

Chapter 04
Proposed
Scheme
Description

Contents

4.	Proposed Scheme Description	1
4.1	Introduction	1
4.2	Proposed Scheme Overview	1
4.3	Design Iteration	4
4.4	Design Principles	5
4.5	Description of the Proposed Scheme	6
4.5.1	Section 1: Tallaght Road to Rathfarnham Road	6
4.5.2	Section 2: Nutgrove Avenue to Terenure Road North – Grange Road, Rathfarnham Road	14
4.5.3	Section: 3 Terenure Road North to Charleville Road – Terenure Road East, Rathgar Road.....	24
4.5.4	Section: 4 Charleville Road to Dame Street	36
4.6	Key Infrastructure Elements	51
4.6.1	Mainline Cross-Section.....	51
4.6.2	Pedestrian Crossings	52
4.6.3	Cycling Provision	53
4.6.4	Bus Priority Provision	55
4.6.5	Accessibility for Mobility Impaired Users	61
4.6.6	Integration.....	61
4.6.7	Junctions	66
4.6.8	Structures	66
4.6.9	Other Street Infrastructure	67
4.6.10	Pavement	68
4.6.11	Parking and Loading.....	70
4.6.12	Landscape and Urban Realm.....	70
4.6.13	Lighting	74
4.6.14	Utilities	74
4.6.15	Drainage	75
4.6.16	Maintenance	80
4.6.17	Safety and Security	80
4.6.18	Land Use and Accommodation Works	81
4.7	References	82

4. Proposed Scheme Description

4.1 Introduction

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

Article 5(1)(a) of the EIA Directive requires that the EIAR contains:

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

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

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

The layout of the chapter begins with the Proposed Scheme Overview (Section 4.2). This is followed by sections describing the Design Iteration process (Section 4.3) and the overall Design Principles applied to the Proposed Scheme (Section 4.4). Following this, there is a detailed description of the Proposed Scheme (Section 4.5) and a section describing the key infrastructure elements associated with the Proposed Scheme (Section 4.6). These sections should be read in their entirety in order to gain a full understanding of the Proposed Scheme and its associated key infrastructure elements.

4.2 Proposed Scheme Overview

The Proposed Scheme has an overall length of approximately 10km from end to end online with additional offline upgrades and quiet street treatment of approx. 2km and 1.5km respectively. The Proposed Scheme will be comprised of two main alignments, namely from Templeogue to Terenure (3.7km), and from Rathfarnham to the City Centre (6.3km).

The Templeogue to Terenure section will commence on the R137 Tallaght Road, east of the M50 junction 11 interchange. From here, the Proposed Scheme is routed via the R137 along Tallaght Road and Templeogue Road, through Templeogue Village, to Terenure Cross, where it joins the Rathfarnham to City Centre section. The Rathfarnham to City Centre section will commence on the R821 Grange Road at the junction with Nutgrove Avenue, and is routed along the R821 Grange Road, the R115 Rathfarnham Road, the R114 Rathfarnham Road, Terenure Road East, Rathgar Road, Rathmines Road Lower, Richmond Street South, Camden Street Upper and Lower and Wexford Street as far as the junction with the R110 at Kevin Street Lower and Cuffe Street where priority bus lanes end. From Cuffe Street to Dame Street along Redmond's Hill, Aungier Street, and South Great George's Street the route will involve a traffic lane and a cycle track in both directions where it will join the prevailing traffic management regime in the city centre. In addition to the above, an alternative cycle facility will be provided along Harold's Cross Road / Terenure Road North between Terenure Cross and Parkview Avenue, as well as along Bushy Park Road, Wasdale Park, Wasdale Grove, Zion Road and Orwell Road. The route of the Proposed Scheme is shown in Image 1.1 in Chapter 1 (Introduction).

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

Moreover, pedestrian facilities will be upgraded, and additional signalised crossings 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 pedestrians experience, an example of this can be seen in Terenure, particularly at Terenure Cross.

Table 4.1 summarises the changes that 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	4.4	6.1
Outbound	1.5	5.4
Bus Priority Through Traffic Management		
Inbound	0.1	2.9
Outbound	0.3	3.0
Total Bus Priority (both directions)	6.3	17.4 (+175%)
Bus Measures		
Proportion of Route with Bus Measures	32%	87%
Cycle Facilities Segregated		
Inbound	1.3	9.6
Outbound	1.8	10.3
Cycle Facilities – Non segregated		
Inbound	3.3	1.7
Outbound	4.6	1.7
Cyclist Facilities – Overall		
Total Cyclist Facilities (both directions)	11	23.3 (+112%)
Proportion segregated	28%	85.4%
Other Features		
Number of Pedestrian Signal Crossings	76	106
Number of Residential Properties with Land Acquisition	Not applicable	72

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 Relevant Drawings

Drawing Series Number	Description
BCIDC-ARP-GEO_HV-1012_ML_00-DR-CR-9001	Mainline Plan and Profile
BCIDC-ARP-LHT_RL-1012_XX_00-DR-EO-9001	Street Lighting
BCIDC-ARP-DNG_RD-1012_XX_00-DR-CD-9001	Proposed Surface Water Drainage Works
BCIDC-ARP-ENV_LA-1012_XX_00-DR-LL-9001	Landscaping General Arrangement
BCIDC-ARP-UTL_UD-1012_XX_00-DR-CU-9001	IW Foul Sewer Asset Alterations
BCIDC-ARP-UTL_UE-1012_XX_00-DR-CU-9001	ESB Asset Alterations
BCIDC-ARP-UTL_UL-1012_XX_00-DR-CU-9001	Telecommunications Asset Alterations
BCIDC-ARP-UTL_UG-1012_XX_00-DR-CU-9001	GNI Asset Alterations
BCIDC-ARP-UTL_UG-1012_XX_00-DR-CU-9001	IW Water Asset Alterations
BCIDC-ARP-SPW_BW-1012_XX_00-DR-CR-9001	Fencing and Boundary Treatment
BCIDC-ARP-TSM_SJ-1012_XX_00-DR-TR-9001	Junction Systems Design
BCIDC-ARP-TSM_GA-1012_XX_00-DR-CR-9001	Traffic Signs and Road Markings
BCIDC-ARP-PAV_PV-1012_XX_00-DR-CR-9001	Pavement Treatment Plans
BCIDC-ARP-GEO_GA-1012_XX_01-DR-CR-9001	General Arrangement
BCIDC-ARP-SPW_ZZ-1012_XX_00-DR-CR-9001	Site Location Map and Site Location Plan
BCIDC-ARP-GEO_CS-1012_XX_01-DR-CR-9001	Typical Cross Sections
BCIDC-ARP-UTL_UC-1012_XX_00-DR-CU-9001	Combined Existing Utilities 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 process described in Chapter 1 (Introduction), undertaken throughout the option selection and design development process have been incorporated where appropriate.

Examples of how the design evolved are as follows:

- It is proposed to convert Spawell Roundabout to a signalised junction with kerb protection for cyclists;
- No physical interventions are proposed within Templeogue Village. Signal-controlled priority will be provided both east and west of Templeogue Village to manage bus priority through the village. BusConnects scheme proposals are intended to tie into the South Dublin County Council Part VIII Templeogue Village Initiative at Templeogue Tennis Club and at Hollingsworth Cycles;
- It is proposed to amend the layout of the Templeogue Road / Cypress Grove Road junction in order to improve alignment for inbound buses and reduce the impact on trees and minimise land acquisition from adjacent properties;
- Quiet street treatment to Rathdown Crescent and Rathdown Park is proposed to provide for inbound cyclists on the Templeogue to Terenure section to join the Rathfarnham to City Centre section;
- Removal of land-take at inbound bus gate on Templeogue Road at Olney Grove and at properties just north of the Springfield Avenue junction;
- In lieu of the EPR Option proposal to provide an alternative cycle facility connecting to Brookvale Downs, the current proposal for Rathfarnham Road between Castleside Drive and Rathdown Park includes for segregated cycle tracks on Rathfarnham Road, with the exception of a 270m long section of inbound cycle track, with bus priority provided through a combination of signal-controlled priority and partial bus lanes;
- Signal-controlled priority proposed between Rathdown Park and Bushy Park Road, reducing land-take along this section;
- Signal-controlled priority proposed through Terenure Cross to minimise impacts on parking and loading, which will also allow urban realm improvements;
- Alternative cycle facilities proposed on Terenure Road North and Harold's Cross Road connecting to the Kimmage to City Centre CBC at Harold's Cross;
- Additional alternative cycle facilities proposed on Bushy Park Road, Wasdale Park, Wasdale Grove, Victoria Road, Zion Road and Orwell Road. No cycle facilities proposed on Terenure Road East, and 1.5m cycle tracks proposed on Rathgar Road. This will reduce the impact on trees and properties on Terenure Road East whilst maintaining a high level of service for cyclists travelling to and from the city centre;
- Signal-controlled priority proposed through Rathgar Village to minimise impacts on parking and loading, which will also allow urban realm improvements;
- One-way inbound general traffic regime proposed on Rathgar Road, removing the need for land-take on this section;
- Two general traffic lanes, and 2m cycle track in each direction proposed between Castlewood Avenue and Grove Road with a Bus Gate provided between Richmond Hill and Lissenfield in order

to ensure priority for buses. This will allow for wider footpaths and urban realm improvements through the village; and

- One-way general traffic regime and 1.5m cycle track in each direction proposed on Camden Street between Charlotte Way and Cuffe Street. This will enhance the cycle facilities along this section of the scheme while maintaining commercial loading and parking where practicable.

4.4 Design Principles

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

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

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

An example of the application of the design principles for the Proposed Scheme can be seen at the proposed replacement of Spawell Roundabout to a signal-controlled junction, with the provision of dedicated cycle and pedestrian walkways. The existing layout with multiple slip lanes facilitates the movement of vehicles, but provides poor facilities for pedestrians, cyclist and buses. Pedestrians and cyclists have to walk a significant distance off their desire line to cross the road at a signalised crossing, which many are observed not to do, resulting in unsafe conditions for these vulnerable road users at a very busy junction.

Having considered the objectives for the Proposed Scheme and using the principles set out in the PDGB a consolidated traffic signal-controlled junction arrangement was developed to address the issues outlined above. This layout controls the flow of traffic and provides a high level of priority for buses on the main corridor arms of the junction. In addition, high quality signal-controlled pedestrian crossing facilities will be provided on all arms of the junction, close to the pedestrian desire lines. For cyclists, taking into account the high traffic volumes and speeds, a fully segregated facility is provided where cyclists are segregated from moving vehicles, which significantly enhances the safety of these vulnerable road users.

Accessibility for mobility impaired users is a core element of the Proposed Scheme design and it has been informed by the principles of DMURS, Building for Everyone: A Universal Design Approach (NDA 2020), How Walkable is Your Town (NDA 2015), Shared Space, Shared Surfaces and Home Zones from a Universal Design Approach for the Urban Environment in Ireland (NDA 2012), Best Practice Guidelines, Designing Accessible Environments (Irish Wheelchair Association 2020), Inclusive Mobility (UK Department for Transport 2005), Guidance on the Use of Tactile Paving Surfaces (UK DfT 2007), and BS8300:2018 Volume 1 Design of an accessible and inclusive built environment - External Environment – code of practice. Accessibility is also addressed in Chapter 12 of the PGDB. Further detail on accessibility for mobility impaired users is given in Section 4.6.6.

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

The Proposed Scheme consists of two main alignments and runs primarily from Templeogue / Rathfarnham to City Centre. The Proposed Scheme is described in the following geographical sections:

- Section 1: Tallaght Road to Rathfarnham Road;
- Section 2: Nutgrove Avenue to Terenure Road North – Grange Road, Rathfarnham Road;
- Section 3: Terenure Road North to Charleville Road – Terenure Road East, Rathgar Road; and
- Section 4: Charleville Road to Dame Street.

4.5.1 Section 1: Tallaght Road to Rathfarnham Road

4.5.1.1 General overview of the Proposed Scheme

The Proposed Scheme will commence on the R137 Tallaght Road adjacent to D'Arcy McGee's, east of the M50 interchange. It is proposed to retain the existing bus and traffic lane configuration on the R137. Between the M50 interchange and the Spawell Roundabout junction it is proposed to relocate the existing two-way cycle track to the carriageway side of the footpath to better tie in with proposals at the Spawell Roundabout junction. It is proposed to convert the Spawell Roundabout to a signalised junction with kerb protection for cyclists. The design of this junction has been coordinated with design proposals under the Wellington Lane Walking and Cycling Scheme and the Dodder Greenway.

Between the Spawell Roundabout and Cypress Grove Road junction, it is proposed to retain the existing bus and traffic lane configuration on the R137. The existing cycle track on the northern side of the carriageway will be relocated to the carriageway side of the footpath, and a new cycle track provided on the southern side of the carriageway between Cheeverstown and the Spawell Roundabout Junction. At the Cypress Grove Road junction, general through traffic may divert to Old Bridge Road for access to the City Centre via the R114. Significantly enhanced cycle facilities will also be provided at this junction with the introduction of kerb protection.

Within this section the existing free standing stone arch adjacent to the R137 Templeogue Road will be cleared of the overgrown vegetation which currently covers it and conserved in its existing location. The existing fencing around the arch will be removed and the arch opened up to the public realm. It is proposed to install high quality stone paving, decorative lighting and soft landscaping elements around the arch as well as to construct a new footpath running behind the arch.

Between the Cypress Grove Road junction and the Ashfield Place development it is proposed to provide bus lanes and traffic lanes in each direction. A limited amount of land take will be required from a number of residential properties on the northern side of the carriageway to achieve this cross section. Dedicated cycle facilities are provided on the approach to the Cypress Grove Road junction, however these will terminate approximately 100m from the junction where cyclists will share the bus lane in an inbound direction and the general traffic lane in an outbound direction. To improve safety for cyclists, it is proposed to introduce a 30kph speed limit between Cypress Grove Road and Templeogue Village. Outside the Ashfield Place Development, there is insufficient space for a bus lane and a general traffic lane in each direction. Therefore, it is proposed to stop the outbound bus lane for a distance of approximately 170m and use Signal-controlled priority along this section.

Within this section, the existing service/access road serving 252 to 256 Templeogue Road will be converted to provide a shared surface for vehicles and pedestrians. This will facilitate the provision of an outbound bus lane to the stop line at the Cypress Grove Road junction, while minimising land acquisition from properties to the north of Templeogue Road.

Between Ashfield Place and the Templeogue Tennis Club, it is proposed to provide a bus lane and a general traffic lane in each direction. It is proposed to utilise a limited amount of land-take within this section to achieve the desired cross-section.

Within Templeogue Village, between Templeogue Tennis Club and the Templeville Road junction, it is proposed to manage bus priority through the use of signal-controlled priority and tie into South Dublin County Council's Templeogue Village Initiative Scheme.

North of Templeogue Village, a cross section consisting of a general traffic lane, and bus lane and a cycle track in each direction is resumed. Between the village and the Springfield Avenue junction, the width of the proposed cycle tracks is reduced locally to minimise the impact on existing mature trees in this section.

At the junction with Templeville Road, general inbound through traffic may divert to the R112 and further to the R114 through the reintroduction of the right turn onto Springfield Avenue. It is proposed to introduce kerb protection at this junction which will improve cycle facilities and cyclist safety.

Between the Templeville Road junction and Fortfield Road it is proposed to provide one bus lane, one general traffic lane and cycle tracks in each direction. The proposed cycle tracks have been narrowed to 1.5m along this section to minimise impacts on mature trees tree on the eastern side of the road. It is proposed to upgrade the Fortfield Road junction to provide a direct, protected cycle crossing for inbound cyclists to a proposed two-way cycle facility on the eastern side of Templeogue Road north of the junction.

Between Fortfield Road and Terenure Road West, the Templeogue Road width is heavily constrained. Within this section of the Proposed Scheme, it is proposed to maintain one outbound bus lane, one outbound general traffic lane and one inbound general traffic lane. A segregated two-way cycle track and footpath is proposed on the southern side of the carriageway within Bushy Park along the alignment of the existing shared path.

This cycle track will link to a quiet street treatment on Rathdown Drive. The existing dirt path through the green space adjacent to Rathdown Drive will be formalised as a footpath, through shallow dig construction methods to minimise impacts on the existing trees within this area.

It is proposed to provide an inbound a Bus Gate at the junction of Olney Grove, which will restrict northbound general traffic on Templeogue Road from accessing Terenure Road West or Terenure Place during the hours of operation of the Bus Gate (06:00 – 20:00 - 7 days a week). A right turn ban is proposed from Fergus Road to Templeogue Road, and a left turn ban from Olney Grove to Templeogue Road.

Right turn bans are also proposed from Templeogue Road to Rathdown Park and to Rathdown Avenue and from Fortfield Road to Greenlea Road and to Lavarna Grove in order to prevent through traffic diverting inappropriately. A quiet street treatment to Rathdown Crescent is intended to tie into the proposed quiet street treatment on Rathdown Park described in Section 2 of the Proposed Scheme section.

4.5.1.2 Deviations from Standard Cross Sections

The width of the cross-sectional elements as outlined in Section 4.6.1 have been reduced (from published guidance, e.g., DMURS), at a number of constrained locations along the Proposed Scheme. The deviations within Section 1- Tallaght Road to Rathfarnham Road - are detailed in Table 4.3.

Table 4.3: Reduced Standard Cross Sections on Section 1 – Tallaght Road to Rathfarnham Road

Location	Design Element	DMURS / NCM	Type	Design	Justification
Ch.J1375 – J1410	Footway (Inbound)	2.0m	Relaxation	1.7m	Footpath width reduced locally over a distance of approximately 35m to mitigate impact on existing property.
Ch.J2000- J2180	Cycle Track (Both directions)	2.0m	Relaxation	1.5-1.9m	Cycle track width reduced over a distance of approximately 180m to mitigate any impact on existing trees in this area.
Ch. J2160 - J2460	Footway (Both directions)	2.0m	Departure	1.65-1.8m	Footpath width reduced over a distance of approximately 300m to mitigate impacts on existing trees and properties in this area.
Ch. J2160 - J2460	Cycle Track (Both directions)	2.0m	Relaxation	1.5m	Cycle track width reduced over a distance of approximately 300m to mitigate any impact on existing trees and properties in this area.

Location	Design Element	DMURS / NCM	Type	Design	Justification
Ch. J2500-J2760	Footway (Inbound)	2.0m	Departure	1.75-1.8m	Footpath width reduced over a distance of approximately 260m to mitigate any impact on Terenure College. Existing footway width maintained.
Ch. J2500-J2790	Two-Way Cycle Track	3.25	Departure	2.5m	Cycle track width reduced over a distance of approximately 290m to mitigate any impact on existing mature trees. Existing width of shared pedestrian and cycle facility maintained.
Ch. J2500-J2790	Footpath (within Bushy Bark)	2.0m	Departure	1.5m	Footpath width reduced over a distance of approximately 290m to mitigate any impact on existing mature trees. Existing width of shared pedestrian and cycle facility maintained.
Ch. J3520-J3640	Footway (Outbound)	2.0m	Departure	1.5-1.8m	Footpath width reduced over a distance of approximately 120m to mitigate any impact on existing properties. Existing footway width maintained.

4.5.1.3 Bus Lane Provision

An overview of the bus lane provision as part of the Proposed Scheme is set out in Section 4.6.5. As outlined within that section, full bus priority through the use of dedicated bus lanes is not possible at all locations. Sections in which full bus lane provision cannot be provided, are listed in Table 4.4.

