect Road / Phibsborough Road	Major Junction	3-arm signal junction	Bus lanes to stop line on Prospect Road and Phibsborough New pedestrian crossing on Prospect Road (north) Two-way cycle route on eastern side with toucan Whitworth Road. Southbound signal controlled priority for bus.
Connaught Street / Phibsborough Road	Minor Junction	4-arm signal junction	Northbound bus lane to the stop line. New southbound bus lane downstream. Additional pedestrian crossing on northern arm. Pedestrian staging islands removed and wrap-around stage.
Doyle's Corner: Phibsborough Road / North Circular Road	Major Junction	4-arm signal junction	Bus lanes to the stop lines on Phibsborough Road
R108 Phibsborough Road / R135 Western Way / Constitution Hill / LUAS Green Line tram	Major Junction	3-arm signal junction	Bus lane to the stop line in southbound direction, not shared with left-turn traffic.

4.5.3.7 Parking and Loading Bays in Section 3

Changes to parking and loading provision along Section 3 as a result of the Proposed Scheme are shown in Table 4.20 and Table 4.21, respectively.

Table 4.20: Section 3: On-Street Parking Spaces Change Impact Summary

Location	Type of Parking	Existing	Proposed	Change
Phibsborough Road, layby outside Euro-Giant and Woodstock Café	Pay and Display (part-time) (Loading Bay (part-time))	7	4	-3
Phibsborough Shopping Centre	Pay and Display (Shopping Centre)	59	25	-34
Phibsborough Road: NCR to Monck Place, east (removed from use in 2020 for temporary protected cycle track)	Night Parking	29	0	-29
Phibsborough Road, north of Monck Place, west	Pay and Display (part-time) (Loading Bay (part-time))	2	0	-2
Phibsborough Road, north of Monck Place, west	Pay and Display	3	0	-3
Phibsborough Road, outside church, west side	Pay and Display	10	0	-10
Phibsborough Road, outside church, east side	Pay and Display	9	9	0
Phibsborough Road, opposite Phibsborough Fire Station, east side	Pay and Display	7	7	0
Phibsborough Road, south of Fire station, west side	Pay and Display, part-time in bus lane	3	0	-3
Phibsborough Road, outside McGowan's Pub, west	Taxi Rank, part-time in bus lane	2	0	-2
Phibsborough Road, north of White Lane, east	Pay and Display (part-time) (Loading Bay (part-time))	4	11	+7
Phibsborough Road south of McGowan's pub, west	Taxi Rank, part-time in bus lane	4	0	-4
Phibsborough Road south of McGowan's pub, west	Pay and Display, part-time in bus lane	10	0	-10
Total		149	56	-93

Table 4.21: Section 3: Existing and Proposed Loading Bays

Location	Type of Parking	Existing	Proposed	Change
Phibsborough Road, layby outside Euro-Giant and Woodstock Café	Loading Bay (part-time) (Pay and Display (part-time))	7	4	-3
Phibsborough Road, north of Monck Place, west	Loading Bay (part-time) (Pay and Display (part-time))	2	0	-2
Phibsborough Road, north of White Lane, east	Loading Bay (part-time) (Pay and Display (part-time))	2	2	0
Total		11	6	-5

4.5.3.8 Structures in Section 3

4.5.3.8.1 Major Structures

There are three existing bridge structures on Section 3 of the Proposed Scheme, as shown in Table 4.22.

Table 4.22: Existing Bridge Structures in Section 3

ID	Chainage	Description
Westmoreland Bridge	A-4700	Concrete solid slab bridge over the Railway Line to the south of Lindsay Grove. It is proposed to remove the existing parapet on the eastern side of this bridge where widening will be provided.
Whitworth Road Bridge	A-4750	Arch and concrete solid slab bridge over the Railway Line adjacent to Whitworth Road. No works are proposed at this structure.
Cross Guns Bridge	A-4770	Steel girder / Solid slab bridge over the Royal Canal. Minor works are proposed on the surface of this bridge to widen the footpath on the western side from 1.6m minimum to 3.3m.

Three new bridge structures and an underpass structure are proposed in Section 3 of the Proposed Scheme, as outlined in Table 4.23.

Table 4.23: Proposed Bridge Structures in Section 3

ID	Chainage	Description
Ballymun 01	A-4700	Single span structure proposed next to the existing bridge over the railway to the south of Lindsay Grove. 6m wide and 21m in length.
Ballymun 02	A-4750	A new cycle bridge over the railway line adjacent to Whitworth Road. Single span bridge, 15m length, 12m wide.
Ballymun 03	A-4770	New cycle / pedestrian steel arch bridge with a perforated deck over the Royal Canal connecting to the Royal Canal Greenway. 6m wide and 17m long.
Ballymun 04	A-5100	Underpass proposed under North Circular Road to allow the unimpeded north-south passage of the cycle lane and footpaths. 16.7m length, 19.2m wide.

4.5.3.8.2 Retaining Walls

There are no existing retaining walls and no new retaining walls proposed within this section of the Proposed Scheme, apart from those required for the ramps at the proposed Royal Canal pedestrian / cycle bridge.

4.5.3.9 Landscape and Urban Realm in Section 3

For an overview of the landscape design principles and approach, reference should be made 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.

4.5.3.9.1 Phibsborough Village Urban Realm Improvements

Enhanced urban realm will be provided in Phibsborough Village. South of Cross Guns Bridge, there is a long right-turn lane in the middle of the street, which will be curtailed to just as long as necessary for traffic purposes. A median island will be provided with some new street trees, as shown in Image 4.4.

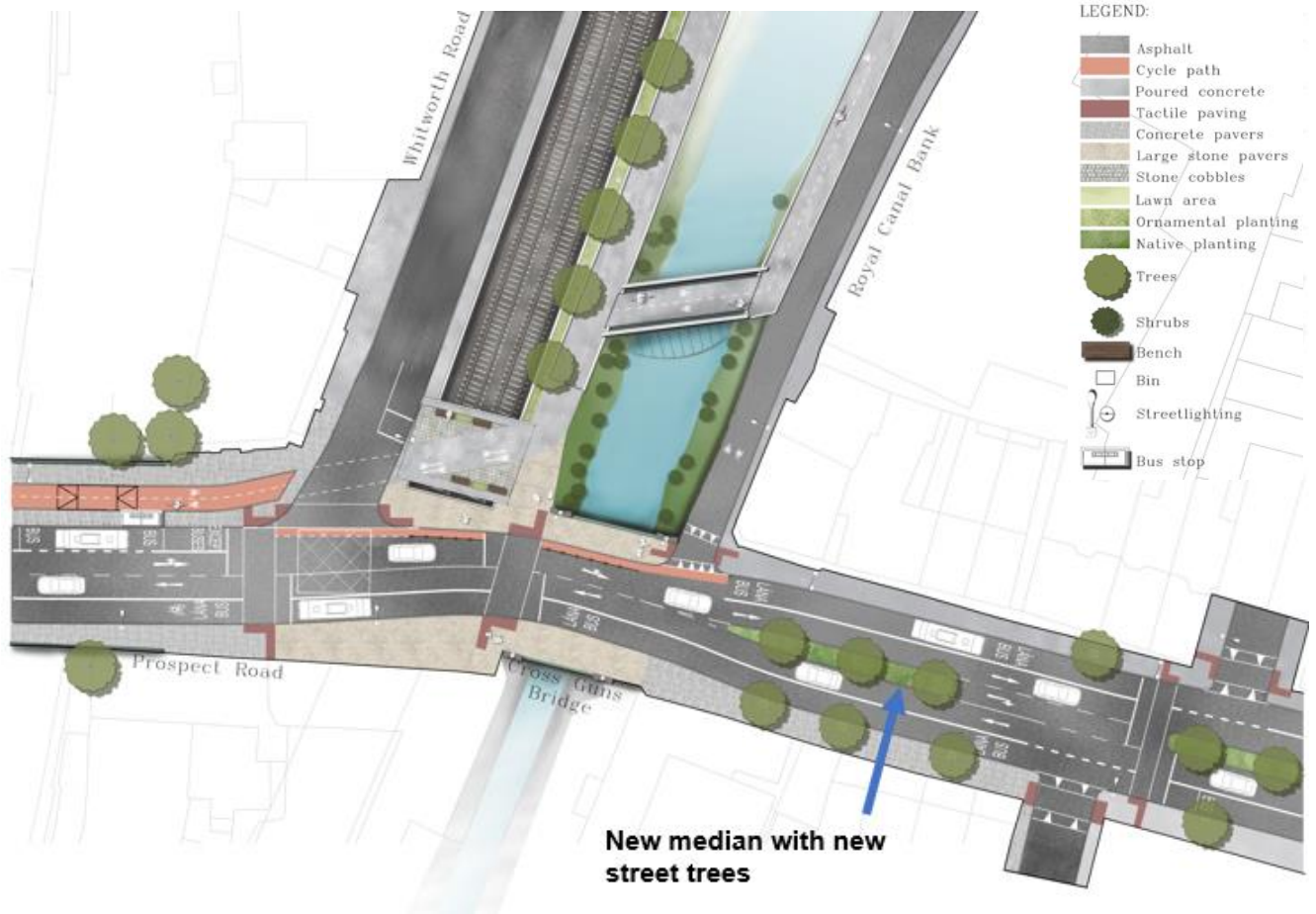


Image 4.4: Median Island with Street Trees on R108 Phibsborough Road

South of the Connaught Street Junction, R108 Phibsborough Road will be widened on the western side into the shopping centre car park, as shown in Image 4.5 and Image 4.6 (Image 4.6 is adapted from Appendix A17.2 Photomontages in Volume 3 of this EIAR). Most of the widening will be required for the proposed new southbound bus lane, but it will also provide for wider footpaths with high-quality paving and new street trees.



Image 4.5: Urban Realm Improvement on R108 Phibsborough Road at Phibsborough Shopping Centre



Image 4.6: Urban Realm Improvement on R108 Phibsborough Road at Phibsborough Shopping Centre

4.5.3.9.2 North Circular Road Underpass

To give continuity to the cycle route along Royal Canal Bank, a bridge is proposed under R101 North Circular Road at Phibsboro Library, as shown in Image 4.7 and Image 4.8 (Image 4.8 is adapted from Appendix A17.2 Photomontages in Volume 3 of this EIAR). It will be necessary to remove all existing landscape features in the park areas on each side of R101 North Circular Road. The ground levels will be lowered for the new shared pedestrian and cycle route and the area will be relandscaped to a high quality. The landscape proposal includes

the use of stone cobble sets for mixed use areas, the relocation of the War of Independence volunteer statue to the park below, and reinstatement of the community garden feature.

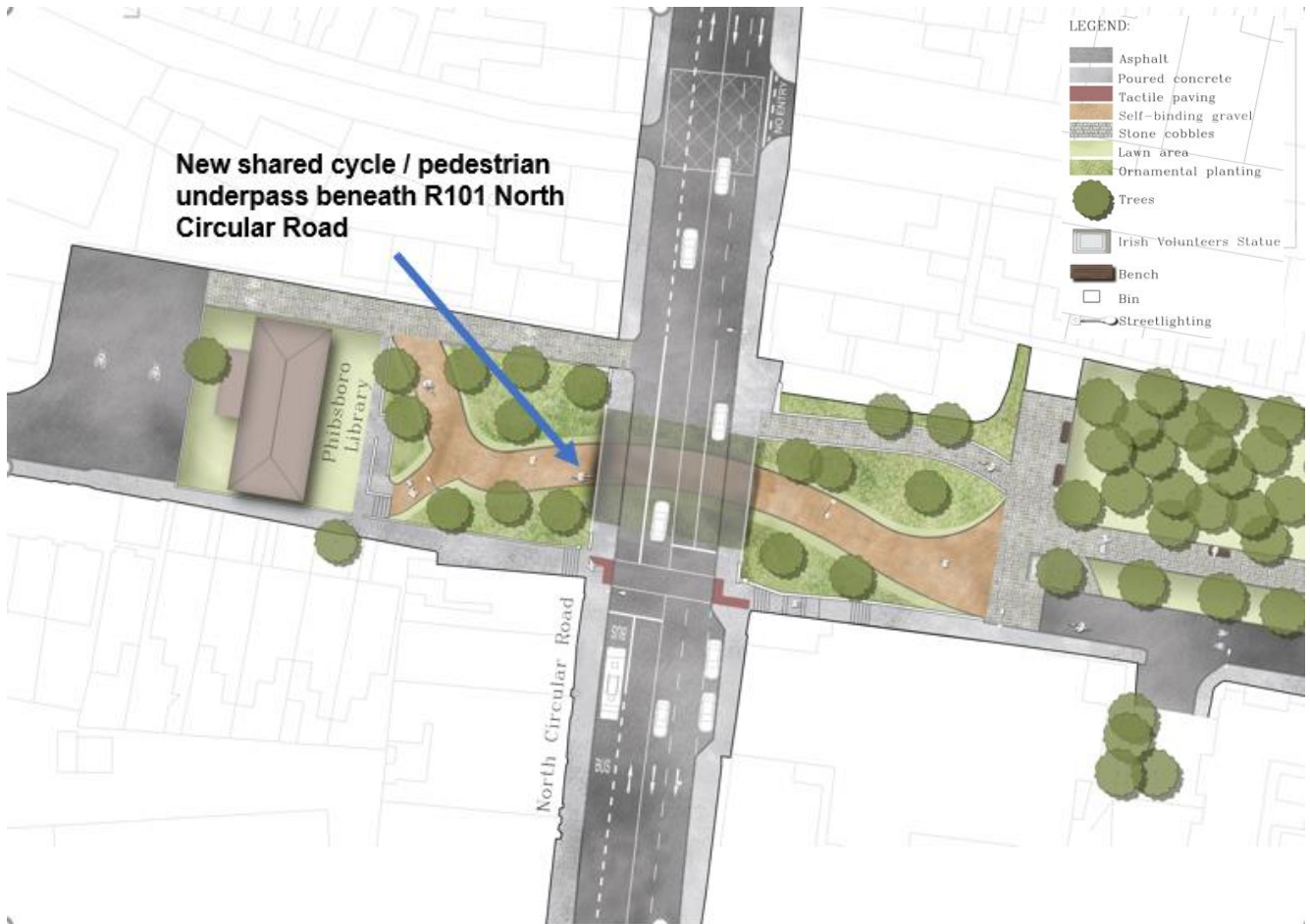


Image 4.7: Urban Realm Upgrade at North Circular Road Underpass



Image 4.8: Urban Realm Upgrade at North Circular Road Underpass

4.5.3.10 Land Acquisition and Use in Section 3

Land acquisition is required within Section 3 at the following locations:

- Private landing areas (permanent) at two businesses on Prospect Road (No. 21 / 22 Prospect Road) beside the railway bridge for the provision of a wider bridge for a two-way cycle track and enlarged footpath area;
- Forecourt area at The Bernard Shaw Public House, Prospect Road; and
- Phibsborough Shopping Centre Car Park.

