Dundrum Village – Strategic Housing Development
Reference number GB01T19/E96/109025

21/03/2022

TRANSPORT ASSESSMENT
STAGE 3 REPORT

SYSTRA

DUNDRUM VILLAGE – STRATEGIC HOUSING DEVELOPMENT

TRANSPORT ASSESSMENT

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1. INTRODUCTION

1.1 Background

1.1.1 SYSTRA Ltd. (Systra) has been commissioned by Dundrum Retail GP DAC (Acting for and on behalf of Dundrum Retail Limited Partnership) (the applicant) to produce a Transport Assessment (TA) in support of a planning application for a proposed residential development on the site of the existing Dundrum Village Shopping Centre lands in Dundrum Town Centre, Dublin.

1.1.2 The proposals are to create a new development consisting of 881 apartments along with retail and commercial uses, associated car parking and public realm space. The indicative development mix at this stage is as follows:

- 881 new apartments;
- 3,424.7 sqm retail (including 2,028 sqm foodstore)
- 523.1 sqm Creche;
- 403.5 sqm café / restaurant;
- 107.4 sqm Commercial Plant / Ancillary;
- 1,750 cycle parking spaces: and
- 373 car parking spaces including 55 spaces to serve the retail/commercial uses (including 3no. for staff of the creche in Zone 4).

1.1.3 The general location of the site in the south of Greater Dublin is indicated by **Figure 1.1** below.

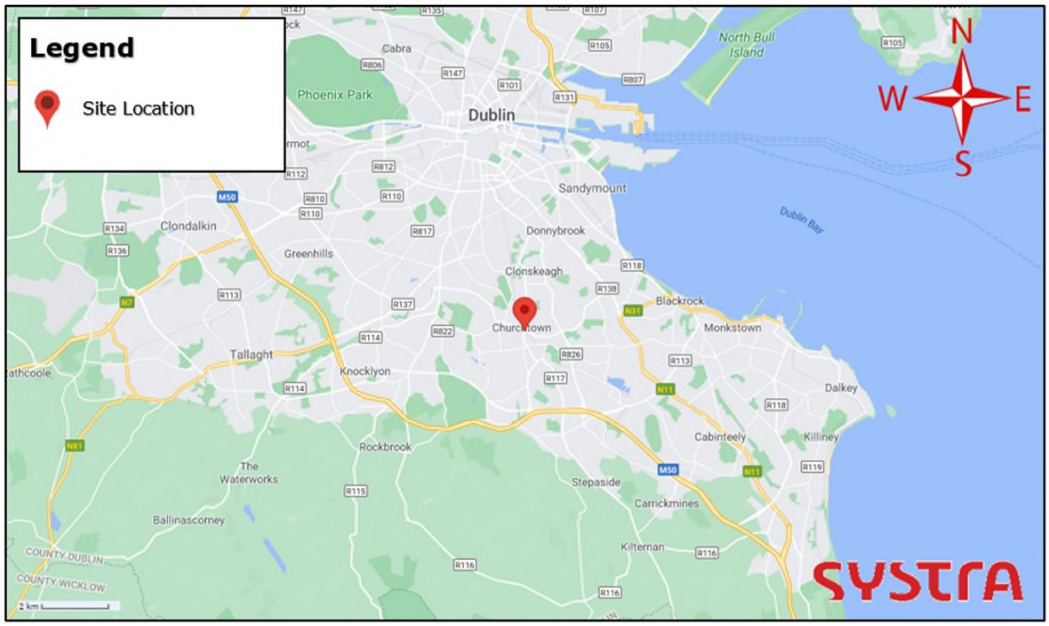


Figure 1.1: General Site Location

1.2 Purpose of the Report

1.2.1 The purpose of this TA is to evaluate the accessibility of the site and ensure that the proposed development can be integrated into the surrounding transport network. The report sets out how the proposed development is likely to be accessed by residents and visitors and assesses whether the transport infrastructure local to the site is suitable to accommodate the needs of the new development.

1.2.2 The principal aim is to ensure that accessibility to the site by foot, cycle and public transport is maximised and that any residual trips by car can be accommodated by the existing road network without detriment to existing users.

1.3 Policy & Guidance

1.3.1 The TA has been undertaken in accordance with the following policy and guidance documents.

- National Cycle Policy Framework (2009-2020);
- Sustainable Urban Housing: Design Standards for New Apartments (2020);
- Design Manual for Urban Roads and Streets (2019);
- Greater Dublin Area Transport Strategy (2016-2023);
- Greater Dublin Area Cycle Network Plan (NTA,2013);
- Regional Planning Guidelines for the Greater Dublin Area (RPGs) (2010-2022);
- Traffic and Transport Assessment Guidelines (May 2014) National Road Authority;
- Urban Development and Building Height Guidelines (2018)
- Guidelines for Traffic Impact Assessments – The Institution of Highways and Transportation (1995); and
- Dun Laoghaire Rathdown County Council Development Plan (2016-2022).

1.4 Scoping and Consultation Discussions

1.4.1 The TA has been informed by meetings between the design team (Systra and TJ O'Connor) and Dun Laoghaire Rathdown County Council (DLRCC) covering the evolution of the masterplan and a number of points relating to traffic and transportation including the scope of this Transport Assessment.

1.4.2 Discussion and correspondence was generated in relation to the scope of the traffic surveys and traffic assessment scope with comments received from DLRCC. These have been taken on board in the preparation of this Stage 3 Transport Assessment. Traffic surveys to inform the Transport Assessment were ultimately undertaken in the first half of November 2021 at a time when traffic levels were expected to have been similar to pre-Covid levels. Some further analysis of this is contained within the latter chapters of this report.

1.4.3 A Stage 2 Transport Assessment was submitted as part of the SHD Process and detailed comments were received from both the DLRCC Transport team and the DLRCC Planning team relating to transportation matters. These comments have also been carefully considered in the preparation of this final Stage 3 report.

1.4.4 Meetings were held with both the NTA and DLRCC in November 2021 and March 2022 to discuss the future Bus Connects proposals for the area around the proposed development site including the bus interchange facility to the immediate north of the site. As a direct result of this consultation, drawings have been produced to demonstrate how the future Bus Connects requirements (additional stops and lay-over area) could be incorporated on the Dundrum Bypass and Main Street Corridors.

1.5 Mobility Management Plan

1.5.1 It is noted that a Mobility Management Plan has been prepared for the development and submitted in support of the planning application for the proposed development. The Mobility Management plan sets out a range of potential measures that can be put in place at the development to encourage greater use of sustainable transport modes. The plan will evolve and be developed over time with a suitable monitoring regime in place. The Mobility Management should be read in conjunction with this Transport Assessment to get a full understanding of the transport arrangements that will be put in place at the new development.

1.6 Report Structure

1.6.1 Following this introductory chapter, the structure of the TA is as follows:

- Chapter 2 - Transport Policy Context;
- Chapter 3 - Existing Conditions & Site Accessibility;
- Chapter 4 - Proposed Development;
- Chapter 5 - Proposed Travel Characteristics;
- Chapter 6 - Traffic Impact Assessment;
- Chapter 7 - Development Parking Provision;
- Chapter 8 - Measures to Support The Development;
- Chapter 9 - NTA Requirements
- Chapter 10 - DLRCC Consultation; and
- Chapter 11 - Summary and Conclusions

2. TRANSPORT POLICY CONTEXT

2.1 General

2.1.1 This chapter of the TA identifies the relevant National and Local transport and planning policies that are relevant to the proposed development at Dundrum and, which should be taken on board in the design and assessment of the proposals.

2.2 National Policy Context

National Cycle Policy Framework 2009-2020

2.2.1 The National Cycle Planning Policy Framework 2009-2020 (NCPF) aims to create a new culture of cycling in Ireland, with a target of 10% of all trips to work being made by bike by 2020. It outlines 19 specific objectives and details 109 actions to achieve the ultimate objective of making cycling safer and easier. In the context of new developments these include the following actions:

- Compliance with Planning Conditions on Cycle Parking (7.2) – ensure that Local Authorities check that developers comply with planning permission conditions regarding the provision of cycling parking facilities.
- Targeting Family / Recreational Cyclists (10.8) – develop special targeted campaigns initiatives aimed at the target group of family / recreational cyclists.

2.2.2 Other relevant objectives are listed below:

- Objective 1: Support the planning, development and design of towns and cities in a cycling and pedestrian friendly way.
- Objective 3: Provide designated rural cycle networks especially for visitors and recreational cycling.

Sustainable Urban Housing: Design Standards for New Apartments

2.2.3 The Department of the Housing, Planning and Local Government released the "Design Standards for New Apartments" planning guidelines in March 2018. This document outlines ministerial guidance, setting out standards for apartment development, mainly in response to circumstances that had arisen whereby some local authority standards were at odds with national standards.

2.2.4 This document sets guidelines with regard to design quality safeguards such as internal spaces standards for 1, 2 and 3-bedroom apartments, internal storage and amenity space. In relation to transport and accessibility specifically, these guidelines set out standards for the level of provision of both cycle and car parking provisions. The document states:

> *'The quantum of car parking or the requirement for any such provision for apartment development will vary, having regard to the types of location in cities and towns that may be suitable for apartment development, broadly based on proximity and accessibility criteria.'*

Design Manual for Urban Roads and Streets

2.2.5 The Design Manual for Urban Roads and Streets (DMURS) (2019) sets out design guidance and standards for constructing new and reconfiguring existing urban roads and streets in Ireland. It also outlines practical design measures to encourage more sustainable travel patterns in urban areas.

2.3 Regional Policy Context

Greater Dublin Area Transport Strategy 2016-2023

2.3.1 This strategy aims to contribute to the economic, social and cultural progress of the Greater Dublin Area by providing for the efficient, effective and sustainable movement of people and goods. To achieve these principles, future developments must:

- Have transport as a key consideration in land use planning – integration of land use and transport as to reduce the need to travel, reduce the distance travelled, reduce the time taken to travel, promote walking and cycling especially within development plans.
- Protect the capacity of the strategic road network.
- Ensure a significant reduction in share of trips taken by car, especially those trips which are shorter or commuter trips
- Take into account all day travel demand from all groups.
- Provide alternate transport modes in order to reduce the strain on the M50 as current increase in traffic is unsustainable.

Greater Dublin Area Cycle Network Plan (NTA,2013)

2.3.2 The **Greater Dublin Area Cycle Network Plan** sets out a 10-year strategy to expand the urban cycle network from 500km to 2,480km. The overarching ambition of the scheme is to, by 2021, increase the number of commuters who commute by bike to be the same amount as those who commute by bus.

2.3.3 The network will consist of a series of primary, secondary and feeder routes as well as greenways routes. These routes will comprise of a mix of cycle tracks and lanes, cycleways and infrastructure-free cycle routes in low traffic environments. To complement the investment in the cycle network, the cycle network plans also provides for:

- Sufficient on-street and off street public cycle parking at key urban destinations such as bus/rail stations, schools and large workplaces.
- The expansion of the bike share scheme in Dublin City and the introduction of similar schemes across the Greater Dublin Area.
- The implementation of a comprehensive cycle route signage programme in conjunction with the development of the cycle network.

Regional Planning Guidelines for the Greater Dublin Area (RPGs) 2010-2022

2.3.4 The Regional Planning Guidelines (RPG) is a policy document which aims to direct the future growth of the GDA and works to implement the strategic planning framework set out in the NSS. The Guidelines provide an overall strategic context for the Development Plans of each local authority in the GDA including population and housing targets, and provides a framework for future investment in environmental services, transportation and other infrastructure.

2.4 Local Policy Context

Dun Laoghaire Rathdown County Council Development Plan 2016-2022.

2.4.1 The current DLRCC '*County Development Plan*' was adopted by the Council on the 16th March 2016. The Sustainable Communities Strategy vision statement of the plan is:

> *"To develop sustainable and successful communities across the County both through the continuing consolidation and redevelopment of the established built up areas, and the promotion of new, compact mixed–use urban villages optimally located in greenfield areas well served by existing or planned public transport networks and where residents will be within walking distance of supporting social and community infrastructure – including shops, services, employment opportunities, schools and leisure facilities."*

2.4.2 Dundrum Town Centre is allocated within the plan "*to protect, provide for and-or improve major town centre facilities*".

2.4.3 The plan sets out a land use strategy for the proper planning and sustainable development of the area. It consists of a written statement and maps indicating objectives for purposes such as the zoning of land; the phasing of development; economic and community development; residential development; heritage and culture; open space and recreation; transportation and infrastructure; urban design; and environmental protection.

3. EXISTING CONDITIONS & SITE ACCESSIBILITY

3.1 Site Location

3.1.1 The proposed site lies to the north of the existing Dundrum Town Centre development and to the north of the Dom Marmion Bridge. The site and the Town Centre sites will be joined below the bridge at car park level whilst pedestrian links will be provided across the bridge to ensure that there is permeability between the two developments.

3.1.2 The Dundrum Village site currently houses a collection of smaller retailers operating out of one main building. The site has been earmarked for re-development for a long time and has extant planning consent for a retail-led redevelopment and associated car parking ("Dundrum Town Centre Phase 2").

3.1.3 The site is bound by Main Street to the north and east, Dom Marmion Bridge to the South and The Dundrum Bypass to the west. A large residential area lies to the west of the Dundrum Bypass (Sweetmount). A further residential area lies to the north and west of Taney junction which is a large intersection between Taney Road and the Dundrum Bypass to the north of the development. The Dundrum LUAS Station and bus interchange lie to the immediate north-east of the site.

3.1.4 A context plan for the Dundrum Village site is indicated by **Figure 3.1** below.

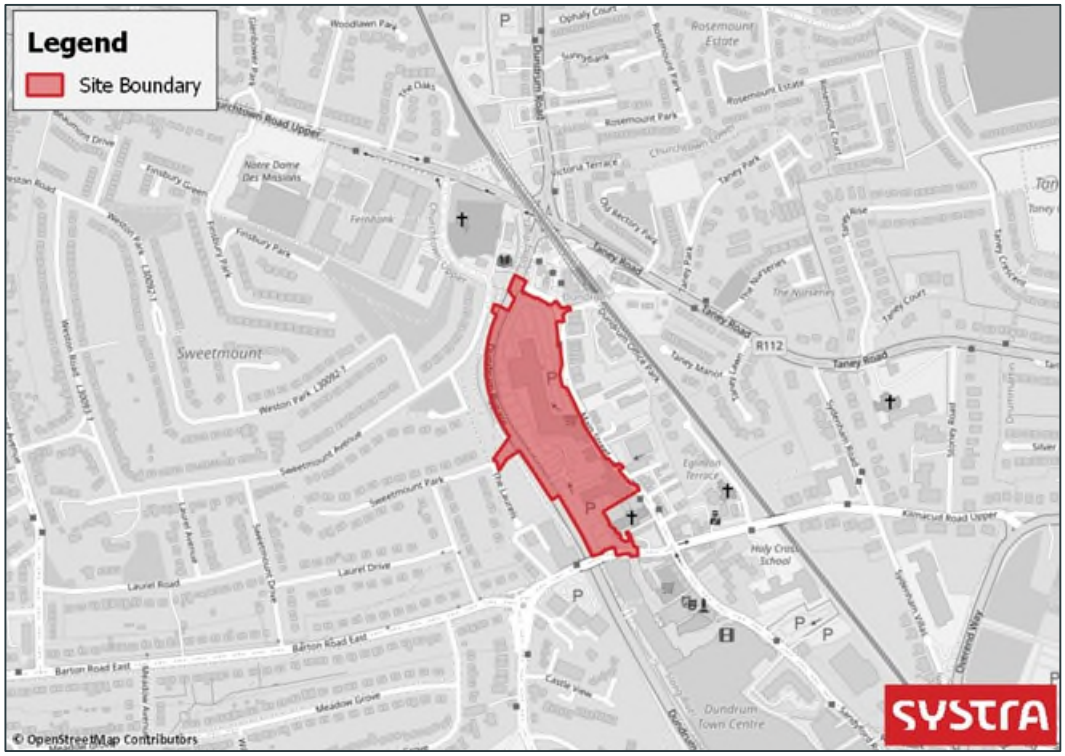


Figure 3.1: Site Location Plan

3.2 Access for Sustainable Modes

Pedestrian Infrastructure

3.2.1 The following paragraphs and accompanying graphics demonstrate the highly accessible nature of the site, particularly for active and sustainable travel modes.

3.2.2 **Figure 3.2** illustrates the primary pedestrian infrastructure surrounding and through the development site, including the various pedestrian crossing facilities to the north and south. The figure demonstrates that there is a good level of existing pedestrian infrastructure serving the site which is conducive to a high proportion of pedestrian trips within the local area.

Figure 3.2: Pedestrian Infrastructure

3.2.3 In the vicinity of the development, the footways are generally in the region of 1.5m – 2.0m in width with provision of dropped kerb and tactile paving arrangements at crossing points.

3.2.4 In the immediate surroundings of the development site, we would note that recent upgrades to the pedestrian and cycle network have been introduced as part of measures to improve active travel as a result of the Covid-19 pandemic.

3.2.5 **Figure 3.3** shows a photograph of a newly implemented dropped kerb and tactile paving pedestrian crossing at Main Street as part of these measures. The crossing lies to the south of the access road between Main Street and the Dundrum LUAS station. **Figure 3.4** indicates the cycleway that has been created in the Main Street corridor.

3.2.6 Within the wider network, formal crossings are provided at all key junctions in the vicinity of the site.

Figure 3.3: Existing Pedestrian Crossing at Main Street

Figure 3.4: Main Street Cycle Infrastructure Upgrades

3.2.7 The Sweetmount area to the west of the Dundrum Village Site is linked to Main Street by means of the traffic signals associated with the Dundrum Bypass / Main Street junction. This link is at the north end of main street and to the north-east corner of Sweetmount. More direct at-grade links are not currently possible as a result of a level difference between the Sweetmount area and the bypass further south of the existing crossing point. There is also no public right of way across the site.

Cycling Infrastructure

3.2.8 The cycling infrastructure in the immediate vicinity of the site is considered to be very good, with several key links at Taney Road, Main Street, Churchtown Road Upper and on the Dundrum Bypass. **Figure 3.4** shows the upgraded cycle infrastructure on Main Street.

3.2.9 **Figure 3.5** demonstrates the strategic cycle network in Dundrum and the surrounding local areas. There is a wealth of cycle routes to several local and strategic destinations, including Sandyford, Dublin City, Blackrock and Tallaght.

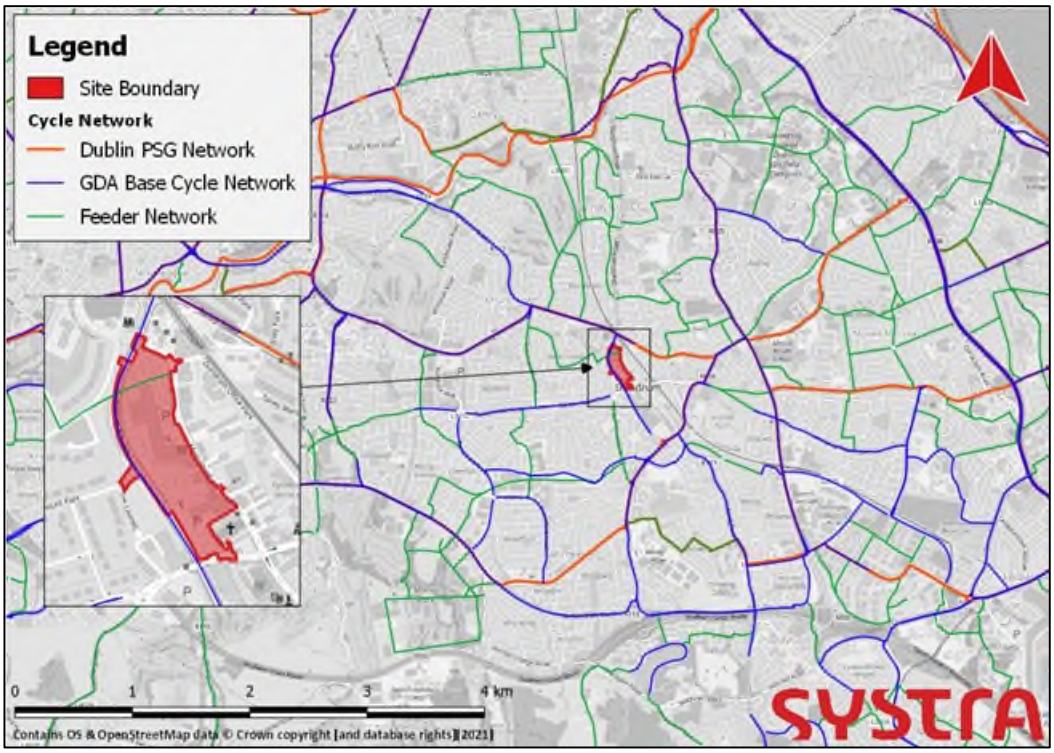


Figure 3.5: Cycling Infrastructure

Local Amenities

3.2.10 There are numerous amenities located within an approximate 5-minute walk / 2-minute cycle of the proposed development. **Table 3.1** sets out each of these local amenities in order of distance from the development, with **Figure 3.6** illustrating the location and approximate distance of each.

Table 3.1: Local Amenities

AMENITY	
No.	**Description**
1	Coffee Shop
2	Dundrum Dental Surgery
3	Dundrum Train Station
4	Dundrum Luas Bus Stop
5	Mulvey's Pharmacy & Coffee Shop
6	Multiple Dentist Practices
7	Dundrum Centre Bus Stop
8	Holy Cross Church & Pastoral Centre
9	Saint Nahi's Church and Cemetery
10	Dundrum Dental Practice
11	Coffee Shop
12	Quigley's Pharmacy & Haven Pharmacy
13	Hope Baptist Church
14	Schools
15	Holy Cross School
16	Christ Church Taney

Figure 3.6: Local Amenities

3.3 Public Transport

3.3.1 The site benefits significantly from its town centre location within Dundrum and there is a wealth of existing public transport interchanges within the immediate vicinity of the site, including 16 bus stops and the Dundrum LUAS station all located within a 5-minute walk (approximately 400m) of the site.

3.3.2 **Figure 3.7 i**llustrates the location of the local bus stops and LUAS station which are within a 5-minute walk.

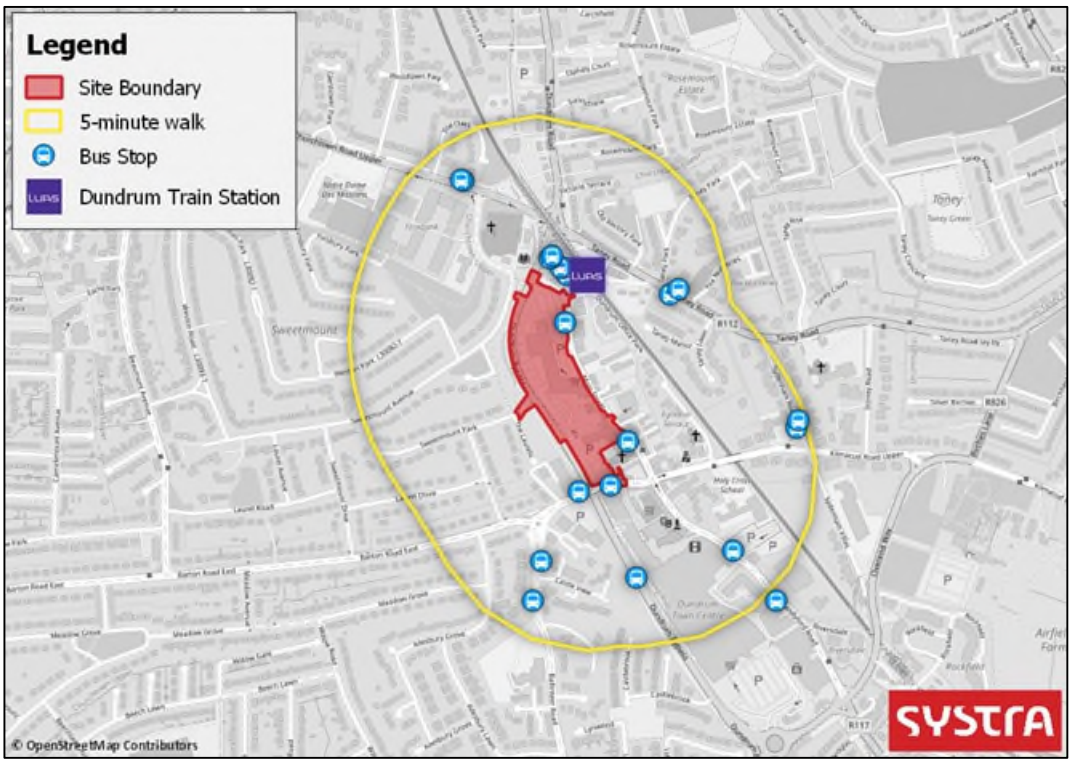


Figure 3.7: Public Transport

3.3.3 The bus service provision is exemplary for a town centre site. There are numerous services in either direction to destinations such as Dublin, Beaumont, Blackrock, Enniskerry and Tallaght.