Table 4.4 : Proposed Controlled Priority Junctions within Section 1 - Tallaght Road to Rathfarnham Road

Junction Location	Priority Type	Note
Templeogue Road (Outbound Direction), opposite Ashfield Place	Signal Controlled Priority	The outbound bus lane is curtailed over a distance of approximately 180m to avoid impact on existing private properties, including buildings.
Templeogue Tennis Club/ Templeville Road	Signal Controlled Priority	No bus lanes are provided within Templeogue Village as part of the Templeogue Village Scheme. Signal controlled priority is provided over approx. 225m length.
Fortfield Road / Templeogue Road to Terenure Road West / Templeogue Road	Bus Gate	No inbound bus lane is proposed between Fortfield Road and Terenure Road West due to the three lane cross-section proposed. A bus gate is proposed at Olney Grove to provide bus priority.

4.5.1.4 Bus stops

The different types of bus stop (island, shared landing, inline and lay-by bus stops) are described in Section 4.6.5. Four out of the sixteen proposed bus stops within this Section of the Proposed Scheme are Island Bus Stops. The bus stop locations and types are outlined in Image 4.8 and shown in the General Arrangement series of drawings (BCIDC-ARP-GEO_GA-1012_XX_01-DR-CR-9001) in Volume 3 of this EIAR. Further details of bus stop design are included in the PDGB (NTA 2021) – Appendix A4.1 in Volume 4 of this EIAR.

Table 4.5: Proposed Bus Stop Locations with Section 1 - Tallaght Road to Rathfarnham Road

Inbound	Bus Stop Name	Bus Stop Number	Chainage	Bus Stop Type	Bus Shelter
Inbound	Spawell Centre	2599	J750	Island Bus Stop	Proposed: Yes Existing: Yes
Inbound	Cheeverstown House	2600	J1100	Island Bus Stop	Proposed: Yes Existing: Yes
Inbound	Cypress Grove Road	1155	J1500	Shared Landing Bus Stop	Proposed: Yes New Location
Inbound	Riverside Cottages	1157	J2000	Shared Landing Bus Stop	Proposed: Yes Existing: Yes
Inbound	Bushy Park	1159	J2400	Shared Landing Bus Stop	Proposed: No New Location
Inbound	Terenure College	1160	J2800	Inline Bus stop	Proposed: Yes New Location
Inbound	Lakelands Park	1161	J3250	Inline Bus stop	Proposed: Yes New Location
Inbound	Olney Crescent	1163	J3550	Inline Bus stop	Proposed: No New Location
Outbound	Wellington Lane	2551	J600	Inline Bus stop	Proposed: Yes Existing: Yes
Outbound	Old Bridge Road	1130	J1350	Shared Landing Bus Stop	Proposed: Yes Existing: Yes
Outbound	Riverside Cottages	1127	J1950	Island Bus Stop	Proposed: by SDCC Existing: by SDCC
Outbound	Bushy Park House	1125	J2400	Island Bus Stop	Proposed: Yes Existing: Yes

4.5.1.5 Cycling Provision

The specific proposals for cycling facilities in Section 1 of the Proposed Scheme are described below. Provision for cyclists at the signal-controlled junctions are described in Section 4.6.4.5

Existing cycle facilities have been retained and integrated where possible along the Proposed Scheme. Segregated cycle lanes are provided throughout the majority of Section 1 of the Proposed Scheme. It is proposed to relocate the existing two-way cycle track to the carriageway side of the pedestrian footpath along on the northern side of the R137. This will allow for improved integration with proposed works to convert Spawell Roundabout to a signalised junction with kerb protection for cyclists. Dedicated cycle tracks will be provided along the R137 but will terminate 100m following Cypress Grove Junction, where cyclists will be required to share inbound and outbound with buses and general traffic. It is proposed to reduce traffic speeds to 30kph through this section to improve cyclists safety. Dedicated cycle tracks will resume at Templeogue Village.

A two-way cycle track is proposed through Bushy Park which will link to a quiet street treatment on Rathdown Drive. A quiet street treatment to Rathdown Crescent is intended to tie into the proposed quiet street treatment on Rathdown Park described in Section 4.5.2.5.

4.5.1.6 Junction Information

An overview of the approach to junction review and design is provided in Section 4.6.7. The major and moderate junctions (signalised) within Section 1 - Tallaght Road to Rathfarnham Road of the Proposed Scheme are outlined in Table 4.6.

Table 4.6: Major and Moderate Junctions (Signalised) within Section 1 of the Proposed Scheme

Junction Name	Summary	Signal Operation
Major Junctions (Signalised)		
Templeogue Rd/ Templeville Rd	This junction will be based on Junction Type 1. Bus lanes and cycle tracks will be provided through the junction to facilitate bus priority and improved cyclist safety. The junction will be converted to a protected junction type in accordance with BusConnects Design Guidelines to further improve cyclist safety.	A four stage signal operation is proposed. Mainline buses and cyclists will operate in the same stage through the junction, to be followed by mainline traffic in both directions. The side roads will operate together, with turning traffic to give way to cyclists on flashing ambers. The pedestrian crossings will operate in their own stage.
Templeogue Rd / Cypress Grove Rd	This junction will be based on Junction Type 1. Bus lanes and cycle tracks will be provided through the junction to facilitate bus priority and improved cyclist safety. The junction will be converted to a protected junction type in accordance with BCPDGB to further improve cyclist safety.	A five stage signal operation is proposed. Due to left-turning buses, they will operate in their own stage to avoid conflict with traffic and cyclists. Mainline traffic will have a dedicated stage in each direction, with the outbound left turn to operate with cyclists on a flashing amber. The inbound mainline traffic arm will operate without a flashing amber due to high left turning flow. The side roads will operate together, without cyclists due to high left turning flow. Pedestrians and the remaining cycle phases will operate together.
Templeogue Rd / Wellington Ln	This junction will be based on Junction Type 4. The existing roundabout junction is proposed to be replaced by a signalised junction with an orbital cycle track. The proposed scheme will be compatible with the proposed Wellington Lane cycle scheme and the Dodder Greenway Phase 6. Controlled crossing points will be provided for cyclists to cross the cycle track to large islands within a central signal controlled area.	A six stage signal operation is proposed. As there are dedicated left turn lanes on the mainline, there will be no requirement for a dedicated bus stage. Mainline inbound buses and traffic in all directions will operate together. The right turning traffic movement into the southern arm will stop to allow outbound straight-ahead and left movements to operate with the inbound straight-ahead and left, with buses in both directions. Inbound movements will then stop to allow the outbound right-turning to the northern arm. The side roads

Junction Name	Summary	Signal Operation
		that will operate separately, with non-conflicting pedestrian crossings. The remaining pedestrian crossings will operate with the orbital cycle track through the junction.
Moderate Junctions (Signalised)		
Terenure Place/Terenure Rd West	In terms of physical layout, this junction will remain largely the same due to local constraints. Bus Priority through the junction will be maintained through the use of an inbound bus gate on Templeogue Road approaching the junction.	A three stage signal operation is proposed. Traffic and non-conflicting pedestrian crossings will operate within the same stage to maximise green time and minimise delay. There will be no bus priority signals at this junction.
Templeogue Rd / Fortfield Rd	This junction will be based on Junction Type 1. Junction modifications are proposed to provide bus lanes in both directions at the junction, with the exception of the inbound direction exiting the junction. Cycle tracks are also proposed at the junction, linking to a two-way facility in Bushy Park to the north-east.	A five stage signal operation is proposed. Mainline buses and outbound cyclists will operate in the same stage, to be followed by mainline traffic in both directions. The side roads will operate separately. The pedestrian crossings will operate with the inbound cycle track diagonally through the junction.

4.5.1.7 Parking and Loading Bays

There is no on-street parking and loading bays between Tallaght Road and Rathfarnham Road, with the exception of within Templeogue Village, which does not form part of the Proposed Scheme. Therefore, the proposed scheme has no impact on parking and loading activities within this Section.

4.5.1.8 Landscape and Urban realm

For an overview of the landscape design principles and approach, reference should be made to Section 4.6.13. The following sections provide a description of specific landscape and urban realm design works in Section 1 of the Proposed Scheme.

The outer dual carriageway sections will incorporate continuous two-way or twin cycle tracks as well as upgraded pedestrian facilities, with rationalisation of the larger junctions to replace roundabouts with signalised junctions with better pedestrian crossing facilities and increased areas of landscape and public realm incorporating additional soft landscaping that will enhance the amenity of these areas.

The designed areas of the proposed scheme will incorporate the mid-18th century stone archway at Templeogue Road. The old archway is part of the wider planned Baroque landscape of Templeogue House Demesne and is designated as a Protected Structure (SDD RPS 244). Following conservation and repair works, soft and hard landscaping with tree planting, the old archway will be opened to the public and will substantially contribute to the character of the area through the reintegration of this historic landmark into the urban realm. Proposals include a high-quality paving scheme which is sympathetic to the aesthetic of the arch. Areas of seating and ornamental planting will be provided to enhance sense of place and provide opportunities for passive recreation (refer to Image 4.1).



Image 4.1: The Old Archway at Templeogue Road

Templeogue Road is narrow and variable in width and will require realignment of a number of private property boundaries to establish continuous facilities along the street. Realigned boundaries will be rebuilt along the new alignment and landscaping re-established so that higher quality footpaths will be continuous either side of the village and will tie into the permitted Part 8 village upgrade scheme and will incorporate new street tree planting.

The existing junction with Springfield Road will be rationalised to eliminate slip lanes and to create pocket park areas at each corner of the revised junction with increased soft landscaping and tree planting and better-quality pedestrian and amenity facilities. Cycle traffic and pedestrians along Templeogue Road will be catered for off road within the perimeter of Bushy Park and along Rathdown Drive where a more attractive and safer environment for cyclists and pedestrians can be provided and leaving the adjoining roadway principally for vehicular use.

Approaching Terenure village where the streetscape is more compact and defined by continuous building frontage, all modes will re-join the street. Inbound cyclists will share a short length of bus lane and the outbound cycle track will be improved to provide safer and more legible facilities leading into the village area.

4.5.1.9 Land Acquisition and Use

Permanent land take is required through this section to facilitate the scheme, including into adjacent properties to accommodate widening required for the Proposed Scheme, resulting in the need to relocate boundary walls and gates at these properties.

Temporary land take is required within this section to facilitate:

- Footpath works and urban realm enhancement around a historic stone arch on Templeogue Road;
- Amendments at the entrance to Cheeverstown;

- Road widening and boundary works on Templeogue Road at some properties between Cypress Grove Road and Templeogue Village; and
- Footpath and cycle track improvement works through Bushy Park opposite Terenure college.

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

4.5.1.10 Rights of Way

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

Table 4.7 : Existing Rights of way Affected by the Proposed Scheme

Location	Chainage	Existing Situation	Proposed Change
Vehicular access 1 to access/service road at 252 – 258 Templeogue Road	J1525	Currently, pedestrians, cyclists and vehicular traffic can enter and exit the access/service road at 252 – 258 Templeogue Road through an existing access.	As part of the Proposed scheme, it is proposed to provide a revised access arrangement to this access/service road, consolidating the two existing accesses. Following the implementation of the scheme vehicular traffic (including bicycles) and pedestrians would no longer be able to use the existing access.
Vehicular access 2 to access/service road at 252 – 258 Templeogue Road	J1550	Currently, vehicular traffic can enter and exit the access/service road at 252 – 258 Templeogue Road through an existing access.	As part of the Proposed scheme, it is proposed to provide a revised access arrangement to this access/service road, consolidating the two existing accesses. Following the implementation of the scheme vehicular traffic (including bicycles) would no longer be able to use the existing access.
Pedestrian access to bus stop on Templeogue Road	J3040	Currently, pedestrians can access bus stop number 1123 on Templeogue Road through a gap in the wall linking to the adjacent green space between Templeogue Road and Rathdown Drive.	As part of the Proposed Scheme, it is proposed to relocate this bus stop and to close the existing pedestrian access through the wall. Following the implementation of the Proposed Scheme, it will no longer be possible to access the existing bus stop location.

4.5.2 Section 2: Nutgrove Avenue to Terenure Road North – Grange Road, Rathfarnham Road

4.5.2.1 General overview of the Proposed Scheme

Section 2 of the Proposed Scheme will commence at the junction of Grange Road and Nutgrove Avenue, where it will tie into the Grange Road Cycle scheme. It is proposed to upgrade this junction through the provision of kerb protection for cyclists. This will require a limited amount of land take from the entrance to the Rathfarnham Wood development. It is also proposed to reconfigure the existing car park adjacent to this junction to facilitate the revised road arrangement and to install a new island bus stop layout in this location.

Between this junction and the Castleside Drive junction it is proposed to provide a single bus lane alongside general traffic lanes and cycle tracks in both directions. To accommodate the road layout, it is proposed to utilise limited land-take from adjacent properties, including setting back the existing boundary wall to Rathfarnham Castle Park. The existing boundary wall of Rathfarnham castle will be set back and reconstructed with a round capping roughcast render.

It is proposed to upgrade the junction of Rathfarnham Road and Willbrook Road through the provision of kerb protection for cyclists. It is also proposed to upgrade the junction of Rathfarnham Road and Butterfield Avenue through the provision of kerb protection for cyclists. This will require the removal of general traffic lanes on the Butterfield Avenue arm of this junction.

On the section of Rathfarnham Road between Castleside Drive and Dodder Park Road, it is proposed to provide an inbound bus lane, two general traffic lanes and a 1.5m wide outbound cycle track, with outbound bus priority provided through signal-controlled priority. Due to construction related constraints, the inbound cycle track will be curtailed over approximately 270m, with cyclists utilising the bus lane over this short section. A section of inbound cycle track will be provided at either end of this section, on approach to junctions. It is proposed to introduce a 30 kph speed limit on Rathfarnham Road at this point due to the fact that inbound cyclists will be sharing the bus lane through this section. This 30 kph speed limit will continue from here to the City Centre, due to the presence of multiple urban villages along the route, as well as other sections where cyclists share the bus lane. This consistent speed limit is proposed to ensure legibility for road users along the route and to avoid frequent increases and decreases in speed limits.

To accommodate the new configuration on Rathfarnham Road between Castleside Drive and Dodder Park Road, it is proposed to utilise land-take from adjacent properties on the western side of the road, south of Brookvale Road.

To maintain bus priority through the Dodder Park Road and Rathfarnham Road junction, it is intended to provide signal-controlled priority on the southern and northern approaches to the junction. It is proposed to upgrade this junction through the provision of kerb protection for cyclists, which will tie into the proposed Dodder Greenway on Dodder View Road and Dodder Road Lower.

Between Dodder Park Road and Rathdown Park, it is proposed to provide bus priority through a combination of signal-controlled priority and partial bus lanes, with 1.5m wide cycle tracks provided. To accommodate the new configuration within this section it is proposed to utilise land-take from adjacent properties on the western side of the road.

Between Rathdown Park and Bushy Park Road, no bus lanes are proposed. It is proposed to maintain bus priority by providing signal-controlled priority in both directions and managing traffic queues in this area.

From Bushy Park Road to Terenure Road North it is proposed to provide 1.5m wide cycle tracks, bus lanes and traffic lanes in both directions. To accommodate these new bus lanes on this section of Rathfarnham Road, it is proposed to acquire land from adjacent properties on the eastern side of Rathfarnham Road.

At the Terenure Road North junction it is intended to extend the existing bus lane and proposed cycle track as far as the junction stop line. Bus movements through this junction will be managed with signal-controlled priority. A number of existing parking spaces on the approach to Terenure Village will be removed to facilitate the proposed cross section.

4.5.2.2 Deviations from Standard Cross Sections

The width of the cross-sectional elements as outlined in Section 4.6.1 have been reduced (from published guidance, e.g., DMURS), at a number of constrained locations along the Proposed Scheme. The deviations within Section 2 - are detailed in Table 4.8.

Table 4.8: Reduced Standard Cross Sections on Section 2

Location	Design Elements	DMURS/NCM	Type	Design	Justification
Ch. A45 - A80	Cycle Track (Both directions)	2.0m	Relaxation	1.8m	Cycle Track width reduced over a distance of approximately 35m to avoid any impact on existing properties and to minimize impact on the adjacent car park.
Ch. A140	Footway (Inbound)	2.0m	Relaxation	1.9m	Footpath width reduced locally to avoid any impact of existing properties.
Ch. A540- A560	Footway (Inbound)	2.0m	Departure	1.75-1.85	Footpath width reduced over a distance of approximately 20m due to the proximity of built form to the carriageway.
Ch. A860 – A950	Footway (Inbound)	2.0m	Relaxation	1.8m	Footpath width reduced over a distance of approximately 90m due to minimise impacts on existing properties.
Ch. A775- A1500	Cycle Track (Outbound)	2.0m	Relaxation	1.5m	Cycle Track width reduced over a distance of approximately 725m to minimise impacts on existing properties.
Ch. A1100- A1500	Cycle Track (Inbound)	2.0m	Relaxation	1.5m	Cycle Track width reduced over a distance of approximately 400m to minimise impacts on existing properties.
Ch. A1400- A1460	Footway (Outbound)	2.0m	Relaxation	1.8-1.9	Footpath width reduced over a distance of approximately 60m due to minimise impacts on existing properties.

Location	Design Elements	DMURS/NCM	Type	Design	Justification
Ch. A1570 – A1725	Cycle Track (Inbound)	2.0m	Relaxation	1.5m	Cycle Track width reduced over a distance of approximately 155m to minimise impacts on existing properties.
Ch. A1570 – A1800	Cycle Track (Outbound)	2.0m	Relaxation	1.5m	Cycle Track width reduced over a distance of approximately 230m to minimise impacts on existing properties.
Ch. A1750- A1880	Cycle Track (Outbound)	2.0m	Departure/ Relaxation	1.45-1.9m	To reduce impact on adjacent properties.

4.5.2.3 Bus Lane Provision

An overview of the bus lane provision as part of the Proposed Scheme is set out in Section 4.6.4. As outlined within that section, full bus priority through the use of dedicated bus lanes is not possible at all locations, and Signal Controlled Priority is used in Section 2 of the Proposed Scheme as listed in Table 4.9.

Table 4.9: Proposed Controlled Priority Junctions within Section 2

Junction Location	Priority Type	Note
Grange Road / Rathfarnham Wood	Bus Priority Signal	There is no receiving bus lane in the outbound direction on Nutgrove Avenue due to the existing three lane cross-section.
Dodder Park Road / Rathfarnham Road	Bus Priority Signal	There is no receiving bus lane in the inbound or outbound direction due to the three-lane cross-section proposed and.
Rathfarnham Road / Rathdown Park	Bus Priority Signal	There is no receiving bus lane in the inbound direction due to the three-lane cross-section proposed.
Rathfarnham Road / Bushy Park Road	Signal Controlled Priority	There is no receiving bus lane in the outbound direction due to the three-lane cross-section proposed.
Terenure Road North/ Rathfarnham Road	Signal Controlled Priority	There is no receiving inbound bus lane at this junction due to the space contains at Terenure Village.

4.5.2.4 Bus stops

The different types of bus stop (island, shared landing, inline and lay-by bus stops) are described in Section 4.6.4. Two of the fourteen proposed bus stops are Island Bus stops. The bus stop locations and types are outlined in Image 4.8 and shown in the General Arrangement series of drawings (BCIDC-ARP-GEO_GA-1012_XX_00-DR-

CR-9001) in Volume 3 of this EIAR. Further details of bus stop design are included in the PDGB (NTA 2021) – Appendix A4.1 in Volume 4 of this EIAR.