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).

4.5.3.10.1 Rights of Way

No public rights of way are affected in Section 3 of the Proposed Scheme.

4.5.4 Section 4 – Constitution Hill and Church Street to Arran Quay

4.5.4.1 General Overview of Section 4 of the Proposed Scheme

Section 4 of the Proposed Scheme will commence at the R135 Western Way Junction and will extend along R108 Constitution Hill and R132 Church Street for 1km southwards to the R148 Arran Quay / Ormond Quay Junction at the River Liffey, which will be the end of the Proposed Scheme.

Priority for buses will be provided with dedicated bus lanes over most of this section, with three short gaps where Signal Controlled Priority will be provided instead at the following locations on Church Street Lower:

- Southbound from the junction of R804 King Street North to Mary's Lane for a length of 190m;
- Northbound from the junction at May Lane for a length of 60m; and
- Southbound from the junction at Chancery Street for a length of 50m.

Along R108 Constitution Hill, a two-way cycle track will be provided on the eastern side of the street to connect from R135 Western Way to Coleraine Street. An additional northbound cycle track will also be provided on the western side to connect to the Technological University Dublin campus at Grangegorman via Broadstone Gate. The main cycle route will follow quiet streets through the Markets Area from Coleraine Street to R148 Ormond Quay. Along Church Street Lower, short sections of cycle track will be provide at the three locations where there will be gaps in the bus lanes.

4.5.4.2 Deviations from Standard Cross Sections in Section 4

The Proposed Scheme has been designed in accordance with the PDGB (refer to Appendix A4.1 in Volume 4 of this EIAR) and the TII publications referenced within the PDGB. However, at a number of constrained locations across the Proposed Scheme, the widths of the cross-sectional elements have been designed below the desirable minimum identified in the PDGB (as outlined in Section 4.6.1). The deviations for Section 4 are detailed in Table 4.24.

Table 4.24: Reduced Standard Cross-Section Along Section 4

Location	Design Element	Required Standard	Design	Justification
A-5980 to A-6080	Cycle Track Width	2m	1.5m	Northbound cycle track with reduced width to allow 2m footpath and retain existing street trees on Constitution Hill.
A-6150 – A-6350	Cycle Track Width	2m	1.4m	On both sides of Church Street Upper for a length of 200m, 1.4m wide cycle tracks will be provided, which is a little narrower than the minimum width of 1.5m. To provide a wider cycle track would require narrowing of the footpaths, which would not be appropriate.
A-6370 to A-6550	Cycle Track Width	2m	1.5m	Southbound cycle track on Church Street Lower with reduced width to allow 2m footpath in available space.
A-6510 to A-6580	Cycle Track Width	2m	1.5m	Northbound cycle track on Church Street Lower reduced width to allow 2m footpath in available space and retain existing street trees.
A-6710 to A-6750	Cycle Track Width	2m	1.5m	40m long southbound link between bus lane sections on very narrow part of Church Street Lower.

4.5.4.3 Bus Lane Provision in Section 4

An overview of the bus lane provision as part of the Proposed Scheme is set out in 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 along the Proposed Scheme, and Signal Controlled Priority is used at a number of junctions as set out in Table 4.25.

Table 4.25: Proposed Signal Controlled Priority Junctions within Section 4

Junction Location	Priority Type	Note
Church Street Upper / North King street	Southbound bus Signal Controlled Priority	No southbound bus lane downstream for 190m
Church Street / May Lane	Northbound bus Signal Controlled Priority	No northbound bus lane downstream for 60m
Church Street / Chancery Street	Southbound bus Signal Controlled Priority	No southbound bus lane downstream for 50m

4.5.4.4 Bus Stops in Section 4

The different types of bus stops (Island, Shared Landing, Inline and Layby) are described in Section 4.6.4. One of the proposed bus stops will be an Island Bus Stop. One of the six existing bus stops will be removed. The bus stop locations and types are outlined in Table 4.26 and shown in the General Arrangement series of drawings (BCIDD-ROT-GEO_GA-0304_XX_00-DR-CR-9001) in Volume 3 of this EIAR. Further detail of bus stop design is included in the PDGB in Appendix A4.1 in Volume 4 of this EIAR.

Table 4.26: Bus Stop Locations within Section 4 of the Proposed Scheme

Direction	Bus Stop Name	Bus Stop Number	Chainage	Bus Stop Type	Bus Shelter
Inbound	Church Street Upper	1614	A-6225	Shared Landing Bus Stop	Existing: Yes Proposed: Yes
Inbound	Church Street Lower (at Mary's Lane)	1615	A-6610	Layby Bus Stop	Existing: Yes Proposed: Yes
Outbound	St. Michan's Church	1616	A-6670	Inline Bus Stop	Existing: Yes Proposed: Yes
Outbound	Capuchin Church – to be removed	1617	A-6450	n/a – to be removed	Existing: Yes
Outbound	Church Street Upper	1618	A-6255	Island Bus Stop	Existing: No Proposed: Yes
Outbound	Constitution Hill	1619	A-6040	Shared Landing Bus Stop	Existing: Yes Proposed: Yes

4.5.4.5 Cycling Provision in Section 4

The specific proposals for cycling facilities in Section 4 of the Proposed Scheme are described below. Provision for cyclists at the signal-controlled junctions is described in Section 4.6.3.5.

From Broadstone Junction southwards, a two-way cycle track will be provided along the eastern side of R108 Constitution Hill, which will provide continuity of the cycle route on the eastern side of the bus corridor from Royal Canal Bank in Section 3 to where it can divert into a quiet streets route through the Markets Area from Coleraine Street through to Ormond Square and connecting to the Liffey Cycle Route at R148 Ormond Quay. Some lengths of cycle track will be provided where there are gaps in the bus lanes along R132 Church Street to accommodate cyclists who choose to remain on the bus corridor instead of taking the alternative route to the east. In addition, there will be a one-way northbound cycle track on the western side of Constitution Hill from the Broadstone Junction.

4.5.4.6 Junction Information for Section 4

An overview of the approach to junction review and design is provided in Section 4.6.7. The junctions within Section 4 of the Proposed Scheme are outlined in Table 4.27.

Table 4.27: Junctions within Section 4 of the Proposed Scheme

Junction Location	Junction Category	Description	Note
Constitution Hill / Broadstone	Major Junction	3-arm signal junction	Two-way cycle track on the eastern side. Bus lanes to the stop line, not shared with left-turn traffic.
North Brunswick Street / Church Street Upper	Moderate Junction	3-arm signal junction	Dedicated pedestrian and cycle crossings. Bus priority inbound and outbound.
King Street North / Church Street Upper and Lower	Major Junction	4-arm signal junction	Bus lane top stop lines on Church Street. Direct crossings for pedestrians on all arms of the junction Cycle lanes on all arms of the junction with protected corners. Southbound signal controlled priority for bus.
Church Street Lower / Mary's Lane / May Lane	Minor Junction	4-arm signal junction	Bus lanes to the stop line, not shared with left-turn traffic. Bus priority signal northbound.
Church Street Lower / Chancery Street / LUAS Red Line tram	Minor Junction	3-arm signal junction	Additional pedestrian crossing on the southern arm. Bus priority signal southbound.
Church Street Lower / Arran Quay / Ormond Quay	Major Junction	4-arm signal junction	Southbound bus lane to the stop line, not shared with left-turn traffic

4.5.4.7 Parking and Loading Bays in Section 4

Changes to parking and loading provision along Section 4 as a result of the Proposed Scheme are shown in Table 4.28 and Table 4.29 respectively.

Table 4.28: Section 4: On-Street Parking Spaces Change Impact Summary

Location	Type of Parking	Existing	Proposed	Change
Church Street, outside LIV student accommodation	Permit - Police for the Courts	12	12	0
Church Street	Disabled Parking	2	2	0

Table 4.29: Section 4: Existing and Proposed Loading Bays

Location	Type of Parking	Existing	Proposed	Change
Church Street, outside The King's Building	Loading	1	0	-1

4.5.4.8 Structures in Section 4

4.5.4.8.1 Major Structures

There are no existing or proposed bridge structures in Section 4 of the Proposed Scheme.

4.5.4.8.2 Retaining Walls

There are no existing and no new retaining walls proposed within this section of the Proposed Scheme.

4.5.4.9 Landscape and Urban Realm in Section 4

For an overview of the landscape design principles and approach, reference should be made to Section 4.6.12. The following sections provide a description of specific landscape and urban realm design works in Section 4 of the Proposed Scheme.

4.5.4.9.1 Broadstone Pocket Garden

There is a small triangular area near Broadstone Gate on the western side of R108 Phibsborough Road, just north of the junction with R135 Western Way, that has the potential to be reused as a small plaza to complement the high-quality urban realm areas in the vicinity. The proposal is to provide a small garden with benches that would serve as a meeting point for residents of the area. The choice of using self-binding gravel, and concrete paver materials for the central zone and granite stone cobbles is related both to the character of the Broadstone Gate landscaping and to the objective of providing a multi-purpose relaxed area for the users. The medium to large existing trees will be kept and possibly scenically enhanced by installing ornamental up-lighters.

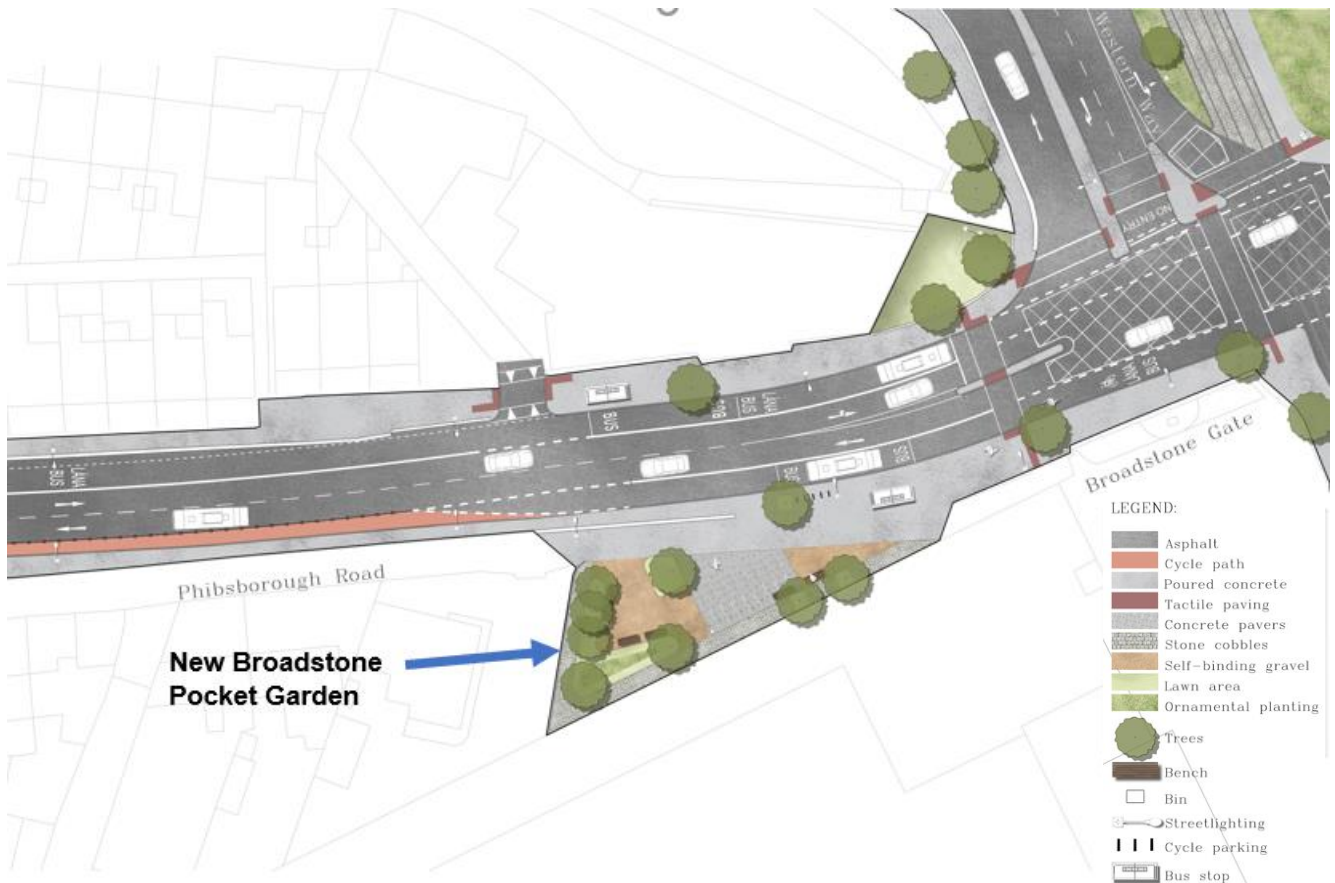


Image 4.9: Urban Realm Upgrade at Broadstone Pocket Garden

4.5.4.10 Land Acquisition and Use in Section 4

Temporary land acquisition is required within Section 4 at one location for Construction Compound B3 on a yard area at the Dublin City Council (DCC) public housing block at the Catherine Lane North / Constitution Hill Junction.