3.3.4 **Table 3.2** sets out the bus routes and frequencies for the stops immediately adjacent to the development.

3.3.5 In addition to the bus provision, the LUAS tram 'green line' runs adjacent to Sandyford Road. As described above, good quality existing pedestrian facilities connect the site to the LUAS station.

3.3.6 The 'green line' operates between Broombridge and Brides Glen and is a very popular mode of transport for those accessing Dublin City Centre, and many other locations. The approximate average frequency between Monday and Friday is 6.4 minutes, 8.5 minutes on a Saturday and 13.3 minutes on a Sunday. The route of the Luas stops are depicted by **Figure 3.8**.

Table 3.2: Bus Service Frequencies

OPERATOR	SERVICE NO.	BUS STOP	DISTANCE FROM SITE	ROUTE	FREQUENCY		
					Mon-Fri	Sat	Sun
Dublin Bus, Go Ahead Ireland	14, 17D, 44, 161, 175	Dundrum Luas (2825)	160m	14: Beaumont - Dundrum Luas 17D: Blackrock - Rialto 44: DCU - Enniskerry 161: Dundrum - Rockbrook 175: Citywest - UCD	14 - 12 mins 17D - 1 per day 44 - 60 mins 161 - 90 mins 175 - 40 mins	14 - 15 mins 17D - 1 per day 44 - 60 mins 161 - n/a 175 - 60 mins	14 - 20 mins 17D - 1 per day 44 - 60 mins 161 - n/a 175 - 60 mins
Dublin Bus, Go Ahead Ireland	14, 44, 44B, 75, 75A, 175	Dundrum Luas (2866)	70m	14: Beaumont - Dundrum Luas 44: DCU - Enniskerry 44B: Dundrum Luas - Glencullen 75/75A: Dun Laoghaire - The Square Tallaght 175: Citywest - UCD	14 - 12 mins 44 - 60 mins 44B - 5 per day 75 - 30 mins 75A - 5 per day 175 - 40 mins	14 - 15 mins 44 - 60 mins 44B - n/a 75 - 30 mins 75A - 2 per day 175 - 60 mins	14 - 20 mins 44 - 60 mins 44B - n/a 75 - 30 mins 75A - n/a 175 - 60 mins
Dublin Bus, Go Ahead Ireland	14, 44, 44B, 75, 75A, 175	Holy Cross Church (2865)	200m	14: Beaumont - Dundrum Luas 44: DCU - Enniskerry 44B: Dundrum Luas - Glencullen 75/75A: Dun Laoghaire - The Square Tallaght 175: Citywest - UCD	14 - 12 mins 44 - 60 mins 44B - 5 per day 75 - 30 mins 75A - 5 per day 175 - 40 mins	14 - 15 mins 44 - 60 mins 44B - n/a 75 - 30 mins 75A - 2 per day 175 - 60 mins	14 - 20 mins 44 - 60 mins 44B - n/a 75 - 30 mins 75A - n/a 175 - 60 mins
Dublin Bus, Go Ahead Ireland	14, 75, 75A	Dundrum Centre (4486)	240m	14: Beaumont - Dundrum Luas 75/75A: Dun Laoghaire - The Square Tallaght	14 - 12 mins 75 - 30 mins 75A - 5 per day	14 - 15 mins 75 - 30 mins 75A - 2 per day	14 - 20 mins 75 - 30 mins 75A - n/a

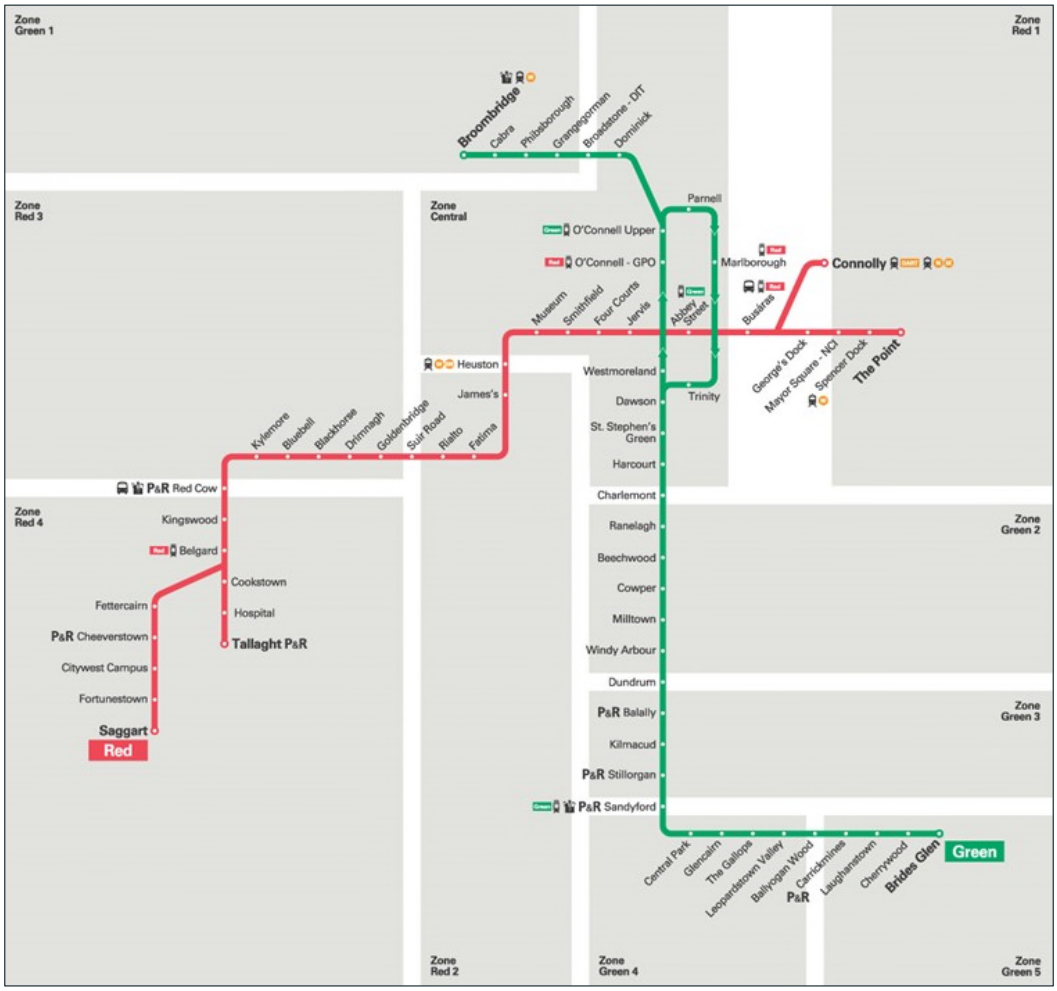


Figure 3.8: LUAS Route Map

3.3.7 The tram system is a popular choice for those accessing the town centre but more importantly, the LUAS offers access to the very wide range of employment and City Centre amenities from the proposed residential development at Dundrum Village. It is fully expected that a high proportion (circa 16%) of residents at the new residential development will use the LUAS to commute to their place of work in the City Centre, Sandyford and Cherrywood Business Districts.

3.3.8 In terms of public transport capacity it is noted that patronage levels on the bus and LUAS Green Line have not yet returned to pre-covid levels and it is not known whether levels will return in the short to medium term. Notwithstanding this, the Bus Connects proposals are to deliver a significant increase in the range of bus services serving Dundrum which will bring a step change in the capacity available. There are also plans to enhance the capacity of the Luas Green line (which serves Dundrum) through the provision of additional fleet and infrastructure to meet forecast passenger demand.

3.3.9 With the planned enhancements to the Luas Green Line and the introduction of the Bus Connects scheme, it is fully expected that the additional demand from the development can be accommodated through the increased public transport capacity and frequency of services that will be delivered in the Dundrum area.

3.4 Local Highway Network

3.4.1 **Figure 3.9** illustrates the local roads which surround the site and provide access to the wider area and to the strategic road network. The site is bound in all directions by local roads/streets. To the north and east, the site is bound by Main Street, to the west by the Dundrum Bypass, and to the south by Ballinteer Road, including a section of road bridge (Dom Marmion Bridge) that crosses along the north side of the existing Dundrum Town Centre development.

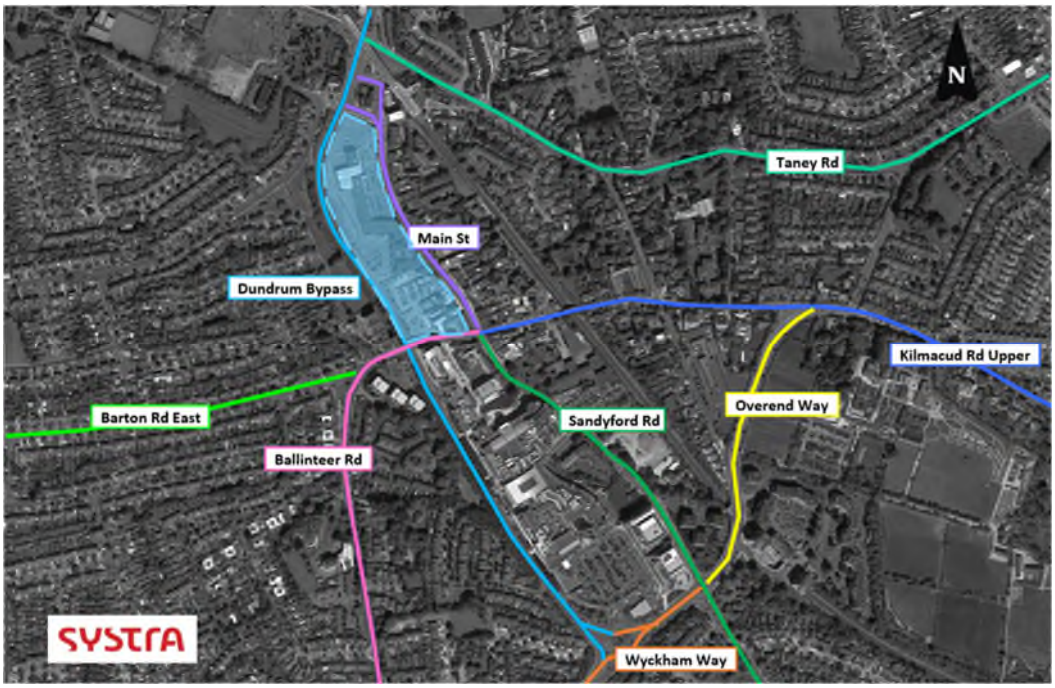


Figure 3.9: Local Roads

3.4.2 A brief overview of each of the key roads/streets on the periphery of the site is set out below.

Main Street

3.4.3 Main Street is a one-way street of town centre characteristics which includes building on both sides of the road and active frontages. The street has recently been modified to become part-pedestrianised as part of measures introduced to encourage active travel during the Covid-19 pandemic. **Figure 3.3** and **Figure 3.4** show the general characteristics of Main Street and demonstrate the significant active travel infrastructure which has been brought forward in the last year.

The Dundrum Bypass

3.4.4 The Dundrum Bypass is a two-way road which features generous carriageway widths of between 7.0m to 7.6m. The road is subject to a 50km/h speed restriction and features a number of accesses into the existing car parks along the western site boundary (including the multi-storey car park south of the Dom Marmion Bridge).

Ballinteer Road

3.4.5 Ballinteer Road is a distributor road which routes between Dundrum (at a junction with Main Street, Sandyford Road and Kilmacud Road Upper) and the M50 motorway approximately 2.0km south of the development site. The road is of varying characteristics (in terms of width and cross section) but is generally of residential and urban standards. In the direct vicinity of the site, Ballinteer Road crosses the Dundrum Bypass via Dom Marmion Bridge. This bridge also crosses an existing vehicular access into the development site from the Dundrum Town Centre development south of Ballinteer Road.

3.5 Access & Parking

3.5.1 Vehicular access into the existing Dundrum Village site is provided via two existing priority junctions on Main Street and a priority junction on the Dundrum Bypass, which takes the form of a ghost island arrangement with a right-turn lane from the bypass northbound lane. The access arrangements for the existing site are indicated by **Figure 3.10** below. Access points A to D are the vehicular points of access.

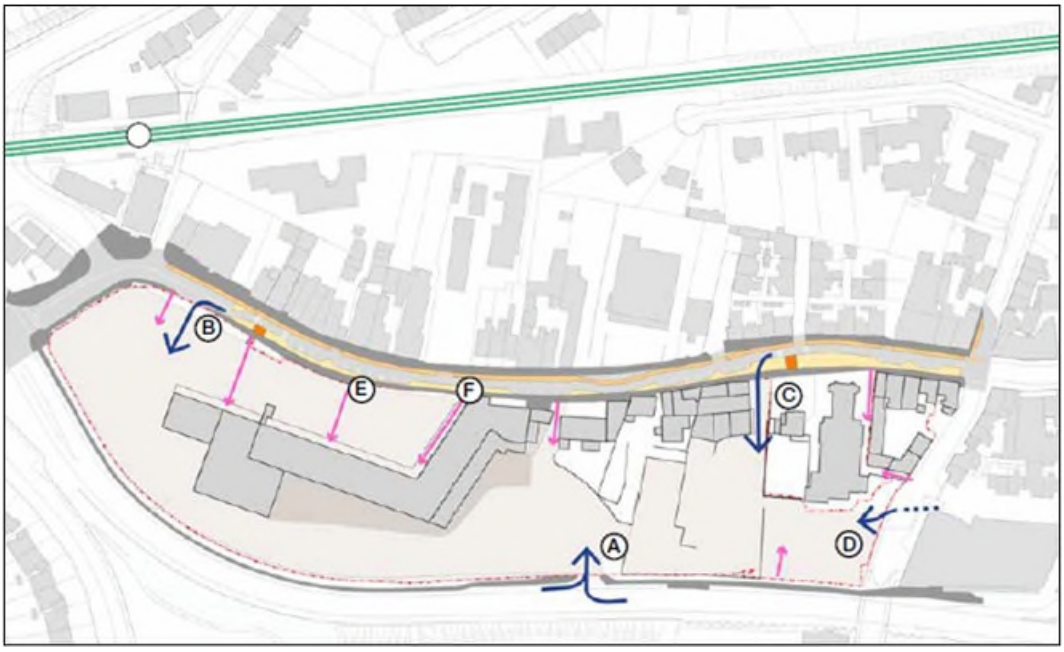


Figure 3.10: Existing Access Strategy

3.5.2 The existing Dundrum Village site includes approximately 459 car parking spaces, split across three parking areas accessed from each of the vehicular access points A to C in the above figure.

3.6 Accessibility Summary

3.6.1 In summary, the proposed development sits within a highly sustainable location benefitting from the following:

- The development sits within a mature transport network and there is a full network of footways which are lit and crossing points are located at key junctions;
- Cycle links exist on Taney Road, between Main Street at Sweetmount, Churchtown Road Upper and on the Dundrum Bypass;
- The site is conveniently located for the LUAS Green Line and sits opposite the Dundrum LUAS Station;
- The site sits adjacent to Main Street and bus interchange which is a key bus corridor in the area. A total of 5 bus services operate adjacent to the site; and
- The site is well located to take advantage of local amenities including Dundrum Town Centre, local schools, hotels and restaurants all of which are within 10 minutes' walk of the site.
- Public transport capacity will be significantly increased at Dundrum over the next few years as the Bus Connects proposals will significantly enhance the choice of bus services and capacity in the area. The Luas Green line is also due for capacity enhancements and the current strategy is to deliver significant additional capacity through the provision of additional fleet and necessary infrastructure to meet forecast passenger demand. The significant capacity enhancements in the Dundrum area will accommodate the additional demand from the proposed development.

4. PROPOSED DEVELOPMENT

4.1 Development Content

4.1.1 The proposals being developed are to bring forward a significant urban re-development of the site in the north of Dundrum Town Centre, comprising primarily of apartment units plus an element of on-site commercial uses, including a new modestly-sized foodstore to serve the development.

4.1.2 The proposed development content at this stage is set out within **Table 4.1** below.

Table 4.1: Development Content

LAND-USE	NO. UNITS / GFA
Residential (apartments)	881 units
Food Store	2,028 sqm
Other Retail	1,396.7 sqm
Café / Restaurant	403.5 sqm
Creche	523.1 sqm
Commercial Plant / Ancillary	107.4 sqm

4.1.3 With regard to the residential aspect of the development, **Table 4.2** sets out the schedule of accommodation in terms of bedroom capacity.

Table 4.2: Schedule of Accommodation

NAME	BEDROOMS	OCCUPANCY (PERSONS)	NO. UNITS
Studio	1	2	1
1B2P	1	2	335
2B3P	2	3	84
2B4P	2	4	379
3B5P	3	5	82
Residential Total:			**881**

4.1.4 In total, there will be approximately 1,508 bedrooms provided within the 881 apartments, ranging from a studio, 1-bedroom apartments (for up to two people) to 3-bedroom apartments (for up to five people).

4.2 Internal Layout

4.2.1 Pedestrian and cycling provision is very much at the forefront of the design criteria of the proposed development, ensuring that a high-level of pedestrian accessibility and permeability is provided with a network of continuous footways and footpaths throughout the development. This network of footways and paths will in turn offer safe, convenient and pleasant links through the site and to the wider pedestrian network.

4.2.2 **Figure 4.1** illustrates the latest site masterplan and shows the high-level of open spaces within the central parts of the development. This is proposed to be high-quality public realm / amenity spaces.

Figure 4.1: Current Site Masterplan

4.2.3 Overall, the development seeks to:

- Promote a safe environment for pedestrians and cyclists;
- Create an integrated permeable network of streets, footways, paths and public realm spaces that are conveniently connected and offer choices of movement;
- Provide pedestrian and cycle desire lines which link to the surrounding network, with strong north to south and east to west connections to wider pedestrian infrastructure and the other local residential areas (such as Sweetmount to the west); and
- Provide a well-connected street layout maximising where possible, the number of routes through the development.

4.3 Access Strategy

4.3.1 In keeping with the recent infrastructure upgrades for pedestrians and cyclists on Main Street, the proposed access strategy is to eliminate all vehicular access points from Main Street. The purpose is to further enhance the priority which is given to pedestrians under the new street layout and to create a more pleasant environment for walking and cycling in this corridor. The access points A and B (**Figure 3.10**) will therefore be removed.

4.3.2 Instead, all vehicles accessing the site will do so via the Dundrum Bypass and via a secondary access via the Dundrum Town Centre development under the Dom Marmion Bridge. **Figure 4.2** demonstrates the new access points and the vehicular flows into and through the site.

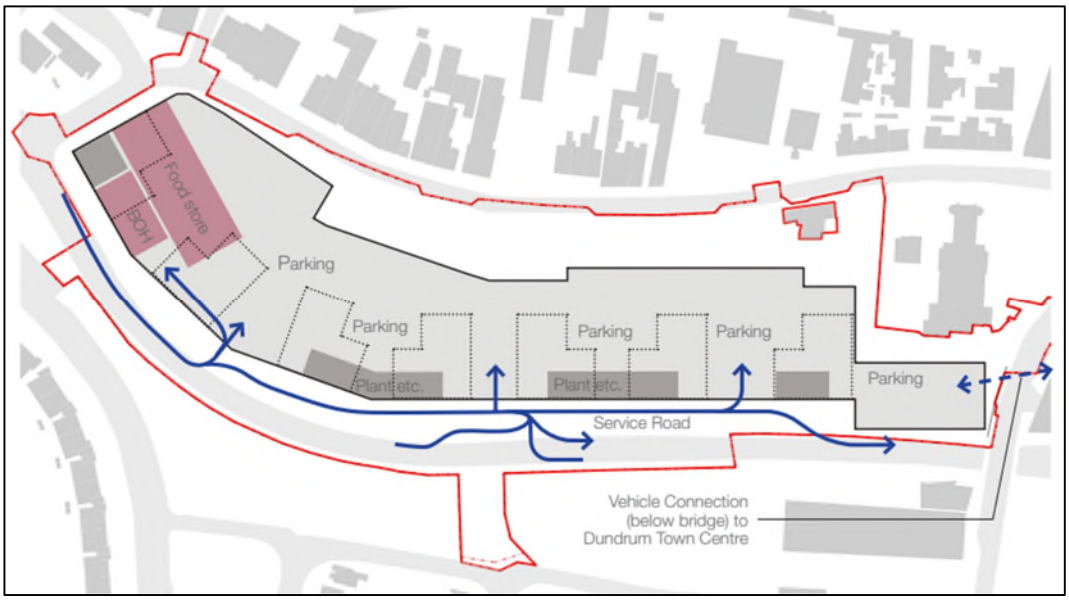


Figure 4.2: Proposed Vehicular Access Strategy

4.3.3 There will be two new access points constructed at the north and south respectively, with the existing centrally-located all-movements access being upgraded. The three primary access points will take the following form:

- A new northern left-in only access with an approximate 39.5m auxiliary lane for deceleration upon entry to the site;
- An all-movements ghost-island junction at the location of the existing all-movements junction (this will be upgraded to provide a raised table across the access for pedestrian/cyclist priority); and
- A new left-out only junction at the southern extents of the western development boundary.

4.3.4 An internal service road will be constructed which will run parallel to the Dundrum Bypass and will provide access into the car parking areas and for service vehicles attending the food retail / commercial units at the northern end. Further details of the site access strategy and servicing arrangements are set out within **Chapter 8**.

4.3.5 It is noted that no basement parking will be constructed, with all development parking provision provided at lower ground-floor only.

5. PROPOSED TRAVEL CHARACTERISTICS

5.1 People-Trips by Mode

5.1.1 This chapter considers the multi-modal trip generation for the proposed development. A people-trip assessment has been undertaken which looks at the potential uplift in trip generation resulting from the redevelopment of the Dundrum Village site. This is based on information relating to the number of dwelling units being developed and people trip rates extracted from the TRICS[1] database.

5.1.2 We have interrogated the data for the following land-use/sub-category:

- Land Use : "*03 – RESIDENTIAL*"; and
- Category : "*C - FLATS PRIVATELY OWNED*"

5.1.3 The sites were then filtered to include only sites within Ireland. The resultant surveys cover nine sites in Ireland, including three within the Greater Dublin area. These are categorised as: four 'edge of town' sites, four 'suburban area' sites and one 'edge of town' site.

5.1.4 It is noted that one of the sites assessed for trip rates is the Southmede residential (apartments) development which lies approximately 600m to the south of the development site (see **Figure 5.1**). It is therefore considered that the site selection parameters are generally suitable and associative with the proposed development.

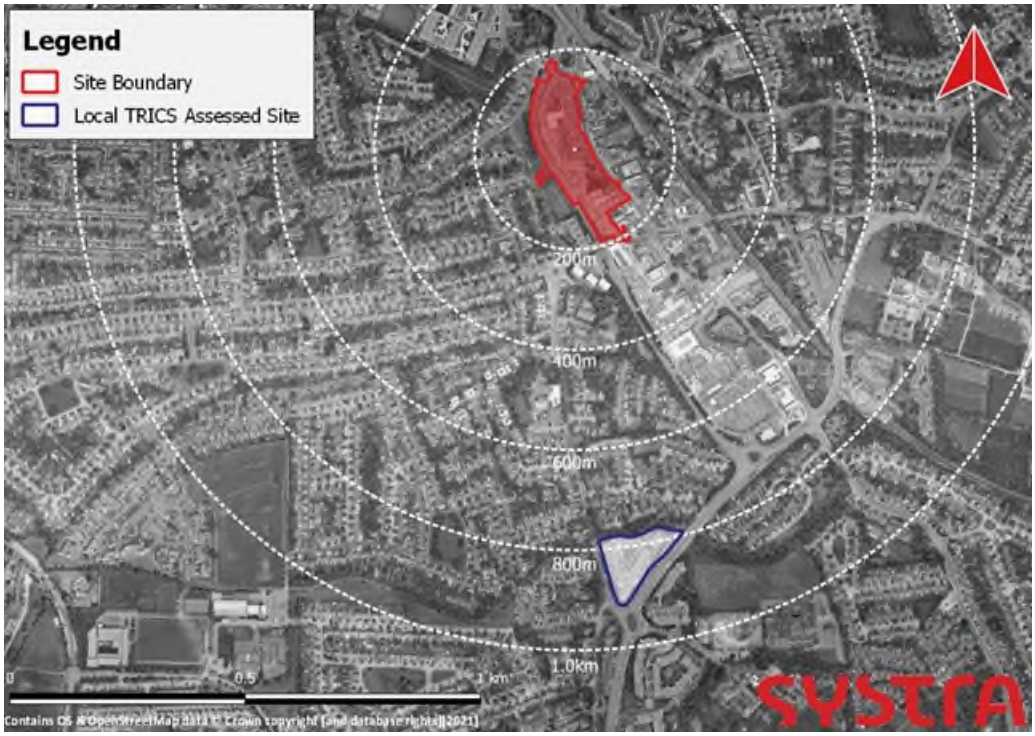


Figure 5.1: Local TRICS Site

[1]TRICS (Trip Rate Information Computer System) is an industry standard database of recorded trip-rates for developments used in Ireland and the UK for transport planning purposes, specifically to quantify the trip generation potential of new developments.