Table 4.10 Proposed Bus Stop Locations with Section 2

Inbound/Outbound	Bus Stop Name	Bus Stop Number	Chainage	Bus Stop Type	Bus Shelter
Inbound	St. Mary's Boys School	1329	A100	Island Bus Stop	Proposed: Yes Existing: Yes
Inbound	Willbrook Road	1330	A300	Shared landing Bus Stop	Proposed: Yes Existing: Yes
Inbound	Butterfield Avenue	1331	A525	Shared landing Bus Stop	Proposed: Yes Existing: Yes
Inbound	Castle side	1332	A800	Inline Bus Stop	Proposed: Yes Existing: Yes
Inbound	Brookvale Rd	1333	A1150	Inline Bus Stop	Proposed: Yes New Location
Inbound	Rathdown Park	7293	A1450	Inline Bus Stop	Proposed: Yes New Location
Inbound	Fergus Road	1336	A1800	Island Bus Stop	Proposed: Yes Existing: Yes
Outbound	Willbrook Road	1305	A275	Shared landing Bus Stop	Proposed: Yes Existing: Yes
Outbound	Butterfield Avenue	1304	A550	Shared landing Bus Stop	Proposed: Yes Existing: Yes
Outbound	Rathfarnham Castle	1303	A675	Inline Bus Stop	Proposed: Yes Existing: No
Outbound	Dodder Park Road	1301	A950	Inline Bus Stop	Removed Existing: No
Outbound	Westbourne Road	1300	A1300	Inline Bus Stop	Proposed: Yes New Location
Outbound	Fergus Road	1299	A1700	Shared landing Bus Stop	Proposed: No Existing: Yes

4.5.2.5 Cycling Provision

The specific proposals for cycling facilities in Section 2 of the Proposed Scheme are described below. Provision for cyclists at the signal-controlled junctions are described in Section 4.6.4.5.

Dedicated cycle tracks in both directions will be provided from Nutgrove Avenue to Castleside Drive. Following Castleside drive a single outbound cycle track will be provided, the inbound cycle track will be curtailed over approximately 270m, with cyclists utilising the bus lane over this short section. Dedicated cycle tracks are proposed from the remainder of Section 2 until it joins Section 3 at Terenure Road North.

A section of inbound cycle track will be provided at either end of this section, on approach to junctions. It is proposed to introduce a 30 kph speed limit on Rathfarnham Road at this point due to the fact that inbound cyclists will be sharing the bus lane through this section. Between Dodder Park Road and Rathdown Park, it is proposed to provide bus priority through a combination of signal-controlled priority and partial bus lanes, with 1.5m wide cycle tracks provided. From Bushy Park Road to Terenure Road North it is proposed to provide 1.5m wide cycle tracks, bus lanes and traffic lanes in both directions.

4.5.2.6 Junction Information

An overview of the approach to junction review and design is provided in Section 4.6.7. The major and moderate junctions (signalised) within Section 2 – Nutgrove Avenue to Terenure Road North of the Proposed Scheme are outlined in Table 4.11.

Table 4.11: Major and Moderate Junctions (Signalised) within Section

Junction Name	Summary	Signal Operation
Major Junctions (Signalised)		
Grange Rd / Rathfarnham Wood	This junction will be based on Junction Type 1. The junction is proposed to be upgraded to provide bus lanes and cycle tracks in both directions on Grange Road western approach tying into existing facilities on the eastern approach. A fully protected junction is also proposed to improve cyclist safety.	A six stage signal operation is proposed. Mainline inbound buses and cyclists will operate with outbound straight-ahead and left general traffic. The outbound straight-ahead and left general traffic will continue with inbound traffic, to be followed by the right-turning outbound traffic and left-turning traffic from Grange Road. Mainline outbound cyclists will operate with left-turning traffic from Grange Road, to be followed by all traffic from both side roads. The pedestrian crossings will operate in a stage with cyclists turning right to and from the side roads.
Rathfarnham Rd / Dodder Park Rd	This junction will be based on Junction Type 1. The existing junction is proposed to be altered by providing bus lanes in each direction on the northern and southern approaches as well as conversion of the junction to a protected junction for cyclists. No inbound bus lane is proposed north of the junction and no outbound bus lane is provided south of the junction with priority maintained in these locations using bus priority signals.	A four stage signal operation is proposed. Mainline buses and cyclists will operate in the same stage through the junction, to be followed by mainline traffic in both directions. Traffic from side roads will operate together. Cyclists crossing from the side roads will operate with pedestrians due to the high volume of left turning traffic.

Junction Name	Summary	Signal Operation
Rathfarnham Rd / Butterfield Ave Ln	This junction will be based on Junction Type 1. The junction is proposed to be updated to provide bus lanes and cycle tracks in each direction. A fully protected junction is also proposed to improve cyclist safety	A five stage signal operation is proposed. Outbound buses, cyclists, and straight-ahead traffic will operate with inbound straight and left-turning buses. Outbound movements will then continue with inbound traffic. Mainline outbound traffic and cyclists turning right will go with side arm traffic turning left, to be followed by all traffic movements from the side road. Pedestrians will operate with inbound cyclists and cyclists turning right from the side road.
Moderate Junctions (Signalised)		
Grange Rd / Willbrook Rd	This junction will be based on Junction Type 1. This junction is proposed to be upgraded to provide bus lanes and cycle tracks in each direction through the junction. A fully protected junction is also proposed to improve cyclist safety.	A five stage signal operation is proposed. Mainline buses and cyclists will operate in the same stage through the junction. Outbound buses and cyclists will continue with mainline traffic in both directions, followed by a right turn indicative arrow to facilitate the heavy traffic flow into Willbrook Road. The side road traffic and cyclists will operate in their own stage with flashing ambers, to be followed by pedestrians and right turning cyclists.
Rathfarnham Rd / Castle side Drive	This junction will be based on Junction Type 3. The existing junction is proposed to be altered by providing bus lanes and cycle tracks in each direction on the northern and southern approaches, except for southbound on approach to the junction where no bus lane is provided. A fully protected junction is also proposed to improve cyclist safety	A five stage signal operation is proposed. Mainline straight and left turning traffic and buses will operate in the same stage, with left turning vehicles to cross the bus lane paths at 20m from the junction and to give way to cyclists on flashing ambers. This will maximise green time for buses and minimise delay. Right turning mainline traffic in both directions will then operate unopposed. The side roads will operate in separate stages, with left turning traffic to give way to cyclists on flashing ambers. The pedestrian crossings will operate in their own stage.
Rathfarnham Rd / Rathdown Park	This junction will be based on Junction Type 1. The existing junction is proposed to be altered by providing dedicated cycle tracks in each direction as well as provision of a protected junction for cyclist at Rathdown Park. A bus lane is to be provided on the northern and southern approaches	A five stage signal operation is proposed. The inbound and outbound bus and cycle lanes will operate at the same time, followed by the inbound and outbound straight and left general traffic lanes. The outbound movements will stop to allow right-turning traffic into Bushy Park Road to operate unopposed. Traffic will be released from the side roads at the same time, followed by the pedestrian crossings in

Junction Name	Summary	Signal Operation
		their own stage. Dynamic staging can be used to ensure buses maintain priority through the junction.
Rathfarnham Rd / Bushy Park Rd	This junction will be based on Junction Type 1. The existing junction is proposed to be altered by providing dedicated cycle tracks in each direction as well as provision of a protected junction for cyclist at Rathdown Park. A bus lane is to be provided on the northern and southern approaches.	A five stage signal operation is proposed. The inbound and outbound bus and cycle lanes will operate at the same time, followed by the inbound and outbound straight and left general traffic lanes. The outbound movements will stop to allow right-turning traffic into Bushy Park Road to operate unopposed. Traffic will be released from the side roads at the same time, followed by the pedestrian crossings in their own stage. Dynamic staging can be used to ensure buses maintain priority through the junction.
Orwell Road / Zion Road	The existing junction is proposed to be altered by providing dedicated cycle tracks on the Orwell Road arm of the junction as well as the removal of the slip lane from Zion Road onto Orwell Road.	A three stage signal operation is proposed. The outbound track will operate at the same time as the mainline traffic stages to maximise green time and minimise delay. The side road traffic will operate separately, with left turning traffic to give way to cyclists on flashing amber, to be followed by pedestrian crossings in their own stage. There will be no bus priority at this junction.

4.5.2.7 Parking and Loading Bays

Changes to the parking and loading provisions along Section 2- Nutgrove Avenue to Terenure Road North as a result of the Proposed Scheme are shown in Table 4.12.

Table 4.12 : Section 2 – Nutgrove Avenue to Terenure Road North On-Street Parking Spaces Change Impact Summary

Location	Type of Parking		Existing	Proposed	Change
Next to St. Mary's Avenue	Designated Paid	Residential	7	7	0
Rathfarnham Road between Cormac Terrace and Terenure Road East	Designated Paid	Commercial	14	7	-7
Rathfarnham Road between Cormac Terrace and Terenure Road East	Disabled Designated Paid and Permit	Commercial	1	1	0

Approx. adjacent on-street parking within 200m	83	83	0
Total	105	98	-7

There are no existing loading bays along this Section.

4.5.2.8 Landscape and Urban realm

For an overview of the landscape design principles and approach, reference should be made to Section 4.6.13. The following sections provide a description of specific landscape and urban realm design works in Section 2 of the Proposed Scheme.

The Grange Road junction is to be rationalised to reduce the overarching vehicular dominance and to provide additional landscape areas that will enhance pedestrian amenity and public realm. Grange Road will be widened further, requiring encroachment into the grounds of Rathfarnham Castle however the realigned boundary will facilitate planting street trees in the new footpath to soften and enhance the appearance of the existing roadway and to provide a sense of separation between the pedestrian space and roadway. The existing poor quality boundary wall will be replaced with a new boundary wall finished in roughcast render, which will be more in keeping with the construction of the castle. The impacted woodland will be replanted with native species and the existing playground will be integrated with the new planting and setback wall alignment (refer to Image 4.2).



Image 4.2: Rathfarnham Castle

Similarly, the junction at Butterfield Avenue will be rationalised to introduce better pedestrian and cycle facilities with widened footpaths facilitating provision of additional landscaping and tree planting.

Rathfarnham Road, either side of the Dodder River, will require encroachment into private front gardens. There will be loss of existing trees and vegetation, both on street and with front garden boundaries, however, the proposals include for reinstatement of garden boundaries and landscaping and the provision of new street trees along the public footpath.

Leading into Terenure Village, the roadway will be rationalised to provide continuous pedestrian and cycle facilities with refurbishment and re-building footpaths so as to upgrade the appearance and integrity of the public realm. New tree planting will be incorporated to replace existing trees felled and the overall quality of the public realm will be upgraded as it leads into the village core beyond.

4.5.2.9 Land Acquisition and Use

Permanent land take is required through this section to facilitate the scheme, including into adjacent properties to accommodate widening required for the Proposed Scheme, resulting in the need to relocate boundary walls and gates at these properties.

Temporary land take is required within this section to facilitate:

- Footpath and cycle track works at the junction of Rathfarnham Wood/Nutgrove Avenue/Grange Road;
- Road widening and boundary works to properties within Rathfarnham Wood;
- Road widening and boundary works along Rathfarnham Castle grounds;
- Amendments at the entrance to Village Green;
- Road widening and boundary works at the petrol station on Rathfarnham Road near Rathfarnham village;
- Road widening and boundary works on Rathfarnham Road at some properties between Main Street Rathfarnham and Terenure Cross;
- Footpath and cycle track improvement works in the green area at the junction of Dodder Park Road / Rathfarnham Road;
- Road widening and boundary works at the laneway to Wasdale House on Rathfarnham Road; and
- Road widening and boundary works at the Terenure Synagogue on Rathfarnham Road.

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 1 of the Proposed Scheme are addressed in Chapter 17 (Landscape (Townscape) & Visual).

4.5.2.10 Rights of Way

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

Table 4.13 : Existing Rights of way Affected by the Proposed Scheme

Location	Chainage	Existing Situation	Proposed Change
Footpath connecting to Grange Road car park	A0100	Currently, pedestrians can use the public footpath which runs behind the bus stop on Grange Road to access the Grange Road car park.	As part of the Proposed scheme, it is proposed to remove this footpath connection. Following the implementation of the scheme pedestrians would no longer be able to use the existing footpath, however pedestrian access to the car park will be maintained via an alternative footpath connection.

4.5.3 Section: 3 Terenure Road North to Charleville Road – Terenure Road East, Rathgar Road

4.5.3.1 General overview of the Proposed Scheme

On Terenure Road East, between the Terenure Road North junction and St. Joseph's Church, due to the proximity of existing built form to the carriageway, it is proposed to provide a single general traffic lane in each direction. Bus priority will be provided through this section by signal-controlled priority. It is also proposed to widen the footpaths within this section and to provide high-quality urban realm within Terenure Village.

Between St. Joseph's Church and the Rathgar Avenue junction it is intended to provide a bus lane and general traffic lane in both directions. To accommodate the proposed cross section, it is proposed to acquire land from adjacent properties on both sides of Terenure Road East.

It is also proposed to provide an alternative cycle facility consisting of cycle tracks in each direction along Terenure Road North and Harold's Cross Road, connecting to the Kimmage to City Centre Core Bus Corridor Scheme at Harold's Cross. An additional alternative cycle facility is proposed along Bushy Park Road, Wasdale Park, Wasdale Grove, Victoria Road, Zion Road and Orwell Road to provide a secondary east-west route for cyclists travelling between Rathfarnham Road and Rathgar Road.

At Rathgar Avenue, it is proposed to maintain bus priority through the junction with signal-controlled priority.

Along Rathgar Road it is proposed to provide bus lanes and 1.5m wide cycle tracks in each direction and a one-way inbound general traffic lane only. Local access for residents on Rathgar Road and adjoining streets will be maintained through the surrounding road network via Rathgar Avenue or Rathmines Road Upper including Frankfort Avenue, Leicester Avenue, Garville Avenue, Garville Road and Highfield Road.

It is proposed to upgrade the junction of Rathgar Road and Grosvenor Road through the provision of kerb protection for cyclists.

It is proposed to remove the current right turn ban from Rathmines Road Upper to Highfield Road as well as the right turn ban from Highfield Road onto Rathgar Road to facilitate outbound general traffic movements.

4.5.3.2 Deviations from Standard Cross Sections

The width of the cross-sectional elements as outlined in Section 4.6.1 have been reduced (from published guidance, e.g., DMURS), at a number of constrained locations along the Proposed Scheme. The deviations within Section 1 - are detailed in Table Below.

Table 4.14: Reduced Standard Cross Sections on Section 3

Location	Design Element	DMURS/ NCM	Type	Design	Justification
Ch. A2560 -A3600	Cycle Track (Inbound)	2m	Departure	1.5m	Approximately 40m of narrowed cycle track due to the on-street parallel parking. Providing a standard width would require the removal of on-street parking facilities at this location.
Ch. A2650 -A3950	Cycle Track (Outbound)	2m	Departure	1.3-1.5m	Approximately 300m of narrowed cycle track due to

Location	Design Element	DMURS/ NCM	Type	Design	Justification
					the provision of bus lane in both directions and the constraint nature of this section of Rathgar Road. Providing a standard width would require land acquisition of adjacent properties.
Ch. A2700 -A2775	Footway (Outbound)	2m	Relaxation	1.8-1.9m	It is proposed to reduce approximately 75m of footpath width at this location to provide a bus lane and cycle tracks in both directions and reduce impact on adjacent properties. This would reduce the footpath width to a minimum of 1.8m.
Ch. A2700-2725	Footway (Inbound)	2m	Relaxation	1.8-1.9m	It is proposed to reduce approximately 25m of footpath width at this location to provide a bus lane and cycle tracks in both directions and reduce impact on adjacent properties. This would reduce the footpath width to a minimum of 1.8m.
Ch. A2840 -A2860	Footway (Outbound)	2m	Departure	1.8-1.9m	It is proposed to reduce approximately 20m of footpath width at this location to provide a bus lane and cycle tracks in both directions and reduce impact on adjacent properties. This would reduce the footpath width to a minimum of 1.8m.
Ch. A2940 -A3125	Footway (Outbound)	2m	Departure/ Relaxation	1.5-1.95m	It is proposed to reduce approximately 185m of footpath width at this location to provide a bus lane and cycle tracks in both directions and reduce impact on adjacent properties. This would

Location	Design Element	DMURS/ NCM	Type	Design	Justification
					reduce the footpath width to a minimum of 1.5m.
Ch. A3520 -A3625	Footway (Outbound)	2m	Departure/ Relaxation	1.5-1.95m	It is proposed to reduce approximately 130m of footpath width at this location to provide a bus lane and cycle tracks in both directions and reduce impact on adjacent properties. This would reduce the footpath width to a minimum of 1.5m.
Ch. A3350-A3625	Footway	2m	Relaxation	1,8-1.95m	It is proposed to reduce approximately 275m of footpath width to provide a bus lane and cycle track in both directions. Narrowing of the footpath results in minimising impact on adjacent properties.
Ch. A2560-A2575	Footway (Inbound)	2m	Relaxation	1.8-1.95m	Approximately 15m of footpath width is retained.
Ch. H30 – H60	Cycle Track (Outbound)	2m	Departure	1.3m	Approximately 30m of narrowed cycle track. Providing a standard width would require narrowing the existing footpath at this location.
Ch. H60 – H100	Cycle Track (Outbound)	2m	Relaxation	1.75	Approximately 40m of narrowed cycle track due to the constraint nature of this section. Providing a standard width would require reducing the width of the existing footpath. This section is in a busy town centre environment, reducing the footpath width would have significant impact on pedestrian comfort.
Ch. H30 – H120	Cycle Track (Inbound)	2m	Relaxation	1.5	Approximately 90m of narrowed cycle track due to the provision of on-street

Location	Design Element	DMURS/ NCM	Type	Design	Justification
					parking and a loading bay. Providing a standard width would require the removal of on-street parking and loading bay and, reducing the footpath width to below standard.
Ch. H340 - H575	Cycle Track (Outbound)	2m	Relaxation	1.5m	Approximately 335m of narrowed cycle track due to the constraint nature of this section. Providing standard width at this section would require reducing the width of the already narrow footpath or land acquisition of adjacent properties.
Ch. H340 - H370	Cycle Track (Inbound)	2m	Relaxation	1.6m	Approximately 30m of narrowed cycle track due to the constraint nature of this section. Providing standard width at this section would require reducing the width of the already narrow footpath or land acquisition of adjacent properties.
Ch. H325 - H375	Footway (Outbound)	2m	Departure / Relaxation	1.4-1.95m	Approximately 50m of existing footpath retained.
Ch. H450 – H480	Footway (Inbound)	2m	Departure / Relaxation	1.6-1.9m	It is proposed to reduce the footpath width locally in this location to provide a 1.5m cycle track in both directions and minimise impact on adjacent properties.
Ch. H450 - H500	Cycle Track (Inbound)	2m	Relaxation	1.5m	Approximately 50m of narrowed cycle track due to the constraint nature of this section. Providing standard width at this section would require reducing the width of the already narrow footpath or land acquisition of adjacent properties.
Ch. H920	Footway (Inbound)	2m	Relaxation	1.9m	Localised pinch point (under 2.0m in length) due to the

Location	Design Element	DMURS/ NCM	Type	Design	Justification
					existing configuration of the junction.
Ch. H1140	Footway (Inbound)	2m	Departure	1.5m	Footpath width retained at this location. Existing localised pinch point (over 2.0m in length) due to the provision of on-street parking at this location.
Ch. H1200 - H1220	Footway (Inbound)	2m	Departure / Relaxation	1.4-1.8m	Footpath width retained at this location. Existing localised pinch point (over 2.0m in length) due to the provision of on-street parking at this location.
Ch. H1360 -H1400	Cycle Track (Inbound)	2m	Relaxation	1.5m	Approximately 40m of narrowed cycle track due to the constraint nature of this section. Providing standard width at this section would require reducing the width of the already narrow footpath or land acquisition of adjacent properties.
Ch. H1325 -H1400	Footway (Outbound)	2m	Departure	1.5m	It is proposed to reduce the footpath width locally at this location due to the constraint nature at this location and to provide 1.5m cycle tracks in both directions.
Ch. H1400-1420	Footway (Outbound)	2m	Departure	1.7-1.8m	It is proposed to reduce the footpath width locally at this location due to the constraint nature at this location and to provide a 1.5m cycle track in both directions.