Permanent land acquisition will be required from CIE lands to facilitate the Broadstone Pocket Park urban realm improvement works within Section 4 at Broadstone in Phibsborough.

4.5.4.10.1 Rights of Way

No public rights of way are affected in Section 4 of the Proposed Scheme.

4.5.5 Section 5 – Finglas Road from St. Margaret’s Road to Wellmount Road

4.5.5.1 General Overview of Section 5 of the Proposed Scheme

Section 5 of the Proposed Scheme will commence at the northern end at the junction of R135 Finglas Road with R104 St. Margaret’s Road and will extend in a south-eastern direction along the Finglas Bypass dual carriageway over a length of 1.1km to the Wellmount Road Junction on the south-western edge of Finglas Village.

The Finglas Bypass is a segregated dual carriageway road that caters only for vehicular traffic until the grade-separated junction with Mellowes Road on the western side of Finglas Village. There are no existing footpaths or cycle tracks along this northern 0.75km length of Section 5, and pedestrians and cyclists will continue to use the parallel local streets to the east and west of the Finglas Bypass. There are no existing pedestrian facilities at the roundabout junction of R135 Finglas Road and R104 St. Margaret’s Road, with a footbridge that spans over the dual carriageway road, 35m south of the roundabout. New bus stops will be provided on the Finglas Bypass dual carriageway, just south of the roundabout, to cater for the proposed F1 route bus services that will bypass Finglas Village. To provide access to these bus stops, new footpaths will be provided around the roundabout, with associated signal pedestrian crossings on all four arms of the junction.

Priority for buses will be provided along the entire length of this section of the Proposed Scheme, with dedicated bus lanes in both directions. There is an existing southbound bus lane over the full length of Section 5, but the existing northbound bus lane ends at the northbound merge ramp from Mellowes Road which is 0.5km south of the northern end of the Proposed Scheme. In the Proposed Scheme, a northbound bus lane will be provided along the full length of this section through conversion of the existing left-hand traffic lane to a bus lane over a length of 0.5km. Bus lanes will also be provided on the southern slip ramps at the Mellowes Road grade-separated junction to cater for proposed bus route F2 that will serve the north-western area of Finglas.

4.5.5.2 Deviations from Standard Cross Sections in Section 5

The Proposed Scheme has been designed in accordance with the PDGB (refer to Appendix A4.1 in Volume 4 of this EIAR) and the TII publications referenced within the PDGB. However, at a number of constrained locations across the Proposed Scheme, the widths of the cross-sectional elements have been designed below the desirable minimum identified in the PDGB (as outlined in Section 4.6.1). The deviations for Section 5 are detailed in Table 4.30.

Table 4.30: Reduced Standard Cross-Section Along Section 5

Location	Design Element	Required Standard	Design	Justification
B-770 - B-1010	Cycle Track Width	2m	1.5m	There is a proposed northbound cycle track along part of Finglas Road in Section 5 between Wellmount Road and Mellowes Road over a length of 360m. North of Church Street, the cycle track will be narrowed from 2m to 1.5m to fit within the limited space that is available on the diverge slip ramp linking to Mellowes Road.
B-1050 to B-1150	Cycle Track Width	2m	1.5m	Reduced width to allow 2m footpath and retain existing street trees.
B-1080 to B-1100	Cycle Track Width	2m	1.5m	Reduced width to allow 2m footpath and retain existing street trees.

4.5.5.3 Bus Lane Provision in Section 5

Bus lanes will be provided over the full length of Section 5 in both directions.

4.5.5.4 Bus Stops in Section 5

The different types of bus stop (Island, Shared Landing, Inline and Layby) are described in Section 4.6.4. Four new bus stops will be provided on this section. The proposed bus stop locations and types are outlined in Table 4.31 and shown in the General Arrangement series of drawings (BCIDD-ROT-GEO_GA-0304_XX_00-DR-CR-9001) in Volume 3 of this EIAR. Further detail of bus stop design is included in the PDGB in Appendix A4.1 in Volume 4 of this EIAR.

Table 4.31: Bus Stop Locations within Section 5 of the Proposed Scheme

Direction	Bus Stop Name	Bus Stop Number	Chainage	Bus Stop Type	Bus Shelter
Inbound	St. Margaret's Road Junction	New	B-85	Inline Bus Stop	Existing: No Proposed: Yes
Inbound	Church Street Junction, Finglas	New	B-990	Inline Bus Stop	Existing: No Proposed: Yes
Outbound	Church Street Junction, Finglas	New	B-1070	Shared Landing Bus Stop	Existing: No Proposed: Yes
Outbound	St. Margaret's Road Junction	New	B-80	Inline Bus Stop	Existing: No Proposed: Yes

4.5.5.5 Cycling Provision in Section 5

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

Segregated cycle tracks will be provided along the full length of Section 5 at the edge of the carriageway to replace existing cycle tracks which are generally located beside the footpath at the rear of the verges and then bend in to the carriageway edges at the junctions.

4.5.5.6 Junction Information for Section 5

An overview of the approach to junction review and design is provided in Section 4.6.7. The junctions within Section 5 of the Proposed Scheme are outlined in Table 4.32.

Table 4.32: Junctions in Section 5 of the Proposed Scheme

Junction Location	Junction Category	Description	Note
St. Margaret's Road	Major Junction	Roundabout	Pedestrian crossings will be provided on all 4 arms.
Mellowes Road	Major Junction	Grade-separated	A new northbound bus lane will be provided on the Finglas Bypass through the junction. Bus lanes will be provided on the southern slip ramps.
Church Street	Minor Junction	Priority	Left-in / left-out junction on the western side only. Northbound bus lane provided through the junction. Northbound cycle track provided through the junction. Signal toucan crossing provided on the southern side across the Finglas Road. Signal pedestrian crossing provided on the eastern Church Street arm.

4.5.5.7 Parking and Loading Bays in Section 5

There is no existing or proposed on-street parking along Section 5.

4.5.5.8 Structures in Section 5

4.5.5.8.1 Major Structures

There are three existing bridge structures on Section 5 of the Proposed Scheme, as outlined in Table 4.33. There are no proposed changes to these structures.

Table 4.33: Existing Bridge Structures in Section 5 of the Proposed Scheme

ID	Chainage	Description
Footbridge	B-060	Concrete girder bridge over Finglas Road
Road bridge	B-780	Two Span Concrete solid slab over Finglas Road
Footbridge	B-1025	Steel truss over Finglas Road

There are no new bridge structures proposed on Section 5 of the Proposed Scheme.

4.5.5.8.2 Retaining Walls

There are existing retaining walls that support the slip ramps at the Mellowes Road Junction. No changes are proposed to the existing retaining walls and no new retaining walls are proposed within Section 5 of the Proposed Scheme.

4.5.5.9 Landscape and Urban Realm in Section 5

For an overview of the landscape design principles and approach, reference should be made 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.

4.5.5.9.1 St. Canice's Church

St. Canice's Church is located just west of the junction of R135 Finglas Road with Church Street. This small area provides the opportunity to draw attention to the heritage value of the old cemetery and ruins of St. Canice's which are hidden by the footbridge and roadside buildings. The proposed design for this area is focused on providing a carefully designed small garden that signals a path to these heritage features.



Image 4.10: Urban Realm Upgrade at St. Canice's Church, Finglas

4.5.5.10 Land Acquisition and Use in Section 5

Temporary land acquisition is required within Section 5 at the proposed Construction Compound F1 at Mellows Park at the northern extent of Section 5.

No permanent land acquisition is required within Section 5.

4.5.5.10.1 Rights of Way

No public rights of way are affected in Section 5 of the Proposed Scheme.

4.5.6 Section 6 – Finglas Road from Wellmount Road to Ballyboggan Road

4.5.6.1 General Overview of Section 6 of the Proposed Scheme

Section 6 of the Proposed Scheme will extend along R135 Finglas Road from the Wellmount Road Junction to the Ballyboggan Road Junction, over a length of 1.6km.

Priority for buses will be provided along the entire length of this section of the Proposed Scheme, with dedicated bus lanes in both directions.

Segregated cycle tracks will be provided in both directions along the full length of this section of the Proposed Scheme.

4.5.6.2 Deviations from Standard Cross Sections in Section 6

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 proposed 2m wide cycle tracks in Section 6 will largely fit within the existing carriageways that will be narrowed from 7.5m to 6m and will extend for 0.5m into the grass verges on the outer sides of the road. The cycle tracks will be narrowed locally from 2m to 1.5m to enable the existing trees in the verges to be retained.

Table 4.34: Reduced Standard Cross-Section Along Section 6

Location	Design Element	Required Standard	Design	Justification
B-1150 to B-2450	Cycle Track Width	2m	1.5m / 1.4m	Reduced widths locally at numerous locations on both sides of the road to retain existing street trees.
B-1120 to B-1220	Footpath Width	2m	1.8m	Existing footpath width retained behind mature street trees.
B-2200 Finglas Road / Tolka Valley Road	Pedestrian crossing distance	19m maximum	24m	Median island cannot be widened from 3m to 4m within the available road width.
B-2450 Finglas Road / Old Finglas Road	Pedestrian crossing distance	19m maximum	21m	Median island cannot be widened from 3m to 4m within the available road width.
B-2450 to B-2650	Cycle Track Width	2m	1.5m	Reduced widths on both sides in constrained section with retaining walls at the River Tolka Valley.

4.5.6.3 Bus Lane Provision in Section 6

An overview of the bus lane provision as part of the Proposed Scheme is set out in in Section 4.6.4. Full bus priority is provided through the use of dedicated bus lanes along the full length of Section 6 of the Proposed Scheme.

4.5.6.4 Bus Stops in Section 6

The different types of bus stop (Island, Shared Landing, Inline and Layby) are described in Section 4.6.4. The bus stop locations and types are outlined in Table 4.35 and shown in the General Arrangement series of drawings (BCIDD-ROT-GEO_GA-0304_XX_00-DR-CR-9001) in Volume 3 of this EIAR. Further detail of bus stop design is included in the PDGB in Appendix A4.1 in Volume 4 of this EIAR.

Table 4.35: Bus Stop Locations within Section 6 of the Proposed Scheme

Direction	Bus Stop Name	Bus Stop Number	Chainage	Bus Stop Type	Bus Shelter
Inbound	Finglas Village	4542	B-1245	Island Bus Stop	Existing: Yes Proposed: Yes
Inbound	Clearwater Shopping Centre	1531	B-1660	Island Bus Stop	Existing: Yes Proposed: Yes
Inbound	Prospect Hill	1532	B-1960	Island Bus Stop	Existing: Yes Proposed: Yes
Inbound	Tolka Valley	1533	B-2335	Island Bus Stop	Existing: Yes Proposed: Yes
Inbound	Ballyboggan Road	1534	B-2740	Island Bus Stop	Existing: Yes Proposed: Yes
Outbound	Ballyboggan Road	1510	B-2560	Shared Landing Bus Stop	Existing: No Proposed: Yes
Outbound	Tolka Vale	1511	B-2395	Island Bus Stop	Existing: Yes Proposed: Yes
Outbound	Prospect Hill	1512	B-1855	Island Bus Stop	Existing: No Proposed: Yes
Outbound	Clearwater Shopping Centre	1538	B-1525	Island Bus Stop	Existing: Yes Proposed: Yes
Outbound	Bottom of the Hill	100891	B-1290	Island Bus Stop	Existing: Yes Proposed: Yes

4.5.6.5 Cycling Provision in Section 6

The specific proposals for cycling facilities in Section 6 of the Proposed Scheme are described below. Provision for cyclists at the signal-controlled junctions is described in Section 4.6.3.5.

Segregated cycle tracks will be provided along the full length of Section 6 at the edge of the carriageway to replace existing cycle tracks which are generally located beside the footpath (at the rear of the verges where there are verges) and then bend in to the carriageway edges at the junctions.