5.1.5 Whilst it is acknowledged that there will also be an element of retail/commercial development at the site, at this stage, it is currently understood that this will primarily serve the residents of the proposed development as well as an element of 'pass-by' trips.

5.1.6 The trip rates and resultant people trips for 884 dwelling units are presented within **Table 5.1**. for the developmental AM and PM peak hours of 09:00-10:00 and 17:00-18:00 respectively.

Table 5.1: TRICS People-Trip Assessment

MODE	08:00 – 09:00			17:00 – 18:00		
	Arrive	Depart	2-way	Arrive	Depart	2-way
Per dwelling	0.104	0.531	0.635	0.416	0.172	0.588
881 dwellings	92	468	560	366	152	518

Source: TRICS (variances due to rounding).

5.1.7 The table indicates that approximately 560 two-way people trips will be generated by the proposed development during the AM peak hour. In the PM peak hour, there will be around 518 two-way people trips generated.

5.2 Mode Share

5.2.1 To determine a suitable mode share for the proposed development, we have adopted Irish Census (2016) data for the local electoral area of Dundrum. The data for '*method of travel to work or study*' has been interrogated to identify a modal split which can anticipated for the proposed development, once it becomes occupied.

5.2.2 **Figure 5.2** illustrates the location of the site within the context of the Dundrum electoral ward.

Figure 5.2: Dundrum Electoral Area

5.2.3 It should be highlighted that applying the modal data for the entire ward is somewhat robust, as the area within the immediate vicinity of the development site is the most accessible in terms of active and sustainable travel, when compared with the wider Dundrum electoral area. It can therefore be assumed that the modal share presented below in **Figure 5.3** is a reasonable worst-case estimate.

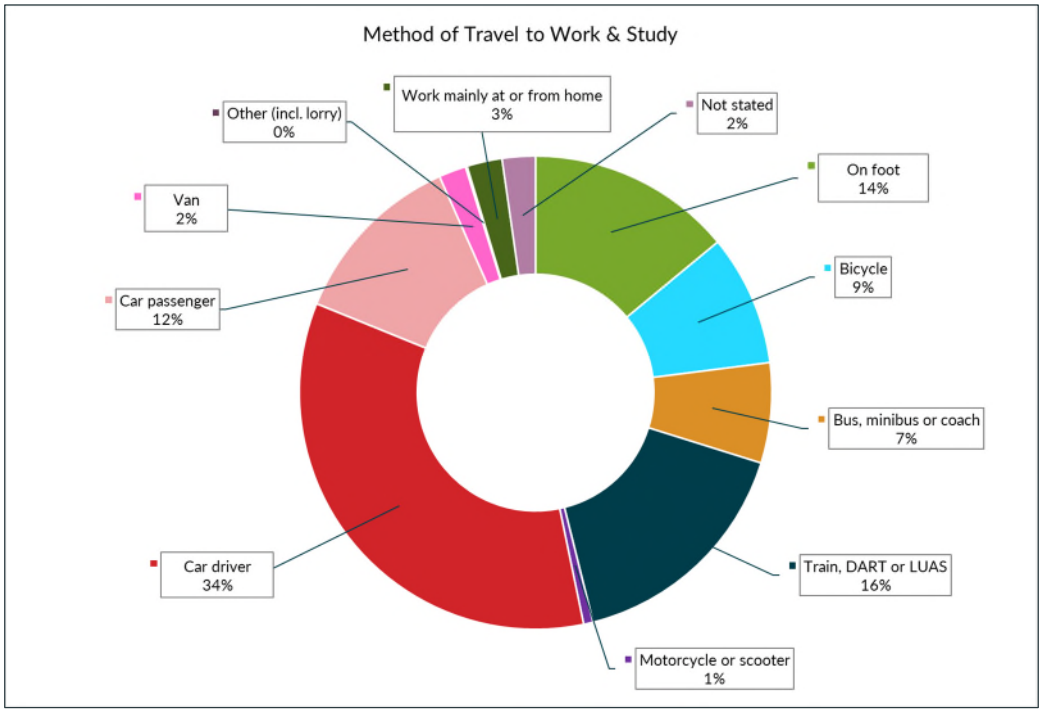


Figure 5.3: Method of Travel to Work or Study

Source: Central Statistics Office (2016 Census data)

5.2.4 As shown in **Figure 5.3**, car drivers account for the highest proportion of travellers within the Dundrum area at 34%. This is followed by public transport users (bus and rail) and active modes (walking and cycling) at 23% each. Car passengers account for 12% of the total trips.

5.2.5 Regarding sustainable modes, walking (14%) cycling (9%), bus (7%) and rail (16%) account for a combined 46% of all trips. We would consider that this is a relatively high proportion of trips and demonstrates the high level of local active and sustainable travel infrastructure.

5.2.6 Finally, it is noted that 3% of commuters reported working mainly at home during the last Census. Whilst we would consider that the impacts of the Covid-19 pandemic is likely to have increased this proportion of people who work from home, we have not taken any account of this within the applied mode share so as to be robust.

5.2.7 Combining the primary modes of travel and ignoring '*work from home*', '*not stated*' and '*other*', the following modal split (as presented in **Figure 5.4**) is estimated for the development.

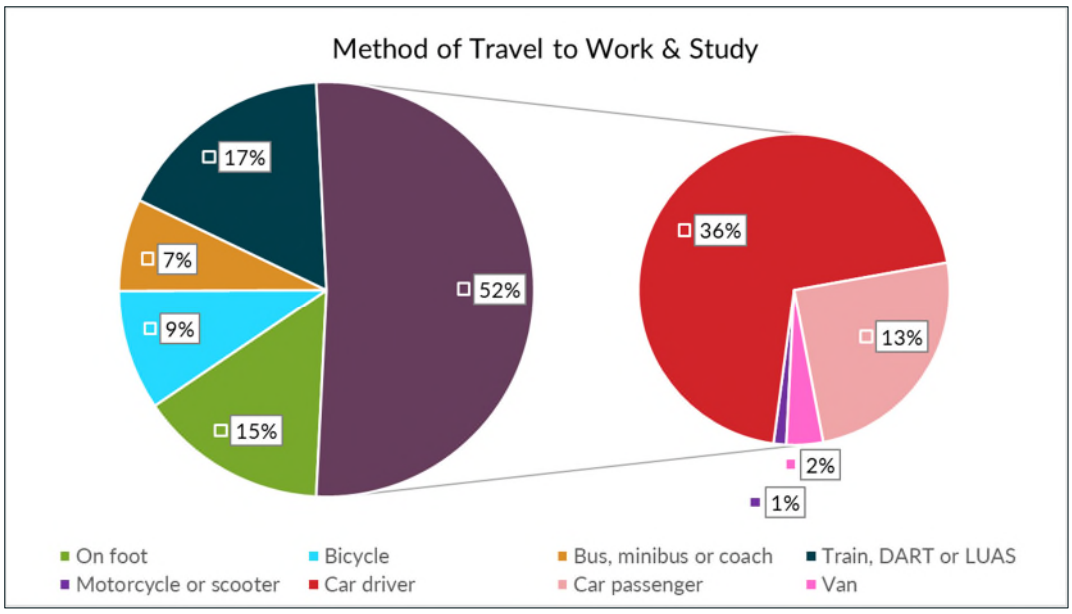


Figure 5.4: Anticipated Development Mode Share
Source: Central Statistics Office (2016 Census data)

5.2.8 Applying this mode share to the peak hour people trips, results in the following people-trips by mode as set out in **Table 5.2**.

Table 5.2: People-Trips by Mode

MODE	AM PEAK HOUR			PM PEAK HOUR			MODE SHARE
	Arrive	Depart	2-way	Arrive	Depart	2-way	
Walking	14	70	84	55	23	78	**15%**
Cycling	8	42	50	33	14	47	**9%**
Public Transport	22	112	134	88	36	124	**24%**
Vehicle Passenger	12	61	73	47	20	67	**13%**
Vehicle Driver	36	183	219	143	59	202	**39%**
TOTAL	**92**	**468**	**560**	**366**	**152**	**518**	**100%**

Source: Central Statistics Office (2016 Census data); TRICS (variances due to rounding).

5.2.9 The data also identifies that there will be a number of new walking and cycling trips associated with the development along with a number of new public transport trips which would be split between the bus and the LUAS. It is considered that the delivery of the walking and cycling enhancements outlined in **Chapter 8** will accommodate this additional demand. With regard to public transport, the additional demand will be accommodated by the significant public transport enhancements that will be delivered in the Dundrum area over the next few years. In particular, the Bus Connects project will deliver a step change in bus service provision in the area which will provide new services, increased frequency and significantly enhanced capacity.

5.2.10 With regard to the LUAS green line, their planned capacity enhancements for the line which are to be achieved through fleet enhancements and infrastructure upgrades to cater for forecast demand.

5.2.11 Taking the above enhancements into consideration, it is considered that there will be capacity available to accommodate the forecast demand from the proposed development. This is in keeping with the Development Plan aspirations for the Dundrum Areas which relate to supporting high density development next to strong public transport links.

5.2.12 The data identifies that approximately 219 two-way vehicle trips (36 arrivals / 183 departures) will be generated by the development during the AM peak hour. In the PM peak hour, approximately 202 two-way vehicle trips will be generated (143 arrivals / 59 departures).

5.3 Vehicle Trips

5.3.1 **Table 5.3** sets out the daily profile of vehicle trips across the 12-hour period between 07:00 and 19:00.

Table 5.3: Vehicle Trip Daily Profile

HOUR	IN	OUT	TWO-WAY
07:00-08:00	15	108	122
08:00-09:00	**36**	**183**	**219**
09:00-10:00	64	102	167
10:00-11:00	38	52	90
11:00-12:00	45	46	91
12:00-13:00	54	68	122
13:00-14:00	54	53	107
14:00-15:00	81	48	129
15:00-16:00	100	47	147
16:00-17:00	81	45	126
17:00-18:00	**143**	**59**	**202**
18:00-19:00	120	77	197
12-Hour Trips:	**830**	**887**	**1,718**

Source: Central Statistics Office (2016 Census data); TRICS (variances due to rounding).

5.3.2 It is estimated from TRICS and Irish Census data that the 881 units will generate approximately 1,718 two-way vehicle trips during the period between 07:00 and 19:00.

5.3.3 Further details of the trip rates extracted from the TRICS database, along with the filtering parameters used, is contained within a TRICS summary report which is provided in **Appendix B** of this TA.

5.4 Distribution & Assignment

5.4.1 To estimate the distribution and assignment of trips which will be generated by the proposed development onto the local road network, we have produced a gravity model which assumes that the likelihood of a trip to/from a particular destination is directly proportionate to the number of potential trip attractors at a given destination and the overall distance by road to that destination.

5.4.2 The gravity model also assumes that the number of attractors at a destination is linked to the population at that destination, i.e. a destination with a higher population will generally have a higher proportion of trip attractors such as employment land uses.

5.4.3 The calculation undertaken for each data zone is as follows:

$$Trip\ Potential = \frac{Total\ Population}{Distance^2}$$

The potential of a trip occurring to each destination is then taken as a percentage of the sum of all potential trips to determine the percentage distribution.

5.4.4 The destinations that have been assessed are the local electoral areas within a 10.0km radius of the development site. Whilst it is likely that there will be some residents who will travel out with this local catchment area, we would consider a 10.0km catchment to be generally representative of an 85th percentile commuting distance.

5.4.5 **Figure 5.5** illustrates the distribution of trips to the other local electoral wards within the 10.0km catchment area.

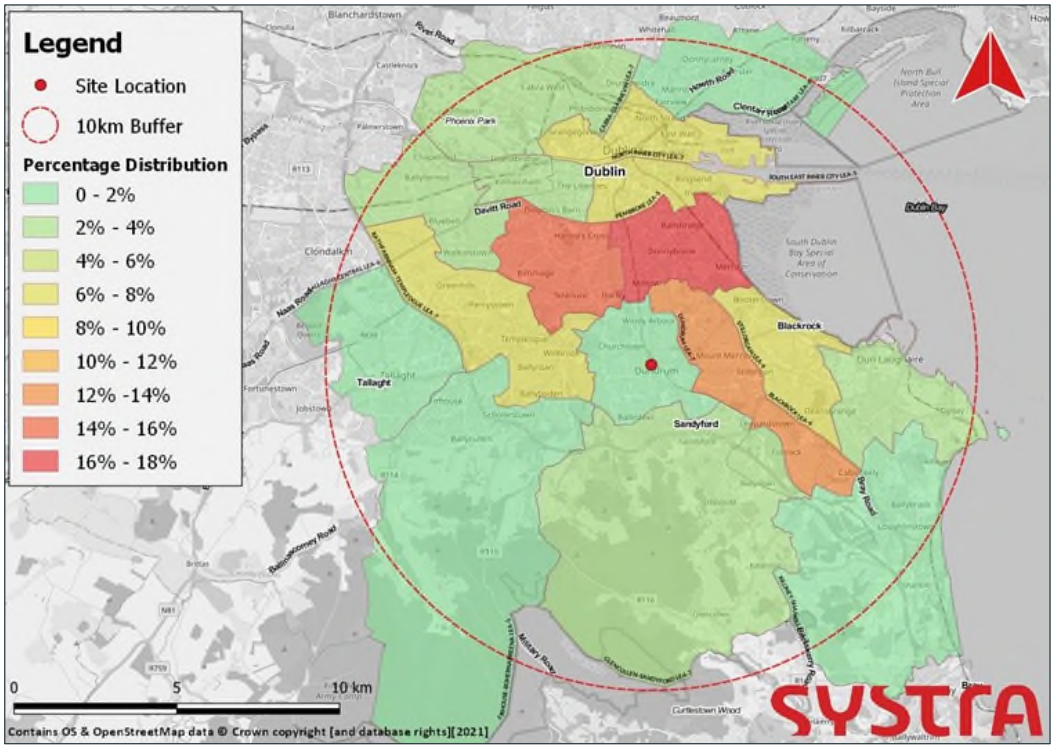


Figure 5.5: Gravity Model Distribution

5.4.6 As shown, the majority of trips will distribute to the north towards Dublin City. This is considered to be a reasonable estimate of distribution which could occur in reality, as the majority of employment opportunities are likely to be within Dublin City itself.

5.4.7 **Table 5.4** sets out the numerical data used in the production of the gravity model (as per **Figure 5.5**). We would note that any trips generated to destinations within the Dundrum electoral area have been discounted as it is assumed that these trips could all be made by sustainable means of travel.

Table 5.4: Gravity Model (Electoral Areas 2019)

ELECTORAL AREA	DISTANCE (KM)	POPULATION	POPULATION / DIST^2	PERCENTAGE %
Pembroke	8.3	45,473	2,390	18%
Kimmage-Rathmines	9.2	55,861	2,145	16%
Stillorgan	5.1	30,508	1,921	14%
Blackrock	13.2	33,727	1,013	8%
Rathfarnham-Templeogue	6.6	47,909	1,084	8%
North Inner City	6.5	63,612	927	7%
South East Inner City	5.8	40,603	973	7%
Cabra-Glasnevin	13.3	58,652	496	4%
Dun Laoghaire	10.2	41,627	495	4%
Ballyfermot-Drimnagh	15	46,068	443	3%
Glencullen-Sandyford	9.3	36,622	427	3%
South West Inner City	4	42,344	434	3%
Killiney-Shankill	10.9	38,082	210	2%
Clontarf	13.5	25,991	146	1%
Firhouse-Bohernabreena	9.9	34,202	195	1%
Tallaght Central	4.4	43,215	191	1%

5.4.8 The distances to each area have been measured by road from the development access to the centroid of each electoral area using QGIS. Measuring the distance to the centroid of each data zone provides a reasonable average journey for any trips which will travel to a given zone.

5.4.9 The methodology for assigning trips was by shortest journey time using the open route service (ORS) extension of QGIS. **Figure 5.6** illustrates the assignment of vehicle trips onto the local road network between the development and each electoral area.

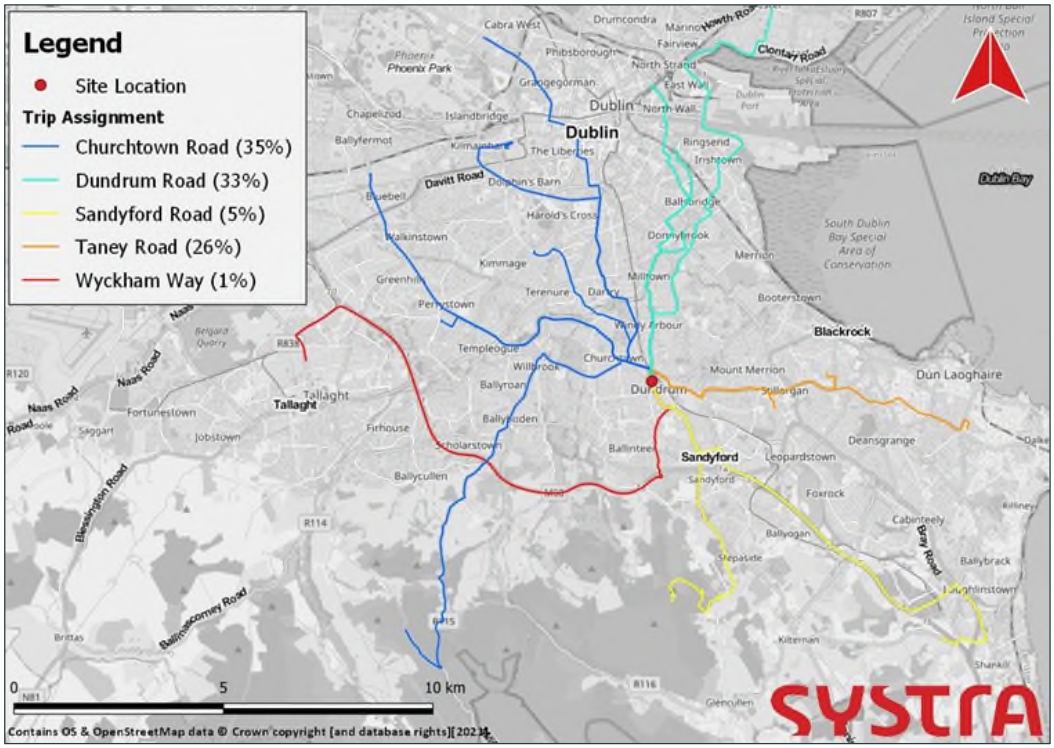


Figure 5.6: Gravity Model Assignment

5.4.10 In numerical terms, **Table 5.5** sets out the distribution of developmental trips onto the local roads within the vicinity of the development site. The majority of trips (94%) will route north on the Dundrum Bypass and distribute at the Taney Cross junction. The remaining 6% will route south, with the majority of these trips heading south via Sandyford Road.

Table 5.5: Local Road Assignment

DISTRIBUTION (LOCAL ROADS)	PERCENTAGE
Dundrum Bypass (NORTH)	**94%**
↳ Churchtown Road	35%
↳ Dundrum Road	33%
↳ Taney Road	26%
Dundrum Bypass (SOUTH)	**6%**
↳ Sandyford Road	5%
↳ Wyckham Way	1%
TOTAL	**100%**

5.5 Existing Land-Use Comparison

5.5.1 In considering the net-impacts of the development on the local road network, it is pertinent to review the existing level of vehicle trips which are generated by the retail aspects of the existing Dundrum Village development which will be removed from the road network following the re-development of the site. To inform this exercise, new traffic surveys were undertaken in the first half of November 2021 to obtain up to date counts at the access points to the car parking area adjacent to the existing retail development. It is considered that this comparison is a good starting point to consider the potential for wider traffic impacts and to identify an appropriate study area in which to consider development traffic impacts.

5.5.2 We have produced the following comparison table (**Table 5.6** overleaf) to demonstrate the relative impact of the development compared with the current land use which is retail in nature. In doing so, we have also considered a nominal level of vehicle trips associated with the proposed food-retail element by undertaking a further TRICS assessment for the 2,007 sqm food store and applying this taking account of a 50% reduction to consider the potential for shared trips with the apartments as well as pass-by trips. We would consider that the potential for shared and pass-by trips will be greater than 50%, but the figure has been adopted to provide a robust assessment.

5.5.3 The table indicates that there is an increase in the AM peak period of 139 vehicle trips whilst there is a net gain of just 8 trips in the PM peak period.

5.5.4 It is noted that this Stage 3 Transport Assessment contains 2021 survey data for the car park whereas earlier versions of this report contained survey data from 2006. The 2006 data indicated a total of 281 vehicle movements from the site whilst the 2006 data for the PM peak indicated a total of 412 vehicle movements. The corresponding 2021 flows were 118 vehicles in the AM peak (less than 50% of 2006 flows) and 297 (more than 25% less) vehicle movements in the PM peak period. This suggests that the car parks have not yet returned to pre-Covid levels of activity.

Table 5.6: Comparison of Vehicle Trip Generation – Existing versus Proposed

ACCESS	AM Peak Hour			PM Peak Hour		
	IN	OUT	2-WAY	IN	OUT	2-WAY
Existing Town Centre Flows (2021 Survey)						
Bypass	35	13	48	32	106	138
Main Street North	53	10	63	77	74	151
Main Street South	7	0	7	7	1	8
TOTAL	**95**	**23**	**118**	**116**	**181**	**297**
Development						
Residential	36	183	219	143	59	203
Retail (50% pass-by)	23	16	39	50	53	103
Bypass (ALL)	**60**	**199**	**259**	**196**	**114**	**310**
NET						
Bypass	24	185	209	161	6	167
Main Street North	6	188	194	116	38	154
Main Street South	52	198	250	186	111	297
COMBINED	**-36**	**175**	**139**	**77**	**-69**	**8**

5.5.5 The change of land use (from primarily retail to residential) will result in a change to the arrival/departure profile of trips generated from the site. This will result in a net-increase in outbound trips of approximately 175 during the AM peak hour. However, the inbound trips during the same period will reduce by around 36. The PM peak period shows an increase of 77 outbound trips and a decrease of 69 inbound trips resulting in a net gain of just 8 trips onto the network although the revised access strategy for the site and the change to trip distribution as a result of the site changing from retail to residential will also have an impact on vehicle trips in the area which needs to be examined. The following chapter considers the traffic impacts associated with the proposed development in more detail.

6. TRAFFIC IMPACT ASSESSMENT

6.1 General

6.1.1 The purpose of this chapter of the TA is to analyse the extent of the impact that the traffic generated by the proposed development will have on the local road network in terms of road capacity, queueing and delay.

6.1.2 The following sections detail the relative impacts that traffic generated by the proposed development will have at the junctions within the study area, taking cognisance of **Table 5.6** which compares the existing level of traffic generation from the site with the trip generation potential for the new development.

6.2 Baseline Traffic Data

6.2.1 **Table 6.1** and **Figure 6.1** (overleaf) detail the junctions which were assessed as part of a previous study for the retail Application at Dundrum Village (Dundrum Phase 2) which effectively formed the study area for the previous Transport Assessment. The previous retail application generated significantly more traffic than that associated with the proposed development. Notwithstanding this, the previous study area has been used as the starting point for assessing the study area for the proposed development.

6.2.2 All nine junction were surveyed in the first half of November 2021 which was considered to be a suitable neutral period for undertaking surveys in this area.

Table 6.1: Junctions Surveyed (2021)

JUNCTION		FORM
1	Dundrum Road / Churchtown Road Upper / Taney Road	Signal-Control
2	Dundrum Road / Dundrum Wood / Main Street	Signal-Control
3	Main Street / Northern Car Park Access	Priority
4	Dundrum Bypass / Western Car Park Access	Priority
5	Main Street / Eastern Car Park Access	Priority
6	Main Street / Kilmacud Road Upper / Sandyford Road / Ballinteer Road	Signal-Control
7	Dundrum Bypass / Multi-Storey Car Park	Priority
8	Dundrum Bypass / Wyckham Way	Priority Roundabout
9	Sandyford Road / Wyckham Way / Overend Way	Signal-Control

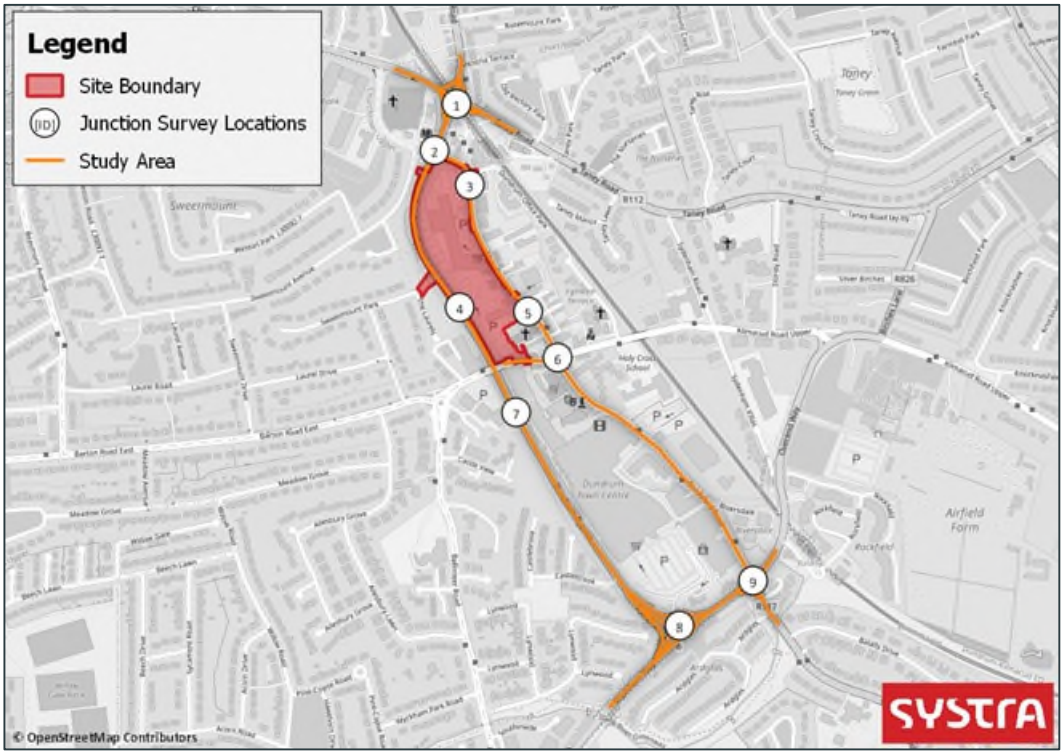


Figure 6.1: Previous Study Area

6.2.3 The network peak hours which have been identified from the available traffic surveys are as follows:

- Weekday AM Peak Hour: 08:00 – 09:00; and
- Weekday PM Peak Hour: 17:00 – 18:00.