4.5.3.3 Bus Lane Provision

An overview of the bus lane provision as part of the Proposed Scheme is set out in Section 4.6.5. As outlined within that section, full bus priority through the use of dedicated bus lanes is not possible at all locations, and Signal Controlled Priority is used in Section 3 of the Proposed Scheme as listed in Table 4.15.

Table 4.15 : Proposed Controlled Priority Junctions within Section 3

Junction Location	Priority Type	Note
Terenure Road East (Outbound), outside St. Joseph's Church.	Signal Controlled Priority	No bus lanes are provided between Terenure Cross and St. Joseph's church due to the space constraint at Terenure Village including buildings close to the carriageway.
Terenure Road East / Orwell Road	Signal Controlled Priority	There is no receiving bus lane in the inbound direction due to the three-lane cross-section proposed.

4.5.3.4 Bus stops

The different types of bus stop (island, shared landing, inline and lay-by bus stops) are described in Section 4.6.4. None of the nine proposed bus stops are Island Bus stops. The bus stop locations and types are outlined in Image 4.8 and shown in the General Arrangement series of drawings (BCIDC-ARP-GEO_GA-1012_XX_00-DR-CR-9001) in Volume 3 of this EIAR. Further details of bus stop design are included in the PDGB (NTA 2021) – Appendix A4.1 in Volume 4 of this EIAR.

Table 4.16 : Proposed Bus Stop Locations with Section 3

Inbound/Outbound	Bus Stop Name	Bus Stop Number	Chainage	Bus Stop Type	Bus Shelter
Inbound	Healthfield Road	1164	A2000	Inline Bus Stop	Proposed: Yes: Existing: Yes
Inbound	Brighton Road	1165	A2450	Inline Bus Stop	Proposed: Yes Existing: Yes
Inbound	Winton Avenue	1166	A 2800	Shared Landing Bus stop	Proposed: Yes Existing: Yes
Inbound	Grosvenor Road	1168	A3200	Shared Landing Bus stop	Proposed: Yes Existing: No
Outbound	Rathfarnham Road	1085	A1950	Inline Bus Stop	Proposed: Yes Existing: Yes

Inbound/Outbound	Bus Stop Name	Bus Stop Number	Chainage	Bus Stop Type	Bus Shelter
Outbound	Rathgar Park	1082	A2400	Inline Bus Stop	Proposed: No Existing: No
Outbound	Highfield Road	1081	A 2700	Shared Landing Bus stop	Proposed: No Existing: No
Outbound	Frankfort Avenue	1079	A3100	Shared Landing Bus stop	Proposed: Yes Existing: No
Outbound	Garda Station	1077	A 3600	Shared Landing Bus stop	Proposed: No Existing: Yes

4.5.3.5 Cycling Provision

The specific proposals for cycling facilities in Section 3 of the Proposed Scheme are described below. Provision for cyclists at the signal-controlled junctions are described in Section 4.6.4.5.

Due to constraints along Terenure Road East it is proposed to provide an alternative cycle facility consisting of cycle tracks in each direction along Terenure Road North and Harold's Cross Road, connecting to the Kimmage to City Centre Core Bus Corridor Scheme at Harold's Cross. An additional alternative cycle facility is proposed along Bushy Park Road, Wasdale Park, Wasdale Grove, Victoria Road, Zion Road and Orwell Road to provide a secondary east-west route for cyclists travelling between Rathfarnham Road and Rathgar Road. Along Rathgar Road it is proposed to provide 1.5m wide cycle tracks in each direction.

4.5.3.6 Junction Information

An overview of the approach to junction review and design is provided in Section 4.6.7. The major and moderate junctions (signalised) within Section 3 – Terenure Road North to Charleville Road of the Proposed Scheme are outlined in Table 4.17.

Table 4.17: Major and Moderate Junctions (Signalised) within Section

Junction Name	Summary	Signal Operation
Major Junctions (Signalised)		
Rathfarnham Rd / Terenure Rd N	This junction will be based on Junction Type 1. The existing junction is proposed to be altered by providing a bus lane on the southern approach and providing dedicated cycle facilities along Rathfarnham Road and Terenure Road North. The existing slip lane for traffic turning left from Rathfarnham Road will be removed to improve pedestrian facilities in the village centre	A five stage signal operation is proposed. The bus lane on Rathfarnham Road will operate in its own stage due to the presence of right and left-turning buses. The mainline cycle tracks and general traffic lanes will then operate together, with turning traffic to give way to cyclists on flashing amber. The inbound movement will then stop to allow right-turning traffic into Terenure Place to operate unopposed. The

Junction Name	Summary	Signal Operation
		side roads will then run together, with right turners from Terenure Place (only permitted outside of peak hour for general traffic) to run in gaps. The pedestrian crossings will operate in their own stage.
Moderate Junctions (Signalised)		
Harold's Cross Rd / Rathgar Ave	The existing junction is proposed to be altered by providing dedicated cycle tracks in each direction. The proposed layout will be compatible with the Kimmage to City Centre scheme	A four stage signal operation is proposed. Cycle tracks will operate at the same time as the mainline traffic stages on Harold's Cross Road to maximise green time and minimise delay, to be followed by Kenilworth Square N separately, then Kenilworth Park and Rathgar Ave together. The pedestrian crossings will operate in their own stage. There will be no bus priority at this junction.
Harold's Cross Rd / Leinster Rd	The existing junction is proposed to be altered by providing dedicated cycle tracks in each direction and toucan crossings on all arms.	A three stage signal operation is proposed. Cycle tracks will operate at the same time as the mainline traffic stages to maximise green time and minimise delay, to be followed by the side road and then the pedestrian crossings will operate in their own stage. There will be no bus priority at this junction.
Terenure Rd E / Rathgar Rd	This junction will be based on Junction Type 1. The existing junction is proposed to be altered by the provision of cycle tracks in each direction through the junction and Advanced Stacking Locations on Highfield Road and Orwell Road. New toucan crossings are proposed across all arms of the junction to improve pedestrian facilities and turning movements for cyclists.	A three stage signal operation is proposed. Cycle tracks will operate at the same time as the mainline traffic stages to maximise green time and minimise delay, to be followed by the side road and then the pedestrian crossings will operate in their own stage. There will be no bus priority at this junction.
Rathgar Rd / Highfield Rd	This junction will be based on Junction Type 1. The existing junction is proposed to be altered by the provision of cycle tracks in each direction through the junction and Advanced Stacking Locations on Highfield Road and Orwell Road. New toucan crossings are proposed across all arms of the junction to improve pedestrian facilities and turning movements for cyclists.	A three stage signal operation is proposed. Cycle tracks will operate at the same time as the mainline traffic stages to maximise green time and minimise delay, to be followed by the side road and then the pedestrian crossings will operate in their own stage. There will be no bus priority at this junction.
Rathgar Rd / Leicester Ave	This junction will be based on Junction Type 1. The existing junction is proposed to be altered by the provision of bus lane in each direction through the junction as well as	A four stage signal operation is proposed. Mainline buses and cyclists will operate together, followed by the inbound general traffic lane. This will maximise green time for buses and minimise delay. The side

Junction Name	Summary	Signal Operation
	cycle facilities on each approach. Outbound traffic lane is proposed to be removed.	roads will operate together, with the pedestrian crossings to operate in their own stage.
Rathgar Rd / Grosvenor Rd	<p>This junction will be based on Junction Type 1.</p> <p>The existing junction is proposed to be altered by the provision of an inbound bus lane through the junction as well as protected cycle facilities on each approach.</p>	<p>A four stage signal operation is proposed. Cycle tracks will operate at the same time as the inbound bus lane, followed by the inbound general traffic lane. The outbound traffic lane will operate at the same time as Grosvenor Road, with turning traffic to give way to cyclists on a flashing amber. The pedestrian crossings will operate in their own stage.</p>
Highfield Road / Rathmines Road Upper	<p>The existing junction is proposed to be altered by permitting the right turn from Rathmines Road Upper onto Highfield Road.</p>	<p>A five stage signal operation is proposed. Straight ahead and right turning movements along Highfield Road and Palmerston Park will operate together with right turning traffic giving way. A right turn indicative arrow will facilitate the heavy traffic flow into Dartry Road. The left turn movement from Palmerston Park will operate continuously with a flashing amber, to give way to all other traffic movements and will stop when pedestrians are allowed to cross. Left turning movements from Highfield Road will operate with right turning movements from Rathmines Road Upper and Dartry Road. Straight ahead and left turning movements from Rathmines Road Upper and Dartry Road will operate together.</p> <p>The pedestrian crossings will operate in their own stage.</p>

4.5.3.7 Parking and Loading Bays

Changes to the parking and loading provisions along Section 3 – Terenure Road North to Charleville Road – Terenure Road East, Rathgar Road, as a result of the Proposed Scheme are shown in Table 4.18 and Table 4.19 respectively.

Table 4.18: On-Street Parking Spaces Change Impact Summary

Location	Type of Parking		Existing	Proposed	Change
Terenure Road East, west of Rathgar Village Junction	Designated Paid	Commercial	6	6	0
Terenure Road East, west of Rathgar Village Junction	Designated Paid	Commercial	1	1	0
Between Highfield Road and Wesley Road	Designated Paid	Commercial	6	3	-3
Between Terenure Place and Yewland's Tce	Designated Paid	Commercial	2	2	0
Between Yewland's Tce and Rathmore Villas	Designated Paid	Commercial	9	7	-2
Between Rathmore Villas and Eagle Hill Ave	Designated Paid	Commercial	5	0	-5
Between Eagle Hill Ave and Whitton Rd	Designated Paid	Commercial	2	2	0
Between West Hampton Pl and Ashdale Rd	Designated Paid and Permit	Commercial	6	4	-2
Between Ashdale Rd and Mt Tallant	Designated Paid and Permit	Commercial	15	0	-15
Between Kenilworth Lane W and Leinster Road	Designated Paid	Commercial	8	8	0
Approx. adjacent on-street parking within 200m			368	368	0
Total			430	401	-29

Table 4.19 : Existing and proposed Loading Bays

Location	Type of Parking		Existing	Proposed	Change
At Highfield Road	Loading Bay	Commercial	6	3	-3
Between Terenure Place and Yewland's Tce	Loading Bay / Designated Paid Parking	Commercial	2	2	0
Between Yewland's Tce and Rathmore Villas	Loading Bay / Designated Paid Parking	Commercial	2	0	-2
Between Rathmore Villas and Eagle Hill Ave	Taxi Rank	Commercial	4	4	0
Between Eagle Hill Ave and Whitton Rd	Loading Bay / Designated Paid Parking	Commercial	2	2	0
Total			16	11	-5

4.5.3.8 Landscape and Urban realm

For an overview of the landscape design principles and approach, reference should be made to Section 4.6.13. The following sections provide a description of specific landscape and urban realm design works in Section 1 of the Proposed Scheme.

Terenure Road East will incorporate wider footpaths within the village core and reduced carriageways so as to enhance pedestrian facilities. Widened footpaths will be built using quality material commensurate with that of the built context of the village so as to enhance the character of the village locality.

Immediately east of the village, bus lanes are proposed on Terenure Road East, and this will require encroachment into private properties, including associate tree felling and realignment of boundary walls and gates. New tree planting will be provided post construction to mitigate the loss of existing trees. Further east, the majority of interventions are related to re-allocation of existing carriageway in order to provide dedicated bus lanes and physical changes comprising rebuilding of kerbs and upgrade of footpaths to match those existing.

At Rathgar Village, the carriageway at the adjoining junction is to be rationalised to reduced vehicular space and to provide additional pedestrian and public realm space. The slip lane from Highfield Road will be removed and this will facilitate the provision of a greatly increased public realm amenity space, with hard and soft landscaping along the shop frontages, that will incorporate seating, tree planting and low-level planting to encourage passive amenity. Medians will be introduced and will incorporate low level planting to further reduce the apparent width of the carriageways. Pavement and kerbs will be re-built using high quality materials sympathetic to the form of the surrounding traditional buildings and the character of the village setting. Importantly, the emerging design avoids impacting the boundary of Christ Church and the mature trees within the grounds and the distinctive focal point of the village will be retained as existing (refer to Image 4.3).

Proposals along Rathgar Road relate to re-allocation of the existing carriageway in order to provide dedicated continuous footpaths and cycle tracks along both sides of the street, established wider zones for pedestrians and cyclists and a reduction in the perceived carriageway width.



Image 4.3: Rathgar Village

4.5.3.9 Land Acquisition and Use

Permanent land take is required from properties to accommodate widening required for the Proposed Scheme, resulting in the need to relocate boundary walls and gates at these properties.

Temporary land take is required within this section to facilitate:

- Road widening and boundary works on Terenure Road East at some properties between Terenure Cross and Brighton Road;
- Amendments at the entrance to 125 Rathgar Road; and
- Amendments at the entrance to Eaton Hall.

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 1 of the Proposed Scheme are addressed in Chapter 17 (Landscape (Townscape) & Visual).

4.5.3.10 Rights of Way

Table 4.20 outlines the locations where existing rights of way will be affected by the Proposed Scheme.

Table 4.20 : Existing Rights of way Affected by the Proposed Scheme

Location	Chainage	Existing Situation	Proposed Change
Loading area/slip lane at the junction of Highfield Road and Rathgar Road.	A2525	Currently vehicles travelling westbound on Highfield Road can access an existing loading area and continue onto Rathgar Road via a slip lane at the junction.	As part of the Proposed Scheme, it is proposed to remove this slip lane in its entirety. Following the implementation of the Proposed Scheme, it will no longer be possible to access the existing loading bay/slip road. An alternative loading bay will be provided in close proximity and traffic will still be able to turn left from Highfield Road to Rathgar Road at this junction.

4.5.4 Section: 4 Charleville Road to Dame Street

4.5.4.1 General overview of the Proposed Scheme

On Rathgar Road and Rathmines Road Lower between Charleville Road and Castlewood Avenue it is proposed to provide an inbound bus lane, an inbound and outbound traffic lane and cycle tracks in each direction. Outbound bus priority will be provided through signal-controlled priority. It is proposed to upgrade the junction of Rathmines Road Upper with Rathmines Road Lower/Rathgar Road through the provision of kerb protection for cyclists. An upgraded public realm will be provided at this junction through the reallocation of road space.

Between Castlewood Avenue and Grove Road, a general traffic lane and a cycle track in each direction are proposed, with the provision of a Bus Gate between Richmond Hill and Lissenfield which will restrict general traffic movements during the hours of operation of the Bus Gate (06:00 - 20:00 - 7 days a week). This proposal also allows for some increase to footpath widths through Rathmines and the provision of 2m wide cycle tracks in each direction through the village.

It is proposed to reverse the existing one-way traffic regime on Williams Park to facilitate traffic to turn off of the Proposed Scheme main corridor at Military Road in advance of the Bus Gate and return via Williams Park. It is proposed to provide a mini roundabout outside of St Mary's College to facilitate school drop off.

It is proposed to restrict movements on Mountpleasant Street Lower, north of the junction with Richmond Hill to pedestrians and cyclists only through the introduction of planted buildouts. It is also proposed to reintroduce the right turn from Richmond Hill to Mountpleasant Avenue Upper, to facilitate general traffic to turn off of the Proposed Scheme main corridor at Richmond Hill in advance of the Bus Gate and return via Mountpleasant Avenue Upper. Due to the restricted road width at this location, a traffic light shuttle system is proposed to safely manage these traffic movements.

At La Touche bridge it is proposed to provide an inbound bus lane and an outbound general traffic lane along with a high-quality segregated cycling facility, to facilitate connectivity with the Grand Canal cycleway. Inbound general traffic will be required to turn left onto Grove Road at this point. Outbound bus priority across the bridge will be

provided through signal-controlled priority from a proposed traffic signal on Richmond Street South approximately 70m north of the bridge.

On Richmond Street South, it is proposed to maintain the outbound traffic lane with a bus lane and cycle tracks in both directions. Immediately south of the junction of Harrington Street/Harcourt Road/Richmond Street South, the outbound bus lane will be curtailed due to space constraints.

It is proposed to restrict movements into and out of Lennox Street to pedestrians and cyclists only through the introduction of planted buildouts. It is also proposed to upgrade the junction of Richmond Street South and Harrington Street through the provision of kerb protection for cyclists.

On Camden Street Upper between Harcourt Road and Charlotte Way, one bus lane in each direction and one inbound general traffic lane is proposed, with a cycle track provided in each direction.

Between Charlotte Way and Cuffe Street it is proposed to provide bus lanes in each direction and a single outbound general traffic lane on Camden Street/Wexford Street. The outbound bus lane will not commence until just south of Montague Street due to the proximity of existing built form to the carriageway. Bus priority will be achieved by signal-controlled priority over this section. Under this proposal, inbound traffic will reroute to Harcourt Street to access Cuffe Street and beyond. 1.5m wide cycle tracks are proposed in this section in order to provide sufficient footpath space in this area of significant pedestrian activity.

Between Cuffe Street and Dame Street it is proposed to provide one general traffic lane and one cycle track in each direction. No bus lanes will be provided on this section of the route. Where practicable, on-street parking bays and loading bays will be retained. The Proposed Scheme ties into the existing road network on Dame Street.

Turning restrictions are proposed at a number of locations off the immediate Proposed Scheme main corridor to prevent through traffic diverting inappropriately. These locations are summarised below:

- Proposed right turn ban from Grand Parade onto Dartmouth Place;
- Proposed right turn ban from Cullenswood Road onto Ranelagh Road;
- Proposed right turn ban from Ashfield Road onto Ranelagh Road;
- Proposed left turn bans from Chelmsford Lane and Sallymount Avenue onto Ranelagh Road; and
- Proposed right turn ban from Merton Drive onto Sandford Road.

4.5.4.2 Deviations from Standard Cross Sections

The width of the cross-sectional elements as outlined in Section 4.6.5 have been reduced (from published guidance, e.g., DMURS), at a number of constrained locations along the Proposed Scheme. The deviations within Section 4 - are detailed in Table 4.21.

Table 4.21 : Reduced Standard Cross Sections on Section 4

Location	Design Element	DMURS/ NCM	Type	Design	Justification
Ch. A3775-3860	Cycle Track (Both directions)	2m	Relaxation	1.5	Approximately 85m of narrowed cycle track on both sides of Rathgar Road and Rathmines Road. The narrowed width enables the provision of a bus lane in the inbound bus lane and retention of sufficiently wide footpaths to facilitate the busy town centre.