4.5.6.6 Junction Information for Section 6

An overview of the approach to junction review and design is provided within Section 4.6.7. The junctions within Section 6 of the Proposed Scheme are outlined in Table 4.36.

Table 4.36: Junctions in Section 6 of the Proposed Scheme

Junction Location	Junction Category	Description	Note
Wellmount Road / Finglas Village	Major Junction	Staggered cross-roads signal junction	Southbound bus lane extended through pair of tee-junctions. Left-turn lanes for traffic. New pedestrian crossing signals on south, east and west arms. New cycle tracks through junction with protected corners.
Finglas Place / Finglas Road	Moderate Junction	3-arm signal	Proposed new traffic signals. Southbound left-turn lane. New cycle and pedestrian crossing facilities.
Clearwater Shopping Centre / Glenhill Road / Finglas Road	Moderate Junction	4-arm signal	Slip lanes and corner islands removed for shorter pedestrian crossings. Segregated southbound bus lane to the stop line not shared with left-turn traffic. Segregated northbound bus lane to the stop line with a separate left-turn lane on the inside. Left-turn traffic segregated from bus and cyclist traffic. 4 pedestrian and cyclist crossings where there are 2 at present. Protected corners and turning facilities for cyclists.
The Griffith / Finglas Road	Minor Junction	4-arm partial signal	Pedestrian crossing on Finglas Road straightened with stagger removed.
Tolka Valley Road / Finglas Road	Major Junction	3-arm signal plus private development access	Northbound left-turn traffic lane. New cycleway facilities on Tolka Valley Road
Old Finglas Road / Finglas Road	Major Junction	3-arm signal plus private development access	Southbound left-turn traffic lane. Additional pedestrian crossings on east and south arms
Ballyboggan Road / Finglas Road	Major Junction	3-arm signal	Northbound left-turn traffic lane and left-slip lane removed. Shorter and simpler pedestrian crossings.

4.5.6.7 Parking and Loading Bays in Section 6

There is no existing or proposed on-street parking along Section 6.

4.5.6.8 Structures in Section 6

4.5.6.8.1 Major Structures

There is one existing bridge structure in Section 6 of the Proposed Scheme, as outlined in Table 4.37. There are no proposed changes to this structure.

Table 4.37: Existing Bridge Structures in Section 6 of the Proposed Scheme

ID	Chainage	Description
River Tolka	B-2660	Combination of masonry arch and concrete slab bridge over River Tolka. No change is proposed to this structure.

There are no new bridge structures proposed on Section 6 of the Proposed Scheme.

4.5.6.8.2 Retaining Walls

There is an existing retaining wall along the western side of R135 Finglas Road that extends for a length of 90m north of the bridge over the River Tolka along the eastern bank of the river. No change is proposed to this retaining wall structure and there will be no new retaining walls required for Section 6.

4.5.6.9 Landscape and Urban Realm in Section 6

For an overview of the landscape design principles and approach, reference should be made to Section 4.6.12. The following sections provide a description of specific landscape and urban realm design in Section 6 of the Proposed Scheme.

4.5.6.9.1 Clearwater Shopping Centre

At Clearwater Shopping Centre, the removal of the left-turn slip lane at the north-western corner will allow for the creation of a proposed urban realm area as shown in Image 4.11.



Image 4.11: Urban Realm Upgrade at Clearwater Shopping Centre Junction

4.5.6.10 Land Acquisition and Use in Section 6

Temporary land acquisition is required within Section 6 at the open green space at Finglas Place for proposed Construction Compound F2.

No permanent land acquisition is required within Section 6.

4.5.6.10.1 Rights of Way

No public rights of way are affected in Section 6 of the Proposed Scheme.

4.5.7 Section 7 – Finglas Road from Ballyboggan Road to Hart’s Corner

4.5.7.1 General Overview of Section 7 of the Proposed Scheme

Section 7 of the Proposed Scheme will extend along R135 Finglas Road for a distance of 1.5km to Hart’s Corner where it will meet the Ballymun Section of the Proposed Scheme.

Priority for buses will be provided along the entire length of this section of the Proposed Scheme, with dedicated bus lanes in both directions. This will require road widening over a length of 330m in front of Glasnevin Cemetery at St. Vincent’s School on the western side and at part of Bengal Terrace on the eastern side.

South of Claremont Lawns, alongside Glasnevin Cemetery, the existing on-street parking will be removed and replaced with a new parking facility with the same number of spaces, which will encroach into the open public space at Claremont Lawns.

Segregated cycle tracks will be provided in both directions along the full length of this section of the Proposed Scheme.

Reaching Hart’s Corner, the southbound traffic turns left into Prospect Way, which is the northern side of the one-way triangular gyratory traffic system at Hart’s Corner. A two-way cycle track will be provided along the northern side of Prospect Way to connect to the proposed two-way cycle track along the eastern side of R108 Prospect Road, as described in Section 2 of the Proposed Scheme. This will allow cyclists to circulate around the northern and eastern sides of Hart’s Corner, fully segregated from traffic.

4.5.7.2 Deviations from Standard Cross Sections in Section 7

The minimum widths of the cross-sectional elements, as outlined in Section 4.6.1 have been reduced at a number of locations across Section 7 of the Proposed Scheme as listed in Table 4.38.

Table 4.38: Reduced Standard Cross-Section Along Section 7

Location	Design Element	Required Standard	Design	Justification
Various lengths	Cycle Track Width	2m	1.5m	Reduced widths to accommodate 2m wide footpaths.
B-3990 to B-4020 Finglas Road / Prospect Way	Footpath	2m	1.8m	Reduced width to accommodate proposed cycle track.
Prospect Way Ch. B-4000 to B-4140	Two-way Cycle Track Width	3.25m	2.5m	Reduced widths to retain existing street trees.

4.5.7.3 Bus Lane Provision in Section 7

An overview of the bus lane provision as part of the Proposed Scheme is set out in 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 along the Proposed Scheme. In Section 7 there is a short gap of 100m length in the northbound bus lane on the southern end of R135 Finglas Road from the bus stop at Dalcassian Downs to the junction at St. Philomena’s Road. Bus priority is not necessary at this location where the traffic conditions are free-flowing at all times and the next traffic signal is 400m downstream at Glasnevin Cemetery.

4.5.7.4 Bus Stops in Section 7

The different types of bus stop (Island, Shared Landing, Inline and Layby) are described in Section 4.6.4. The bus stop locations and types are outlined in Table 4.39 and shown in the General Arrangement series of drawings (BCIDD-ROT-GEO_GA-0304_XX_00-DR-CR-9001) in Volume 3 of this EIAR. Further detail of bus stop design is included in the PDGB in Appendix A4.1 in Volume 4 of this EIAR.

Table 4.39: Bus Stop Locations within Section 7 of the Proposed Scheme

Direction	Bus Stop Name	Bus Stop Number	Chainage	Bus Stop Type	Bus Shelter
Inbound	The Willows	1535	B-3170	Island Bus Stop	Existing: Yes Proposed: Yes
Inbound	Glasnevin Cemetery	1536	B-3660	Shared Landing Bus Stop	Existing: Yes Proposed: Yes
Inbound	St. Vincent's School	1537	B-3960	Shared Landing Bus Stop	Existing: No Proposed: Yes
Outbound	Finglas Road / Dalcassian Downs	1506	B-4120	Shared Landing Bus Stop	Existing: Yes Proposed: Yes
Outbound	St. Vincent's School	1507	B-3870	Island Bus Stop	Existing: Yes Proposed: Yes
Outbound	Glasnevin Cemetery	1508	B-3555	Island Bus Stop	Existing: Yes Proposed: Yes
Outbound	Slaney Road	1509	B-3035	Island Bus Stop	Existing: Yes Proposed: Yes

4.5.7.5 Cycling Provision in Section 7

The specific proposals for cycling facilities in Section 7 of the Proposed Scheme are described below. Provision for cyclists at the signal-controlled junctions is described in Section 4.6.3.5.

Segregated cycle tracks will be provided along the full length of Section 7 at road level at the edge of the carriageway to replace and extend the existing cycle tracks which are generally located beside the footpath and at the same level. Upstand kerbs will be provided to separate the cycle tracks from the bus lane adjoining. At the Prospect Way Junction, the single directional cycle tracks will converge into a two-way cycle track that will extend along the northern side of Prospect Way to join the Ballymun Section cycle route at the junction with the R108 on Botanic Road and Prospect Road, thus bypassing the one-way traffic system at Hart's Corner.

4.5.7.6 Junction Information for Section 7

An overview of the approach to junction review and design is provided within Section 4.6.7. The junctions within Section 7 of the Proposed Scheme are outlined in Table 4.40.

Table 4.40: Junctions in Section 7 of the Proposed Scheme

Junction Location	Junction Category	Description	Note
Slaney Road / Finglas Road	Moderate Junction	3-arm signal	Pedestrian crossing distance shortened at east arm.
Claremont Court / Finglas Road	Minor Junction	3-arm priority	Pedestrian crossing on Finglas Road straightened with stagger removed.
Prospect Way	Major Junction	3-arm signal	Segregated crossing facilities for cyclists.

4.5.7.7 Parking and Loading Bays in Section 7

Changes to parking and loading provision along Section 7 as a result of the Proposed Scheme are shown in Table 4.41 and Table 4.42 respectively.

Table 4.41: Section 7: On-Street Parking Spaces Change Impact Summary

Location	Type of Parking	Existing	Proposed	Change
Finglas Road at Glasnevin Cemetery	Pay and Display	30	27	-3
Finglas Road at Hart's Corner	Informal	4	4	0
Finglas Road at Glasnevin Cemetery	Disabled	1	3	2
Finglas Road at Glasnevin Cemetery	Coach / Loading	2	2	0
Total		37	36	-1

Table 4.42: Section 7: Existing and Proposed Loading Bays

Location	Type of Parking	Existing	Proposed	Change
None – N/A	Loading	2	2	0

4.5.7.8 Structures in Section 7

4.5.7.8.1 Major Structures

There are no existing bridge structures and no proposed new bridges in Section 7 of the Proposed Scheme.

4.5.7.8.2 Retaining Walls

There are no existing or proposed retaining walls in Section 7 of the Proposed Scheme.

4.5.7.9 Landscape and Urban Realm in Section 7

For an overview of the landscape design principles and approach, reference should be made to Section 4.6.12. The following sections provide a description of specific landscape and urban realm design in Section 7 of the Proposed Scheme.

4.5.7.9.1 Glasnevin Cemetery

At the car parking area in front of Glasnevin Cemetery, the replacement car park has been designed to retain all but three of the existing trees. Replacement trees will be provided.

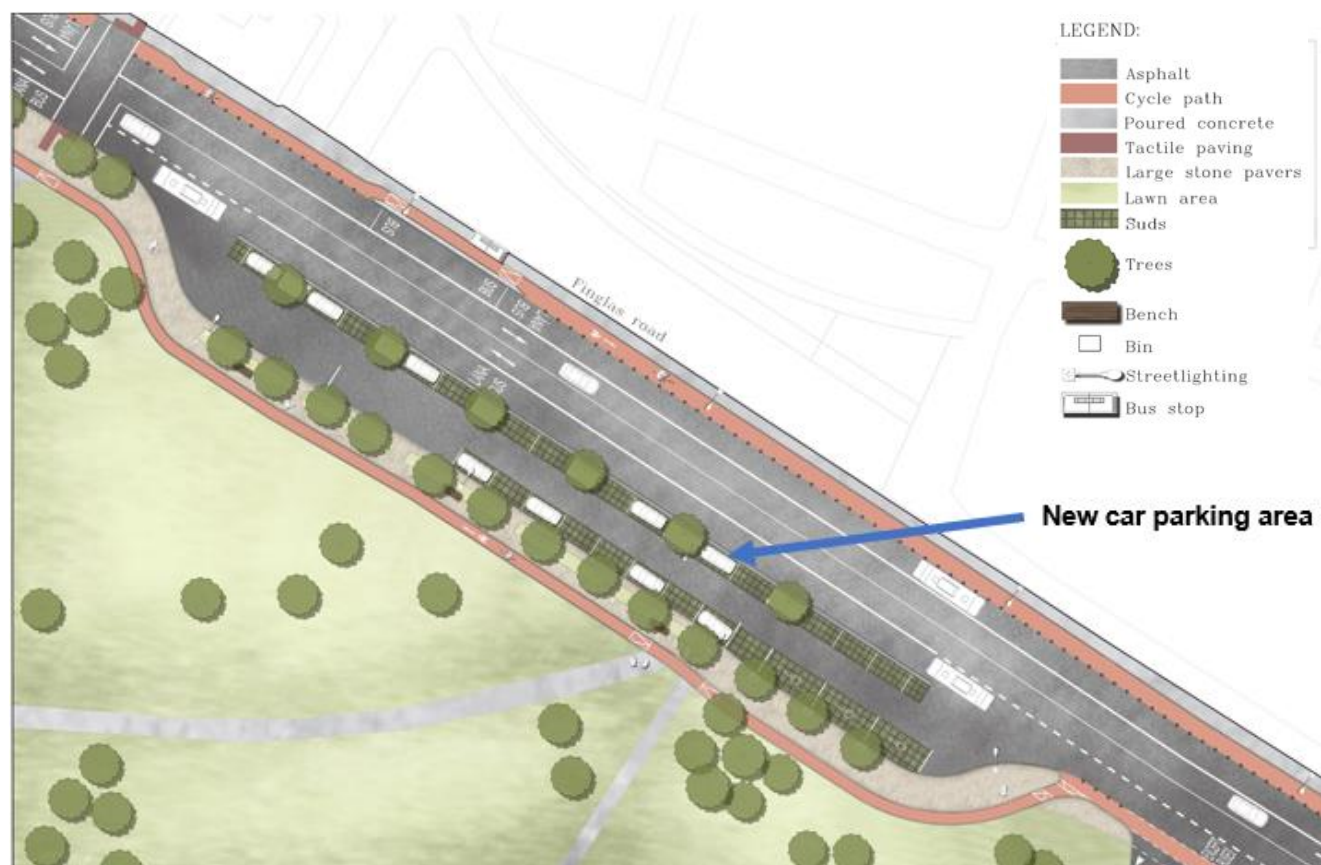


Image 4.12: Urban Realm Upgrade at Glasnevin Cemetery

The existing landscaped strip behind the boundary of St. Vincent's School will be removed to facilitate road widening for the proposed additional northbound bus lane. Replacement planting will be provided behind the new boundary at the school.