6.2.4 We would note that these network peak hours coincide with the anticipated development peak hours (see **Chapter 5**).

6.3 Assessment Year

6.3.1 Given the scale of development, we anticipate that the year of completion will be during the year 2024. The analysis within this TA has been undertaken on the basis of a 1.4% annual growth in network traffic over the period 2021 to 2024. This is consistent with the TA undertaken for the pending application for the residential development at Mount St. Mary's in April 2021. We have therefore applied a medium growth of 4.2% between 2021 and 2024 i.e.:

- **Medium Growth Factor (2021 to 2024) = 1.042**

6.4 Survey Scope

6.4.1 The scope of the traffic surveys was discussed and agreed with DLRCC during scoping discussions and the surveys were undertaken to the following specification:

- **Scope of Surveys:**
  - Classified junction turning counts (JTC) in 15-minute intervals; and
  - Maximum queueing (per cycle for signal-controlled junctions and in 5-minute intervals for priority junctions).

- **Days / Periods:**
  - AM (07:30-09:30); and PM (16:30-18:30) periods during a neutral weekday; and
  - 11:00-15:00 during a Saturday.

6.5 Traffic Impact Assessment – Threshold Assessment

6.5.1 It is generally accepted that a percentage impact of 5% or greater for congested junctions would trigger the requirement for detailed junction analysis.

6.5.2 **Table 6.2** sets out the results of the network threshold assessment, taking account of the changes in traffic generation and the re-distribution of traffic primarily onto the Dundrum Bypass as a result of the development access strategy. It is noted that there is no negative traffic impacts on junctions 3,5 and 6 so they have been excluded from the Threshold Assessment although data has been collected for these junctions.

Table 6.2: Network Threshold Assessment

Junction / Arm	AM Peak Hour			PM Peak Hour		
	B + C	DEV	↑	B + C	DEV	↑
Dundrum Bypass / Main Street						
Dundrum Bypass (N)	518	-1	0%	669	92	14%
Main Street	275	-10	-4%	361	-76	-21%
Dundrum Bypass (S)	521	171	33%	574	44	8%
Dundrum Road / Taney Road / Dundrum Bypass / Churchtown Road						
Dundrum Road	616	-12	-2%	678	20	3%
Taney Road	442	7	2%	473	35	7%
Dundrum Bypass	777	161	21%	808	-33	-4%
Churchtown Road	996	4	0%	838	37	4%
Dundrum Bypass / Multi-Storey Car Park						
Dundrum Bypass (N)	534	13	2%	826	-42	-5%
Multi-Storey Car Park	18	0	0%	87	0	0%
Dundrum Bypass (S)	535	-8	-1%	552	21	4%
Dundrum Bypass / Wyckham Way / TESCO Car Park						
Dundrum Bypass	507	12	2%	777	-46	-6%
TESCO Car Park	72	0	0%	408	5	1%
Wyckham Way (E)	677	-1	0%	794	9	1%
Wyckham Way (W)	1,305	-8	-1%	1,097	6	1%
Main Street / Ballinteer Road / Kilmacud Road / Sandyford Road						
Main Street	6	0	0%	5	0	0%
Kilmacud Road	241	-2	-1%	287	-3	-1%
Sandyford Road	189	-11	-6%	219	-20	-9%
Ballinteer Road	196	-18	-9%	88	-15	-17%
Sandyford Road / Overend Avenue / Wyckham Way						
Sandyford Road (N)	100	0	0%	280	1	0%
Overend Avenue	573	0	0%	654	-1	0%
Sandyford Road (S)	606	-1	0%	554	4	1%
Wyckham Way	994	8	1%	942	6	1%

6.6 Study Area

6.6.1 In light of the network threshold assessment above, the impact at the following junctions exceeds 5% and as such, detailed capacity assessments are required. It is recognised that there will be two new access points onto the Dundrum Bypass. The northern access junction will be a "left-in" only junction with no conflicting traffic movements so a detailed capacity assessment at this junction is not required. The southern access will be a "left-out" only junction with the development traffic giving way to Dundrum Bypass Junction. As there is a conflicting movement at this junction, it has been added to the junctions identified for detailed assessment.

1. Dundrum Bypass/ Churchtown Road Upper / Taney Road;
2. Dundrum Bypass / Main Street;
3. Dundrum Bypass / Central Development Access Junction;
4. Dundrum Bypass / Southern Development Access Junction; and

6.7 Traffic Impact Assessment – Detailed Capacity Assessments

6.7.1 The following section of the Transport Assessment looks at the operation of the junctions identified above under both base plus committed development conditions and with the extra addition of development Traffic.

6.8 Junction Assessment Methodology & Reporting

Assessment of Priority Junctions

6.8.1 The ARCADY extension of the Junctions 9 transport planning software is the industry standard tool for assessing the capacity of priority junctions and been used to assess the performance of the Dundrum Bypass / Wyckham Way Roundabout within the study area.

6.8.2 The Junctions 9 analysis reports the Ratio of Flow to Capacity (RFC) and maximum forecast queue for each movement within the junction. The RFC of an arm of a junction is one of the principal factors in influencing queues and delays. General engineering design principles as set out in the Design Manual for Roads & Bridges (DMRB) are that when assessing a priority junction or roundabout, RFC levels should not exceed 0.85 in order for the arm of a junction to operate within '*practical capacity*'. Should the RFC level exceed 1.0 then the junction is operating above '*theoretical capacity*'.

6.8.3 When the performance of an arm exceeds 1.0 RFC, the subsequent queue and delay information increases exponentially. For these instances, queue and delay values should not be compared, only simply agreed that the junction is performing significantly over capacity.

6.8.4 The LinSig (version 3) software has been used to undertake junction modelling of the signal-controlled junctions within the study area (Dundrum Bypass junctions with Main Street and Taney Road). LinSig is an industry standard tool for assessing the capacity of signal-controlled junctions.

6.8.5 The parameters for assessing the capacity of a signal-controlled junction in LinSig (along with their upper limits) are described within **Table 6.3**, with a description of each parameter set out within the text below.

Table 6.3: LinSig Output Parameters

PARAMETER	UNIT	UPPER LIMIT
Degree of Saturation (DoS)	Percentage (%)	90% Practical Capacity 100% Theoretical Capacity
Mean Maximum Queue (MMQ)	Passenger Car Units (PCUs)	Varies by Lane Capacity
Delay	Seconds (s)	Engineering Judgement
Practical Reserve Capacity (PRC)	Percentage (%)	0%

6.8.6 DoS refers to individual lane performance. A DoS of less than 90% indicates that the lane will operate within 'practical' capacity. Within this limit, lanes are generally considered to operate effectively. A DoS of between 90% and 100% will begin to exacerbate any queueing at the junction. A DoS of 100% or more indicates that the lane is operating above theoretical capacity. Above this limit, queueing will rise exponentially and any minor increases in traffic flows can have a significant impact on queueing and delays.

6.8.7 The MMQ is a combination of vehicles in:

- The vehicle queue at the end of the red period;
- Vehicles joining the back of the queue at the start of the green period; and
- Random / oversaturated queueing which is exacerbated if the DoS exceeds the practical capacity of a given lane (90%).

6.8.8 Queueing is reported in terms of Passenger Car Units (PCUs) whereby 1 PCU is equal to 5.75m (i.e. the average passenger car length including vehicle spacing). PCUs are an industry standard unit of measurement of vehicle stacking, particularly for the assessment of junction queueing. **Table 6.4** outlines the standard PCU length and number of units used for each vehicle type within the assessment. Delays will be reported in seconds.

Table 6.4: Passenger Car Units (PCUs)

	CAR	LGV	OGV		COACH	MOTOR CYCLE
			1	2		
PCU Value	1	1	1.5	2.3	2	1
Length (m)	5.75	5.75	8.63	13.23	11.5	5.75

LGV denotes "Light Goods Vehicle"; OGV denotes "Ordinary Goods Vehicle"

6.8.9 PRC is a measure of the overall network capacity. A positive PRC indicates that the network as a whole will operate within capacity. A negative PRC (i.e. 0% or less) indicates that a network is subject to areas of over-saturation. This can lead to increased queueing and delay which is exponential in nature.

6.8.10 The PRC is calculated from the maximum degree of saturation on a Lane controlled by a Stage Stream and is a measure of how much additional traffic could pass through a junction or network controlled by the Stage Stream whilst maintaining a maximum degree of saturation of 90% on all Lanes.

6.9 Results and Discussion

6.9.1 Each model has been tested under two separate scenarios to determine the relative traffic impacts from the uplift in development traffic:

- 2024 (year of opening) *base + committed development*; and
- 2024 (year of opening) *base + committed development + proposed development*.

6.9.2 The remainder of this section discusses the modelling assumptions, results and (where necessary) any mitigation which is proposed to offset any detrimental traffic impacts caused by the uplift in development traffic.

Dundrum Bypass / Churchtown Road Upper / Taney Road Junction (Taney Cross)

6.9.3 The Dundrum Bypass / Churchtown Road Upper / Taney Road junction is a large signal-controlled crossroads with a bridge structure overhead carrying the Luas green line. The junction has been modelled with the Linsisg software for the AM and PM "base plus committed development" and the "base plus committed plus development scenarios". The results of the assessment are indicated by the table below.

Table 6.5: Taney Cross Linsig Results

ARM	AM PEAK HOUR			PM PEAK HOUR		
	DoS (%)	MMQ (pcu)	Delays (s)	DoS (%)	MMQ (pcu)	Delays (s)
	Base + Committed (2024)					
Dundrum Bypass North **Ahead Left**	100.0	22.7	131	97.6	18.8	118
Dundrum Bypass North **Ahead Right**	102.3	12.8	198	97.2	12.7	127
Taney Road EAST **Ahead Left**	74.0	9.9	60	91.3	11.0	103
Taney Road EAST **Ahead Right**	70.0	3.7	75	90.4	10.2	108
Dundrum Bypass SOUTH **Ahead Left**	91.3	15.8	84	98.0	19.7	109
Dundrum Bypass SOUTH **Ahead Right**	92.3	16.2	89	98.2	19.9	123
Churchtown Road Upper **Ahead Left**	100.0	23.8	105	99.7	17.2	115
Churchtown Road Upper **Ahead Right**	100.6	24.1	147	100.7	17.9	138
PRC (%)	-13.8			-11.9		
Delay (PcuHr)	87.96			92.98		
	Base + Committed + Development (2024)					
Dundrum Bypass North **Ahead Left**	105.4	32.9	196	102.6	23.2	170
Dundrum Bypass North **Ahead Right**	102.3	11.6	219	103.0	21.0	182
Taney Road EAST **Ahead Left**	79.2	10.6	35	88.0	10.4	81
Taney Road EAST **Ahead Right**	69.6	3.7	75	86.0	9.3	92
Dundrum Bypass SOUTH **Ahead Left**	103.5	29.8	171	100.4	21.2	133
Dundrum Bypass SOUTH **Ahead Right**	103.8	31.6	175	100.6	21.6	148
Churchtown Road Upper **Ahead Left**	104.1	31.7	153	103.4	23.7	155
Churchtown Road Upper **Ahead Right**	103.5	28.8	184	104.0	25.8	180

ARM	AM PEAK HOUR			PM PEAK HOUR		
	DoS (%)	MMQ (pcu)	Delays (s)	DoS (%)	MMQ (pcu)	Delays (s)
	Base + Committed (2024)					
PRC (%)	-17.2			-15.6		
Delay (PcuHr)	134.55			117.84		

Note: Modelled based on 120-second cycle time and pedestrian phase called every cycle.
Red Text denotes results which are in excess of the link capacity and/or above acceptable limits.

6.9.4 The junction is recorded as operating over capacity on the north, south and west arms in the 2024 Base + Committed AM peak scenario, with a maximum DoS value of 102.3% recorded on the northern Dundrum Bypass arm, resulting in Mean Max Queue of 23 PCUs and a delay of over three minutes per PCU.

6.9.5 The junction is recorded as operating over capacity on all arms in the 2024 Base + Committed development PM peak scenario, with a maximum DoS value of 100.7% recorded on the western Churchtown Road Upper arm, resulting in Mean Max Queue of 18 PCUs and a delay of over two minutes per PCU.

6.9.6 Taking into account the impact of development traffic, the junction continues to operate over capacity in the 2024 AM peak, with a maximum DoS value of 105.4% recorded on the northern Dundrum Bypass arm, resulting in Mean Max Queue of 33 PCUs and a delay of over three minutes per PCU.

6.9.7 The junction continues to operate over capacity in the 2024 PM peak with development traffic, with a maximum DoS value of 104.0% recorded on the western Churchtown Road Upper arm, resulting in Mean Max Queue of 26 PCUs and a delay of three minutes per PCU.

6.9.8 It has been established that by 2024, the junction will operate over capacity before taking into account the impact of traffic related to the proposed development but the addition of development traffic does not cause a significant change in the operation of the junction.

Dundrum Bypass / Main Street Junction

6.9.9 The Dundrum Bypass / Main Street Junction is a three armed priority controlled junction which is located at the north-west corner of the development site. The junction has been modelled with the Linsisg software for the AM and PM "base plus committed development" and the "base plus committed plus development scenarios". The results of the assessment are indicated by the table below.

Table 6.6: Dundrum Bypass / Main Street Junction Linsig Results

ARM	AM PEAK HOUR			PM PEAK HOUR		
	DoS (%)	MMQ (pcu)	Delays (s)	DoS (%)	MMQ (pcu)	Delays (s)
	Base + Committed (2024)					
Dundrum Bypass NORTH **Ahead Left**	67.1	15.0	36	81.5	21.6	41
Main Street **Left**	10.1	0.9	45	36.1	3.3	53
Main Street **Right**	68.1	8.5	60	82.9	10.5	79
Dundrum Bypass SOUTH **Ahead Right**	59.9	13.6	30	62.1	14.7	29
PRC (%)	32.2			8.5		
Delay (PcuHr)	13.97			19.4		
	Base + Committed + Development (2024)					
Dundrum Bypass NORTH **Ahead Left**	62.8	14.2	32	82.6	24.1	38
Main Street **Left**	11.9	1.0	49	51.0	3.8	67
Main Street **Right**	74.2	8.6	69	81.4	7.8	91
Dundrum Bypass SOUTH **Ahead Right**	75.5	20.2	34	60.7	14.8	24
PRC (%)	19.2			8.9		
Delay (PcuHr)	15.99			18.61		

Note: Modelled based on 120-second cycle time and pedestrian phase called every cycle.
Red Text denotes results which are in excess of the link capacity and/or above acceptable limits.

6.9.10 The junction is recorded to operate within capacity across all arms in the AM and PM peak periods, both without and with the impact of development traffic.

Dundrum Bypass / Central Development Access Junction

6.9.11 The Dundrum Bypass / Central Development Access junction will be a new junction providing the primary point of vehicular access to the development. It essentially replaces the existing bypass junction providing access to the existing site by moving slightly further north on the bypass.

6.9.12 The results of the Junctions9 modelling exercise are indicated by the following table. As this is a new junction, only the 2024 "With Development" scenario has been modelled.

Table 6.7 Junction Capacity Analysis – Central Development Access Junction

ARM	AM PEAK			PM PEAK		
	RFC	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)
Base + Committed + Development (2024)						
Development Arm	0.52	1.0	19	0.29	0.4	15
Dundrum Bypass	0.04	0.0	8	0.13	0.1	10

6.9.13 It can be seen that the junction operates within capacity during both peak periods.

Dundrum Bypass / Southern Access Junction

6.9.14 The Dundrum Bypass / Southern Access Junction will operate as a "left-out" only junction with vehicles exiting the development joining the southbound lane of the Dundrum bypass.

6.9.15 The results of the Junctions9 Modelling exercise are indicated by the following table. As this is a new junction, only the 2024 "With Development" scenario has been modelled.

Table 6.8 Junction Capacity Analysis – Central Development Access Junction

ARM	AM PEAK			PM PEAK		
	RFC	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)
Base + Committed + Development (2024)						
Development Arm	0.02	0.0	6	0.05	0.1	7
Dundrum Bypass	0.00	0.0	0	0.00	0.0	0

6.9.16 It can be seen that the junction operates within capacity during both peak periods.

6.9.17 The traffic modelling input and output files are contained within **Appendix H** for information.

7. DEVELOPMENT PARKING PROVISION

7.1 General

7.1.1 This section of the report details the car parking requirements for the proposed development based on the Sustainable Urban Housing: Design Standards for New Apartments (Guidelines for Planning Authorities) document. This was published by the Department of Housing, Planning and Local Government (DHPLG) In March 2018.

7.1.2 Car parking for the development will be accommodated in a lower ground floor car park with access points from the Dundrum Bypass.

7.1.3 The remainder of this chapter of the TA will provide details and justification for the level of parking provision that is proposed to serve the development. Overall, it is proposed to provide 373 parking spaces (including 55 non-residential spaces for the commercial/retail and creche uses).

7.1.4 As per **Chapter 3**, there are currently 459 spaces provided within the curtilage of the development boundary. The proposals are therefore to reduce this quantum by 86 spaces in total when compared to the existing activities on the Dundrum Village site.

7.2 Car Parking Standards & Policy

7.2.1 In December 2020 the Department of Housing, Planning, Community and Local Government (DHPLG) released new guidelines on apartments standards. This is an update to the original guidance which was published in 2015 and the updated guidance published in 2018. The document contains guidance on the provision of car parking. Car parking for new residential developments has been left to the discretion of individual Local Authorities, however, reduced parking is highly encouraged.

7.2.2 For residential developments located within "*Central and/or Accessible Urban Locations*", the DHPLG design standards state in reference to local authority development management requirements that: "*the default policy is for car parking provision to be minimised, substantially reduced or wholly eliminated in certain circumstances. The policies above would be particularly applicable in highly accessible areas such as in or adjoining city cores or at a confluence of public transport systems such rail and bus stations located in close proximity*".

7.2.3 We would consider that the proposed development site sits firmly within the category of being within a central and/or accessible urban location, with the interchange between bus and rail (LUAS) lying on the periphery of the north-eastern site boundary, an array of local bus stops surrounding the site and a highly accessible pedestrian/cycle network immediately surrounding (and through) the site.

7.2.4 The standards also indicate that sufficient parking spaces should be provided for visitors, car sharing club vehicles, those with mobility impairments and cycle parking.

7.2.5 The current DLRCC Development Plan (2016-2022) has a sliding scale of residential parking provision based on the number of bedrooms ranging from 1 space per 1 bedroom apartment to 2 spaces per 3+ bedroom apartments. The emerging DLRCC residential parking standard (contained within the newly adopted, but not yet in force, Development Plan) is for 1 space per unit across the board regardless of bedroom numbers for development within Zone 1 (Dundrum).

7.2.6 If the above maximum standard was to be applied to the proposed development content then a maximum parking provision of 881 spaces could be delivered. In our opinion such a level of provision would not be appropriate for the Dundrum Village site given the highly sustainable location that the site lies within.

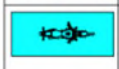
7.2.7 We would also note the availability of circa 3,500 parking spaces within the existing Dundrum Town Centre immediately to the south of this development which can be accessed directly from the southern development access underneath Dom Marmion bridge.

7.3 Proposed Car Parking Provision

7.3.1 The proposal to deliver a total of 373 parking spaces is in keeping with the highly accessible nature of the site and surrounding area, as well as with other local sites which have been consented for a level of parking which is deliberately below the national standards.

7.3.2 **Table 7.1** sets out the proposed parking quantum for the development, split into residential and retail/commercial provision per zone. We would consider that the allocation of residential spaces would likely be on a needs-basis, as opposed to spaces being sold with particular units.

Table 7.1: Proposed Parking Quantum

Car Parking Spaces						Motorcycle spaces (4 per 100 spaces)	EV Spaces	Car Share Spaces
						Note: Totals include provision of EV and Car Share spaces		
Zone	Standard	Disabled Spaces	Parent Spaces	Totals				Car Share Space
Zone 1	41	4	7	52		2	4 + 1 Disabled	0
Zone 2	137	7		144		7	19 + 1 Disabled	6
Zone 3	108	4		112		5	11 + 1 Disabled	3
Zone 4	62	3		65		3	5 + 1 Disabled	2
Totals	348	18	7	373		17	43	11
Residential Ratio (Zone 2, Zone 3 & Zone 4) 318 to 881 units = 0.361								
Note: Total includes 3No. Creche staff car parking spaces within Zone 4, not included with residential ratio								

7.3.3 The table also indicates the number of disabled parking spaces, motorcycle spaces and car share spaces within the overall provision.

7.3.4 **Figure 7.1** shows the proposed parking arrangement at lower ground-floor level at the development.

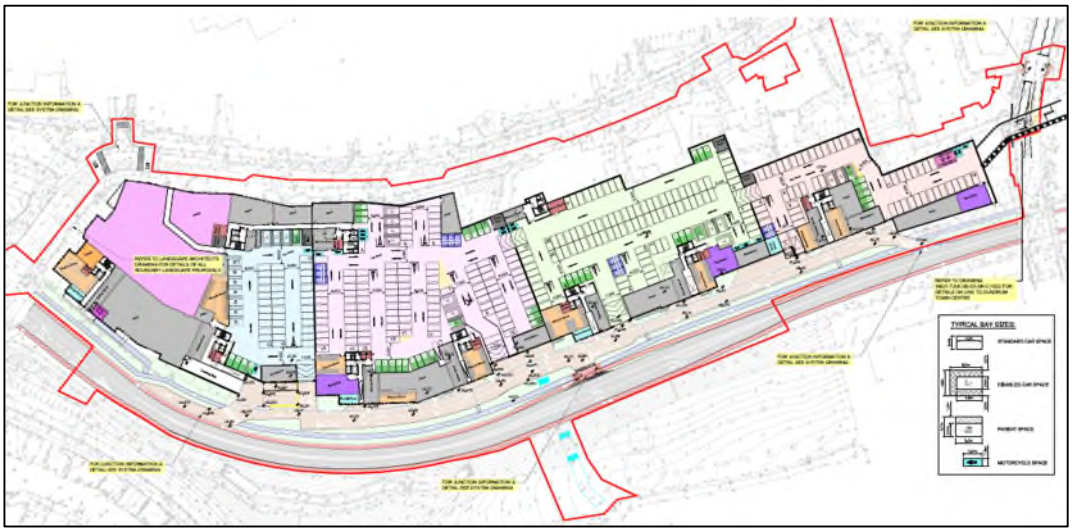


Figure 7.1: Proposed Lower Ground Floor Parking Provision

7.3.5 We would note that the overall provision of residential parking spaces will be approximately 0.361 spaces per unit. This is largely in line with other recently consented residential developments in the local area (and indeed greater than some other local developments, including the walled garden application which has been consented at a ratio of 0.31). Fundamentally, this will encourage more sustainable travel choices by prospective residents.

Go Car / Yuko Car Schemes

7.3.6 It is intended that a small number of the residential provision of car parking spaces will be handed over to the '*Go-Car*' or '*Yuko*' car club schemes. Car share schemes allow users to rent cars for as little as an hour, using an online booking system to reserve vehicles and in-car technology to unlock the car and drive. The proposed scheme has been discussed with Go Car and Yuko and both companies are interested in providing services to the development. Letters of support from the companies are included at **Appendix C**.

Electric Vehicle Spaces

7.3.7 In accordance with the local development plan (section 8.2.4.12) the proposed development will make provision of electric vehicle (EV) charging spaces.

7.3.8 It is understood that DLRCC expect a nominal level of EV charging spaces to be provided as part of the residential provision. At this stage, it is envisaged that approximately 10% of the overall residential allocation could be afforded to EV spaces. The proposals include for 43 EV spaces in total with 38 for the residential element of the development and 5 for the commercial element whilst ducting would be provided to allow all other spaces to be linked to EV charging infrastructure in the future.