Location	Design Element	DMURS/ NCM	Type	Design	Justification
Ch. A3800	Footway (Inbound)	2m	Relaxation	1.5m	Localised pinch point (Less than 2.0m) due to the constraint nature of Wynnefield Road Junction. A minimum width of 1.5m is achieved at this location.
Ch. A4720-4880	Cycle Track (Both directions)	2m	Relaxation	1.5m	Approximately 160m of narrowed cycle track on both sides at this section of Richmond Street South due to the constraint nature of this section. It should be noted that the narrowed width enables the retention of existing kerb line along much of this section.
Ch. A4780-4960	Footway (Inbound)	2m	Departure/ Relaxation	1.2-1.95m	It is proposed to reduce approximately 180m of reduced footpath width at this section to provide a bus lane in both directions along most of the section.
Ch. A5100-5650	Cycle Track (Both directions)	2m	Relaxation	1.5-1.9m	It is proposed to provide approximately 550m of narrowed cycle track at this section to provide a bus lane in both directions. Providing a standard width would require reducing the width of the footpath at this section. This location is in a busy town centre environment, reducing the footpath width at this location would have significant impact on pedestrian comfort.
Ch. A6130-6220	Cycle Track (Outbound)	2m	Relaxation	1.5m	It is proposed to provide 90m of narrowed cycle track due to the constraint nature of this section. It should be noted that the narrowing enables the retention of existing kerb line along majority of this section and existing footpath width.
A4+640	SSD	70	Relaxation	65	Due to the existing vertical alignment of the bridge
A4+650	SSD	70	Relaxation	55	Due to the existing vertical alignment of the bridge
A4+660	SSD	70	Relaxation	45	Due to the existing vertical alignment of the bridge
A4+670	SSD	70	Relaxation	36	Due to the existing vertical alignment of the bridge

Location	Design Element	DMURS/ NCM	Type	Design	Justification
A4+680	SSD	70	Relaxation	30	Due to the existing vertical alignment of the bridge

4.5.4.3 Bus Lane Provision

An overview of the bus lane provision as part of the Proposed Scheme is set out in Section 4.6.4. As outlined within that section, full bus priority through the use of dedicated bus lanes is not possible at all locations, and Signal Controlled Priority is used in Section 4 of the Proposed Scheme as listed in Table 4.22.

Table 4.22 - Proposed Controlled Priority Junctions within Section 4

Junction Location	Priority Type	Note
Rathmines Road Lower / Castlewood Avenue to Rathmines Road Lower / Grove Road	Bus Gate	Two lane cross-sections proposed due to the proximity of built form to the carriageway.
Richmond Street south / Richmond PI South	Signal Controlled Priority	There is no receiving bus lane in the outbound direction due to the proximity of built form to the carriageway and space constraints on La Touche bridge.

4.5.4.4 Bus stops

The different types of bus stop (island, shared landing, inline and lay-by bus stops) are described in Section 4.6.5. Five of the 20 proposed bus stops are Island Bus Stops. The bus stop locations and types are outlined in Table 4.23 and shown in the General Arrangement series of drawings (BCIDC-ARP-GEO_GA-1012_XX_00-DR-CR-9001) in Volume 3 of this EIAR. Further details of bus stop design are included in the PDGB (NTA 2021) – Appendix A4.1 in Volume 4 of this EIAR.

Table 4.23 - Proposed Bus Stop Locations with Section 4

Inbound/Outbound	Bus Stop Name	Bus Stop Number	Chainage	Bus Stop Type	Bus Shelter
Inbound	Rathmines Road	1170	A 3700	Shared landing bus stop	Proposed: No Existing: No
Inbound	Williams Park	1070	A 4100	Island Bus Stop	Proposed: Yes Existing: Yes
Inbound	Military Road	1071	A 4375	Shared landing bus stop	Proposed: Yes Existing: Yes
Inbound	Grove Park	4528	A 4550	Shared landing bus stop	Proposed: Yes Existing: No

Inbound/Outbound	Bus Stop Name	Bus Stop Number	Chainage	Bus Stop Type	Bus Shelter
Inbound	Lennox Street	1072	A 4750	Shared landing bus stop	Proposed: Yes Existing: Yes
Inbound	Camden St Lower	1352	A 5200	Island Bus Stop	Proposed: Yes Existing: Yes
Inbound	Pleasant Street	1353	A 5350	Shared landing bus stop	Proposed: No Existing: No
Inbound	Peters Row	1354	A 5650	Shared landing bus stop	Proposed: Yes Existing: No
Inbound	Whitefriars Street	1355	A 5925	Shared landing bus stop	Proposed: No Existing: Yes
Inbound	Exchequer Street	7578	A 6200	Shared landing bus stop	Proposed: Yes Existing: No
Outbound	Castlewood Ave	1076	A 3900	Island Bus Stop	Proposed: Yes Existing: Yes
Outbound	Town Centre	1020	A 4150	Inline Bus Stop	Proposed: Yes Existing: No
Outbound	Richmond Hill	1018	A 4375	Shared landing bus stop	Proposed: Yes Existing: No
Outbound	Grove Park	1017	A 4650	Shared landing bus stop	Proposed: Yes Existing: Yes
Outbound	Lennox Street	1016	A4800	Shared landing bus stop	Proposed: No Existing: No
Outbound	Grantham Street	1285	A 5200	Island Bus Stop	Proposed: Yes Existing: Yes
Outbound	Montague Street	New Stop	A 5375	Shared landing bus stop	Proposed: No New Stop
Outbound	Cuffe Street	7579	A 5600	Island Bus Stop	Proposed: Yes Existing: Yes
Outbound	Whitefriars St	4456	A 5800	Shared landing bus stop	Proposed: Yes Existing: Yes

Inbound/Outbound	Bus Stop Name	Bus Stop Number	Chainage	Bus Stop Type	Bus Shelter
Outbound	Fade Street	1282	A 6100	Shared landing bus stop	Proposed: Yes Existing: No

4.5.4.5 Cycling Provision

The specific proposals for cycling facilities in Section 4 of the Proposed Scheme are described below. Provision for cyclists at the signal-controlled junctions are described in Section 4.6.4.5.

On Rathgar Road and Rathmines Road Lower between Charleville Road and Castlewood Avenue it is proposed to provide an inbound and outbound cycle track. Between Castlewood Avenue and Grove Road, a general traffic lane and a cycle track in each direction are proposed, with the provision of a Bus Gate between Richmond Hill and Lissenfield which will restrict general traffic movements during the hours of operation of the Bus Gate (06:00 – 20:00 - 7 days a week). This proposal also allows for some increase to footpath widths through Rathmines and the provision of 2m wide cycle tracks in each direction through the village. At La Touche bridge it is proposed to provide an inbound bus lane and an outbound general traffic lane along with a high-quality segregated cycling facility, to facilitate connectivity with the Grand Canal cycleway. On Richmond Street South, it is proposed to maintain the outbound traffic lane with a bus lane and cycle tracks in both directions. On Camden Street Upper between Harcourt Road and Charlotte Way, one bus lane in each direction and one inbound general traffic lane is proposed, with a cycle track provided in each direction. Under this proposal, inbound traffic will reroute to Harcourt Street to get to Cuffe Street and beyond. 1.5m wide cycle tracks are proposed in this section in order to provide sufficient footpath space in this area of significant pedestrian activity. Between Cuffe Street and Dame Street it is proposed to provide one general traffic lane and one cycle track in each direction.

4.5.4.6 Junction Information

An overview of the approach to junction review and design is provided in Section 4.6.7. The major and moderate junctions (signalised) within Section 4 - Tallaght Road to Rathfarnham Road of the Proposed Scheme are outlined in Table 4.24.

Table 4.24: Major and Moderate Junctions (Signalised) within Section

Junction Name	Summary	Signal Operation
Major Junctions (Signalised)		
N/A		
Moderate Junctions (Signalised)		
Rathmines Rd Lower / Rathmines Rd Upper	This junction will be based on Junction Type 1. The existing junction is proposed to be altered by the provision of an inbound bus lane through the junction as well as protected cycle facilities on each approach	A three stage signal operation is proposed. The inbound bus lane, traffic, and cycle lane will operate together with outbound traffic. The side road traffic and cyclists will operate together, with left turning traffic giving way to cyclists on a flashing amber. Pedestrians, outbound cyclists, and cyclists

Junction Name	Summary	Signal Operation
		turning right to the side road will operate together.
Rathmines Rd Lower / Castlewood Ave	This junction will be based on Junction Type 1. The existing junction is proposed to be altered by the provision of improved cycle tracks as well as a bus priority signal on approach from the south. Improvement pedestrian facilities are also provided with pedestrian crossings proposed across each arm.	A three stage signal operation is proposed. Cycle tracks will operate at the same time as the inbound bus lane and outbound general traffic lane. The inbound cycle track will then continue with the inbound general traffic lane and left-only side road running together to maximise green time and minimise delay. The pedestrian crossings will operate in their own stage.
Rathmines Rd Lower / Leinster Rd	The existing junction is proposed to be altered by the provision of cycle tracks as well as the removal of general traffic turning lanes.	A three stage signal operation is proposed. Cycle tracks will operate at the same time as the mainline traffic stages to maximise green time and minimise delay, with turning traffic to give way to cyclists on flashing amber. The side road traffic will operate separately, to be followed by pedestrian crossings in their own stage. There will be no bus priority at this junction.
Richmond St S / Grove Rd	This junction will be based on Junction Type 1. The existing junction is proposed to be reconfigured to provide a dedicated bus lane inbound, a shared bus/traffic lane outbound, as well as the removal of left turn general traffic lanes and the inbound general traffic lane on La Touche bridge. A cycle track in each direction is proposed, plus a dedicated turn pocket for cyclists turning from La Touche Bridge onto the canal cycle track which is expected to be a busy movement.	A five stage signal operation is proposed. The two-way cycle track on Charlemont Mall and Richmond Row will operate unopposed, at the same time as traffic movements on Grove Road and Canal Road. Traffic from Charlemont Mall will operate unopposed, followed by the pedestrian crossings which will operate in their own stage. Inbound bus left turning traffic, and cyclists will operate together, at the same time as outbound traffic, buses, and cyclists, with turning traffic giving way to cyclists on flashing ambers. Traffic will be stopped for right turning cyclists into Charlemont Mall to operate unopposed.
Richmond St S / Charlemont Mall	This junction will be based on Junction Type 1. The existing junction is proposed to be reconfigured to provide a dedicated bus lane inbound, a shared bus/traffic lane outbound, as well as the removal of left turn general traffic lanes and the inbound general traffic lane on La Touche bridge. A cycle track in each direction is proposed, plus a dedicated turn pocket for cyclists turning from La Touche Bridge onto the canal cycle track which is expected to be a busy movement.	A five stage signal operation is proposed. The two-way cycle track on Charlemont Mall and Richmond Row will operate unopposed, at the same time as traffic movements on Grove Road and Canal Road. Traffic from Charlemont Mall will operate unopposed, followed by the pedestrian crossings which will operate in their own stage. Inbound bus left turning traffic, and cyclists will operate together, at the same time as outbound traffic, buses, and cyclists, with turning traffic giving way to cyclists on flashing ambers. Traffic will

Junction Name	Summary	Signal Operation
		be stopped for right turning cyclists into Charlemont Mall to operate unopposed.
Camden St / Richmond St S / Harrington St /	This junction will be based on Junction Type 1. The existing junction is proposed to be altered by the provision of an inbound bus lane through the junction as well as the removal of inbound general traffic lanes on the Richmond Street South arm of the junction. The junction will be upgraded to include full protection for cyclists through the junction.	A five stage signal operation is proposed. The inbound and outbound bus and cycle lanes will operate in the same stage, with the pedestrian crossing on Richmond Street S. The left bus and traffic movements from Harrington Street operate in separate stages, both with the ahead and left movements from Harcourt Road, with turning traffic from Harcourt Road to give way to cyclists on a flashing amber. Cyclists crossing from Harrington Street will be unable to operate with traffic due to the high volume of left turners. Right turning traffic from Harcourt Road to operate unopposed. The pedestrian crossings will operate in a stage with the cyclists from Harrington Street.
Camden St / Charlotte Way	This junction will be based on Junction Type 1. The existing junction is proposed to be altered by the removal of the inbound traffic lane on the Camden Street arm of the junction and the provision of an inbound bus lane through the junction. Continuous cycle tracks are also provided in each direction.	A four stage signal operation is proposed. Inbound bus and cyclists will operate at the same time as outbound buses and traffic. The outbound traffic will stop to allow for outbound cyclists to operate unconflicted. All outbound movements will stop to allow for right turning traffic into Charlotte Way. A pedestrian only phase is also proposed due to the high volume of pedestrians at this junction.
Kevin St Lower / Wexford St	This junction will be based on Junction Type 1. The existing junction is proposed to be altered by the replacement of the inbound traffic lane on the Wexford Street arm with a bus lane. It is also proposed to remove the existing general traffic slip lanes and provide inbound and outbound cycle tracks on the side arms thereby providing a fully protected junction for cyclists.	A four stage signal operation is proposed. Mainline cycle tracks operate at the same time as the outbound traffic and inbound bus lane to maximise green time and minimise delay, with left turning traffic to give way to cyclists on a flashing amber. The side roads straight and left traffic and cyclists operate together, with flashing ambers, to be followed by the side road right turn traffic. The pedestrian crossings will operate in their own stage.
South Great George St / Longford St Lower	The existing junction is proposed to be altered by the provision of cycle tracks on approach to the junction on the South Great George Street arms. The existing outbound bus lane on the southern arm of the junction is proposed to be removed.	A three stage signal operation is proposed. Cycle tracks will operate at the same time as the mainline traffic stages, with left turning traffic to give way to cyclists on a flashing amber, to maximise green time and minimise delay. The side road will operate on its own, to be followed by the

Junction Name	Summary	Signal Operation
		pedestrian crossings. There will be no bus priority at this junction.
South Great George St / Stephen St Upper	The existing junction is proposed to be altered by the removal of the existing inbound bus lane on the South Great George's Street arm of the junction and the provision of inbound and outbound cycle tracks.	A three stage signal operation is proposed. Cycle tracks will operate at the same time as the mainline traffic stages, with left turning traffic to give way to cyclists on a flashing amber, to maximise green time and minimise delay. The side road will operate on its own, to be followed by the pedestrian crossings. There will be no bus priority at this junction.
South Great George St / Dame St	The existing junction is proposed to be upgraded to accommodate the provision of inbound and outbound cycle tracks along South George's Street.	A four stage signal operation is proposed. Traffic and cyclists on Dame Street will operate together, to be followed by traffic only from South Great George's Street. The cycle track from South Great George's Street will operate in its own stage due to limited room for segregated infrastructure through the junction. The pedestrian crossings will operate in their own stage. There will be no bus priority at this junction.

4.5.4.7 Parking and Loading Bays

Changes to the parking and loading provisions along Section 4- Charleville Road to Dame Street as a result of the Proposed Scheme are shown in Table 4.25 and

Table 4.26 respectively.

Table 4.25: On- Street Parking Spaces Change Impact Summary

Location	Type of Parking		Existing	Proposed	Change
Military Road	Designated Paid and Permit	Residential	21	17	-4
Near Junction with Harcourt Rd, Spar	Designated Paid and Permit	Commercial	4	4	0
Near Junction with Harcourt Rd	Designated Paid and Permit	Commercial	4	4	0
Between Grantham St and Pleasant's Street	Designated Paid	Commercial	14	13	-1

Location	Type of Parking		Existing	Proposed	Change
Between Grantham St and Pleasant's Street	Disabled Permit Parking	Commercial	0	1	1
Between Pleasant St and Montague St	Designated Paid	Commercial	2	0	-2
Between Pleasant St and Montague St	Designated Paid / Taxi Rank	Commercial	4	0	-4
Between Montague St and Cuffe St	Designated Paid	Commercial	9	0	-9
Between Montague St and Cuffe St	Disabled Parking	Commercial	1	0	-1
Approx. adjacent on-street parking within 200m			497	497	0
Total			556	536	-20

Table 4.26 : Existing and proposed Loading Bays

Location	Type of Parking		Existing	Proposed	Change
Military Road	Loading Bay	Commercial	1	1	0
Between Castelwood Avenue and Swanville PI	Loading Bay	Commercial	4	4	0
Outside Paddy Power	Loading Bay	Commercial	2	2	0
Outside Aldi	Loading Bay	Commercial	3	3	0
Outside Lidl	Loading Bay	Commercial	5	11	6
Perpendicular to Lennox St	Loading Bay	Commercial	2	2	0

Location	Type of Parking		Existing	Proposed	Change
Near Junction with Harcourt Rd, Spar	Loading Bay	Commercial	2	2	0
Near Junction with Harcourt Rd	Loading Bay	Commercial	2	2	0
Near Junction with Charlotte Way	Loading Bay	Commercial	2	2	0
Between Grantham St and Pleasant's Street	Loading Bay	Commercial	4	4	0
Between Pleasant St and Montague St	Loading Bay	Commercial	2	5	3
Between Montague St and Cuffe St	Loading Bay	Commercial	5	2	-3
Between Cuffe St and Digges St Upper	Loading Bay	Commercial	5	5	0
At YMCA Gym	Loading Bay	Commercial	2	2	0
Between Longford St Lower and Stephen St Lower	Loading Bay	Commercial	6	3	-3
Between Stephen St Upper and Dade St	Taxi Rank	Commercial	5	5	0
Between Stephen St Upper and Fade St	Taxi Rank / Loading Bays	Commercial	3	0	-3
Between Exchequer St and Fade Street	Taxi Rank / Loading Bays	Commercial	5	5	0
Between Exchequer St and Dame Ln	Taxi Rank / Loading Bays	Commercial	3	3	0
Total			63	63	0

4.5.4.8 Landscape and Urban realm

For an overview of the landscape design principles and approach, reference should be made to Section 4.6.13. The following sections provide a description of specific landscape and urban realm design works in Section 1 of the Proposed Scheme.

Rathmines village will be re-configured and rationalised to reduce the overall carriageway widths, remove slip lanes and provide substantial additional public realm space that will incorporate high quality hard and soft landscaping interventions to establish a much stronger and more appealing pedestrian environment in the core of the village. Materials will be high quality reflecting those of the existing built context, and pavements and kerbs will be rebuilt to unify the core of the village in a manner that reinforces its distinct local character (Refer to Image 4.4).



Image 4.4: Rathmines Village, Rathgar Road and Rathmines Upper Road Junction

Along Rathmines Road, the carriageway will be re-allocated to eliminate general through traffic and thereby reduce the overall vehicular demand and provide opportunities for improving pedestrian and cycle facilities along the road. The wider pavements and cycle tracks will combine visually to substantially widen the pedestrian zone along both side of the street and to reduce the perception of carriageway to the minimum. New footpaths and cycle lanes will be built using high quality materials to enhance the character and presentation of the streetscape and to provide greater pedestrian facilities and amenity that will in turn underpin the vitality of the retail and services business along the street. There will be some new street tree planting together with localised soft landscaping interventions to soften and add diversity and amenity to the streetscape. A bus gate between

Richmond Hill and Lissenfield will substantially reduce traffic volumes along Rathmines Road and contribute to the establishment of a much stronger pedestrian streetscape.

North of the Grand Canal, changes will mostly relate to the re-allocation of roadway to widen footpaths where practicable and to upgrade the build quality of footpaths and kerbs using high quality materials that will improve streetscape presentation and pedestrian amenity. As the street varies locally in width, there are locations where new street trees will be introduced to soften the streetscape and provide localised passive amenity spaces along the busy street. Additionally, the localised variations in width will facilitate the provision of loading bays to serve the retail and commercial uses together with localised on-street parking.

4.5.4.9 Land Acquisition and Use

The works within this section sit within the existing road boundary with minimal land take and accommodation works required. In this area, permanent land take is required from a number of private landings (along Richmond Street South, Richmond Row, Camden Street and Harrington Street), to accommodate the Proposed Scheme.

Temporary land take is required within this section to facilitate:

- Amendments at the entrance to Lissenfield; and
- Relocation of coal holes at 44 and 45 Richmond Street South.

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).