4.5.7.10 Land Acquisition and Use in Section 7

Temporary land acquisition is required within Section 7 at the proposed Construction Compound F3 location opposite Glasnevin Cemetery in the green area at Claremont Lawns.

Permanent land acquisition is required within Section 7 at various locations as follows:

- Green area at the car wash (former service station) at Slaney Road and Finglas Road Junction;
- The open green space at Claremont Lawns for relocation of the parking opposite Glasnevin Cemetery; and
- St. Vincent's School and No. 34, 36 and 38 Bengal Terrace for road widening to provide a northbound bus lane and cycle tracks on both sides.

The impacts on residential amenity arising from land acquisition in Section 7 of the Proposed Scheme are addressed in Chapter 10 (Population). Similarly, the impacts on landscape amenity arising from land acquisition in Section 7 of the Proposed Scheme are addressed in Chapter 17 (Landscape (Townscape) & Visual).

4.5.7.10.1 Rights of Way

No private rights of way are affected in Section 7 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 (refer to Appendix A4.1 in Volume 4 of this EIAR), as outlined in Section 4.4.

4.6.1 Mainline Cross-Section

Traffic lane widths (including bus lanes) will follow the guidance outlined in DMURS (Government of Ireland 2013), with the preferred width of traffic lanes on the Proposed Scheme being:

- 3m in areas with a posted speed limit <60km/h (kilometres per hour); and
- 3.25m in areas with a posted speed limit >60km/h.

Traffic lane width of 2.75m is permissible but not desirable and should only be permitted on straight road sections with very low Heavy Goods Vehicle (HGV) percentage 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 2m. 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.

2m is a desirable minimum width for footpaths with 1.2m being an absolute minimum width at pinch points.

An example of the typical BusConnects road layout (without multiple traffic lanes in each direction or a median) is shown in Image 4.13.

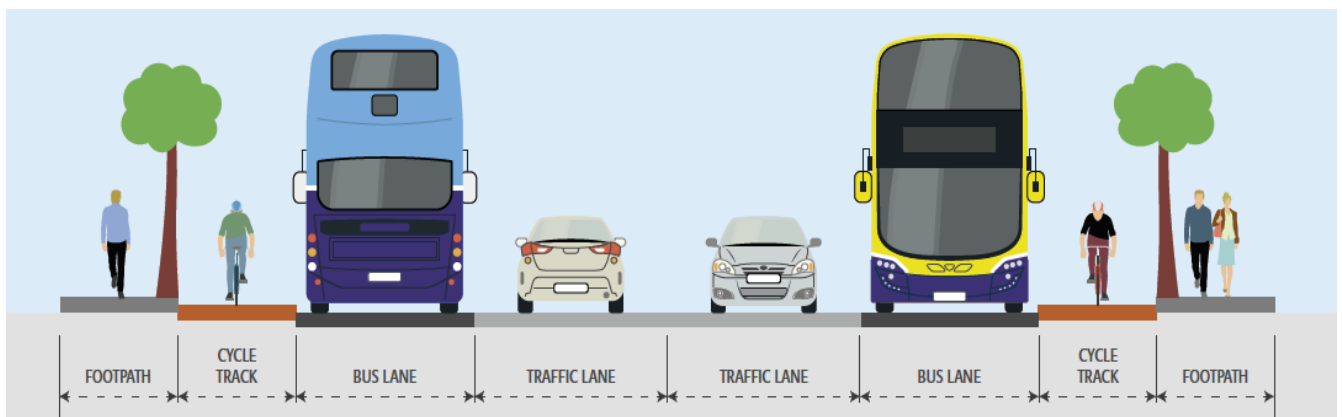


Image 4.13: Typical BusConnects Road Layout (as per the PDGB)

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 4.43.

Table 4.43: Cross-Sectional Design Parameters

Design Element	Desirable Minimum Standard	Minimum Width	Permitted Reductions at Constraints
Footway	2m	1.8m	1.2m (over distances <2m as per the PDGB in Appendix A4.1 in Volume 4 of this EIAR)
Cycle Track (one-way)	2m	1.5m	1.2m (over distances <2m as per the PDGB in Appendix A4.1 in Volume 4 of this EIAR:)
Cycle Track (two-way)	3.25m + 0.5m (buffer)	Refer to National Cycle Manual Width Calculator. 0.3m (buffer)	Reduced at bus stops.
Bus Lane	3m	3m	n/a
Traffic Lane	3m (<60km/h)	3m	2.75m (low HGV flow)

For the Proposed Scheme, the width of the bus lanes and traffic lanes have not been reduced below 3m. The width of the cross-sectional elements detailed in Table 4.43 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 2m. This width should be increased in areas catering for significant pedestrian volumes where space permits. DMURS (Government of Ireland 2013) 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 2m 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 2m 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 (Government of Ireland 2013) 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. However, for the wider dual carriageway sections of the Proposed Scheme along R135 Finglas Road, it was necessary to stretch the length of the pedestrian crossings to 21m due to the existing central median, which is too narrow to provide a suitably wide refuge area for staggered crossings.

Refuge islands should be a minimum width of 2m. 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 60km/h 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 and 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 will be provided to raise the road level up to footpath level and facilitate unimpeded crossing. Tactile paving will be 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 (BCIDD-ROT-ENV_LA-0304_XX_00-DR-LL-9001) in Volume 3 of this EIAR.

4.6.3 Cycling Provision

One of the objectives for the Proposed Scheme is to enhance the potential for cycling by providing safe infrastructure, segregated from general traffic, wherever practicable. Physical segregation ensures that cyclists are protected from motorised traffic and can bypass vehicular congestion, thus improving cyclist safety and reliability of journey times. Physical segregation can be provided in the form of vertical segregation (e.g. raised kerbs), horizontal segregation (e.g. parking / verge protected cycle tracks), or both. Bike racks will generally be provided, where practicable, at bus stops and key additional locations as noted in the Landscaping General Arrangement drawings (BCIDD-ROT-ENV_LA-0304_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 in Appendix A4.1 in Volume 4 of this EIAR.

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.

The desirable minimum width for a two-way cycle track is 3.25m. In addition to this, a buffer of 0.5m should be provided between the two-way cycle track and the carriageway. Using the NCM Width Calculator, reduction of these desirable minimum widths can be considered on a case-by-case basis, with due cognisance of the volume of cyclists anticipated to use the route as well as the level of service required.

The Proposed Scheme is 10.9km long (21.8km in the two directions) and includes approximately 20.2km of segregated cycle tracks compared with an existing provision of 7.5km of cycle tracks, and 5.5km of unsegregated cycle lane. Details of the proposed cycle provision throughout the extent of the Proposed Scheme are provided in the following sections.

4.6.3.1 Cycle Tracks

A cycle track is a segregated lane dedicated to cycling which is physically separated from the adjacent traffic lane and / or bus lane horizontally and / or vertically, as shown in Image 4.14 taken from the PDGB in Appendix A4.1 in Volume 4 of this EIAR.

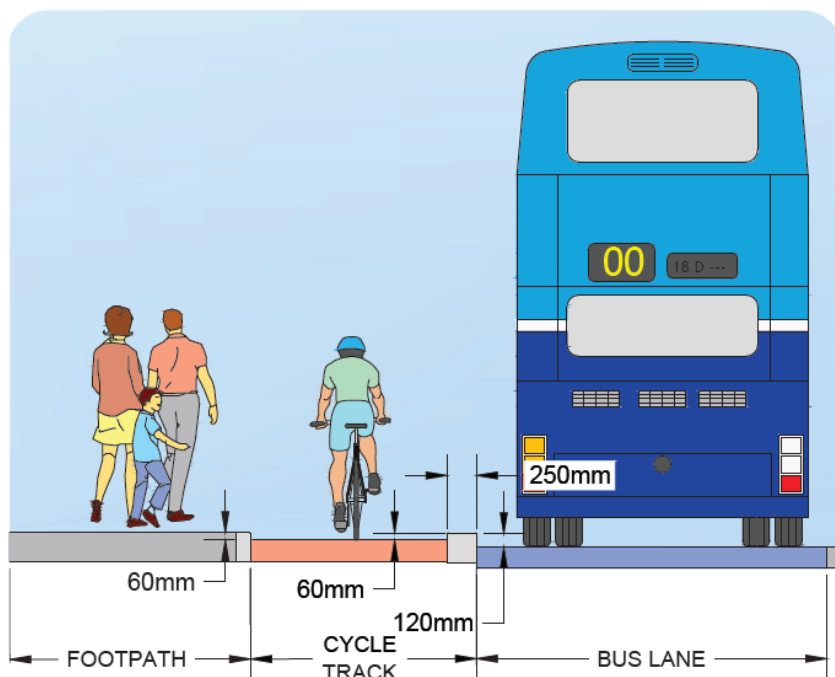


Image 4.14: Fully Segregated Cycle Track

Segregated cycle tracks have been provided along approximately 20.2km of the Proposed Scheme. At-grade cycle tracks (as per NCM Section 4.3.4 (NTA 2011)) may be used as an alternative where the appointed contractor (in liaison with the suitably qualified arborist engaged by them), deems that a no-dig technique is required following on-site inspection of a tree's root protection area (RPA). In these instances, the cycle tracks will be at carriageway level and segregated from general traffic using slip formed kerbing. Such assessments are likely to be required in areas where the existing kerbs are proposed to be retained due to the presence of existing trees at the road edge.

4.6.3.2 Cycle Lanes

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.

4.6.3.3 Quiet Street Treatment

Where Core Bus Corridor roadway widths cannot facilitate cyclists without significant impact on bus priority, alternative cycle routes are explored, where appropriate and feasible, 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 in Appendix A4.1 in Volume 4 of this EIAR, which states:

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

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

A quiet street cycle route will be provided in the Proposed Scheme along the Royal Canal Bank for 1.1km in Phibsborough, with a further link southwards for 0.7km between Coleraine Street and R148 Ormond Quay (running through the Markets Area). There will be a new link provided under R101 North Circular Road to provide a connection between the two parts of Royal Canal Bank at the location of a former canal bridge that was infilled. Some traffic management measures will be required to enable contraflow cycling on one-way streets and to open a gap where one street is closed to traffic.

4.6.3.4 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.

4.6.3.5 Cycle Provision Through Junctions

Junctions have been designed to facilitate a high level of safety, comfort, and priority for sustainable modes of travel (i.e. walking and cycling) and for public transport by prioritising the space and time allocated to these modes within the operation of a junction. This will also accommodate the forecast future year traffic volumes as safely and efficiently as possible within the remaining space and time. This has allowed the 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 (BCIDD-ROT-GEO_GA-0304_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 the general traffic lanes. This means in some circumstances that left-turning traffic cannot use the bus lane at junctions and instead will be provided 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 width outlined in DMURS (Government of Ireland 2013). Larger lane widths are needed in some instances to enable buses to navigate corners, etc. ('swept path'). Bus lanes are shown on the General Arrangement drawings (BCIDD-ROT-GEO_GA-0304_XX_00-DR-CR-9001) included in Volume 3 of this EIAR.

4.6.4.2 Signal Controlled Priority

An alternative measure for achieving bus priority at locations where the provision of bus lanes is not possible is the use of Signal Control Priority (SCP). SCP facilitates bus priority by using traffic signals to give buses priority ahead of general traffic on sections of a route with significant physical constraints or pinch-points impacting on the provision of a bus lane. Typical pinch-points arise where the existing carriageway is narrow (no bus lane or segregated cycle track) due to existing buildings or structures that cannot be demolished or modified to widen the road to make space for a bus lane. While SCP is a good alternative to a physical bus lane it is only effective for short distances. It works through the use of traffic signal controls (typically at junctions) where the bus lane and general traffic lane must merge ahead and share the road space for a short distance until the bus lane recommences downstream. The general traffic will be stopped at the signal to allow the bus pass through the narrow section first. SCP will fail if downstream congestion blocks access to the downstream bus lane. Image 4.15 illustrates a schematic operation of SCP.