7.3.9 There is also a requirement to duct a minimum of 10% of the disabled provision for EV charging. This would in theory equate to two spaces. However, there will be a minimum of one EV disabled space provided per parking zone (four in total) so the standards are exceeded.

Creche Staff Parking

7.3.10 In accordance with the local development plan (section 8.2.4.11) the proposed development will make provision of parking associated with the on-site childcare facility.

7.3.11 Given the size of the development, it is expected that a large proportion of the users of the creche will be drawn from the development itself and the nearby residential area of Sweetmount. Notwithstanding, there will be three parking spaces within Zone 4 of the parking provision which are allocated to the Creche for staff parking.

7.3.12 With regard to parent drop-off and pick-up associated with the Creche, there will be loading and temporary parking bays provided on Main Street which provide direct access to the Creche. These bays will provide capacity for approximately eight vehicles at any given time. Notwithstanding that there will be competing demands, Systra considers that during the periods in which these spaces would be required for the Creche (weekday mornings and early to mid-afternoon's) there will generally be a good availability to accommodate Creche drop-off and pick-up.

7.4 Proposed Cycle Parking Provision

7.4.1 DLRCC's '*Standards for Cycle Parking and associated Cycling Facilities for New Developments*' outline cycle parking requirements for new developments as do the DHLG '*Design Standards for New Apartments*' . Through the consultation process, it has been established that it is the latter guidelines that should be followed.

7.4.2 For cycle parking, a general standard of 1 cycle storage space per bedroom shall be applied to the residential element. This equates to a total of 1,508 cycle parking spaces. The residential cycle parking provision will be accessed from both Main Street and from the Dundrum Bypass. A high percentage of the spaces can be accessed from Main Street with at-grade access onto the Main Street corridor. The provision includes over-sized spaces for cargo bikes and tandems as well as normal sized spaces for standard cycles.

7.4.3 There will also be provision of 242 cycle parking spaces for visitors to the development, taking the total provision to 1,750 spaces. The level of visitor spaces is below the recommended visitor parking standard of 1 space per 2 residential units. It is considered, that the proposed level of provision for visitors is a high level of provision given the scale of the development proposals and the highly accessible location which the development proposals sit within. The development sits opposite the Dundrum LUAS station as well as sitting adjacent to a key bus corridor which will benefit from the Bus Connects scheme in the years to come. This means that there are a range of high quality public transport options for accessing this site which are likely to be highly attractive for visitors leading to a lower demand for visitor cycle parking. It must also be remembered that the development proposals sit adjacent to Dundrum Town Centre which has extensive visitor cycle parking which will generally not be in use during peak demand periods for cycle parking at the neighbouring new residential development.

7.4.4 The visitor parking will include 78 internal spaces and a further 164 external to the buildings which will be provided by means of covered Sheffield type racks.

7.4.5 **Figure 7.2** shows the currently proposed internal cycle parking locations and the quantum of provision (610) at podium level, with **Figure 7.3** showing the proposed cycle parking at mezzanine level (178) and lower ground floor level (798). The cycle parking areas are indicated by the pink coloured area whilst full scale layout plans of the cycle parking are included at **Appendix D.**

Figure 7.2: Proposed Ground Floor Cycle Parking Locations

Figure 7.3: Proposed Lower Ground Floor Cycle Parking Locations

7.4.6 A full breakdown of the cycle parking provision across the four zones of the development including detail on the number of two-tier parking spaces, the number of Sheffield style racks and number of cargo bike spaces is detailed in **Table 7.3** below.

Table 7.3: Proposed Cycle Parking Quantum

CYCLE PARKING PROVISION & BREAKDOWN:

	PODIUM LEVEL - INTERNAL		LOWER GROUND FLOOR - INTERNAL			MEZZANINE LEVEL:	TOTAL INTERNAL SECURE CYCLE STORAGE PER ZONE:
	TWO-TIER:	SHEFFIELD:	TWO-TIER:	SHEFFIELD:	CARGO:	TWO-TIER:	
ZONE 1	134	12	130	68	3	178	525
ZONE 2	166	16	232	10	1		425
ZONE 3	160	12	198	18	1		389
ZONE 4	102	8	130	6	1		247
TOTALS:	562	48	690	102	6	178	1586
	Podium Level - Internal Total = 610 Cycle Spaces		Lower Ground Floor - Internal Total = 798 Secure Cycle Storage Spaces			Mezzanine Total = 178 Cycle Storage Spaces	

NOTE:
1,750 TOTAL CYCLE SPACES ALLOWED FOR, BREAKDOWN AS FOLLOWS:
1 SPACE PER BEDROOM = 1,508 SECURE INTERNAL SPACES (PROVIDED ON BOTH TWO-TIER AND SHEFFIELD TYPE RACKS)
242 VISITOR SPACES ALLOWED FOR, BREAKDOWN AS FOLLOWS:
78 NO. VISITOR CYCLE SPACES ALLOWED FOR INTERNALLY - ACCESSED WITH FOB FROM CONCIERGE.
REFER TO LANDSCAPE DRAWINGS FOR FURTHER DETAILS OF 164 EXTERNAL VISITOR SPACES PROVIDED ON 82 NO. SHEFFIELD TYPE COVERED BIKE RACKS."

Cycle Spaces:	
Podium (Internal) :	610
Lower Ground Floor (Internal) :	976
Podium (External Visitor):	164
Total:	1,750

7.4.7 The external cycle parking provision is incorporated in the landscape plans for the development and the external visitor cycle parking provision of 164 spaces has been spread out across the development. All areas would have at-grade access from Main Street or via the new Sweetmount Bridge. **Figures 7.4** and **7.5** below indicate the external cycle parking areas.

Figure 7.4: Proposed Podium Level External Cycle Parking Layout

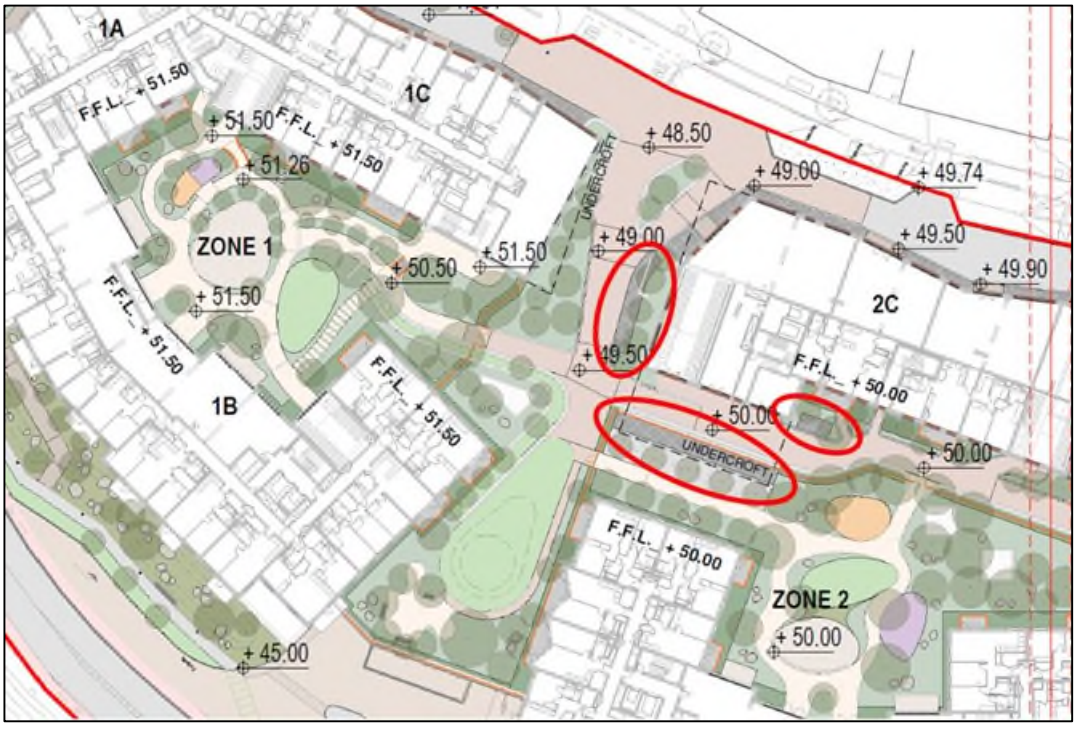


Figure 7.5: Proposed Podium Level External Cycle Parking Layout

7.5 Cycle Linkage to Parking Areas

7.5.1 In addition to the provision of cycle parking spaces, it is important to consider how the parking areas will be accessed from the surrounding transport network which includes links from adjacent roads (Main Street and Dundrum Bypass) and to existing cycle and pedestrian routes (on-road and adjacent provision and the areas accessed by the new bridge link over the Dundrum Bypass to Sweetmount Park). The pedestrian access and cycle access to Main Street from the ground floor is relatively straightforward and will be through the public realm areas which form a key part of the masterplan. Linkage to the new bridge link from the ground floor will also be possible via the public realm areas on the ground level of the scheme. The linkage to the cycle parking areas on the lower ground level will essentially be to and from the cycle facilities either side of the Dundrum Bypass. **Figure 7.6** below indicates the proposed strategy for accessing these areas via the proposed service road that runs parallel to the Dundrum Bypass.

Figure 7.6: Proposed Lower Ground Cycle Parking Links

7.5.2 The figure above indicates that a two-way cycle route will be provided along one side of the service road with links provided into each of the cycle parking locations. Crossing points would be provided at regular locations along the service road so that pedestrian access can be achieved across to the footway on the Dundrum Bypass. The cycle routes link back to the central all movements junction which is where cyclists can exit the scheme to then cross the bypass and access the northbound cycle route. Cyclists can leave the southbound cycle route at the north end of the scheme and follow the service road route to access the parking locations. Cyclists can follow the service road route and then join the cycle route at the southbound junction of the service road / Dundrum Bypass.

8. MEASURES TO SUPPORT THE DEVELOPMENT

8.1 Walking

8.1.1 Government guidelines indicate a hierarchy of travel modes with walking being the highest and most sustainable form of travel. It is therefore important to ensure that the surrounding network of pedestrian infrastructure is suitable to accommodate additional trips on foot generated by the proposed development and that good connectivity is provided to this network.

8.1.2 The existing situation review in **Chapter 3** has demonstrated that the surrounding pedestrian infrastructure is of a high standard, with the majority of the footways having an approximate width of 2-2.5m and numerous formal pedestrian crossings are provided within proximity of the proposed development.

8.1.3 The proposed development will have multiple access points for pedestrians including a wealth of access points from Main Street which has recently been upgraded for pedestrians and cyclists. This will ensure that the proposed development will integrate into the existing town centre offering, making use of the existing high quality pedestrian infrastructure which provides links to the remainder of the town centre as well as to the nearby public transport opportunities that include the Luas station and bus interchange.

8.1.4 Systra has undertaken a waking isochrone assessment using GIS software. **Figure 8.1** highlights the walking isochrones from the development site in 5-minute increments up to a 20-minute walking distance from the development[2].

Figure 8.1: Walking Isochrones

[2]The isochrone assessment assumes an average walking speed across all users of 1.2m/s.

8.1.5 The isochrone assessment illustrates that numerous amenities such as supermarkets, schools, a cinema, public transport stations and multiple shops and restaurants are accessible within a 20 minute walk from the development. We consider that the existing local infrastructure will be able to support the additional pedestrian movements generated by the development with just local changes to provide integration between the existing network and the development.

Treatment along Main Street

8.1.6 With the creation of the new residential and commercial units with direct frontage to Main Street, there will be a need to create a new environment along this part of the Main Street corridor. This new environment needs to ensure that the area is highly attractive to pedestrians and cyclists while catering for existing public transport movements.

8.1.7 The proposals acknowledge and enhance the benefits that the DLRCC Covid interventions have brought to the Main Street. The new one-way system has significantly enhanced the urban street environment and promote cyclist and pedestrian permeability.

8.1.8 The Dundrum Village proposals provide for the removal of the two existing vehicular access points from Main Street into the site by providing additional access points from the Dundrum Bypass. Eliminating access points from the Main Street to the Phase 2 site will greatly assist in removing further traffic from the Main Street and consideration will be given to the extension of the one-way system and improving pedestrian movement to and from the Luas Station.

8.1.9 The design requires that pedestrians are given ample footway space, are given priority and pedestrian / vehicular conflicts are minimised.

8.1.10 Consideration has therefore been given to the location and form of existing pedestrian crossing points and how these may be re-located and enhanced so that there are high quality linkages in place between the development and the LUAS station / bus facilities opposite. These have been designed to line up with a series of public realm squares on the development side of the road so that there are legible routes and crossing points along pedestrian desire lines.

Proposed Upgrades to the Pedestrian Infrastructure

8.1.11 It is proposed to bring forward two new pedestrian crossings around the periphery of the development. The proposed form and location of these new crossing points are as follows:

- A new raised table crossing at the junction between Main Street and the access road to the LUAS station at the north-east corner of the development boundary; and
- A new signal-controlled crossing at the eastern side of the Dom Marmion Bridge (see **Section 8.4**).

8.1.12 **Figure 8.2** shows the proposed raised-table form of the pedestrian crossing at Main Street which will facilitate all pedestrian desire lines at the foot of the access road to the LUAS station. It is currently understood that pedestrians accessing or coming from the LUAS station do not make full use of the existing crossing south of this location. The proposed crossing will therefore allow for enhanced permeability for pedestrians whilst improving road safety through traffic calming.

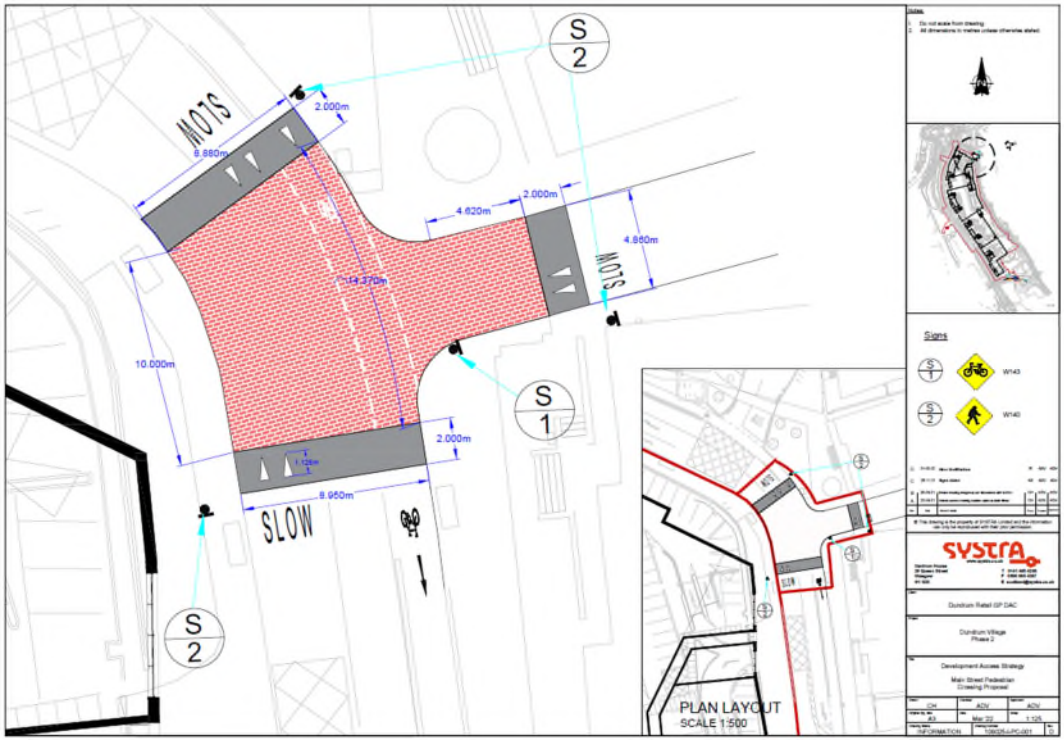


Figure 8.2: New Raised Table Crossing at Main Street

8.1.13 The other proposed pedestrian crossing location is described in **Section 8.4** as part of the Dom Marmion Bridge proposals.

8.1.14 A set of A3 preliminary design drawings detailing the proposed crossings at 1:100 scale are provided within **Appendix A**.

8.2 Cycling

8.2.1 Cycling is the second most sustainable mode of travel after walking. The proposed development is well situated with regards to cycling facilities with cycle lanes, on and off-road routes and cycle parking located within the vicinity of the site. The development will also bring forward a provision of cycle parking totalling 1,750 spaces for residents and visitors, maximising the opportunities for people to choose cycling as a mode of travel to and from the development.

8.2.2 It is generally accepted that journey times of up to 30 – 40 minutes are appropriate for cycle access to developments, which equates to around 10km at typical cycle speed[3]. **Figure 8.3** therefore details the cycling isochrones up to a 40-minute journey time from the proposed development site.

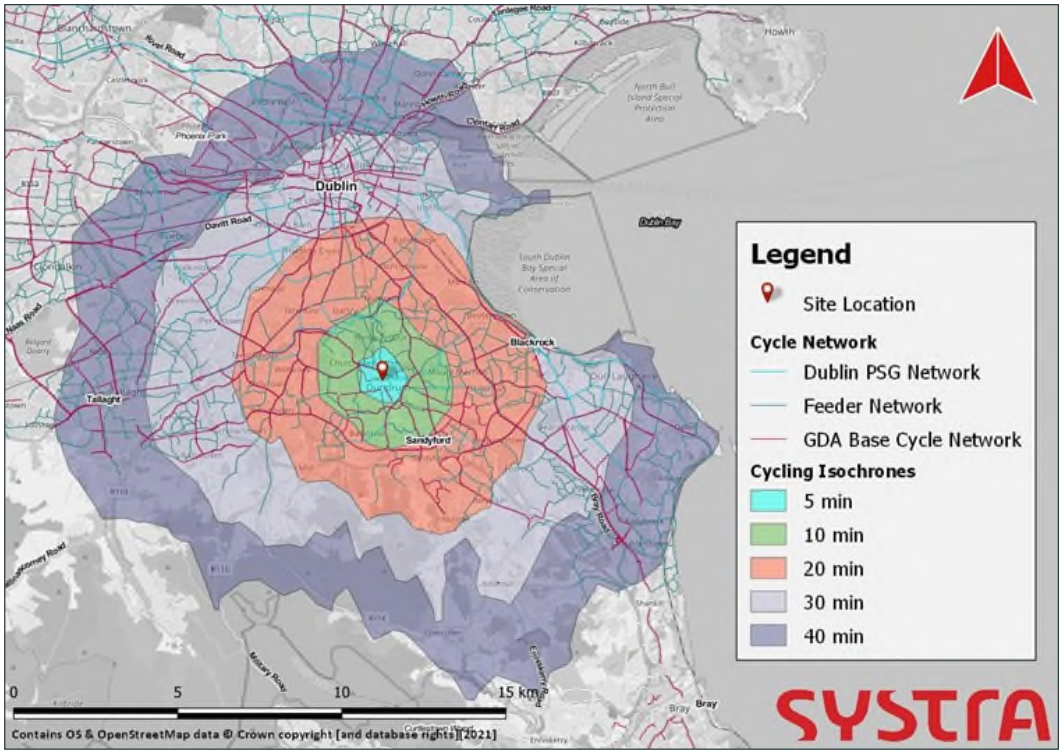


Figure 8.3: Cycling Isochrones

8.2.3 The figure indicates that through cycling, a vast proportion of Dublin can be accessed within a 30 minute cycle from the proposed development site. This is largely due to the significant cycle network which routes in all directions from the development.

8.2.4 We would note that cyclists accessing the lower ground Floor level from Dundrum bypass northbound cycleway will be required to continue north along the cycleway to the Dundrum Bypass / Main Street junction and cross at the signal-controlled crossing to access the development.

[3]The isochrone assessment assumes an average cycle speed across all users of 16km/h.

8.3 Public Transport

8.3.1 Public Transport is next in the sustainable travel hierarchy behind walking and cycling and is the mode which is most suited to longer distance sustainable trips. As described within Chapter 3, there is a very good provision of bus services within the immediate vicinity of the site, with bus stops on Main Street, Ballinteer Road and at the interchange to the north-east corner of the site.

8.3.2 With regard to the accessibility of the site by bus, **Figure 8.4** details the bus accessibility isochrones for a 5 and 10-minute walk of a direct bus services to/from the development[4].

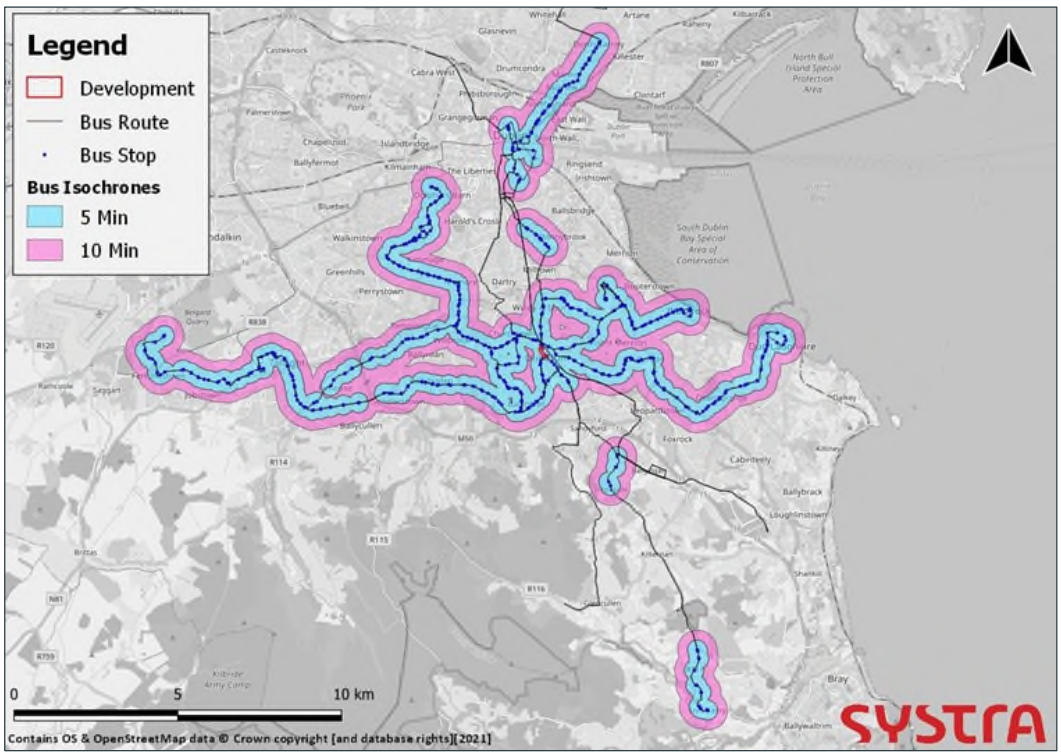


Figure 8.4: Bus Accessibility Isochrones

8.3.3 The bus accessibility isochrones demonstrate that the site is accessible by direct bus service from a large proportion of Greater Dublin, particularly the surrounding areas of Churchtown, Mount Merrion, Ballinteer and Dublin City Centre. It should also be noted that the Dundrum area is part of the Dublin-wide Bus Connects project which will see a step change in bus service provision delivered in the area. The proposed development is well located to take advantage of these new facilities and it is very well located to take account of the capacity enhancements that will come to Dundrum in the form of the Bus Connects project and the planned capacity enhancements to the LUAS Green Line which will see fleet enhancements and new infrastructure delivered to accommodate forecast passenger demand. These enhancements will accommodate the demand from the proposed development.

[4] The bus accessibility isochrone assessment uses GIS software to plot each of the bus stops situated along a direct bus service route to the proposed development. Isochrones of 300m and 600m (representing approximate walking times of 5 and 10-minutes respectively) have then been plotted around each of these stops.

8.4 Dom Marmion Bridge

8.4.1 The proposals to upgrade the pedestrian accessibility of the site include the creation of a public square to the rear of Dundrum Church. It is intended to promote pedestrian movements across Dom Marmion Bridge between Dundrum Town Centre, Dundrum Village and the Main Street by providing a pedestrian crossing on the bridge with the potential removal of part of the existing bridge parapet as per **Figure 8.5**.