4.5.4.10 Rights of Way

Table 4.27 Outlines the location where existing rights of way will be affected by the Proposed Scheme

Location	Chainage	Existing Situation	Proposed Chainage
Williams Park	A4160	Currently Williams Park operates as one-way westbound for general traffic.	<p>As part of the Proposed Scheme, it is proposed to reverse the flow of general traffic on Williams Park to one-way eastbound for general traffic.</p> <p>Following the implementation of the Proposed Scheme it will no longer be possible for general traffic to turn from Rathmines Road Lower onto Williams Park. General traffic will still be able to access the area via Military Road. Cyclists and pedestrians will still be permitted to travel westbound on Williams Park.</p>
Mountpleasant Avenue Lower north of the junction with Richmond Hill	Offline	Currently vehicles can turn from Mountpleasant Avenue Lower onto Richmond Hill, and similarly can turn from Richmond Hill onto Mountpleasant Avenue Upper.	<p>As part of the Proposed Scheme, it is proposed to install a modal filter on Mountpleasant Avenue Upper, just north of the junction with Richmond Hill.</p> <p>Following the implementation of the Proposed Scheme, it will no longer be possible to turn from Richmond Hill to Mountpleasant Avenue Upper, or from Mountpleasant Avenue Upper to Richmond Hill. Cyclists will still be able to make these movements and alternative routes will be available for general traffic in close proximity.</p>
Junction of Lennox Street and Richmond Street South	A4840	Currently vehicles can turn from Richmond Street South onto Lennox Street, and similarly can turn from Lennox Street onto Richmond Street South.	<p>As part of the Proposed Scheme, it is proposed to install a modal filter on Lennox Street, just west of the junction with Richmond Street South.</p> <p>Following the implementation of the Proposed Scheme, it will no longer be possible to turn from Lennox Street to Richmond Street South, or from Richmond Street South to Lennox Street. Cyclists will still be able to make these movements and alternative routes will be available for general traffic in close proximity.</p>
Junction of Bishop Street and Redmond's Hill	A5630	Currently there are temporary planters at the junction of Bishop Street and Redmond's	<p>As part of the Proposed Scheme, it is proposed to make this arrangement permanent through the provision of a new build out in this location.</p> <p>Following the implementation of the Proposed Scheme, it will no longer be possible to turn from Bishop Street onto Redmond's Hill and from Redmond's Hill onto Bishop Street. General traffic will still be able to access the area via Peter Row and Whitefriar Place.</p>

Location	Chainage	Existing Situation	Proposed Chainage
		Hill which prevent general traffic from turning from Bishop Street onto Redmond's Hill and from Redmond's Hill onto Bishop Street.	

4.6 Key Infrastructure Elements

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

4.6.1 Mainline Cross-Section

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

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

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

The desirable minimum width for a single direction, with flow, raised adjacent cycle track is 2.0m. Based on the National Cycle Manual (NCM) this allows for overtaking within the cycle track. The minimum width is 1.5m. The desirable width for a two-way cycle track is 3.25m with a 0.5m buffer between the cycle track and the carriageway.

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

An example of the typical BusConnects road layout (without multiple traffic lanes in each direction or median) is shown in Image 4.5.

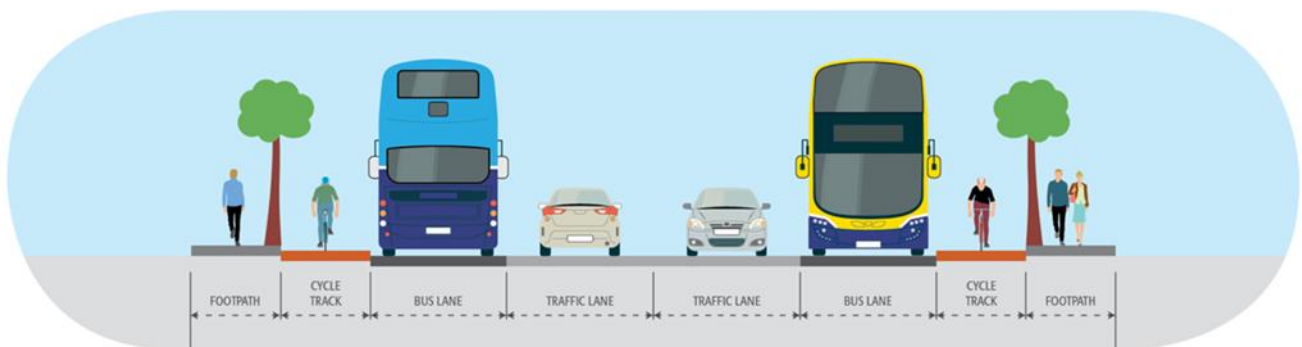


Image 4.5: Typical BusConnects Road Layout (PDGB)

The cross-sectional design of the mainline has been developed to achieve the desirable width criteria contained within DMURS 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 within Table 4.27

Table 4.27: DMURS Cross-Sectional Design Parameters

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

4.6.2 Pedestrian Provision

4.6.2.1 Footpath Widths

The desirable minimum width for a footpath is 2.0m. This width should be increased in areas catering for significant pedestrian volumes where space permits. DMURS defines the absolute minimum footpath width for road sections as 1.8m based on the width required for two wheelchairs to pass each other. Building for Everyone: A Universal Design Approach (NDA 2020), defines acceptable minimum footpath widths at specific pinch points as being 1.2m wide over a two-metre length of path.

In line with the Road User Hierarchy designated within DMURS, at pinch points the width of the general traffic lane should be reduced first, then the width of the cycle track should be reduced before the width of the footpath is reduced, where practicable.

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

4.6.3 Pedestrian Crossings

Where possible, DMURS recommends that designers provide pedestrian crossings that allow pedestrians to cross the street in a single, direct movement. To facilitate road users who cannot cross in a reasonable time, the desirable maximum crossing length without providing a refuge island applied across the Proposed Scheme is 19m. This is applicable at stand-alone pedestrian crossings as well as at junctions. There are cases where it has been necessary to provide crossing lengths greater than 19m in village settings where large pedestrian volumes are expected and where space for central medians cannot be provided.

Refuge islands should be a minimum width of two metres. Larger refuge islands should be considered by designers in locations where the balance of place and movement is weighted towards vehicle movements, such as areas where the speed limit is 60kph or greater, in suburban areas or where there is an increased pedestrian safety risk due to particular traffic movements. Where a refuge island is provided, straight crossings are desirable,

and the refuge island has been designed to be 4m wide or more. At a staggered crossing, islands of less than 4m in width may be provided, and these have been designed to have a minimum effective width of 2m between obstacles such as signal poles.

Along the Proposed Scheme pedestrian crossings varying from 2.4m 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 are provided to raise the road level up to footpath level and facilitate unimpeded crossing. Tactile paving is provided at the mouth of each pedestrian crossing and audio units will be provided on each traffic signal push button to assist mobility impaired users. Pedestrian crossings are indicated in the Landscaping General Arrangement drawings (BCIDC-ARP-ENV_LA-1012_XX_00-DR-LL-9001) in Volume 3 of this EIAR.

4.6.4 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 (BCIDC-ARP-ENV_LA-1012_XX_00-DR-LL-9001) in Volume 3 of this EIAR.

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

The principal source for guidance on the design of cycle facilities is the National Cycle Manual (NCM) (NTA 2011) and the PDGB.

The desirable minimum width for a single-direction, with-flow, raised-adjacent cycle track is 2m. This arrangement allows for two-abreast cycling, and based on the NCM Width Calculator, this also allows for overtaking within the cycle track. The minimum width is 1.5m, which based on the NCM Width Calculator, allows for single file cycling. Localised narrowing of the cycle track below 1.5m is also necessary over very short distances to cater for local constraints (e.g., exceptional mature trees).

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

The Proposed Scheme will provide fully segregated cycle tracks provided throughout the majority its route, which is 10 km in length, compared with an existing provision of just 3 km of cycle track and 7.6 km unsegregated cycle lane. Details of the proposed cycle provision throughout the extent of the Proposed Scheme are provided in the following sections.

4.6.4.1 Cycle Tracks

A cycle track is a segregated lane dedicated to cycling which is physically segregated from the adjacent traffic lane and/or bus lane horizontally and/or vertically, as shown in Image 4.6, taken from the PDGB.

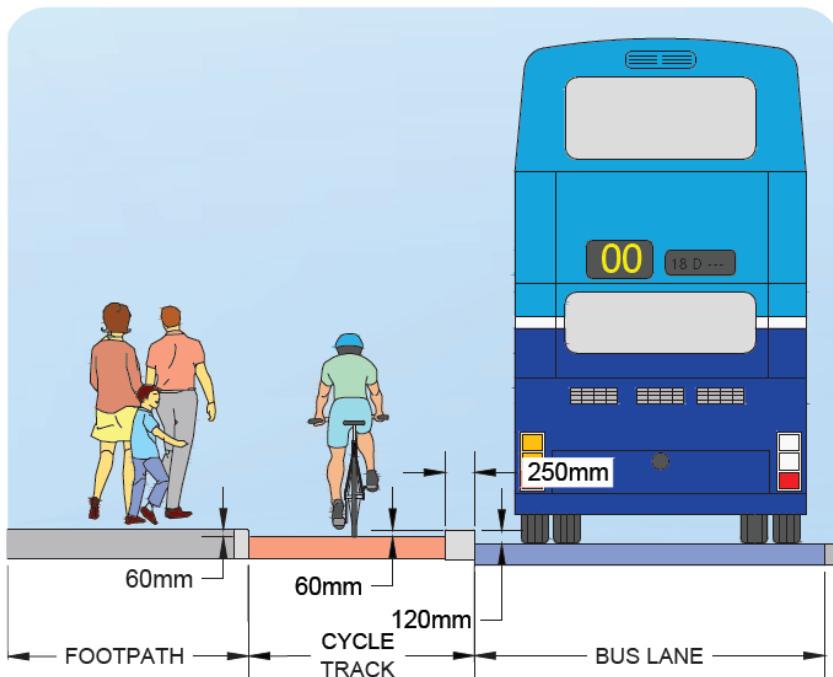


Image 4.6: Fully Segregated Cycle Track

Segregated cycle tracks have been provided throughout the majority of the Proposed Scheme, where practicable. At-grade cycle tracks (as per NCM Section 4.3.4) 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.

4.6.4.2 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.

4.6.4.3 Quiet Street Treatment

Where roadway widths cannot facilitate cyclists without significant impact on bus priority, alternative cycle routes are explored for short distances away from the Proposed Scheme, where practicable. Such offline options may include directing cyclists along streets with minimal general traffic other than car users who live on the street. They are called Quiet Streets due to the low amount of general traffic and are deemed suitable for cyclists sharing the roadway with the general traffic without the need to construct segregated cycle tracks or painted cycle lanes. The Quiet Street Treatment would involve appropriate advisory signage for both the general road users and cyclists. Quiet Street Cycle Routes are proposed at the following locations:

- Rathdown Crescent;
- Rathdown Park;
- Rathdown Drive;
- Wasdale Park;
- Wasdale Grove;
- Victoria Road; and
- Zion Road.

4.6.4.4 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.

4.6.4.5 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 (BCIDC-ARP-GEO_GA-1012_XX_01-DR-CR-9001) included in Volume 3 of this EIAR.

4.6.5 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.

4.6.5.1 Bus Lanes

Bus Priority can be achieved by means of providing a dedicated lane within the carriageway for the bus to travel independently from the general traffic. This includes priority through junctions by bringing the bus lane to the junction stop line as per general traffic lanes. This means in some circumstances that left-turning traffic cannot use the bus lane at junctions and instead will be provided with a dedicated left-turn traffic signal phase for the turn movement off the general traffic lane or will be provided with a separate left-turning lane. In general, bus lanes will be a minimum of 3m wide. This is as per the guidance for traffic lane width outlined in DMURS. Larger lane widths are needed in some instances to enable buses to navigate corners, etc. ('swept path'). Bus Lanes are shown on the General Arrangement drawings (BCIDC-ARP-GEO_GA-1012_XX_01-DR-CR-9001) included in Volume 3 of this EIAR.

4.6.5.2 Signal Controlled Bus 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 4.7 illustrates a schematic operation of SCP.



Image 4.7: Signal Controlled Priority Schematic Operation (Source: PDGB)

Locations within the Proposed Scheme where signal-controlled priority provisions will result in buses and general traffic sharing a lane are described below:

- R137 Templeogue Road at the Ashfield Place development (outbound) - Approximately 180m length;
- R137 Templeogue Road within Templeogue Village between Templeogue Tennis Club and Hollingsworth Cycles (inbound and outbound) - Approximately 200m length; and
- Rathfarnham Road between Castle side Drive and Dodder Park Road (outbound) - Approximately 450m length;
- Rathfarnham Road between Dodder Park Road and Westbourne Road (inbound) - Approximately 145m length;
- Rathfarnham Road between Westbourne Road and Rathdown Park (outbound) - Approximately 100m length;

- Rathfarnham Road between Rathdown Park and Bushy Park Road (inbound and outbound) - Approximately 50m length;
- Rathfarnham Road and Terenure Road East between St. Joseph's Church and Beechlawn Way (outbound) - Approximately 250m length;
- Terenure Road East between Terenure Cross and St. Joseph's Church (inbound and outbound) - Approximately 150m length;
- Terenure Road East between Highfield Road and Rathgar Park (outbound) - Approximately 45m length;
- Rathgar Road between Rathgar Avenue and Christ Church Rathgar (inbound) - Approximately 40m length;
- Richmond Street South between Richmond Place South and Grove Road (outbound) - Approximately 90m length; and
- Wexford Street between Kevin Street and Montague Street (outbound) - Approximately 100m length.

Sections of the Proposed Scheme where signal controlled priority at multiple traffic signal junctions are proposed are described further in Section 4.5.

4.6.5.3 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.

Two bus gates are proposed along the Proposed Scheme at the following locations:

- Rathmines Road Lower at junction with Lissenfield; and
- Templeogue Road at junction with Fergus Road (Inbound direction only).

4.6.5.4 Treatment at Pinch Points

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

4.6.5.5 Bus Stops

To improve the efficiency of the bus service along the Proposed Scheme the position and number of bus stops have been evaluated as part of a bus stop assessment.

The criteria that are considered when locating a bus stop are as follows;

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

- Adequate footpath width.

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

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

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

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

4.6.5.5.1 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 when. Visually impaired pedestrians may call for a fixed green signal when necessary and the cycle signal will change to red. The cycle track will narrow from 2.0m to 1.5m for single file cycling through the bus stop, as overtaking is not required in this area.

An example of an Island Bus Stop is showed in Image 4.8 (One-way Cycle Track) and Image 4.9 (Two-way Cycle Track).

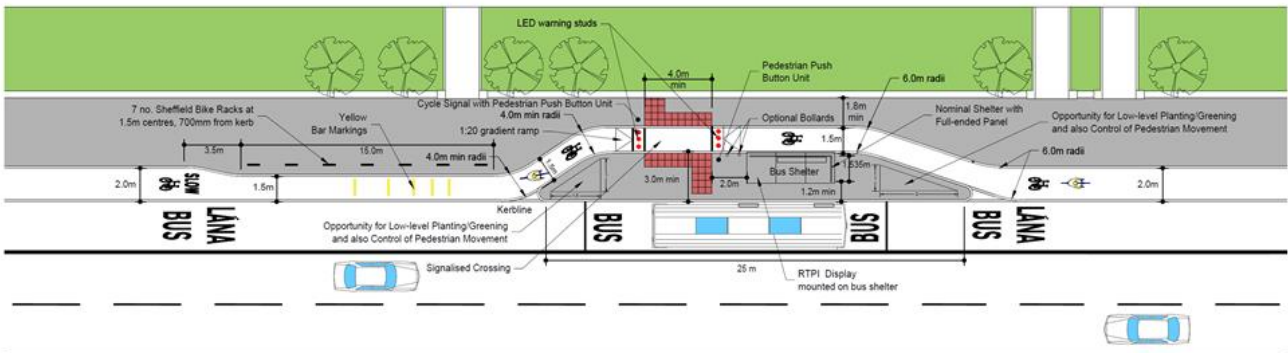


Image 4.8: Island Bus Stop – One Cycle Track

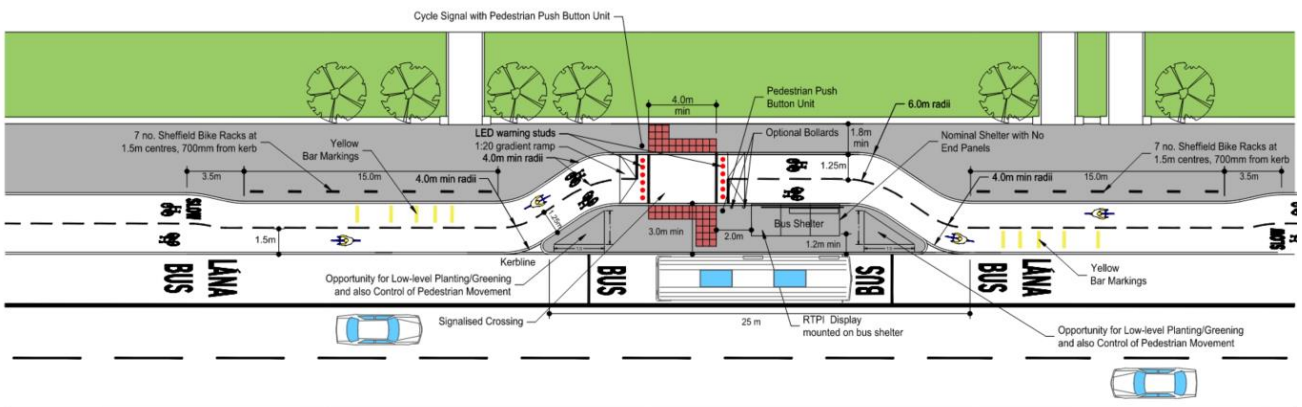


Image 4.9: Island Bus Stop - Two-way Cycle Track

4.6.5.5.2 Shared Landing Bus Stops

Where space constraints do not allow for an island bus stop, an option consisting of a shared bus stop landing zone is proposed. It is designed to reduce conflict between cyclists and stopping buses by ramping cyclists up to footpath level where they continue through the stop. The cycle track will also be narrowed when level to the footpath and tactile paving provided to prevent pedestrian/ cyclist conflict. An example of a Shared Landing Bus Stop is shown in **Image 4.10**.

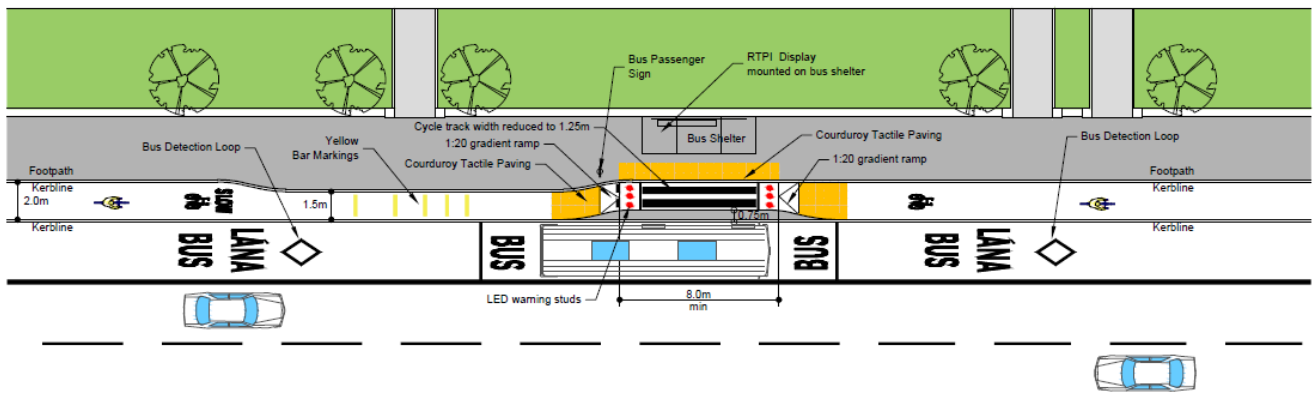


Image 4.10: Shared Bus Stop Landing Zone Arrangement

The location of Shared Landing Bus Stops, which are used for most of the bus stops along the Proposed Scheme, are described in Section 4.5.