Image 4.15: SCP Schematic Operation (PDGB in Appendix A4.1 in Volume 4 of this EIAR)

Continuous bus priority is being provided along the Proposed Scheme, insofar as possible. Bus priority signals have been allocated at every junction where bus services could suffer conflicts with turning vehicles. In a number of locations where there is no space downstream to provide a bus lane, there will be a bus priority signal to enable the bus to proceed into the shared lane section before general traffic, as follows:

1. R108 Botanic Road, southbound at the Fairfield Road Junction;
2. R108 Botanic Road, northbound approximately 130m north of the R108 Prospect Way Junction;
3. R108 Prospect Way / Botanic Road Junction, northbound;
4. R108 Prospect Road / Phibsborough Road, southbound at Whitworth Road Junction;
5. R108 Phibsborough Road, northbound in front of St. Peter's Court;
6. R108 Phibsborough Road, northbound at Royal Canal Terrace;
7. R132 Church Street, southbound at R804 King Street North;
8. R132 Church Street, northbound at May Lane; and
9. R132 Church Street, southbound at Chancery Street.

4.6.4.3 Bus Gates

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

The hours of operation of the Bus Gate will be subject to ongoing review based on prevailing traffic conditions and the goal of achieving the scheme objectives. The NTA and local authority will co-operate in good faith to address any issues with the hours of operation that may arise during the lifetime of the Proposed Scheme.

One Bus Gate is proposed on R108 St. Mobhi Road on the Ballymun Section of the Proposed Scheme. This Bus Gate will restrict northbound through-traffic at the junction of R108 St. Mobhi Road and R102 Griffith Avenue. By reducing the volume of general traffic northbound to just local access, it will enable reliable bus movements along R108 St. Mobhi Road where there will be no northbound bus lane provided due to space constraints.

4.6.4.4 Treatment at Pinch Points

In line with the Road User Hierarchy designated within DMURS (Government of Ireland 2013), at pinch points, the width of the general traffic lane should be reduced first, then the width of the cycle track should be reduced before the width of the pedestrian footpath is reduced. The Proposed Scheme design reflects this approach, where practicable.

4.6.4.5 Bus Stops

To improve the efficiency of the bus service along the Proposed Scheme, the position and number of bus stops has been evaluated as part of a bus stop 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 CBC 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 is provided earlier 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 2m to 1.5m for single file cycling through the bus stop, as overtaking is not required in this area.

Examples of Island Bus Stops are shown in Image 4.16 (one-way cycle track) and Image 4.17 (two-way cycle track).

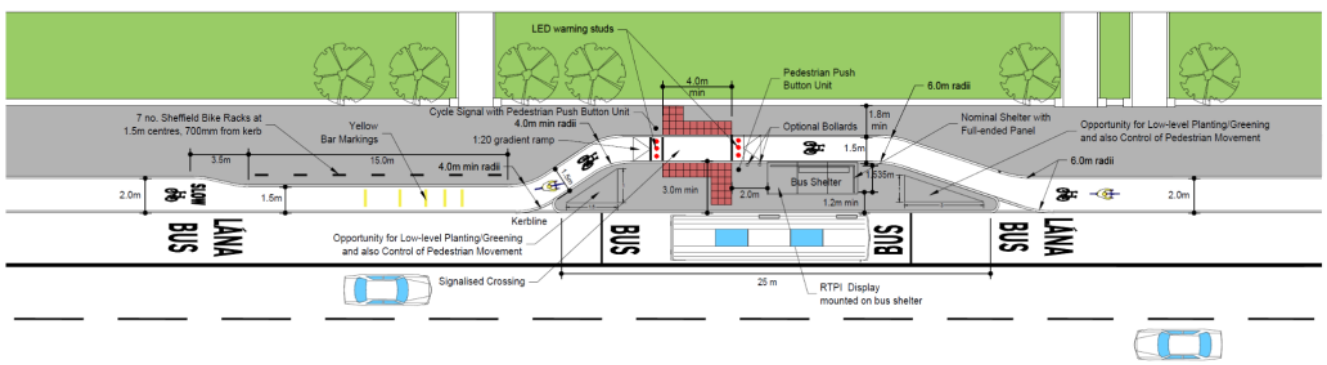


Image 4.16: Island Bus Stop Arrangement (One-Way Cycle Track)

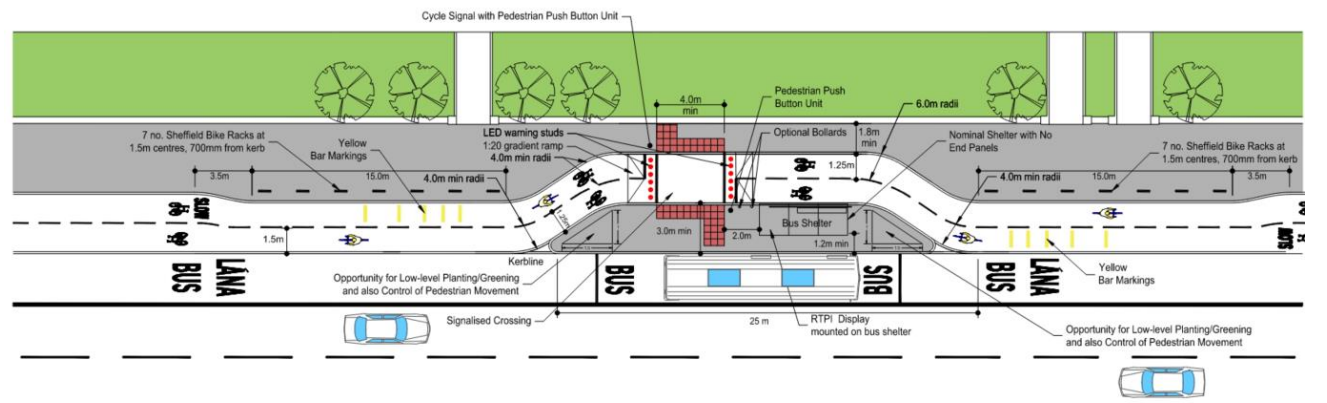


Image 4.17: Island Bus Stop Arrangement (Two-Way Cycle Track)

4.6.4.5.2 Shared Landing Bus Stop Zone

Where space constraints do not allow for an Island Bus Stop, an option consisting of a Shared Landing Bus Stop 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 4.18.

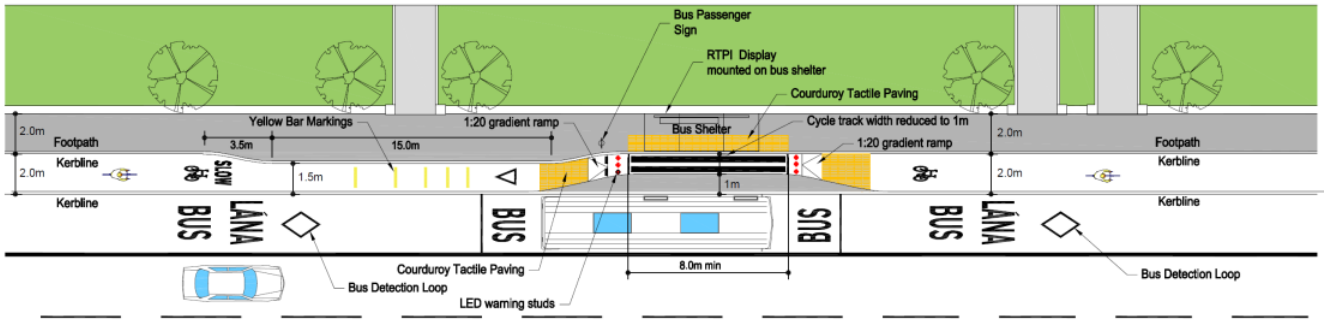


Image 4.18: Shared Landing Bus Stop Arrangement

The location of Shared Landing Bus Stops, which are required in some locations along the Proposed Scheme due to localised space constraints are outlined in Section 4.5.

4.6.4.5.3 Inline Bus Stops

Where there are no cycle tracks provided, Inline Bus Stops will be used, where the users departing the bus will exit straight onto the footway. Inline Bus Stops are proposed to be retained only on the southern section of the Proposed Scheme through Phibsborough, where a separate cycle route will be provided, from Cross Guns Bridge on the Royal Canal at the northern end, along R108 Phibsborough Road to R135 Western Way, and at one location on R132 Church Street, as listed in Section 4.5.

4.6.4.5.4 Layby Bus Stop

Layby Bus Stops can provide an effective solution for coaches with long dwell times at bus stops, allowing other buses to pass the stopped bus. An existing layby bus stop is proposed to be retained at Prospect Way (Stop 200) in the outbound direction of the Ballymun Section of the Proposed Scheme. This will allow for unimpeded traffic flow at this location. This location is outlined in Section 4.5.

An example of a Layby Bus Stop arrangement is shown in Image 4.19.

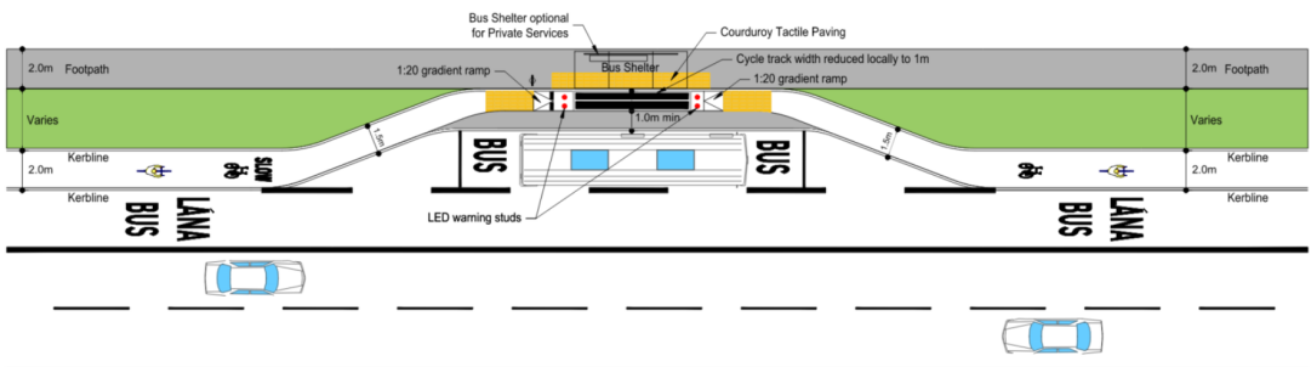


Image 4.19: Layby Bus Stop Arrangement

4.6.4.5.5 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.

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 been developed using the PDGB (refer to Appendix A4.1 in Volume 4 of this EIAR) and in accordance with the principles of DMURS (Government of Ireland 2013) 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:

- PDGB (refer to Appendix A4.1 in Volume 4 of this EIAR);
- Building for Everyone: A Universal Design Approach (NDA 2012a);
- 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 2012b);
- 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 (BSI 2012).

Number 14 of 2005 - Disability Act 2005 (as amended) places a statutory obligation on public service providers to consider the needs of people with disabilities. A Disability Audit of the existing environment and proposed draft preliminary design for the corridor was undertaken. The Audit provided a description of the key accessibility features and potential barriers to people 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 a 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 Networks

One of the 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 will facilitate improved existing and new interchange opportunities with other transport services, including:

- Existing Dublin Bus services at numerous locations along the route, including routes 4, 9, 11, 13, 40, 40B, 40D, 83, 83a, 140, 155;
- The LUAS Green Line at Broadstone Station and the Luas Red Line at Chancery Street;
- MetroLink is a proposed high-capacity railway that will extend between Dublin City Centre and Dublin Airport, continuing to Swords. It will run underground for most of the length parallel to the Ballymun Section between Phibsborough at the southern end and Northwood at the northern end. There will be interfaces between the two schemes at five locations, where underground stations will be located beside the Ballymun Section;

- DART+ West is a proposed railway corridor upgrade along the Dublin to Sligo line which will cross under the Ballymun Section at Phibsborough / Glasnevin where a new railway station will be constructed to the west of R108 Prospect Road. This new railway station will also have a MetroLink station at a lower level where the north / south tunnel will pass beneath the east / west railway line that is in cutting just below ground level;
- Interface with LUAS Green Line future extension at the R104 St. Margaret's Road Roundabout, at R135 Finglas Road;
- The Blanchardstown to City Centre Core Bus Corridor Scheme will be located 0.5km to the west of the Proposed Scheme at the southern end. The Blanchardstown Scheme will include some traffic management restrictions in the area of Stoneybatter and Cabra that will likely result in some traffic displacement eastwards towards the Ballymun Section at Phibsborough; and
- The Swords to City Centre Core Bus Corridor Scheme will be located 0.75km to the east of the Proposed Scheme at Phibsborough. Little interaction is expected with the Ballymun Section.