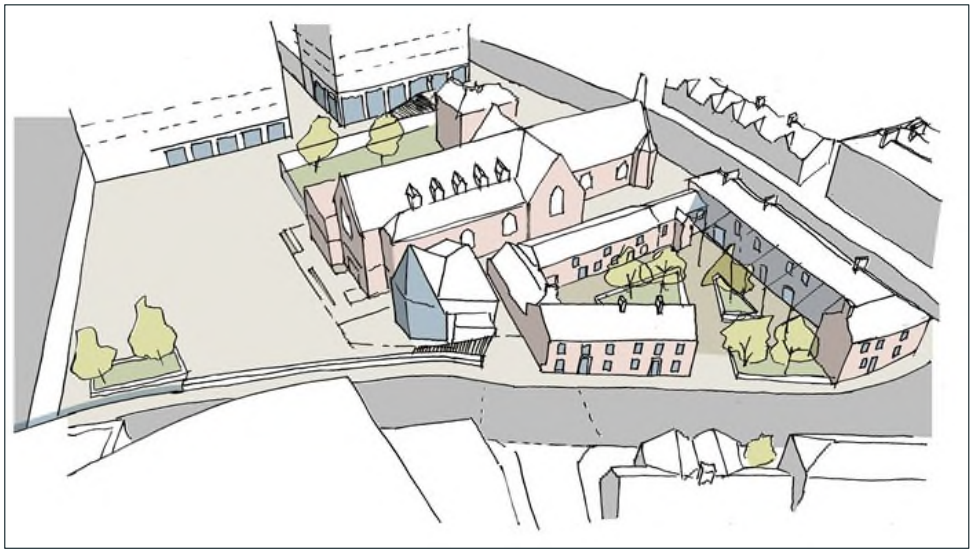


Figure 8.5: Dom Marmion Bridge Proposals

8.4.2 To support this improved pedestrian route, it is proposed to bring forward a new signal-controlled crossing of Ballinteer Road, at the pedestrian desire line. As per **Figure 8.6** below, the form of this crossing is likely to be a TOUCAN style crossing of 4.0m in width to support both pedestrian and cyclists movements across Ballinteer Road.

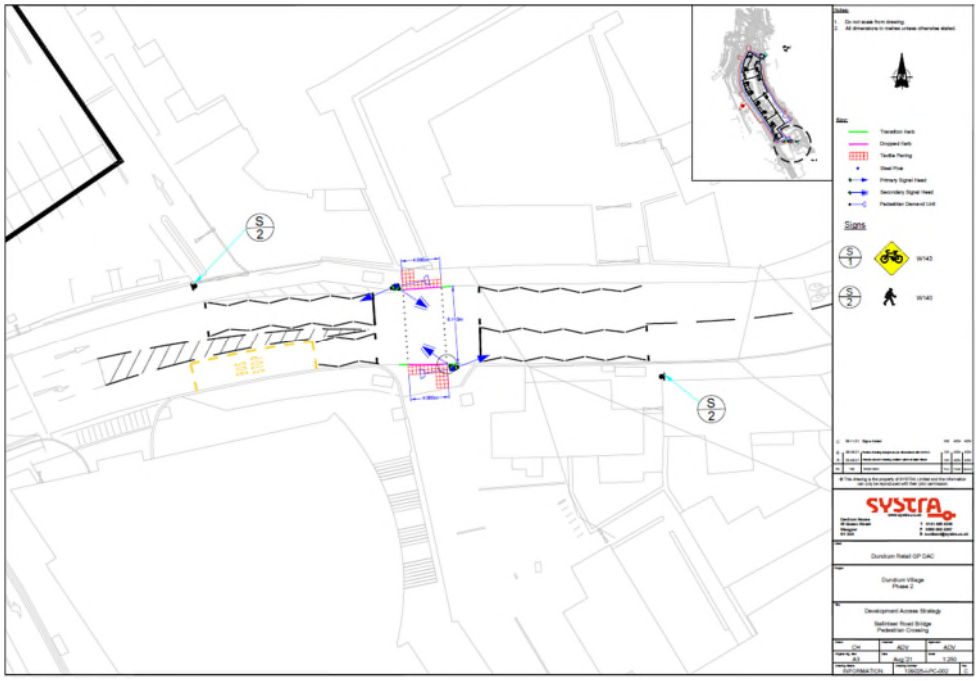


Figure 8.6: New Signal-Controlled Crossing at Dom Marmion Bridge

8.5 Sweetmount Bridge Proposals

8.5.1 The development proposals also include a new footbridge between the public realm space within the development and the nearby residential area of Sweetmount, west of the site. The bridge will be approximately 4.0m in width and will provide a key link to the west, where currently there is a lack of existing direct routes.

8.5.2 **Figure 8.7** shows the linkages through the development in an east-west direction which will be achieved by bringing forward this new link. It also shows the high-permeability north to south through the development, which links up with the east-west route central to the site, therefore providing access in all directions for active modes. The bridge would operate with a shared surface for pedestrians and cyclists.

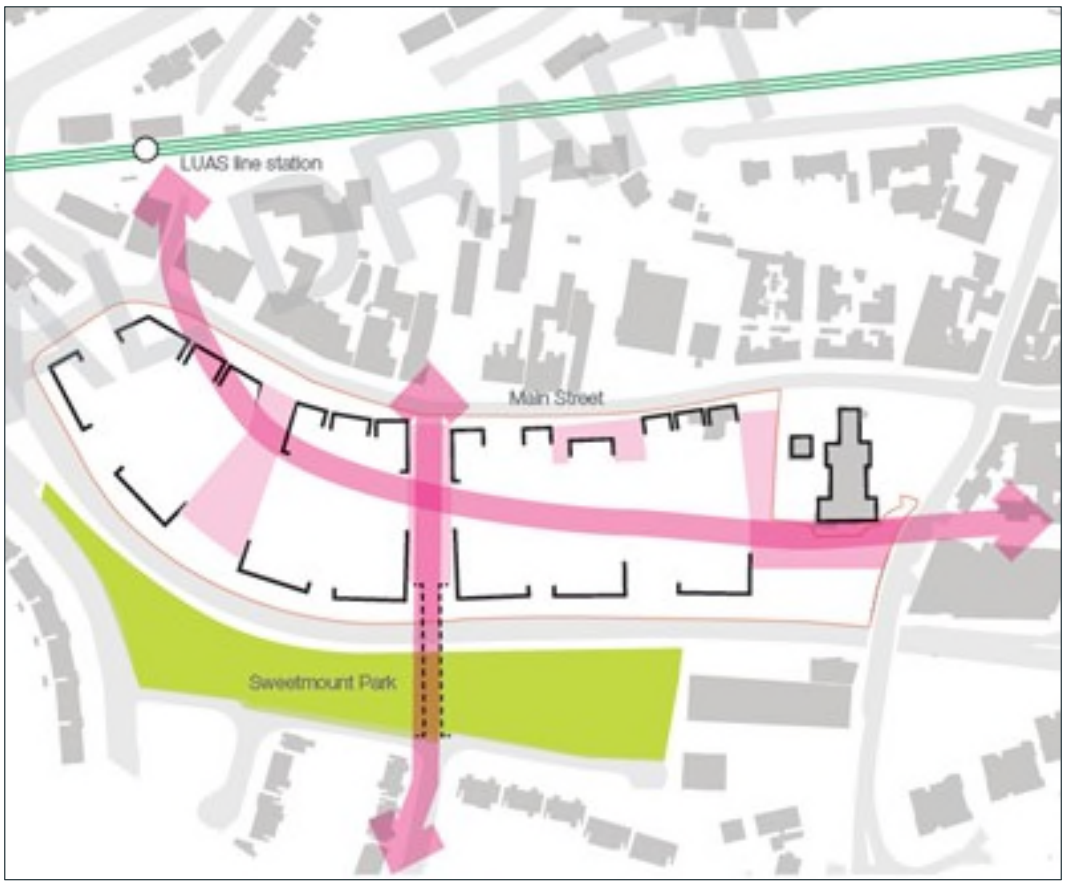


Figure 8.7: Sweetmount Footbridge Proposal

8.5.3 Bringing forward such a significant piece of infrastructure demonstrates the desire for pedestrian permeability to be maximised in all directions.

8.5.4 The anticipated bridge structure design is indicated by **Figure 8.8** below.

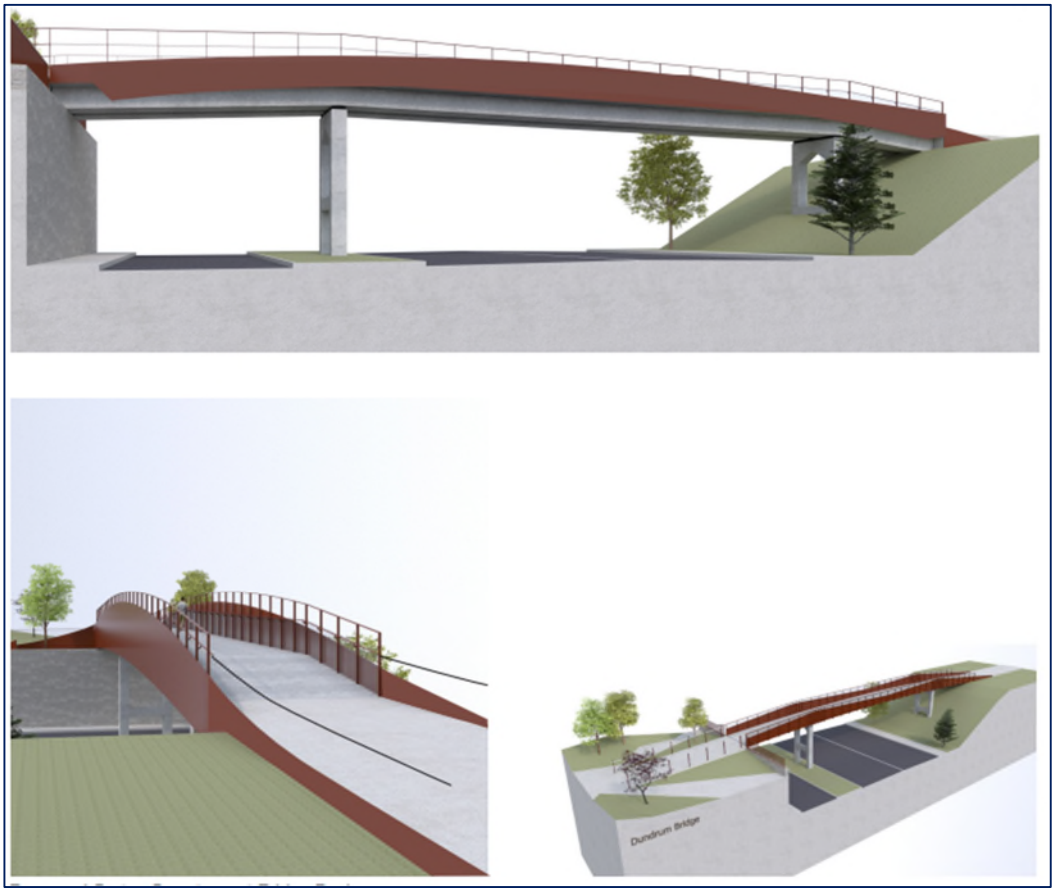


Figure 8.8: Sweetmount Shared Pedestrian and Cycle Bridge

8.6 Development Access Infrastructure

8.6.1 Vehicular access is required into the residential parking areas, the commercial car park and also for servicing. As discussed in **Section 4.3**, the proposed access strategy is to remove all vehicular access points from Main Street to support the recent infrastructure upgrades for pedestrians and cyclists. The access strategy therefore focusses all vehicular access points from the Dundrum Bypass corridor.

8.6.2 As there are different elements to the development and the development stretches along the bypass in a linear shape, it is proposed to have a total of 3 vehicular access points as follows:

- Access Point 1 (North) — Left-in only from Dundrum Bypass;
- Access Point 2 (Central) — All movements ghost-island priority junction with right turning refuge from bypass; and
- Access Point 3 (South) — Left-out Only Priority Junction.

8.6.3 Systra has produced a package of preliminary design drawings for each of the site accesses, including swept path analysis for the most onerous design vehicles required to use these accesses.

8.6.4 **Figure 8.9** shows the upgraded ghost-island junction central to the development, including the proposed raised table across the site access to give priority to pedestrians and cyclists.

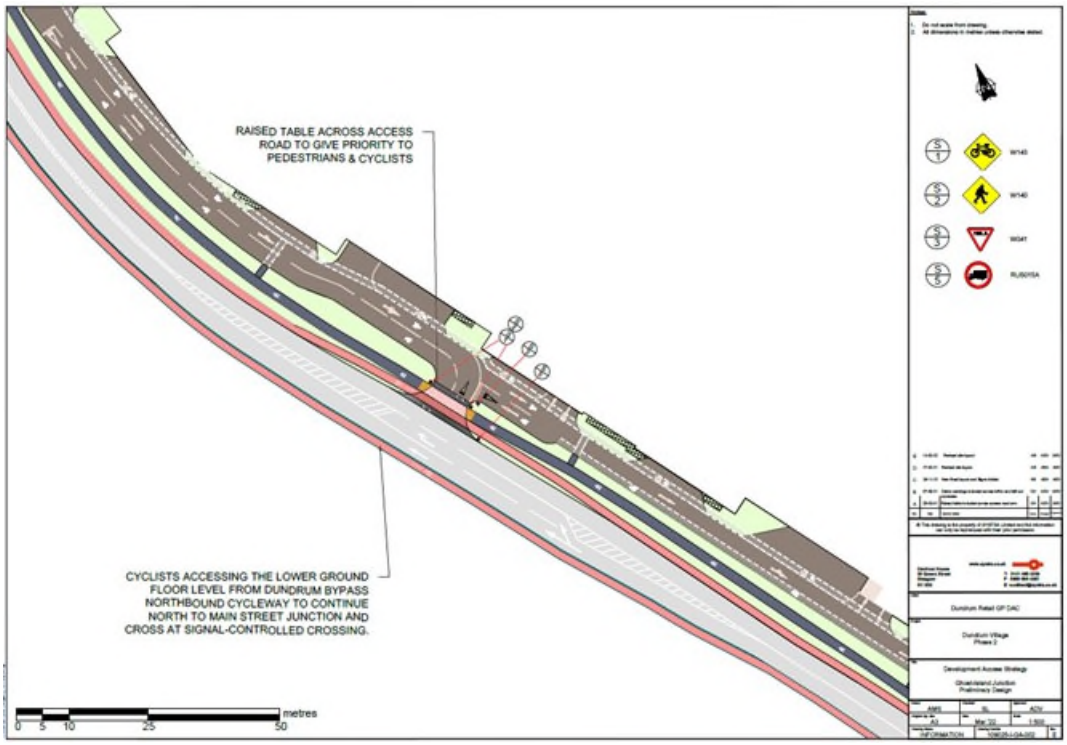


Figure 8.9: All-Movements Vehicular Ghost-Island Access (Central)

8.6.5 It is reiterated that cyclists accessing the lower ground Floor level from Dundrum bypass northbound cycleway will be required to continue north along the cycleway to the Dundrum Bypass / Main Street junction and cross at the signal-controlled crossing to access the development.

8.6.6 **Figure 8.10** shows the left-in only access at the north end of the development and details the auxiliary lane which will be used to facilitate deceleration of large service vehicles. As shown, the cycleway will change to an indicative arrangement (with hatched lining) across the auxiliary lane to allow vehicular movements across the cycle lane. However, priority will still lie with cyclists and this is reinforced using high-contrast surface paint to raise driver awareness.

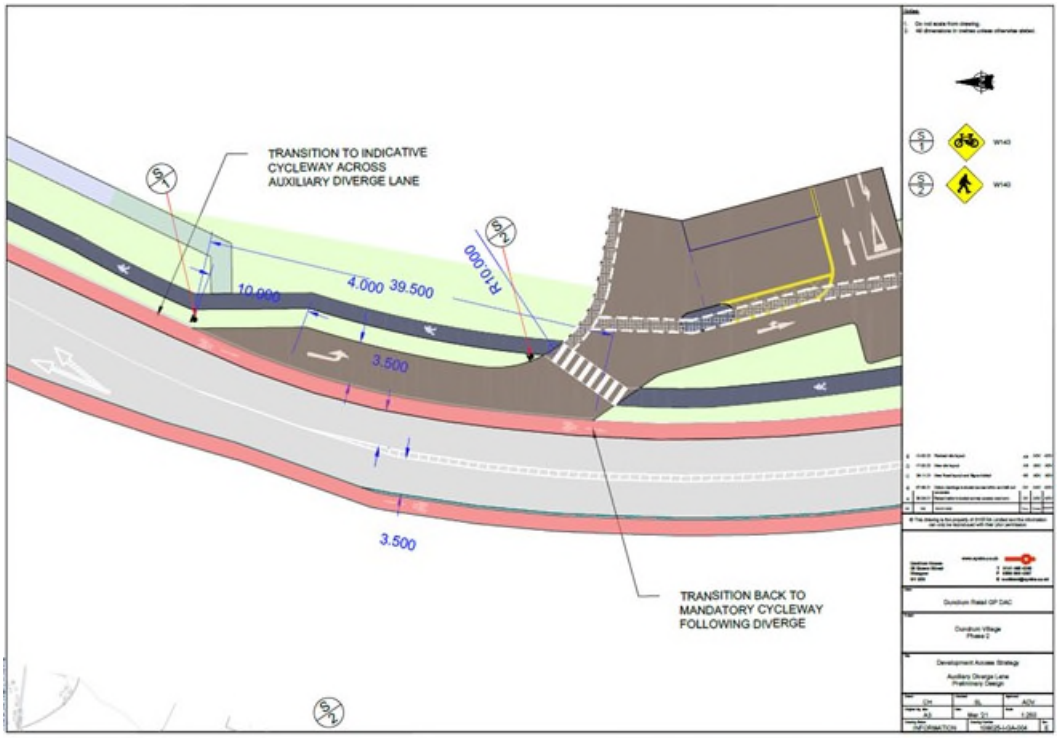


Figure 8.10: Left-In Only Access (North)

8.6.7 **Figure 8.11** shows the left-out only junction onto the Dundrum Bypass southbound lane. Similarly with the left-in access (**Figure 8.10** above), high-contrast surface paint will raise driver awareness that cyclists are afforded priority across the junction.

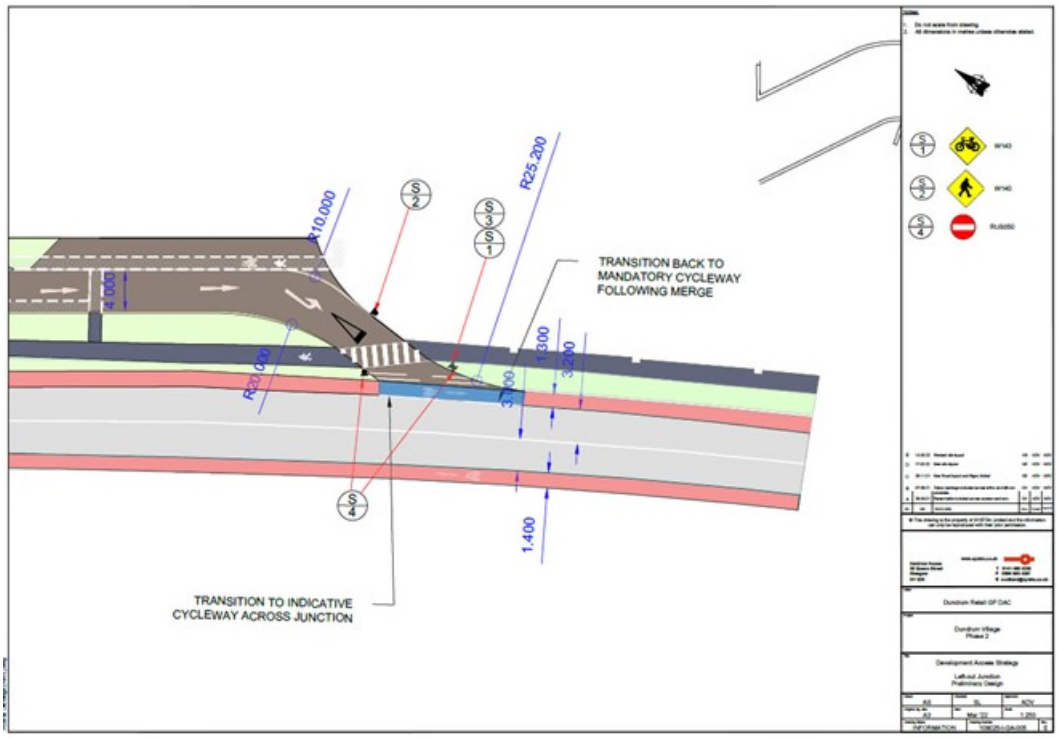


Figure 8.11: Left-Out Only Access (South)

8.7 Site Servicing Strategy

8.7.1 It is proposed to service the development primarily from the Dundrum Bypass. The access strategy has been developed with this in mind, and the creation of an internal access road running parallel to the Dundrum Bypass allows for off-street servicing of the retail and residential aspects of the development.

8.7.2 The servicing strategy will be to provide a one-way system for servicing vehicles which are of HGV standard. Service vehicles will slip into the access road from the left-in access point at the north of the development and will exit via the left-out access point at the south of the site. Service vehicle access will not be permitted from the central access junction.

8.7.3 Servicing for the foodstore will take place at the northern end of the site within a dedicated service yard. Deliveries will be diverted into the service yard on entry to the site and will then reverse back into a back-of house delivery area which will span the length of the foodstore. The smaller commercial units along the Main Street will be primarily serviced during early mornings by utilising loading bay areas along Main Street.

8.7.4 The servicing strategy is supported by a package of AutoTrack swept path analysis (SPA) drawings produced by TJ O'Connor.

8.7.5 Refuse collection will take place along the length of the service road using various layby-type pick-up points to the rear of each residential block.

8.7.6 The strategy for the refuse collection is indicated by **Figure 8.12**. The continuous orange line indicates the route of the refuse vehicle while the recessed orange rectangles indicate the collection points and the light green areas indicate the bin storage areas.

Figure 8.12: Refuse Collection Strategy

8.7.7 An internal reception will provide a delivery point for courier deliveries and a series of short-stay loading bays will be created along the service road to cater for deliveries and deliveries to the small commercial / retail units. The route for the residential deliveries is indicated by **Figure 8.13** with the marked yellow areas representing post holding stores.

Figure 8.13: Residential Delivery Strategy

8.7.8 In addition to the delivery servicing strategy from the Dundrum Bypass, there will also be provision of a singular loading bay located immediately east of the development on Main Street, with the purpose of facilitating deliveries to the small retail units which will front on to Main Street.

8.7.9 The main reason for this is that there is a level difference between Main Street and the Dundrum Bypass, meaning that deliveries to these units would otherwise be impractical if using the main servicing strategy as per **Figure 8.13**.

8.7.10 **Figure 8.14** illustrates the proposed location and scale of the loading bay at Main Street in relation to the development boundary and proposed pedestrian crossing at the northern end of Main Street.

Figure 8.14: Proposed External Loading Bay

8.7.11 The loading bay arrangement will be approximately a 50/50 split between loading for servicing vehicles attending the commercial premises on Main Street and for drop-off / pick-up activity, primarily associated with the adjacent Creche facility. It is proposed to implement time-limited parking of up to 20 minutes for all loading at this bay in order to maintain the quality pedestrian and cycle environment along Main Street.

8.7.12 It is reiterated that, given the size of the development, it is expected that a large proportion of the users of the Creche will be drawn from the development itself and the nearby residential area of Sweetmount. For those requiring drop-off and pick-up facilities, there will be capacity for approximately eight vehicles at any given time within the loading bays shown in **Figure 8.14**.

8.7.13 Notwithstanding that there will be competing demands, Systra considers that during the periods in which these spaces would be required for the Creche (weekday mornings and early to mid-afternoon's) there will generally be a good availability to accommodate Creche drop-off and pick-up.

8.8 Mobility Management Planning Measures

8.8.1 A Mobility Management Plan (MMP) is a general term for a package of measures tailored to the needs of individual sites and aimed at promoting more sustainable travel choices among users of those sites. MMPs are frequently a planning condition for new development sites such as employment units, leisure facilities; schools; and residential developments.

8.8.2 A framework MMP has been prepared for the proposed development which seeks to enable and promote the use of sustainable transport modes for travelling to and from the development.

8.8.3 The Mobility Management approach seeks to help encourage residents to take steps to reduce dependency on the car and take alternative transport options. The overarching aims of our Mobility Management approach is to:

- Promote more sustainable transport choices of future residents;
- Promote accessibility to the site by walking, cycling, passenger transport and car sharing; and
- Reduce the need to travel, especially alone by car.

8.8.4 Successful Mobility Management depends on an integrated approach between 'hard' and 'soft' measures, with the provision of quality facilities and services enabling residents to choose to walk, cycle or use public transport – supported by promotion of these travel modes through behavioural change techniques.

8.8.5 Given the accessible location of the proposed development, SYSTRA anticipates that the integrated Mobility Management approach proposed through the MMP will support continued and enhanced sustainable travel choices by residents of the proposed new development.

8.8.6 The MMP for the proposed development will not be linked to the MMP for the wider Dundrum Town Centre. The residential development will be managed by a separate management company, therefore, the MMP measures for the proposed development will be actioned and monitored separately to the Dundrum Town Centre MMP.

8.9 DMURS Statement of Consistency

8.9.1 It is noted that the design of the proposed development has been prepared in accordance with the DMURS. A Statement of Consistency has been prepared and is included within **Appendix G**.

9. NTA REQUIREMENTS

9.1 Consultation

9.1.1 Two meetings have been held with the NTA and DLRCC (in November 2021 and in March 2022) and correspondence has been exchanged in relation to the NTA's potential future requirements for the area around the development. The requirements are all in relation to the future delivery of the Bus Connects scheme which is at an early design stage.