4.6.5.5.3 Inline Bus Stop

Where there are no cycle tracks provided, inline bus stops are used, where the users departing the bus exit straight on the footway. Inline bus stops will typically be found in the constrained sections of the Proposed Scheme such as on Terenure Road East and Redmond's Hill / Aungier Street/South Great Georges Street.

4.6.5.5.4 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. In these cases, and where space has permitted, a separate layby bus stop has been proposed.

An example of a Layby Bus stop is shown in Image 4.11.

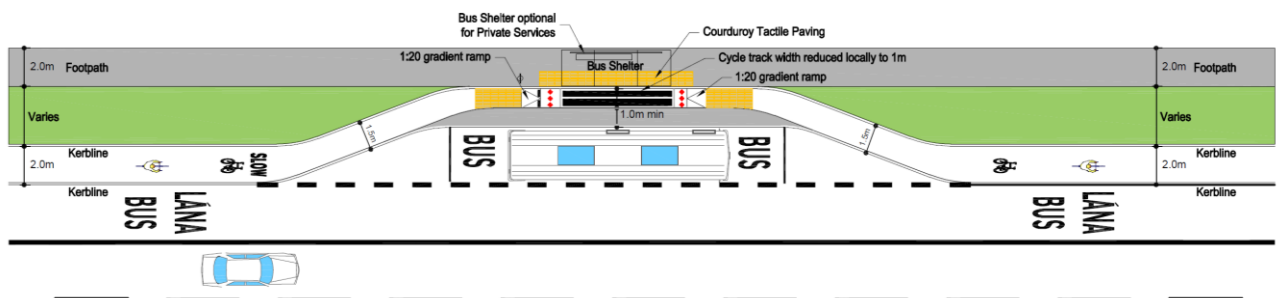


Image 4.11: Layby Bus Stop Arrangement

4.6.5.5.5 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. In some locations, such as those designated as Architectural Conservation Areas, it may however not be appropriate to provide a bus shelter in front of a building of heritage value to minimise visual impact.

4.6.6 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 and in accordance with the principles of DMURS and Building for Everyone: A Universal Design Approach (NDA 2020).

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

- Preliminary Design Guidance Booklet for BusConnects Core Bus Corridors (NTA 2020);
- Building for Everyone: A Universal Design Approach (NDA 2020);
- 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 (IWA) (IWA 2020).;
- UK DfT Inclusive Mobility (UK DfT 2005);
- UK DfT Guidance on the use of tactile paving surfaces (UK DfT 2007); and
- BS8300:2018 Volume 1 Design of an accessible and inclusive built environment. External Environment- code of practice (BSI 2012).

The Disability Act 2005 (as amended) places a statutory obligation on public service providers to consider the needs of disabled people. 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 disabled people 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 footway and the cycle track is of particular importance for guide dogs, whereby the use of white line segregation is not as effective for establishing a clear understanding of the change of pavement use and potential for cyclist/pedestrian interactions.

One of the other key areas that was focused on was the interaction between pedestrians, cyclists and buses at bus stops. The Proposed Scheme has prioritised, where possible, the use of island bus stops, including signal call button for crossing of cycle tracks, to manage the interaction between the various modes with the view to providing a balanced safe solution for all modes.

4.6.7 Integration

4.6.7.1 Interchange with Existing and Proposed Public Transport

One of the objectives of the Proposed Scheme will be to enhance interchange between the various modes of public transport operating in the city and wider metropolitan area. The Proposed Scheme facilities improved existing or new interchange opportunities with other transport services, including;

- Existing Dublin bus services at numerous locations including 9, 13, 16, 68, 14, 15, 15A, 15B, 16, 17, 18, 27, 40, 49, 54A, 65b, 77A, 83, 83A, 122,123, 140, 142, 150 and 151.
- LUAS Green Line at Camden / Harcourt Street.
- Future Bus Service proposals S2, S4, S6, 74, 80, 81,82, 85, O, F1, F2 and P18 routes from the BusConnects Network Redesign

4.6.7.2 Integration with Other Road Users

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

4.6.7.3 Integration with Other Infrastructure Projects

The Proposed Scheme would interface with the following under construction or proposed developments.

Templeogue Village Improvement Scheme

This scheme, which was completed in 2022, involved upgrade and enhancement of the public realm within Templeogue Village by SDCC. The Proposed Scheme integrates with this scheme at either end of Templeogue Village.

Wellington Lane Walking and Cycling Scheme

This scheme involves the provision of walking and cycling facilities on Wellington Lane between Spawell Roundabout and Kimmage Road West. The Proposed Scheme has been coordinated with the proposals.

Grange Road Walking and Cycling Scheme

This scheme, which was completed in 2022, involved the provision of walking and cycling facilities on Grange Road between St. Enda's Drive and Nutgrove Avenue. The Proposed Scheme has been coordinated with this scheme.

Dodder Greenway Scheme

This scheme involves the provision of cycle facilities adjacent to Dodder Park Road as well as the provision of cycle facilities on Spawell Road. The Proposed Scheme has been coordinated with the proposals.

Integration with Other Adjacent BusConnects Core Bus Corridor Schemes

As part of the design of the Proposed Scheme, consideration has been given to the potential coordination required in relation to other schemes within the BusConnects CBC Infrastructure Works. This section outlines potential interactions of the Proposed Scheme with adjacent scheme(s) and identifies any procedures within the construction strategies that may be required in order to account for various sequencing scenarios in the construction of the schemes.

The closest such scheme to the Proposed Scheme is the Kimmage to City Centre Core Bus Corridor Scheme, with which the Proposed Scheme interacts at the signalised junction of Harold's Cross Road / Rathgar Avenue / Kenilworth Square / Kenilworth Park and the junction of Harold's Cross Road and Parkview Avenue.

The BusConnects Infrastructure Team has coordinated the design tie-ins to ensure a holistic design has been achieved, so that each scheme can be implemented, and integrated, regardless of the sequencing of their construction.

The Proposed Scheme intends to improve the subject junction through the provision of cycle tracks on approach to the northern and southern arms of the junction, as well as the provision of toucan crossings on all arms of the

junction to facilitate turning cyclists. It is proposed to remove the right turn lanes on Harold's Cross Road to facilitate these improve cycle facilities. Image 4.12 shows an extract of the preliminary design of the Proposed Scheme at the subject junction.

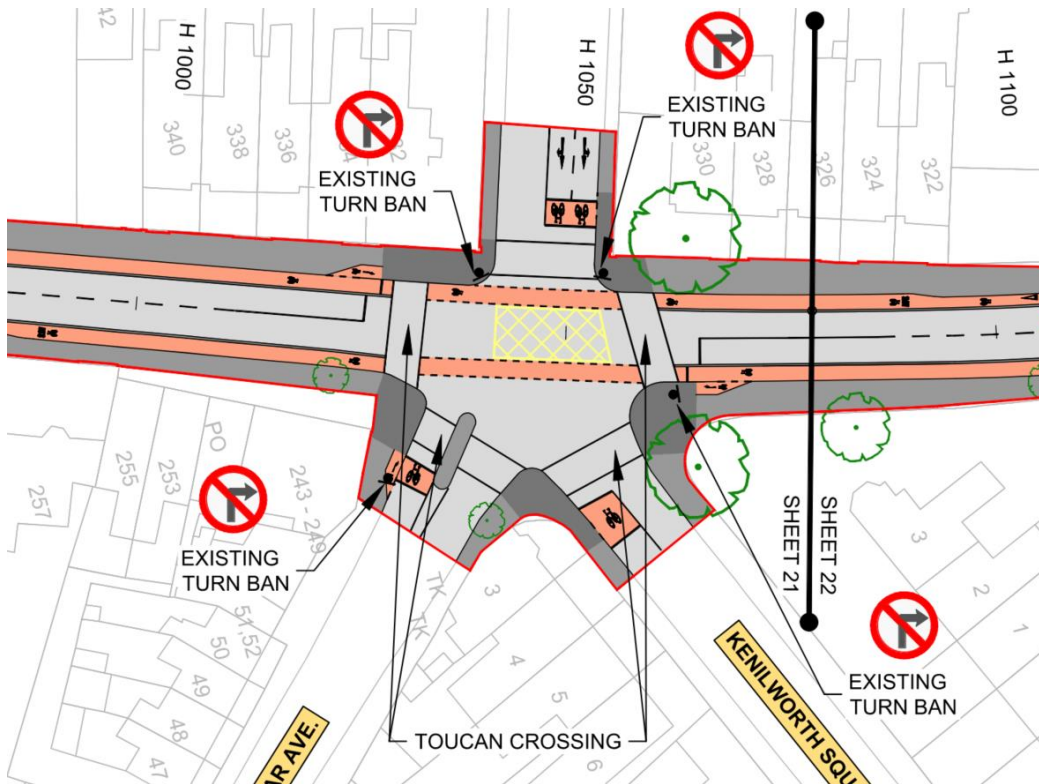


Image 4.12: Preliminary design of the Proposed Scheme at the tie-in location with the Kimmage to City Centre Core Bus Corridor Scheme

The Kimmage to City Centre Scheme proposes significant amendments to the existing junction to bring it in line with the BCPDGB and to meet the needs of the Kimmage to City Centre Scheme, i.e. protected junction for cyclist principles, restricted turning movements for general traffic, Bus gate on Kenilworth Square North etc. Image 4.13 shows an extract of the design of the Kimmage to City Centre Scheme at the subject junction.

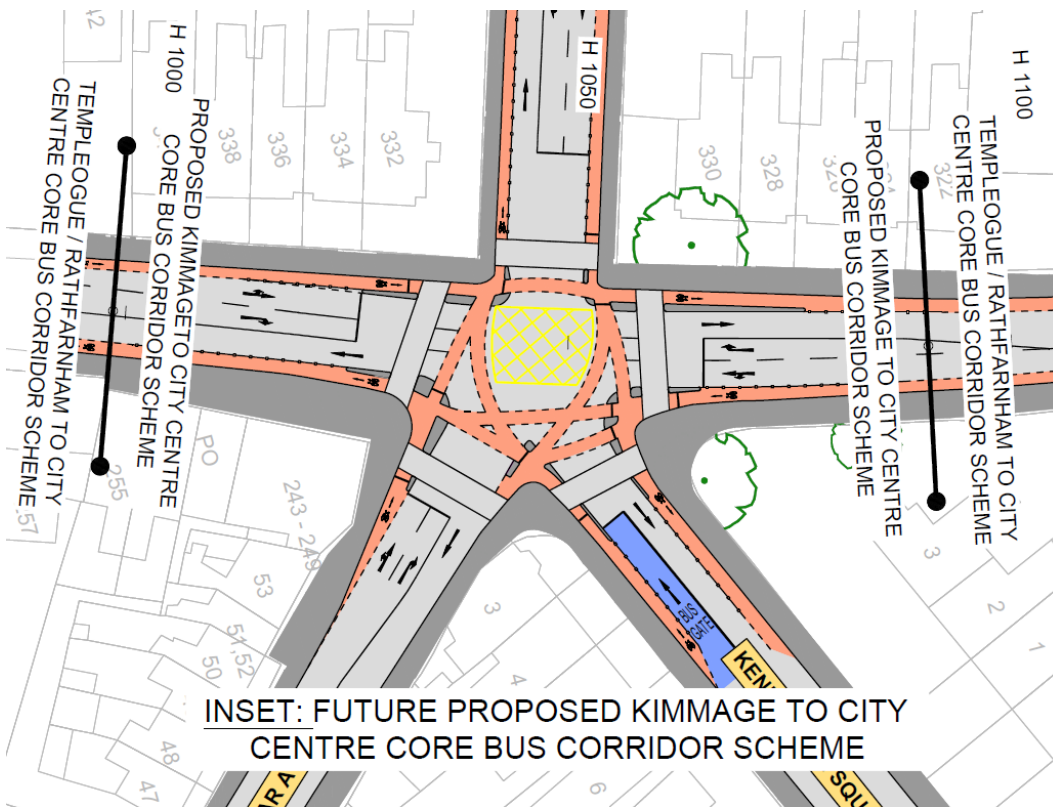


Image 4.13: Preliminary design of the Kimmage to City Centre Core Bus Corridor Scheme at the subject junction

The Kimmage to City Centre Scheme is subject to a separate planning process, the timing of which is largely independent of that of the Proposed Scheme, and as such no exact sequencing of construction works can be determined at this stage. Table 4.28 presents a matrix of potential interactions and impacts associated with various potential sequencing scenarios in relation to construction and operation of both schemes.

Table 4.28: Matrix of Potential Interactions and impacts associated with different sequencing scenarios.

	Kimmage Scheme: Not Yet Commenced	Kimmage Scheme: Under construction	Kimmage Scheme: Completed
Proposed Scheme: Not Yet Commenced	N/A	<p>Construction of the proposed Kimmage to City Centre Core Bus Corridor Scheme shall be carried out in accordance with the Construction Strategy within that scheme's planning application, without any potential interaction with works associated with the Proposed Scheme.</p> <p>The works shall take place within the Red Line Boundary of same and tie-in with the existing environment on Harold's Cross Road.</p>	<p>The Kimmage to City Centre Scheme shall be in full operation, designed in accordance with its planning application.</p> <p>Harold's Cross Road shall remain unchanged, in terms of physical infrastructure, outside of the Kimmage to City Centre Scheme's Red Line Boundary.</p>
Proposed Scheme: Under Construction	<p>Construction of the Proposed Scheme will be carried out in accordance with the Construction Strategy within its planning application, without any potential interaction with works associated with the</p>	<p>It is not envisaged that both schemes will be under construction at the same time at this location.</p>	<p>The Kimmage to City Centre Scheme will have been completed including the proposed upgrade of the subject junction.</p> <p>Common tie-in points have been determined approximately 35m from the</p>

	Kimmage Scheme: Not Yet Commenced	Kimmage Scheme: Under construction	Kimmage Scheme: Completed
	<p>Kimmage to City Centre Core Bus Corridor Scheme.</p> <p>The works shall take place within the Red Line Boundary of same and tie-in with the existing environment at the subject junction.</p>		<p>existing stop line on the southern arm of the junction, and approximately 60m from the existing stop line on the northern arm of the junction outside of which the Proposed Scheme works will be constructed as per the proposed design shown in Image 4.12. In this scenario it is not envisaged that any significant abortive works will be required, aside from minor works associated with footpath, cycle track, and pavement tie-ins.</p>
Proposed Scheme: Completed	<p>The Proposed Scheme shall be in full operation, designed in accordance with its planning application.</p> <p>The subject junction shall remain unchanged, in terms of physical infrastructure, outside of the Rathfarnham to City Centre Scheme's Red Line Boundary.</p>	<p>The Proposed Scheme will have been completed up to and including the interventions at the subject junction. As noted previously, the Kimmage to City Centre Scheme proposes significant interventions at the subject junction, and as such any works carried out by the Proposed Scheme within the confines of the junction will be considered abortive and will be removed as part of the construction work on the Kimmage to City Centre Scheme.</p> <p>Common tie-in points have been determined approximately 35m from the existing stop line on the southern arm of the junction, and approximately 60m from the existing stop line on the northern arm of the junction inside which the Kimmage to City Centre Scheme works will be constructed as per the proposed design shown in Image 4.13.</p>	<p>Both schemes shall be in full operation in accordance with each planning application and the arrangement will reflect the design shown in Image 4.13..</p>

4.6.8 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); and
- Minor and Priority Junctions.

The categorisations are based on;

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

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

4.6.9 Structures

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

4.6.9.1 Retaining Walls

Retaining walls with a retained height greater than 1.5 m are classified as principal structures.

There is no impact on existing retaining walls greater than 1.5m, nor is there a requirement for new retaining walls greater than 1.5m as part of the Proposed Scheme. Those retaining walls that have a retained height less than 1.5m are classified as minor retaining walls.

4.6.9.2 Archways

4.6.9.2.1 Templeogue Archway

The existing free standing stone arch adjacent to the R137 Templeogue Road will be cleared of the overgrown vegetation which currently covers it and conserved in its existing location. The existing fencing around the arch will be removed and the arch opened up to the public realm. It is proposed to install high quality stone paving, decorative lighting and soft landscaping elements around the arch as well as to construct a new footpath running behind the arch.

4.6.9.3 Retaining Walls (<1.5m)

Table 4.29 indicates the location of the only retaining wall less than 1.5m high proposed.

Table 4.29: Summary of Minor Retaining Walls <1.5m.

Ref.	Location	Length (m)	Max Retained Height (m)
RW01	Adjacent to access/service road at 252 – 256 Templeogue Road	Approx. 15m	1.2

4.6.9.4 Other

4.6.9.4.1 Digipoles / Digipanels

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

- Junction of Rathmines Road Upper and Rathmines Road Lower – Outbound Footpath;
- Junction of Camden Street Lower and Charlotte Way – Within central Traffic Island; and
- Camden Street Lower – South of Montague Street - Outbound Footpath.

Please refer to General Arrangement drawing (BCIDC-ARP-GEO_GA-1012_XX_01-DR-CR-9001) for details of their proposed locations.

4.6.10 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.

4.6.10.1 Traffic Signs and Road Markings

4.6.10.1.1 Traffic Signage Strategy

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

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

As stated in TSM Chapter 1, in urban areas the obstruction caused by posts located in narrow pedestrian footpaths should be minimised. Therefore, where practicable, signs are to be placed on single poles, or larger signs will be

cantilevered from a post at the back of the footpath using H-frames where necessary. Passively safe posts will be introduced where possible to eliminate the need for vehicle restraint systems.

4.6.10.1.2 Gantry Signage

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

4.6.10.1.3 Road Marking

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

- Bus lanes;
- Cycle tracks: the pavement will be marked according to best practice guidelines such as DMURS and the National Cycle Manual with particular attention given to junctions. Advance Stacking Locations (ASLs) have been designed where practicable to provide a safer passage for cyclists at signal-controlled junction for straight ahead or right turn movements; and
- Pedestrian crossings have been incorporated throughout the design to connect the network of proposed and existing footpaths. Wider pedestrian crossings have been provided in locations expected to accommodate a 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.

4.6.11 Pavement

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

4.6.11.1 Design Requirements

The Proposed Scheme pavement design will include new pavement, pavement strengthening or rehabilitation works where the existing pavement will be disturbed by construction works, as indicated in the Pavement Treatment Plans (BCIDC-ARP-PAV_PV-1012_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.

4.6.11.2 Design Standards

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

- DN-PAV-03021 (Dec. 2010) – Pavement and Foundation Design
- DN-PAV-03023 (Jun. 2020) – Surfacing Materials for New and Maintenance Construction for use in Ireland;
- AM-PAV-06050 (Mar. 2020) – Pavement Assessment, Repair and Renewal Principles;
- PE-SMG-02002 (Dec. 2010) – Traffic Assessment;
- CC-SPW-00600 (Mar. 2013) – Specification for Road Works Series 600 – Earthworks;
- CC-SPW-00700 (Jan. 2016) – Specification for Road Works Series 700 – Road Pavements – General;
- CC-SPW-00800 (Mar. 2013) – Specification for Road Works Series 800 – Road Pavements – Unbound and Cement Bound Mixtures; and
- CC-SPW-00900 (Sep. 2017) – Specification for Road Works Series 900 – Road Pavements – Bituminous Materials.