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 will get better equitable choices and the associated more efficient use of the road space for people movement. The improvement provided to more reliable sustainable travel options will be 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:

- **DART+ West:** The two existing railway lines (Dublin-Maynooth-Sligo line and the Docklands branch line) that cross under R108 Phibsborough Road and R108 Prospect Road at the northern edge of Phibsborough Village are proposed to be included in the DART electrified suburban rail service network. This will include the construction of a new railway station immediately to the west of R108 Prospect Road where existing buildings including Des Kelly Interiors and Hedigan's The Brian Ború pub will be demolished and replaced with a public plaza and station building. There has been coordination between the BusConnects and DART projects at this location. It is expected that a new bus stop will be provided on the western side of the street at the new station to accommodate interchange of passengers between the bus and railway services;
- **MetroLink:** It is proposed to develop a new underground railway line on a north to south alignment parallel to the Ballymun Section of the Proposed Scheme over the 5km length between Northwood and Phibsborough. There will be metro stations at five locations along this part of the railway line at Northwood, Ballymun, Collins Avenue, Griffith Park and Glasnevin (Phibsborough), and these are outlined on the General Arrangement drawings (BCIDD-ROT-GEO_GA-0304_XX_00-DR-CR-9001) included in Volume 3 of this EIAR. The designs of the two projects have been coordinated in relation to surface features including bus stops, cycle track alignments and footpaths for access to the stations. There are other interfaces along the route such as at a tunnel access and fire ventilation building at Albert College Park for which traffic access will be provided for maintenance vehicles from R108 Ballymun Road. At R101 North Circular Road, in Phibsborough, the metro tunnel will be located at a depth of about 25m below ground and will pass underneath the foundations for the proposed bridge over the Royal Canal Bank cycle route;
- **Phibsborough Shopping Centre Redevelopment:** Planning permission has been granted for partial redevelopment of the shopping centre site in Phibsborough. The existing ground floor retail facilities will remain unchanged, and the development will provide new multi-storey residential buildings overhead of the ground floor structure. The existing surface car park at the shopping centre will be reduced in size as part of the Proposed Scheme, but this will not affect the proposed development. Coordination and consultation took place between the developer and the

- BusConnects Infrastructure team during the preparation of the plans submitted for planning permission;
- **Former Cahill Print Works, Botanic Road:** The former print works site has been divided into two plots. The southern part of the site is under development for new homes under the brand of 'Daneswell Place' and this has been under construction since 2019. There is a considerable set-back to the development on the frontage of R108 Botanic Road from which it is proposed to acquire a narrow strip of land for road widening to provide an additional bus lane and cycle tracks in the Proposed Scheme. On the northern part of the site, the historic building is retained and has been renovated for other uses with planning permission. A small strip of the car park at the front will be removed for road widening as part of the Proposed Scheme, but this will not compromise the operation of the car park; and
 - **Site at 54 Glasnevin Hill:** Planning permission has been granted for a multi-storey residential development at this former commercial premises. The proposed access for the development is compatible with the proposals for changes along the street as part of the Proposed Scheme. (Construction of the proposed development has not commenced at the time of this EIAR).

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 the following categories, namely:

- Major Junctions (Signalised);
- Moderate Junctions (Signalised);
- 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 Section 4.5.

4.6.8 Structures

Where the route interfaces with an existing structure, a visual inspection has been carried out to identify the current condition of the structure and any repair / maintenance works required. Where alterations to the existing carriageway lines, kerbs lines and verge widths are proposed to the superstructure of an existing structure, a structural assessment has been carried out to ensure the structural capacity is fit-for-purpose for the revised arrangement. The existing structures are detailed in Section 4.5 and are listed in Table 4.44.

Table 4.44: Structures Along the Proposed Scheme

	ID	Name	Type	Obstacle	Expected Structural Works?
Ballymun Section	CBC03-01	Dean Swift Bridge	Existing Concrete solid slab	River Tolka	No
	CBC03-02	Westmoreland Railway Bridge, Prospect Road	Existing Concrete solid slab / new concrete beam	Railway	Yes. Extension on eastern side of existing bridge
	CBC03-03	Whitworth Road Railway Bridge	Arch and concrete solid slab	Railway	New
	CBC03-04	Cross Guns Bridge	Existing steel girder / solid slab bridge	Royal Canal	No
	CBC03-05	Royal Canal Footbridge (Proposed)	Steel arch bridge and concrete ramp	Royal Canal	New
	CBC03-06	North Circular Road Bridge (Proposed)	New concrete bridge under road	Royal Canal Bank Greenway	New
Finglas Section	CBC04-01	Footbridge at St. Margaret's Road	Existing Concrete	Finglas Road	No
	CBC04-02	Mellowes Road Bridge	Concrete solid slab	Finglas Road	No
	CBC04-03	Church Street Footbridge	Steel truss	Finglas Road	No
	CBC04-04	Tolka River Bridge	Retaining wall and concrete solid slab	River Tolka	No

4.6.8.1 Retaining Walls

A retaining wall is proposed along R108 St. Mobhi Road, parallel to the road on the eastern side, to retain the proposed road layout. A structural retaining wall is proposed instead of building an earth embankment in that area. This wall is required to accommodate the Proposed Scheme road layout with a bus lane, cycle lane and pedestrian footpath on the referred eastern side of the road.

The retaining wall has an overall length of approximately 148m and its height varies between 1.2m and 4m.

4.6.9 Other Street Infrastructure

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

4.6.9.1 Traffic 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; and existing signs. In line with DMURS (Government of Ireland 2013), the signage proposals have been kept to the minimum requirements of the TSM (DoT 2019), particularly where place values are very high.

A review of the existing regulatory and warning signs in the vicinity of the Proposed Scheme 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 (DoT 2019). This exercise also included the preliminary road marking design of the following items:

- Bus lanes;
- Cycle tracks: the pavement will be marked according to best practice guidelines such as DMURS (Government of Ireland 2013) and the NCM (NTA 2011), with particular attention given to junctions. Advance Stacking Locations (ASLs) have been designed where possible to provide a safer passage for cyclists at signal-controlled 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 footpaths. Wider pedestrian crossings have been provided in locations expected to accommodate a relatively 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, footways 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 of the following:

- Widening of the existing carriageways;
- Carriageway realignment;
- Rehabilitation and strengthening of the existing carriageways;
- Other specific trafficked areas (e.g. bus lay-bys, offline parking and loading bays);
- New pedestrianised areas including footways; 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 (BCIDD-ROT-PAV_PV-0304_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:

- Pavement and Foundation Design – DN-PAV-03021 (December 2010) (TII 2010a);
- Surfacing Materials for New and Maintenance Construction for Use in Ireland – DN-PAV-03023 (June 2020) (TII 2020a);
- Pavement Assessment, Repair and Renewal Principles - AM-PAV-06050 (March 2020) (TII 2020b);
- Traffic Assessment – PE-SMG-02002 (December 2010) (TII 2010b);
- Specification for Road Works Series 600 – Earthworks – CC-SPW-00600 (March 2013) (TII 2013a);
- Specification for Road Works Series 700 – Road Pavements – General – CC-SPW-00700 (March 2015) (TII 2015);
- Specification for Road Works Series 800 – Road Pavements – Unbound and Cement Bound Mixtures – CC-SPW-00800 (March 2013) (TII 2013b); and
- Specification for Road Works Series 900 – Road Pavements – Bituminous Materials (.

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

- Pavement and Foundation Design – DN-PAV-03021 (December 2010) (TII 2010a);
- Footway Design - DN-PAV-03026 (January 2005) (TII 2005);
- Construction Standards for Road and Street Works in Dublin City Council (May 2016) – Revision 1 (DCC 2016a);
- Traffic Assessment – PE-SMG-02002 (December 2010) (TII 2010b);
- Specification for Road Works Series 600 – Earthworks – CC-SPW-00600 (March 2013) (TII 2013a);
- Specification for Road Works Series 700 – Road Pavements – General – CC-SPW-00700 (March 2015) (TII 2015);
- Specification for Road Works Series 800 – Road Pavements – Unbound and Cement Bound Mixtures – CC-SPW-00800 (March 2013) (TII 2013b);
- Road Pavements – Bituminous Materials – CC-SPW-00900 (September 2017) (TII 2017);
- Specification for Road Works Series 1000 – Road Pavements – Concrete Materials - CC-SPW-01000 (March 2013) (TII 2013c);
- Specification for Road Works Series 1100 – Kerbs, Footways and Paved Areas - CC-SPW-01100 (February 2012) (TII 2012); and
- BS 7533 series of standards (1999 – 2021) – Pavement Constructed with Clay, Natural Stone or Concrete Pavers (BSI 1999-2021).

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 Pavement Assessment, Repair and Renewal Principles - AM-PAV-06050 (March 2020) (TII 2020b) will be specified for the successful appointed 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; and
- 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 \geq 7: no works;
 - PSCI = 5 or 6: 50mm Bituminous Inlay;
 - PSCI = 3 or 4: 200mm Bituminous Inlay; and
 - PSCI = 1 or 2: 350mm Bituminous Inlay + 150mm Subbase Inlay + 400mm Capping Inlay.
 - Rigid Carriageway:
 - PSCI \geq 5: no works; and
 - PSCI \leq 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.

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 in so far as is reasonably practicable, by incorporating some parking provision and compensatory loading 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 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 Sustainable Drainage Systems (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 and historical materials, while also identifying areas for betterment through the use of higher quality surface materials. The Landscaping General Arrangement drawings (BCIDD-ROT-ENV_LA-0304_XX_00-DR-LL-9001) in Volume 3 of this EIAR illustrate these elements.

The material typologies employed in the preliminary design are:

- **Poured in situ concrete pavement** - Used extensively on existing footpaths. Concrete pavements can be laid 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 reuse 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

Soft landscape design proposals include the following components that provide mitigation for loss of trees, ecological benefits and visual enhancements to the urban realm:

- New tree planting;
- Native hedgerows;
- Native planting;
- Ornamental planting;
- Amenity grass areas; and
- Species rich grasslands.

4.6.12.3.1 Planting Strategy

The planting strategy has been developed to meet the needs of the Dublin City Tree Strategy 2016 – 2020 (DCC 2016b) and the Dublin Biodiversity Action Plan as follows:

- Where possible the initial conservation of existing biodiversity has been considered;
- Opportunities have been identified to enhance biodiversity through green infrastructure;
- Promote the role of street trees planting consistent with the recommendations of the Dublin City Tree Strategy; and
- Develop the role of SUDS opportunities within the Proposed Scheme to ideally reduce impervious areas for drainage management benefit.

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 were developed. These are discussed further below.

4.6.12.5.1 New Street Trees

As noted on the Landscaping General Arrangement drawings (BCIDD-ROT-ENV_LA-0304_XX_00-DR-LL-9001) in Volume 3 of this EIAR, medium to large canopy trees will be provided in large urban tree pit systems to allow for protection of the soil structure and good root development (Image 4.20). In addition, ornamental planting will also be provided, providing small landscape interventions at local community spaces that comprise of a combination of street trees, seating and more formal planting arrangements. These exist at certain intervals (Image 4.21) and are often picked up as 'focal points'..



Image 4.20: Example of Semi-Mature Street Trees



Image 4.21: Example of Ornamental Planting 'Focal Point'

4.6.12.5.2 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 a limited degree of both temporary and permanent acquisition of lands.

Impacted property boundaries will be reinstated following construction with similar materials. In some instances, 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 (BCIDD-ROT-LHT_RL-0304_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 Electricity Supply Board (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 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;
- BS EN 13201 Road Lighting Standards (all sections) (BSI 2014);
- ET 211:2003 Code of Practice for Public Lighting Installations in Residential Areas (Electro-Technical Council of Ireland 2003);
- BS 5489-1:2003 Code of practice for the design of road lighting (BSI 2003);
- Specification for Road Works Series 1300 – Road Lighting Columns and Brackets (Volume 1) (TII 2011a);
- Specification for Road Works Series 1400 – Electrical Work for Road Lighting and Traffic Signs (Volume 1) (TII 2011b);
- Standard Construction Details - Series 1300 (Volume 4) (TII 2017b);
- Standard Construction Details - Series 1400 (Volume 4) (TII 2017c);
- BS EN 40-3-1:2013 – Lighting Columns (BSI 2013); and
- Guidance Note 01/21- The Reduction of Obtrusive Light (Institution of Lighting Professionals 2021).

Lighting schemes will comply with the Guidance notes for the reduction of light pollution (Institution of Lighting Professionals 1992).

4.6.13.2 Lighting at Bus Stops

The design shall 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, GPR 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 Existing Drainage Description

The design basis statement was developed whilst taking into account, the Greater Dublin Regional Code of Practice (GDRCoP), the GDSDS (Irish Water 2005), planning requirements of local authorities within the Dublin Region, TII requirements and international best practices such as CIRIA The SUDS Manual (C753) (CIRIA 2015). Agencies consulted included DCC, Fingal County Council (FCC) and Irish Water, where applicable.

4.6.15.2 Existing Watercourses and Culverts

The location of existing watercourses and culverts have been identified from surveys. Table 4.45 shows where the Proposed Scheme will cross the existing watercourses and culverts. Except for one case (the footbridge with code Ballymun 03), there are no proposed new culverts or bridges at any of these watercourses due to the Proposed Scheme.