9.1.2 Through discussions, the NTA have expressed a wish for the following infrastructure to be created in the future in addition to the interchange facilities at Waldemar Terrace

- A 75-80m lay-by facility on the Dundrum Bypass south of the existing Dundrum Bypass / Main Street junction

9.1.3 The NTA has indicated that the creation of a stop at this location would allow some services to pick-up set-down and (for some) to lay over without entering the central area of the interchange, between the EIR building and Waldemar Terrace. Furthermore, the NTA has indicated that keeping some services on the bypass would enable options for the central area which could cater better for enhanced walking, cycling and urban realm features.

9.1.4 At this stage, the NTA has no design drawings of their own for this area and no design drawings for the existing interchange facility which is likely to change in nature or be removed. It has therefore been necessary to examine what could be created on the Dundrum Bypass to try and accommodate the NTA's aspirations for bus infrastructure in this area.

9.1.5 On examination of the Dundrum Bypass south of the Main Street junction, it has been possible to accommodate a bus lay-by with a length of approximately 29m long. This would accommodate a maximum of 2 buses at any one time.

Figure 9.1: Potential Bus Layby Location on Dundrum Bypass

9.1.6 It is noted that the provision of the lay-by does not form part of the development proposals and scheme drawings. The indicative layout above is intended to just show how the NTA may deliver infrastructure in the surrounding area in the future and how it would sit with the proposed development layout.

9.1.7 On review of the plans, the NTA advised that the 29m lay-by would not give them sufficient kerbside length on the bypass to accommodate all of their potential future requirements. They indicated that they will require layover space for two terminating bus services, the L33 and 74 (and potentially the airport bus service) along with stopping space for three through bus services, the 87, 88 and L35.

9.1.8 The NTA requested that consideration was given to moving the proposed northern access junction associated with the development or eliminating it altogether. It is noted that the access strategy for the proposed development has been carefully conceived in consultation with DLRCC. The strategy is based on eliminating the current vehicular access points on Main Street and taking all access from the bypass to ensure a sustainable transport corridor is created on Main Street. With the commercial development (including the foodstore) served from the northern access junction, there is a need to gain access at this location to bring in larger vehicles which would not be able to use the central access junction to double back to the servicing location. This means that elimination of the access point is not an option and moving the access is also not possible as a result of the swept path of the service vehicles. It is noted that this northern access point would have to be amended (shortening up the diverge) in order to accommodate the potential future delivery of the bus lay-by north of the access.

9.1.9 Extension of the layby currently drawn to achieve an overall length of 75m-85m is technically challenging (even without the proposed access junction) as the road bends to the left quite sharply just after the access junction. This would significantly affect the inter-visibility between buses exiting the front of the lay-by and other vehicles travelling southbound on the bypass. Systra would therefore be of the view that extension of the potential facility identified by **Figure 9.1** would not be possible to deliver.

9.1.10 In a situation where it has not been possible to provide a continuous layby of 75m-85m, further work has been undertaken to identify other options on the Dundrum Bypass where additional / alternative bus lay-by could be provided. Further investigations have indicated that there would be additional opportunities to accommodate bus spaces on the bypass at the following locations:

Dundrum Bypass at Waldemar Terrace Junction – If Waldemar is pedestrianised as per DLRCC aspirations then there would be an opportunity to accommodate a bus layby of approximately 36m between the Taney Junction and the Main Street junction which would cross the stopped up Waldemar Terrace junction. This would be a very good location for through bus services with direct pedestrian links to the LUAS station. This could be delivered in tandem with the lay-by drawn to the south of the Main Street junction.

Dundrum Bypass between Dundrum Village Central and Southern Access Points – There is a significant verge area available between the proposed central access point and the proposed southern access point. Preliminary examinations have indicated that it would be possible to provide a facility of 75m in length at this location although we would see benefit in providing one of the options mentioned above in combination with a shorter facility at this location (say 36m). This would allow the different locations to be designated for different purposes (say through services, terminating services / layover).

Dundrum Bypass between proposed southern access point and access to Dundrum Town Centre – A further location has been identified where a la-by facility of 75m in length could be accommodated. It is acknowledged that this location is slightly further from the LUAS station but it could serve as a good location for bus lay-over and as a termination point for some services.

9.1.11 The three potential options are illustrated by **Figures 9.2**, **9.3 and 9.4** below. Again, these plans simply demonstrate what areas are available for future provision of facilities and do not represent facilities that form part of the development proposals.

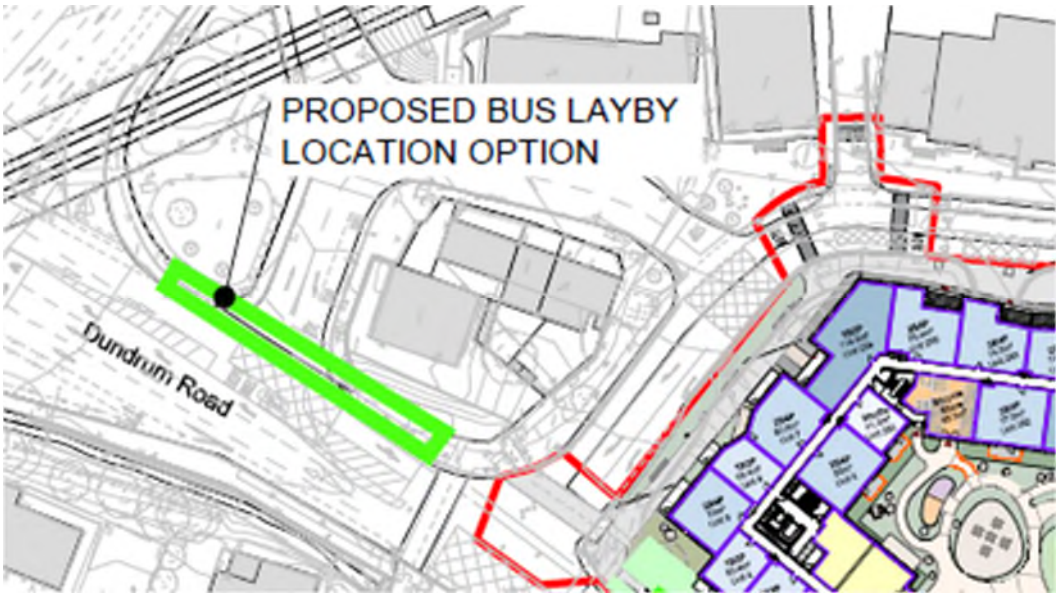


Figure 9.2 Potential Bus Layby on Dundrum Bypass Between Development Accesses

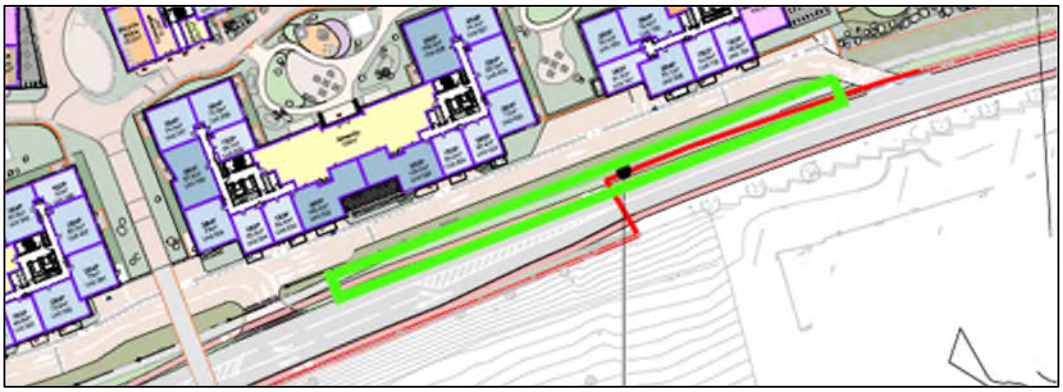


Figure 9.3 Potential Bus Layby on Dundrum Bypass Between Development Accesses

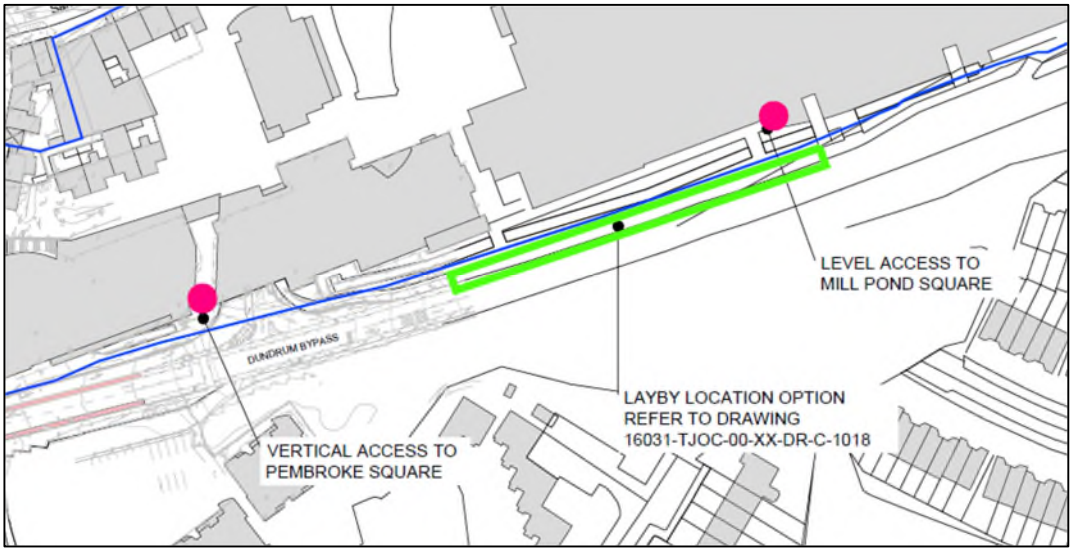


Figure 9.4 Potential Bus Layby on Dundrum Bypass to South of Development Access

9.2 Summary and Next Steps

9.2.1 At this point in time the NTA do not have scheme plans available for the proposed development to consider and work with. There are therefore no firm constraints or committed infrastructure in the area that the development needs to conform with. The applicant is however, very willing to work with the NTA to ensure that public transport infrastructure is delivered in this area. This will benefit existing users and also the future residents of the proposed development.

9.2.2 At this stage, a number of options have been identified for accommodating the NTA's potential future requirements for the Dundrum bypass. A total of 4 locations have been identified. We would therefore be of the view that an agreeable solution can be found to accommodating the NTA's requirement for lay-by facilities totalling 75-80m in length whilst maintaining the access strategy that has been put forward for the proposed development.

9.2.3 Going forward, the applicant would be keen to maintain an on-going dialogue with the NTA in relation to the bus connects proposals and once the NTA proposals are more developed, it is fully anticipated that the optimum solution for the exact location of the lay-by facilities will be identified.

10. DLRCC CONSULTATION

10.1 SHD Process

10.1.1 The applicant has engaged fully with DLRCC as part of the overall SHD process with a full Stage 2 submission made which included scheme drawings and supporting documents.

10.1.2 Consultation meetings were also held with DLRCC including a dedicated session on transportation matters.

10.1.3 At Stage 2, DLRCC provided detailed comments on all matters including a number of comments on transportation and infrastructure. These comments have been reproduced in a Memo along with a response on each comment to demonstrate how they have been addressed in the final submission. The Memo is included at **Appendix E**.

10.2 Quality Audit

10.2.1 As part of the consultation process with DLRCC, a request was made for a Quality Audit (to include a Road Safety Audit) to be undertaken and submitted with the final Dundrum Village submission.

10.2.2 The Quality Audit was subsequently commissioned with ORS Limited undertaking the Audit which covers a road safety audit for the proposed road infrastructure and the quality audit covering the sustainable transport provision. A copy of the completed Quality Audit and the designer's response to the audit (which addresses the issues identified by the Audit) are included at **Appendix F**. It is noted that there are some small discrepancies between unit numbers, parking spaces etc in the quality audit when compared with this Transport Assessment. This is due to the Audit being undertaken in advance of the final design plans and the numbers within this Transport Assessment are the final numbers.

11. SUMMARY & CONCLUSION

11.1 Summary

11.1.1 Systra has been commissioned by Dundrum Retail GP DAC (Acting for and on behalf of Dundrum Retail Limited Partnership) to produce a Transport Assessment in support of a detailed planning application for a proposed residential development on the site of the existing Dundrum Village Shopping Centre lands in Dundrum Town Centre, Dublin.

11.1.2 The proposals are to create a new development consisting of 881 apartments along with retail and commercial uses, associated car parking and public realm space.

Existing Site Accessibility

11.1.3 The proposed development site sits within a highly sustainable location in Dundrum Town Centre, benefitting from the following:

- The development sits within a mature transport network and there is a full network of footways which are lit and crossing points are located at key junctions;
- Cycle links exist on Taney Road, between Main Street at Sweetmount, Churchtown Road Upper and on the Dundrum Bypass;
- The site is conveniently located for the LUAS Green Line and sits opposite the Dundrum LUAS station;
- The site sits adjacent to Main Street and bus interchange which is a key bus corridor in the area. A total of 5 bus services operate adjacent to the site; and
- The site is well located to take advantage of local amenities including Dundrum Town Centre, local schools, hotels and restaurants all of which are within 10 minutes' walk of the site.

Development Access Strategy

11.1.4 The primary pedestrian access will be from Main Street, with a wealth of access points into the building and public realm area being brought forward. It is also proposed to deliver a new footbridge across Sweetmount Park for pedestrians travelling to and from the west.

11.1.5 There will be two new vehicular access points constructed at the north and south of Dundrum Bypass respectively, with the existing centrally-located all-movements access being upgraded. The three primary access points will take the following form:

- Access Point 1 (North) — Left-in only from Dundrum Bypass;
- Access Point 2 (Central) — All movements ghost-island priority junction with right turning refuge from bypass; and
- Access Point 3 (South) — Left-out Only Priority Junction.

11.1.6 An internal service road will be constructed which will run parallel to the Dundrum Bypass and will provide access into the car parking areas and for service vehicles attending the food retail / commercial units at the northern end.

Trip Generation, Distribution & Assignment

11.1.7 We have undertaken a trip generation calculation based on the proposed 881 units in line with the TRICS database and applied Irish Census (2016) data for *method of travel to work or study* to determine the people-trips by mode which could be generated by the residential aspect of the proposed development. It is estimated that around 560 two-way people-trips (92 arrivals / 468 departures) will be generated during the AM network peak hour (08:00 – 09:00) and around 518 two-way people-trips (366 arrivals / 152 departures) during the PM network peak hour (17:00 – 18:00).

11.1.8 It is likely that around 219 additional two-way vehicle trips (36 arrivals / 183 departures) will be generated by the proposed development in the AM peak hour. In the PM peak hour, there will be approximately 202 two-way trips (143 arrivals / 59 departures).

11.1.9 Car drivers account for the highest proportion of travellers within the Dundrum area at 34%. This is followed by public transit users (bus and rail) and active modes (walking and cycling) at 23% each. Car passengers account for 12% of the total trips.

11.1.10 To estimate the distribution and assignment of trips, we have adopted a gravity model which assumes that the likelihood of a trip to/from a particular destination is directly proportionate to the number of potential trip attractors at a given destination and the overall distance by road to that destination. The gravity model predicts that the majority of trips (94%) will route north on the Dundrum Bypass and distribute at the Taney Cross junction. The remaining 6% will route south, with the majority of these trips heading south via Sandyford Road.

Comparison with Existing Land-Use

11.1.11 It is noted that the change of land use (from primarily retail to residential) will result in a change to the arrival/departure profile of trips.

11.1.12 Due to the change of land use (and hence arrival/departure profile) there will be a net-increase in outbound trips of approximately 139 during the AM peak hour. However, the inbound trips during the same period will reduce by around 36. In the PM peak period, there will be a net increase of just 8 trips when looking at the difference between existing trips and trips associated with the new development.

Road Network Threshold Assessment and Traffic Modelling

11.1.13 We have undertaken a threshold assessment to determine the impact of the development on the surrounding road network and to identify junctions that require to be assessed in detail. This exercise takes account of the changes in traffic generation and the re-distribution of traffic primarily onto the Dundrum Bypass as a result of the development access strategy.

11.1.14 In light of the threshold assessment, detailed traffic modelling has been undertaken to assess the impact of the development at the Taney Junction and a the Dundrum Bypass / Main Street junction. Assessments have also been undertaken for the new access junctions on the Dundrum Bypass.

11.1.15 The results of the traffic modelling exercise have identified that the existing Taney Cross junction operates over capacity under base plus committed development traffic conditions. With the addition of development traffic, the junction operates marginally increases the degree of saturation and queuing figures but the increases are not considered significant and as such, there are no proposals to implement any new physical mitigation measures at the junction. Instead, the development will focus on ensuring that it maximises the use of sustainable transport modes to access the site and a Mobility Management Plan will be implemented to assist this objective.

11.1.16 The other junctions modelled are all predicted to operate within capacity for the opening year of the development.

Development Parking Provision

11.1.17 Overall, it is proposed to provide 373 parking spaces (including 55 non-residential spaces for the commercial/retail uses and creche).

11.1.18 The agglomeration of 373 spaces will be made up as below:

- **318 Residential Spaces:**
  - 304 Standard spaces (including 35 EV spaces); and
  - 14 Disabled Access spaces (including 3 EV spaces).

- **55 Retail / Commercial Spaces:**
  - 41 Standard spaces (including 4 EV spaces);
  - 4 Disabled Access spaces (including 1 EV space);
  - 7 Parent and Child spaces; and
  - 3 Creche Staff spaces in Zone 4.

11.1.19 The proposal to deliver a total of 373 parking spaces is in keeping with the highly accessible nature of the site and surrounding area, as well as with other local sites which have been consented for a level of parking which is below the national standards.

Measures to Support the Development

11.1.20 The following proposals/infrastructure will help to accommodate the development and its anticipated trip generation into the receiving environment:

- Recent upgrades along Main Street;
- Proposed upgrades to the pedestrian infrastructure to provide new crossing facilities at Main Street and at the Dom Marmion Bridge;
- 1,750 cycle parking spaces;
- 373 off-street car parking spaces;
- A dedicated service road to accommodate refuse collection and general servicing activity;
- New site access strategy to move all vehicular access from Main Street to Dundrum Bypass:
- The proposed link to Dom Marmion bridge from the development;
- The proposed new footbridge to the Sweetmount area in the west; and
- A Mobility Management Plan to encourage uptake of the wealth of active and sustainable travel opportunities within the surrounding environment.

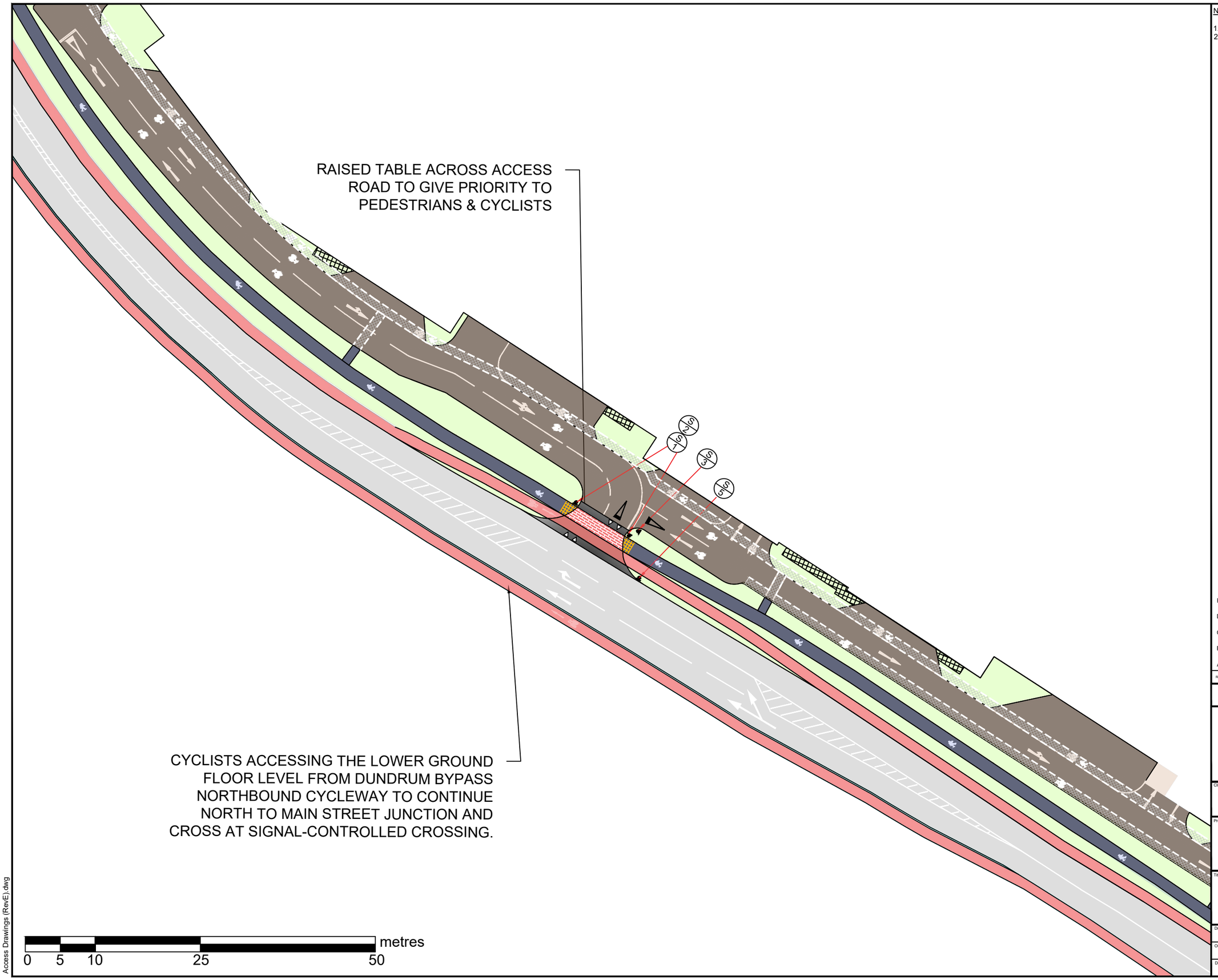
11.2 Overall Conclusion

11.2.1 The Dundrum Village proposals are advantageously located within a prime town centre location to benefit from accessibility by a range of modes, offering prospective new residents genuine modal choice with a wealth of sustainable travel options available in the immediate vicinity.

11.2.2 The development proposals are in line with local and national transportation policy. The proposals will see a reduction in car parking provision on the site from 459 spaces to 373 spaces and, moreover, the re-development of the site will generate a lower number of vehicle trips onto the local road network compared with the site's consented use for retail development. It is considered that a residential development at this location will integrate well with the existing transport network and with a range of transport options available for accessing the site, a highly sustainable development can be achieved.