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

- DN-PAV-03021 (Dec. 2010) – Pavement and Foundation Design;
- DN-PAV-03026 (Jan. 2005) – Footway Design;
- Construction Standards for Road and Street Works in Dublin City Council (May 2016) – Revision 1;
- PE-SMG-02002 (Dec. 2010) – Traffic Assessment;
- CC-SPW-00600 (Mar. 2013) – Specification for Road Works Series 600 – Earthworks;
- CC-SPW-00700 (Jan. 2016) – Specification for Road Works Series 700 – Road Pavements – General;
- CC-SPW-00800 (Mar. 2013) – Specification for Road Works Series 800 – Road Pavements – Unbound and Cement Bound Mixtures;
- CC-SPW-00900 (Sep. 2017) – Specification for Road Works Series 900 – Road Pavements – Bituminous Materials;
- CC-SPW-01000 (Mar. 2013) – Specification for Road Works Series 1000 – Road Pavements – Concrete Materials;
- CC-SPW-01100 (Feb. 2012) – Specification for Road Works Series 1100 – Kerbs, Footways and Paved Areas;
- BS 7533 series of standards (1999 – 2021) – Pavement Constructed with Clay, Natural Stone or Concrete Pavers.

4.6.11.3 Pavement Rehabilitation Strategy

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

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

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

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

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

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

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

4.6.12 Parking and Loading

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

The number and type of parking spaces and loading bays were counted along the Proposed Scheme, and the proposed losses of these parking spaces and loading bays has been quantified. Mitigation measures have been identified to reduce the impact of the Proposed Scheme 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.

4.6.13 Landscape and Urban Realm

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

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

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

4.6.13.1 Landscape and Character Analysis

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

4.6.13.2 Hardscape

4.6.13.2.1 Typical Material Typologies

Through the process of developing the Proposed Scheme, a typology and palette of proposed materials was developed to create a consistent design response for various sections of the route. The proposed materials were based on the existing landscape character, existing materials, historical materials while also identifying areas for betterment through the use of higher quality surface materials. The Landscaping General Arrangement drawings (BCIDC-ARP-ENV_LA-1012_XX_00-DR-LL-9001) in Volume 3 of this EIAR illustrate these elements.

The material typologies employed in the preliminary design are:

- **Poured in situ concrete footpath.** - Used extensively on existing footpaths. Concrete footpaths can be laid without a kerb, can have neatly trowelled edges and textured surface for a clean, durable, slip resistant surface;
- **Asphalt footpath.** - Widely used on existing footpaths and will tie in with other sections of urban realm. Laid with a road kerb, can have a smooth finish or textured aggregate surface, provides a strong flexible slip resistant surface. Opportunities to retain good quality kerbs have been explored and tie-in points considered;
- **Precast concrete unit paving.** - Either concrete paving slabs or concrete block, there is a very wide variety of sizes and colours available to provide an enhanced urban realm. The use/reuse of granite kerbs where appropriate will further enhance the urban realm. This type of material use is mostly employed in non-inner-city urban realm enhancements;
- **Natural stone paving.** - Employed for high quality urban realm areas, mostly in city centre locations. This typology represents natural stone surface treatments such as granite and are used to create enhanced public spaces for major urban realm interventions;
- **Stone or Concrete setts.** - Proposed for distinguishing pedestrian crossing points either on raised table or at road level;
- **Self-binding gravel.** - Proposed for pedestrian paths set away from the road expected to see less traffic. Used for natural areas, for example, paths through wildflower meadows. They provide a defined informal route as an alternative to asphalt or concrete; and
- **No change.** - In addition to areas with proposed material changes, there were also areas identified where no change in materials would be required. For example, where pavement has recently been laid and is in good condition. The design also explores opportunities where good quality kerbs such as granite kerbs could be reused, which would have both cost and sustainability advantages.

Other design responses include:

- The re-use of existing high-quality and natural stone kerbs to maintain streetscape character, reduce construction costs and maximise sustainability;
- Pedestrian crossings at side streets will be raised where possible and will be distinguished using stone or concrete setts as appropriate to the locality;
- In some locations, existing street trees have disturbed or broken footpath surfaces. The footpath around such trees will be replaced where appropriate with self-binding gravel to improve the vitality of the trees and ensure accessible pedestrian facilities;
- Informal footpaths through landscaped areas that are set back from the main carriageway will be formed using self-binding gravel as an alternative to asphalt or concrete;
- Where private or commercial property boundaries are realigned, boundary walls and railings will be reinstated to match the existing and may be extended to other properties along the same street to enhance streetscape character; and
- Existing street furniture such as seating will be relocated within the revised streetscape and new street furniture will be provided at locations where opportunity sites have been identified to establish or enhance public spaces

4.6.13.3 Softscape

4.6.13.3.1 Planting Strategy

The planting strategy has been developed to meet the needs of the South Dublin County Council Development Plan 2016 –2022, the Dublin City Tree Strategy 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 South Dublin County Council Development Plan 2016 –2022 and the Dublin City Development Plan 2016 – 2022; and
- Develop the role of SuDS opportunities within the Proposed Scheme to ideally reduce impervious areas for drainage management benefit.

4.6.13.4 Arboricultural Survey

4.6.13.4.1 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.

4.6.13.5 Typical Planting Typologies

Several typologies were developed. These are discussed further below.

4.6.13.5.1 New Street Trees

As noted on the Landscaping General Arrangement (BCIDC-ARP-ENV_LA-1012_XX_00-DR-LL-9001) in Volume 3 of this EIAR, a range of urban street tree species (Image 4.19) have been incorporated into the design. The type of tree depends on the location and whether trees are to be planted in grass verges or in tree pits within paved urban environments as appropriate, and also to ensure diversity of species and provide habitats for urban wildlife. Typically, trees will be semi-mature and where appropriate, selected for having a clear stem height to facilitate visual permeability.

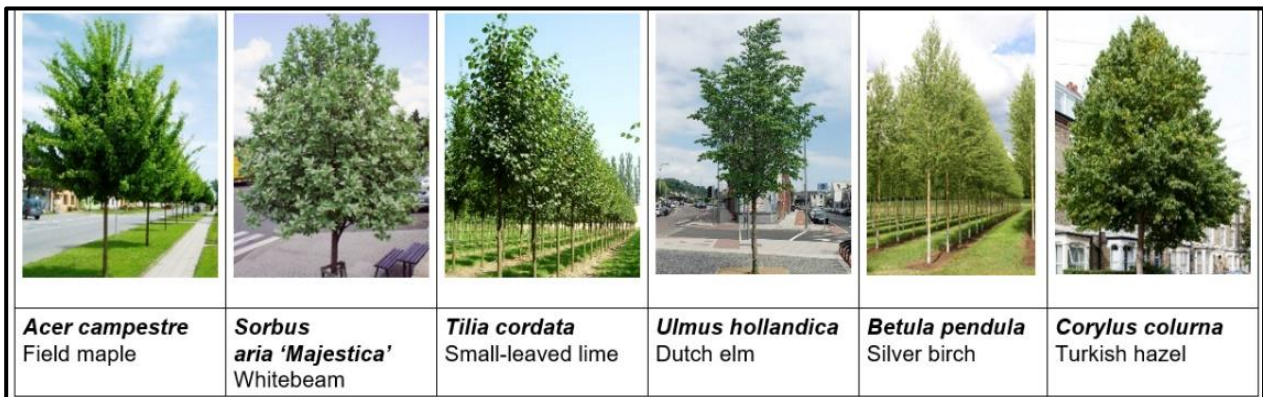


Image 4.14: Street tree species

4.6.13.5.2 New Woodland/ Parkland Areas and Tree Groups

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

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

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

The Proposed Scheme incorporates additional landscaping arising from junction reconfiguration, reinforcement of existing vegetation areas, and the establishment of new urban realm and landscape opportunity areas. Tree species will be determined by location and will comprise of either native woodland / parkland trees as set out above. Landscaping proposals respond to the different localities and may include grass planting, hedgerows, trees, grasses, ornamental planting and swathes of bulbs.

4.6.13.5.3 Boundary Planting

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

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

4.6.14 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 (BCIDC-ARP-LHT_RL-1012_XX_00-DR-EO-9001) in Volume 3 of this EIAR.

Light Emitting Diode (LED) lanterns will be the light source for any new or relocated public lighting provided. The lighting design will involve works on functional, heritage and contemporary lighting installations on a broad spectrum of lighting infrastructure along the Proposed Scheme. This will include, but not exclusively, luminaires supplied by underground and overhead cable installations and those located on ESB infrastructure.

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

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

4.6.14.1.1 New Lighting

All new public lighting will be designed and installed in accordance with the requirements of the relevant National Standards and guides, including but not limited to:

- Local Authority Guidance Specifications;
- EN 13201: 2014 Road Lighting (all sections);
- ET211:2003 'Code of Practice for Public Lighting Installations in Residential Areas';
- BS 5489-1 'Code of practice for the design of road lighting';
- Volume 1 – NRA Specification for Road Works, Series 1300 & 1400;
- Volume 4 – NRA Road Construction Details, Series 1300 & 1400;
- IS EN 40 – Lighting Columns; and
- Institution of Lighting Professionals "GN01 Guidance Notes for Reduction of Obtrusive Light"

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

4.6.14.1.2 Lighting at Bus Stops

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

4.6.15 Utilities

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

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

The utility design strategy included the analysis of records provided by all utility providers associated with the Proposed Scheme corridor. The analysis included desktop reviews including review of topographic surveys

together with site reconnaissance. In locations where critical assets were identified and the risk of interference was considered high, Ground Penetrating Radar surveys were undertaken to inform the design.

4.6.15.1 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).

4.6.16 Drainage

4.6.16.1 Relevant Standards and Guidance

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

4.6.16.2 Existing Watercourses and Culverts

The location of existing watercourses and culverts has been identified from survey. Table 4.30 shows where the Proposed Scheme crosses the existing watercourses and culverts.

Table 4.30: Existing Watercourses and Culverts

Watercourse	Chainage	Crossing Details
River Dodder	A1320	Bridge
	J1425	Bridge
Grand Canal	A4700	Bridge

4.6.16.3 Existing Drainage Description

Based on the information received from Irish Water, TII, DCC and SDCC the Proposed Scheme is served by surface water and 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. The design assumes that there are generally no SuDS / attenuation measures on the existing drainage networks to treat or attenuate runoff from the existing carriageway.

The existing drainage network along the Proposed Scheme can be split into the 18 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 (BCIDC-ARP-DNG_RD-1012_XX_00-DR-CD-1001 to BCIDC-ARP-DNG_RD-1012_XX_00-DR-CD-1004) in Volume 3 of this EIAR. The existing catchments are summarised below in Table 4.31.

Table 4.31: Summary of Existing Catchments

Existing Catchment Reference	Chainage	Approx. Drainage Catchment Area (km ²)	Existing Network Type	Existing Outfalls
Catchment 1	A 0-000 – A0+162	0.127	Surface Water (Storm)	Network outfalls to the River Dargle
Catchment 2	A0+162 - A0+612	0.026	Surface Water (Storm)	Network outfalls to the Owendoher River
Catchment 3	A0+612 – A1+318	0.045	Surface Water (Storm)	Network outfalls to the River Dodder
Catchment 4	N/A (Dodder View Road)	0.012	Surface Water (Storm)	Network outfalls to the River Dodder
Catchment 5	A1+318 – A1+859 and J3+704 - J3+771	0.070	Surface Water (Storm) and Combined	Network outfalls to the River Dodder with overflows to London Bridge Pumphouse which discharges to Ringsend Treatment Works
Catchment 6	B0+500 – B1+121	0.235	Combined	Network outfalls to London Bridge Pumphouse which discharges to Ringsend Treatment Works
Catchment 7	A1+1534 - A1+859 and A1+882 – A2+103 and B0+000 – B0+180	0.123	Combined	Network outfalls to the River Dodder with overflows to London Bridge Pumphouse which discharges to Ringsend Treatment Works
Catchment 8	N/A Rathmines Road Upper and Highfield Road Junction	0.432	Combined	Network outfalls to the River Dodder with overflows to London Bridge Pumphouse which discharges to Ringsend Treatment Works
Catchment 9	A1+859 – A1+882 and A2+103 - A4+695 and B0+180 – B0+500 and H0+000 – H1+548	2.101	Combined	Network outfalls to London Bridge Pumphouse which discharges to Ringsend Treatment Works with partial overflows to Grand Canal Dock and River Liffey
Catchment 10	A4+695 – A5+704	0.232	Combined	Network outfalls to London Bridge Pumphouse which discharges to Ringsend Treatment Works with overflows to River Liffey
Catchment 11	A5+704 – A6+047	0.028	Combined	Network outfalls to Ringsend Main Lift Pumphouse which discharges to Ringsend Treatment Works
Catchment 12	A6+047 – A6+285	0.013	Combined	Network outfalls to Ringsend Main Lift Pumphouse which discharges to Ringsend Treatment Works with overflows to River Liffey
Catchment 13	J0+100 – J0+712	0.351	Surface Water (Storm)	Network outfalls to the River Dodder

Existing Catchment Reference	Chainage	Approx. Drainage Catchment Area (km ²)	Existing Network Type	Existing Outfalls
Catchment 14	J0+712 – J1+429	0.557	Surface Water (Storm)	Network outfalls to the River Dodder
Catchment 15	J1+429 – J1+550	0.169	Surface Water (Storm)	Network outfalls to the River Dodder
Catchment 16	N/A	0.034	Surface Water (Storm)	Network outfalls to the River Dodder
Catchment 17	J1+550 – J2+717	0.091	Foul & Combined	Network outfalls to the River Dodder with overflows to London Bridge Pumphouse which discharges to Ringsend Treatment Works
Catchment 18	J2+717 – J3+704	0.340	Surface Water (Storm)	Network outfalls to the River Dodder with overflows to London Bridge Pumphouse which discharges to Ringsend Treatment Works

4.6.16.4 Proposed Drainage/Runoff

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

Each catchment area has been broken down into sub-catchments to 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 4.32. In addition, the table contains a column entitled “Net change” which takes account of the change of use from impermeable to permeable areas and vice versa.

Table 4.32: Summary of Increased Permeable and Impermeable Areas

Existing Catchment Reference	Chainage	Approx. Drainage Catchment Areas (km ²)	Change of use to impermeable areas (m ²)	Change of use to permeable areas (m ²)	Net Change (m ²)	Percentage change (%)
Catchment 1	A0000 – A0162	6,141	1,005	85	920	15
Catchment 2	A0162 - A0612	10,557	1,431	188	1,243	11.8
Catchment 3	A0612 – A1318	16,514	152	133	19	0.1

Existing Catchment Reference	Chainage	Approx. Drainage Catchment Areas (km ²)	Change of use to impermeable areas (m ²)	Change of use to impermeable areas (m ²)	Net Change (m ²)	Percentage change (%)
Catchment 4	Dodder View Road	2,155	86	0	86	4.0
Catchment 5	A1318 –A1534 & A1534 – A1859 (Left) & J3704 - J3771	11,112	204	28	176	1.6
Catchment 6	B0500 – B1121	9,771	0	0	0	0.0
Catchment 7	A1534 - A1859 (Right), A1859 – A2057, A2057– A2134 (left) & B0000 – B0180	9,038	521	0	521	5.8
Catchment 8	N/A Rathmines Road Upper & Highfield Road Junction	3,004	0	0	0	0.0
Catchment 9	A2057–A2134 (right), A2103 - A4695 & B0180 – B0500 & H0000 – H1548	86,430	480	267	213	0.2
Catchment 10	A4695 – A5704	26,848	0	152	-152	-0.6
Catchment 11	A5704 – A6047	6,225	0	0	0	0.0
Catchment 12	A6047 – A6285	6,858	0	0	0	0.0
Catchment 13	J0100 – J0712	35,214	4,105	2,506	1,599	4.5
Catchment 14	J0712 – J1429	26,229	1,646	192	1,454	5.5
Catchment 15	J1429 – J1550	4,988	459	146	313	6.3
Catchment 16	J2115 – J2200	4,882	190	278	-88	-1.8
Catchment 17	J1550 – J2115 J2200 – J2717	18,409	1,155	-74	1,229	6.7

Existing Catchment Reference	Chainage	Approx. Drainage Catchment Areas (km ²)	Change of use to impermeable areas (m ²)	Change of use to impermeable areas (m ²)	Net Change (m ²)	Percentage change (%)
Catchment 18	J2717 – J3704	25,859	206	97	109	0.4

4.6.16.5 Proposed Drainage System

The principle objectives of drainage design are as follows:

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

The following drainage types are proposed for the Proposed Scheme catchments comprising newly paved and combined existing / newly paved areas, as indicated on the Proposed Surface Water Drainage Works (BCIDC-ARP-DNG_RD-1012_XX_00-DR-CD-9001) in Volume 3 of this EIAR:

- Sealed Drainage (SD) comprised of gullies and sealed pipes will be located within the kerb line mostly between the cycle track and bus lane and / or the footpath and the cycle track depending on the carriageway profile;
- Grass Surface Water Channels, Swales and Bio Retention Areas/ Rain Gardens (SW/RG) are provided as road edge/ footpath edge drainage collection systems. They will provide treatment and can provide attenuation if required;
- Filter Drains (FD) are provided as road edge channels and comprise of perforated pipes with granular surround which are designed to convey, attenuate, and treat runoff prior to discharge;
- Tree pits (TP) are provided near the road. These receive flows from the sealed pipe network and are designed to convey, attenuate, and treat runoff prior to discharge; and
- Attenuation Tanks / Oversized Pipes (AT / OSP) are provided where there is insufficient attenuation volume provided by the proposed SuDS drainage measures

4.6.16.6 Runoff Attenuation & Sustainable Drainage Systems

SuDS measures and/or attenuation systems will be provided to ensure no increase in existing run off rates from newly paved 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.

4.6.16.7 Pollution Control

One of the principal objectives of the road drainage system is to minimise the impact of the runoff from the roadways on the surrounding environment via the provision of SuDs. The proposed road drainage system is shown in the Proposed Surface Water Drainage Works drawings (BCIDC-ARP-DNG_RD-1012_XX_00-

DR-CD-9001) in Volume 3 of this EIAR. The system incorporates a variety of pollution control measures which will provide interception and treatment as the types indicated below:

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

4.6.17 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.

4.6.18 Safety and Security

In addition to public lighting, it is proposed to install traffic monitoring cameras at key locations including junctions to enable the monitoring of traffic flows along the Proposed Scheme and provide rapid identification of any events that are causing, or are likely to cause, disruption to bus services on the route and to road users in general. Junctions System Design information is included in the drawings BCIDC-ARP-TSM_SJ-1012_XX_00-DR-TR9001 in Volume 3 of this EIAR.

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

4.6.19 Land Use and Accommodation Works

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

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

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

- 77 residential properties; and
- 40 non-residential properties or land, including commercial, healthcare and educational institutes.

Mitigation accommodation works are proposed in the affected locations, including reconstruction of boundary walls and fences, as required, as outlined in Section 4.6.19.1.

4.6.19.1 Summary of Accommodation Works and Boundary Treatment

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

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

Modifications to driveways and entrances will be guided by DCC's Parking Cars in Front Gardens Advisory Booklet (DCC 2011).

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

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

4.7 References

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

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

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

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

National Transport Authority (NTA) (2011). National Cycle Manual

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

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

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

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