Table 4.45: Existing Watercourses and Culverts

Proposed Scheme Section	Watercourse	Chainage	Crossing Detail
Ballymun Section	River Tolka	3+710 (Dean Swift Bridge, St. Mobhi Road)	Existing Bridge
	River Tolka	0+720 (Glasnevin Village)	Existing Bridge
	Royal Canal	4+725 (Cross Guns Bridge)	Existing Bridge
Finglas Section	Bachelor's Stream	Running parallel to R135 Finglas Road	Existing Culvert (Bachelors Stream runs culverted along lengthy sections)
	River Tolka	2+670	Existing Bridge

4.6.15.3 Existing Drainage Description

Based on the information received from Irish Water, TII, DCC and FCC, the Proposed Scheme is served by both surface water and foul / combined drainage networks. The surface water drainage system is managed by the local authority, whilst the combined sewer systems are managed by Irish Water. Flows are typically collected in standard gully grates and routed via a gravity network to outfall points. 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 21 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 the Proposed Surface Water Drainage Works drawings (BCIDD-ROT-DNG_RD-0304_XX_00-DR-CD-9001) in Volume 3 of this EIAR. The existing catchments are summarised in Table 4.46.

Table 4.46: Summary of Existing Catchments

Existing Catchment Reference	Approx. Drainage Catchment Area (km ²)	Existing Network Type	Existing Outfalls
BS_01	0.532	Surface Water (Storm)	Network outfalls to Bachelors Stream
BS_02	0.150	Surface Water (Storm)	Network outfalls to Bachelors Stream
BS_03	0.018	Surface Water (Storm)	Network outfalls to Bachelors Stream
BS_04	0.235	Surface Water (Storm)	Network outfalls to Bachelors Stream
BS_05	1.291	Surface Water (Storm)	Network outfalls to Bachelors Stream
BS_06	0.112	Surface Water (Storm)	Network outfalls to Bachelors Stream
TR_01	3.641	Surface Water (Storm)	Network outfalls to River Tolka
TR_02	0.041	Surface Water (Storm)	Network outfalls to River Tolka
TR_03	0.490	Surface Water (Storm)	Network outfalls to River Tolka
TR_04	0.003	Surface Water (Storm)	Network outfalls to River Tolka
TR_05	0.764	Surface Water (Storm) / Combined	Network outfalls to River Tolka
TR_06	0.059	Surface Water (Storm) / Combined	Network outfalls to River Tolka
TR_07	0.144	Surface Water (Storm)	Network outfalls to River Tolka
TR_08	0.061	Surface Water (Storm)	Network outfalls to River Tolka
TR_09	0.083	Surface Water (Storm)	Network outfalls to River Tolka
TR_10	0.012	Surface Water (Storm)	Network outfalls to River Tolka
TR_11	1.121	Surface Water (Storm)	Network outfalls to River Tolka
RSTBC_01	0.707	Combined	Network outfalls to Ringsend Wastewater Treatment Plant
RSTBC_02	5.052	Combined	Network outfalls to Ringsend Wastewater Treatment Plant
RSTBC_03	0.039	Combined	Network outfalls to Ringsend Wastewater Treatment Plant
RSTBC_04	0.019	Combined	Network outfalls to Ringsend Wastewater Treatment Plant

4.6.15.4 Proposed Drainage / Runoff

Whilst in some areas the Proposed Scheme will increase the impermeable areas, additional permeable areas will also be 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 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, bioretention areas, tree pits, oversized pipes, silt traps and attenuation features, if necessary.

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

A summary list of the sub-catchments, the associated chainage, and impermeable surface area differential is given in Table 4.47. In addition, this table contains a column entitled ‘Net Change’ which takes account of the change of use from impermeable to permeable areas and vice versa.

Table 4.47: Summary of Increased Permeable and Impermeable Areas

Existing Catchment Reference	Section / Chainage	Road Corridor Area (m ²)	Change of use to impermeable areas (m ²)	Change of use to permeable areas (m ²)	Net Change (m ²)	Percentage Change (%)
D3_01 – TR_01	Ballymun Section – A0000 – A3720	127,349	2,275	5,320	-3,045	-2.4%
D3_02 – TR_02	Ballymun Section – A1840 – A1870	277	0	77	-77	-27.7%
D3_03 – TR_03	Ballymun Section – A2745 – A3660	23,431	509	92	417	1.8%
D3_04 – TR_04	Ballymun Section – A0660 – A0740 Glasnevin	1,392	0	0	0	0%
D3_05 – TR_06	Ballymun Section – A3660 – A3950	5,583	239	35	204	3.6%
D3_06 – TR_05	Ballymun Section – A3660 – A4685	19,841	296	250	46	0.2%
D3_07 – RSTBC_01	Ballymun Section – A4685 – A6005	47,533	1,010	374	636	1.3%
D3_08 – RSTBC_02	Ballymun Section – A6150 – A6840	21,079	161	179	-18	-0.1%
D3_09 – RSTBC_03	Ballymun Section – A6005 – A6350	8,604	432	5	428	5%
D3_10 – RSTBC_04	Ballymun Section – A6350 – A6610	3,001	0	0	0	0%
D4_01 – BS_01	Finglas Section – B070 – B0090	6,079	543	0	543	8.9%
D4_02 – BS_02	Finglas Section – B0030 – B0100	1,048	53	0	53	5%
D4_03 – BS_03	Finglas Section – B0030 – B0295	4,926	184	0	184	3.7%
D4_04 – BS_04	Finglas Section – B0295 – B0500	5,048	0	0	0	0%
D4_05 – BS_05	Finglas Section – B0500 – B2030	43,493	1,845	370	1,475	3.4%
D4_06 – BS_06	Finglas Section – B1815 – B2425	16,341	348	434	-86	-0.5%
D4_07 – TR_09	Finglas Section – B2425 – B2525	3,361	40	23	16	0.5%
D4_08 – TR_10	Finglas Section – B2525 – B2640	3,018	106	0	106	3.5%
D4_09 – TR_08	Finglas Section – B2640 – B2690	892	6	0	6	0.7%
D4_10 – TR_11	Finglas Section – B2690 – B2770	2,721	0	0	0	0%
D4_11 – TR_07	Finglas Section – B2770 – B3200	12,820	44	42	2	0%
D4_12 – TR_05	Finglas Section – B3200 – B4127	25,039	1,596	85	1,511	6%

4.6.15.5 Proposed Drainage System

The principle objectives for the drainage design are as follows:

- To drain surface water from existing and proposed pavement areas throughout the Proposed Scheme and maintain the existing standard of service;
- To maintain existing runoff rates from existing and newly paved surfaces using SUDS;
- To minimise the impact of the runoff from the carriageway on the surrounding environment using SUDS and / or silt traps;

- No drainage features like gullies or manholes will be located at, or any ponding will be allowed to occur at, pedestrian cross-walk locations or at bus stop locations. Where any such drainage features currently exist at such locations, they will be relocated. Drainage of newly paved areas includes SUDS measures to treat and attenuate any additional runoff. These measures ensure that there is:
 - No increase in existing runoff rates from newly paved areas; and
 - The provision of appropriate treatment to ensure runoff quality.
- A hierarchical approach to the selection of SUDS measures has been adopted with 'Source' type measures (e.g. tree pits) implemented in preference to catchment type measures (e.g. attenuation tanks).

The 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 drawings (BCIDD-ROT-DNG_RD-0304_XX_00-DR-CD-9001) in Volume 3 of this EIAR:

- Reuse of existing drainage;
- 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 highway profile;
- Grass Surface Water Channels and Swales are provided. They will provide treatment and can provide attenuation if required;
- Perforated pipes with granular surround are provided, designed to convey, attenuate, and treat runoff prior to discharge;
- Tree pits are provided near the road. These receive flows from the sealed pipe network and are designed to convey, attenuate, and treat runoff prior to discharge; and
- Attenuation Tanks / Oversized Pipes / Ponds – Where there is insufficient attenuation volume provided by the proposed SUDS drainage measures, a pond /oversized pipe / attenuation tank is required to provide the required storage volume.

4.6.15.6 Runoff Attenuation and Sustainable Drainage Systems

SUDS measures and / or attenuation systems will be provided to ensure no increase in existing runoff 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 was tested for each catchment from 30-minutes to 24 hours to ensure that the proposed measures have sufficient capacity to cater for high intensity, short duration storms and longer duration, low intensity storms where the total runoff volumes are greater.

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 shown in the Proposed Surface Water Drainage Works drawings (BCIDD-ROT-DNG_RD-0304_XX_00-DR-CD-9001) in Volume 3 of this EIAR. In a few locations, where appropriate, the proposed system incorporates a variety of pollution control measures which will provide interception and treatment as the types indicated below:

- 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
- Bioretention areas: Bioretention systems 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 significantly disrupting pedestrian, bicycle, or vehicle traffic.

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

- Use of retention sockets, where applicable, for the erection of Traffic Signal, CCTV, Above Ground Detection, and other equipment mounting poles to allow for the ease of installation, maintenance and replacement;
- The use of lightweight equipment poles, where appropriate, such as cantilever signal poles. Products that allow for maintenance activities to be undertaken from ground level, where practicable, such as tilt down poles or poles with wind-down mechanisms;
- Placement of poles and retention sockets within 7m of chambers to provide ease of installation and replacement of cables;
- Location of chambers away from pedestrian desire lines, and areas of tactile paving;
- Chambers to be placed at 180m centres, where practicable, on longitudinal duct runs to allow for the ease of installation and replacement of cables;
- Safe areas for the access and parking of maintenance vehicles, where practicable; and
- Controller, and other, cabinets located in positions that allow for safe access and clear visibility of the operation of an adjacent road junction.

4.6.17 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 to 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 (BCIDD-ROT-TSM_SJ-0304_XX_00-DR-TR-9001) in Volume 3 of this EIAR.

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 permanent land acquisition and land required temporarily for the construction of the Proposed Scheme is shown on the General Arrangement Drawings (BCIDD-ROT-GEO_GA-0304_XX_00-DR-CR-9001) included in Volume 3 of this EIAR.

Construction of the Proposed Scheme will require land acquisition from several different parties, as outlined in Section 4.5 for each section of the Proposed Scheme.

Mitigation for accommodation works is 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 Proposed Scheme where there will be the requirement for accommodation works and boundary treatments. Specific accommodation works will be 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 will be 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 will be determined during the detailed design stage if strengthening works are required to these existing structures.

Existing gates will be reused where possible. 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 (1999-2021). BS 7533 series of standards (1999 – 2021) – Pavement Constructed with Clay, Natural Stone or Concrete Pavers
- BSI (2003). BS 5489-1:2003 Code of practice for the design of road lighting
- BSI (2012). BS8300-1:2018 Design of an accessible and inclusive built environment. External Environment- code of practice
- BSI (2013). BS EN 40-3-1:2013 – Lighting Columns
- BSI (2014). BS EN 13201 Road Lighting Standards
- BSI (2018). BS8300-1:2018 Design of an accessible and inclusive built environment - External environment – Code of practice
- CIRIA (2015). The SUDS Manual (C753)
- DCC (2011). Parking Cars in Front Gardens Advisory Booklet
- DCC (2016a). Construction Standards for Road and Street Works in Dublin City Council (May 2016) – Revision 1
- DCC (2016b). Dublin City Tree Strategy 2016 – 2020
- DoT (2019). The Traffic Signs Manual
- Electro-Technical Council of Ireland (2003). ET 211:2003 Code of Practice for Public Lighting Installations in Residential Areas
- Government of Ireland (2013). Design Manual for Urban Roads and Streets
- Institution of Lighting Professionals (1992). Guidance notes for the reduction of light pollution
- Institution of Lighting Professionals (2021). Guidance Note 01/21- The Reduction of Obtrusive Light
- Irish Water (2005). Greater Dublin Strategic Drainage Study
- Irish Wheelchair Association (2020). Best Practice Guidelines, Designing Accessible Environments
- NDA (2012a). Building for Everyone: A Universal Design Approach
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- NDA (2015). How Walkable is Your Town
- NDA (2020). Building for Everyone: A Universal Design Approach
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- NTA (2021). Preliminary Design Guidance Booklet for BusConnects Core Bus Corridors
- TII (2005). Footway Design - DN-PAV-03026 (January 2005)

TII (2010a). Pavement and Foundation Design – DN-PAV-03021

TII (2010b). Traffic Assessment – PE-SMG-02002 (December 2010)

TII (2011a). Specification for Road Works Series 1300 – Road Lighting Columns and Brackets (Volume 1)

TII (2011b). Specification for Road Works Series 1400 – Electrical Work for Road Lighting and Traffic Signs (Volume 1)

TII (2012). Specification for Road Works Series 1100 – Kerbs, Footways and Paved Areas - CC-SPW-01100 (February 2012)

TII (2013a). Specification for Road Works Series 600 – Earthworks – CC-SPW-00600 (March 2013)

TII (2013b). Specification for Road Works Series 800 – Road Pavements – Unbound and Cement Bound Mixtures – CC-SPW-00800 (March 2013)

TII (2013c). Specification for Road Works Series 1000 – Road Pavements – Concrete Materials - CC-SPW-01000 (March 2013)

TII (2015). Specification for Road Works Series 700 – Road Pavements – General – CC-SPW-00700 (March 2015)

TII (2017a). TII Specification for Roadworks Series 900 – Bituminous Materials

TII (2017b). Standard Construction Details - Series 1300 (Volume 4)

TII (2017c). Standard Construction Details - Series 1400 (Volume 4)

TII (2020a). Surfacing Materials for New and Maintenance Construction for Use in Ireland – DN-PAV-03023 (June 2020)

TII (2020b). Pavement Assessment, Repair and Renewal Principles - AM-PAV-06050

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

Number 14 of 1993 - Roads Act, 1993 (as amended)

Number 14 of 2005 - Disability Act 2005 (as amended)