APPENDIX A

SUPPORTING INFRASTRUCTURE DRAWINGS



Notes:

1. Do not scale from drawing.
2. All dimensions in metres unless otherwise stated.

S/1 W143

S/2 W140

S/3 W041

S/5 RUS015A

Rev.	Date	Revision details	Drawn	Checked	Approved
E	14-03-22	Revised site layout	AS	ADV	ADV
D	17-02-21	Revised site layout	AS	ADV	ADV
C	26-11-21	New Road layout and Signs Added	KS	ADV	ADV
B	07-09-21	Zebra markings included across left-in and left-out accesses	CH	ADV	ADV
A	26-08-21	Raised table included across access road arm.	CH	ADV	ADV

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Client: Dundrum Retail GP DAC

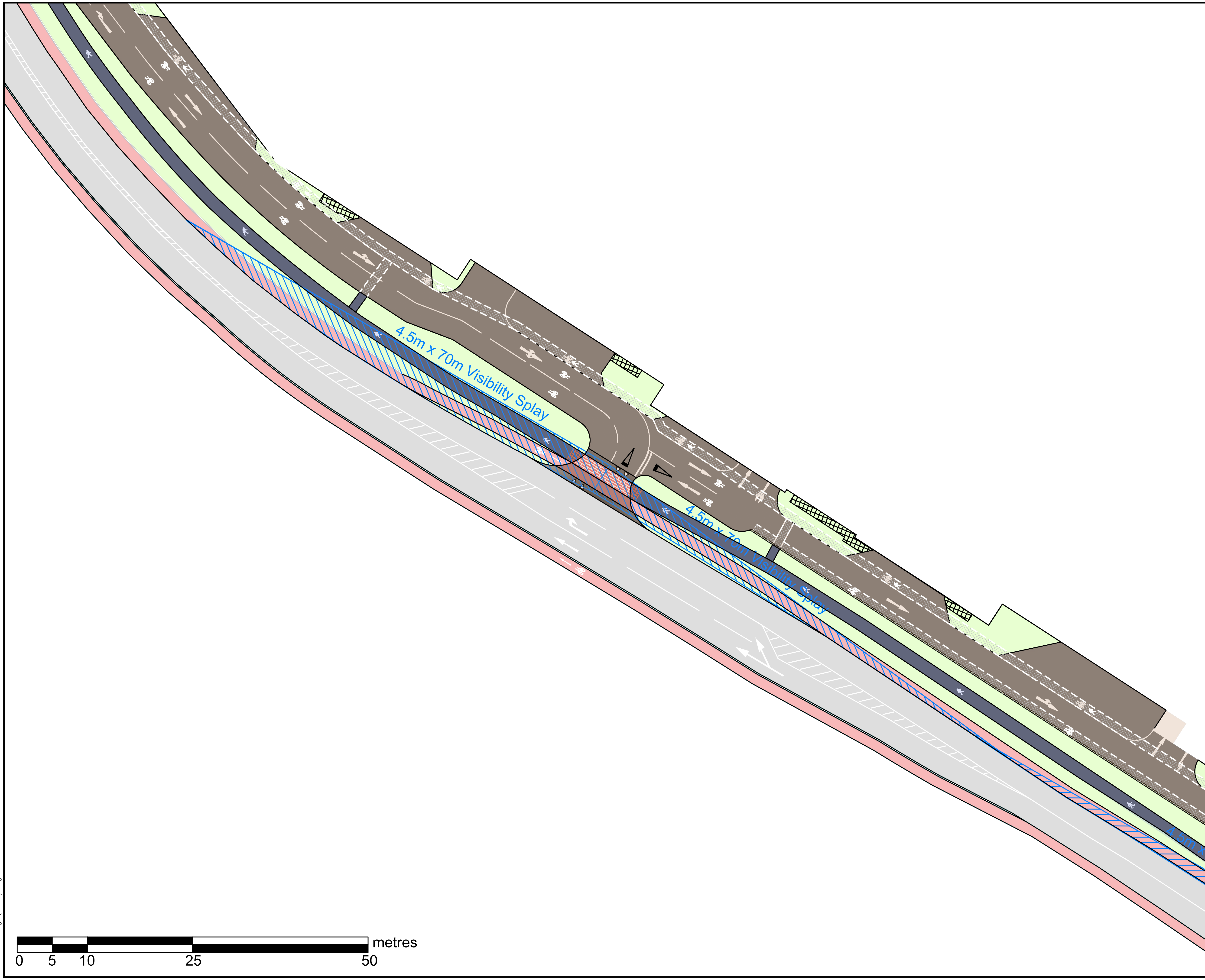
Project: Dundrum Village Phase 2

Title: Development Access Strategy

Ghost-Island Junction
Preliminary Design

Drawn	Checked	Approved
AMS	SL	ADV
Original drg. size: A3	Date: Mar '22	Scale: 1:500
Drawing Status: INFORMATION	Drawing Number: 109025-I-GA-002	Rev.: E

Access Drawings (RevE).dwg



Notes:

1. Do not scale from drawing.
2. All dimensions in metres unless otherwise stated.

Rev.	Date	Revision details	Drawn	Checked	Approved
E	14-03-22	Revised site layout	AS	ADV	ADV
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Project
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Phase 2

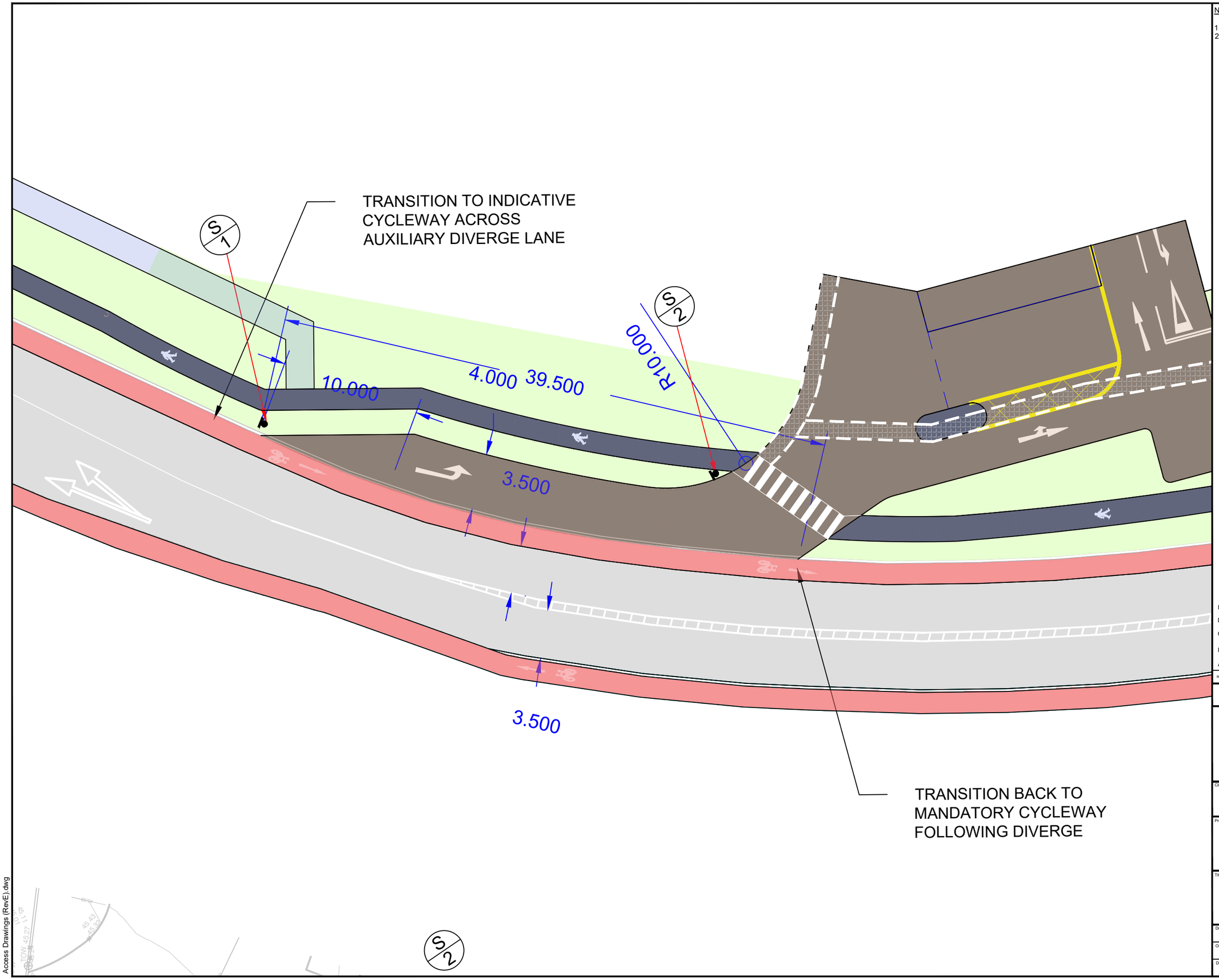
Title
Development Access Strategy

Ghost-Island Junction
Visibility Splays

Drawn	Checked	Approved
AS	SL	ADV
Original drg. size: A3	Date: Mar '22	Scale: 1:500

Drawing Status	Drawing Number	Rev.
INFORMATION	109025-I-GA-003	E

Access Drawings (RevE).dwg



Notes:

1. Do not scale from drawing.
2. All dimensions in metres unless otherwise stated.

S/1 W143

S/2 W140

Rev.	Date	Revision details	Drawn	Checked	Approved
E	14-03-22	Revised site layout	AS	ADV	ADV
D	17-02-22	New site layout	AS	ADV	ADV
C	26-11-21	New Road layout and Signs Added	KS	ADV	ADV
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A	26-08-21	Raised table included across access road arm.	CH	ADV	ADV

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Client: Dundrum Retail GP DAC

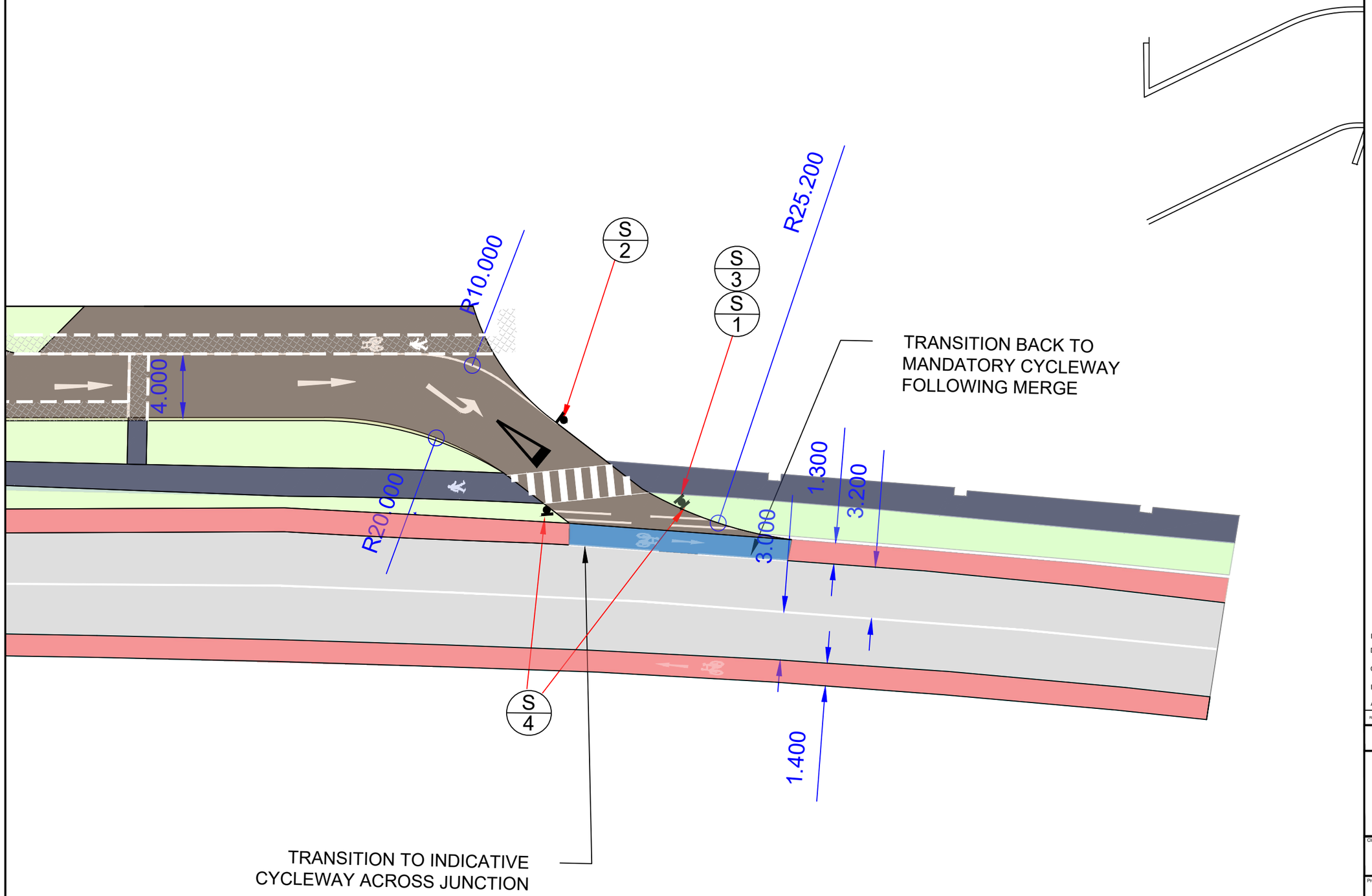
Project: Dundrum Village
Phase 2

Title: Development Access Strategy

Auxiliary Diverge Lane
Preliminary Design

Drawn	Checked	Approved
CH	SL	ADV
Original drg. size: A3	Date: Mar '21	Scale: 1:250
Drawing Status: INFORMATION	Drawing Number: 109025-I-GA-004	Rev.: E

Access Drawings (RevE).dwg



Notes:

1. Do not scale from drawing.
2. All dimensions in metres unless otherwise stated.

S 1 — W143

S 2 — W140

S 4 — RUS050

Rev.	Date	Revision details	Drawn	Checked	Approved
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D	17-02-22	New site layout	AS	ADV	ADV
C	26-11-21	New Road layout and Signs Added	KS	ADV	ADV
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Project: Dundrum Village Phase 2

Title: Development Access Strategy

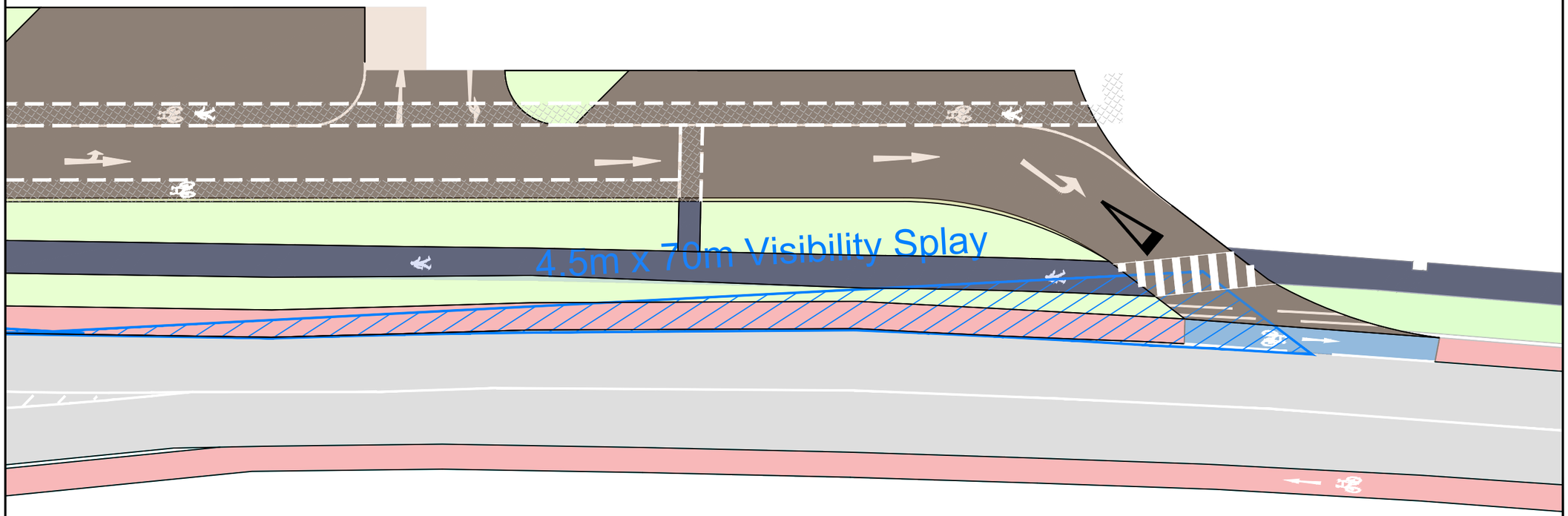
Left-out Junction
Preliminary Design

Drawn	Checked	Approved
AS	SL	ADV

Original drg. size	Date	Scale
A3	Mar '22	1:250

Drawing Status	Drawing Number	Rev.
INFORMATION	109025-I-GA-005	E

Access Drawings (RevE).dwg



Notes:

1. Do not scale from drawing.
2. All dimensions in metres unless otherwise stated.

Rev.	Date	Revision details	Drawn	Checked	Approved
E	14-03-22	Revised site layout	AS	ADV	ADV
D	17-02-22	New site layout	AS	ADV	ADV
C	26-11-21	New Road layout and Signs Added	KS	ADV	ADV
B	07-09-21	Zebra markings included across left-in and left-out accesses	CH	ADV	ADV
A	26-08-21	Raised table included across access road arm.	CH	ADV	ADV

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Client

Dundrum Retail GP DAC

Project

Dundrum Village
Phase 2

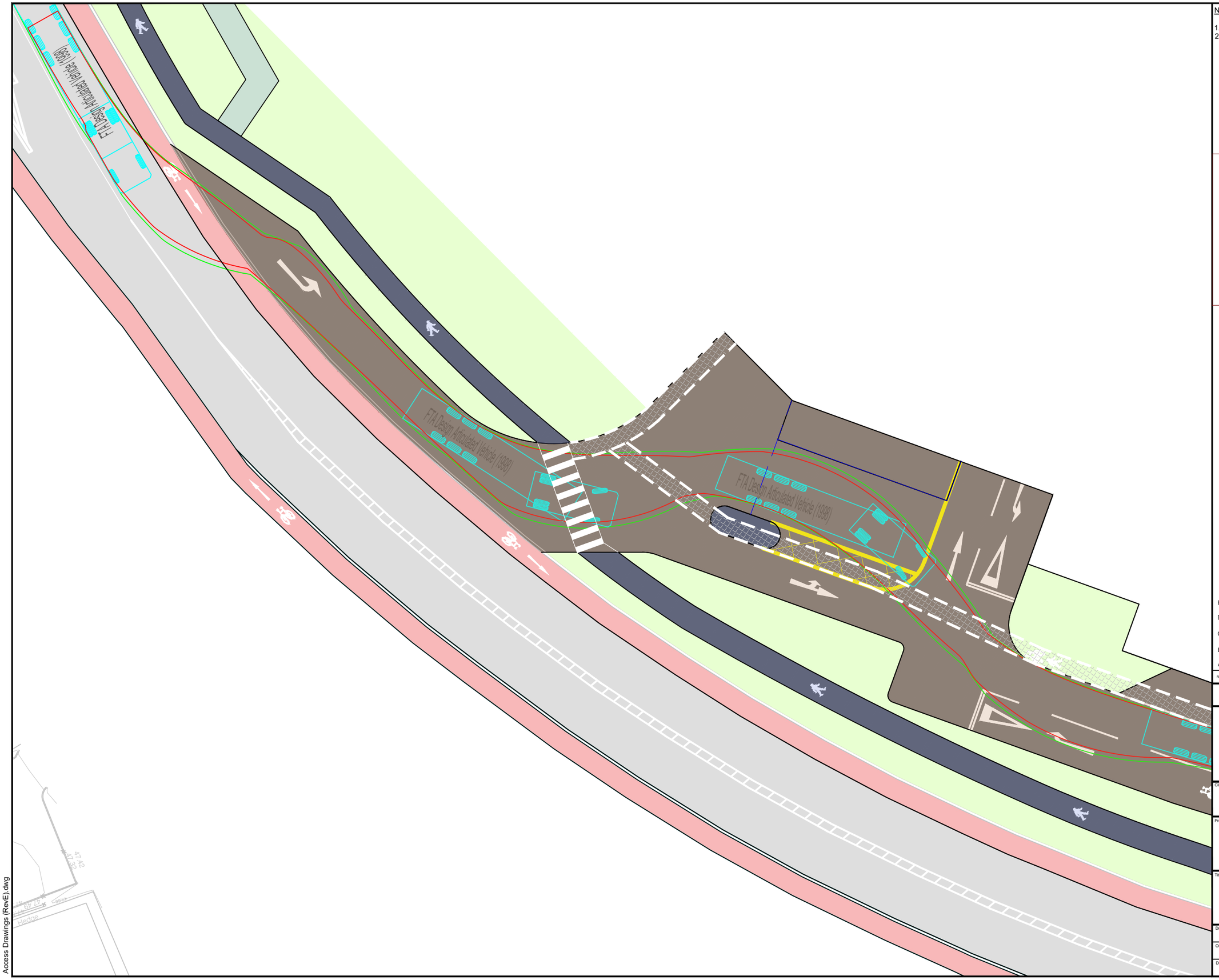
Title

Development Access Strategy

Left-out Junction
Visibility Splay

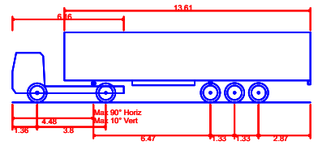
Drawn	Checked	Approved
AS	SL	ADV
Original drg. size	**Date**	**Scale**
A3	Mar '22	1:250
Drawing Status	**Drawing Number**	**Rev.**
INFORMATION	109025-I-GA-006	E

Access Drawings (RevE).dwg



Notes:

1. Do not scale from drawing.
2. All dimensions in metres unless otherwise stated.



FTA Design Articulated Vehicle (1998)	
Overall Length	16.480m
Overall Width	2.550m
Overall Body Height	3.870m
Min Body Ground Clearance	0.515m
Max Track Width	2.470m
Lock to lock time	3.00s
Kerb to Kerb Turning Radius	6.550m

Rev.	Date	Revision details	Drawn	Checked	Approved
E	14-03-22	Revised site layout	AS	ADV	ADV
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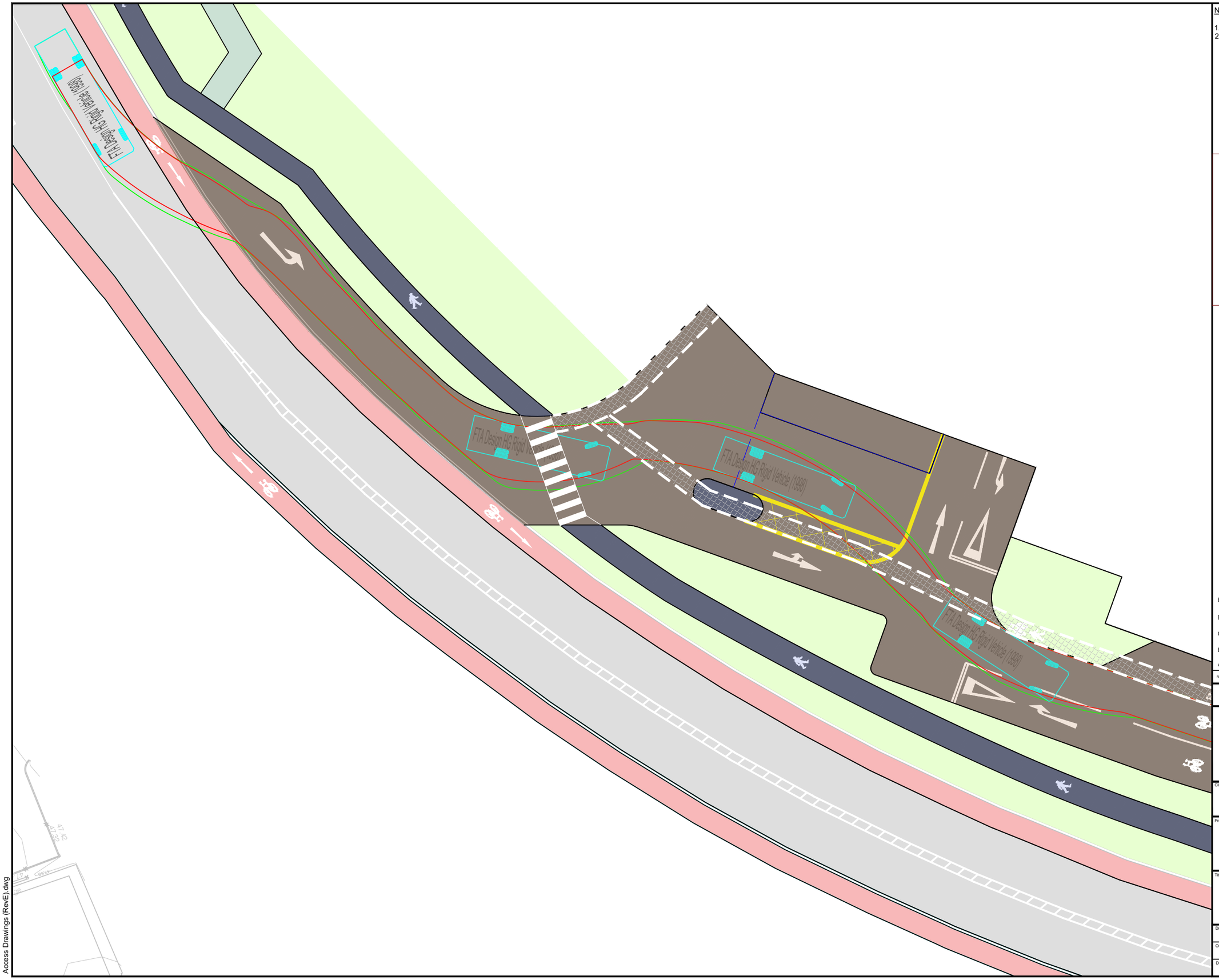
Phase 2

Title
Development Access Strategy

Swept Path Analysis
Sheet 1 of 5

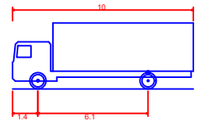
Drawn	Checked	Approved
AS	SL	ADV
Original drg. size	Date	Scale
A3	Mar '22	1:250
Drawing Status	Drawing Number	Rev.
INFORMATION	109025-I-SPA-001	E

Access Drawings (RevE).dwg



Notes:

1. Do not scale from drawing.
2. All dimensions in metres unless otherwise stated.



FTA Design HG Rigid Vehicle (1998)	
Overall Length	10.000m
Overall Width	2.500m
Overall Body Height	3.645m
Min Body Ground Clearance	0.440m
Track Width	2.470m
Lock to lock time	3.00s
Kerb to Kerb Turning Radius	11.000m

Rev.	Date	Revision details	Drawn	Checked	Approved
E	14-03-22	Revised site layout	AS	ADV	ADV
D	17-02-22	New site layout	AS	ADV	ADV
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Phase 2

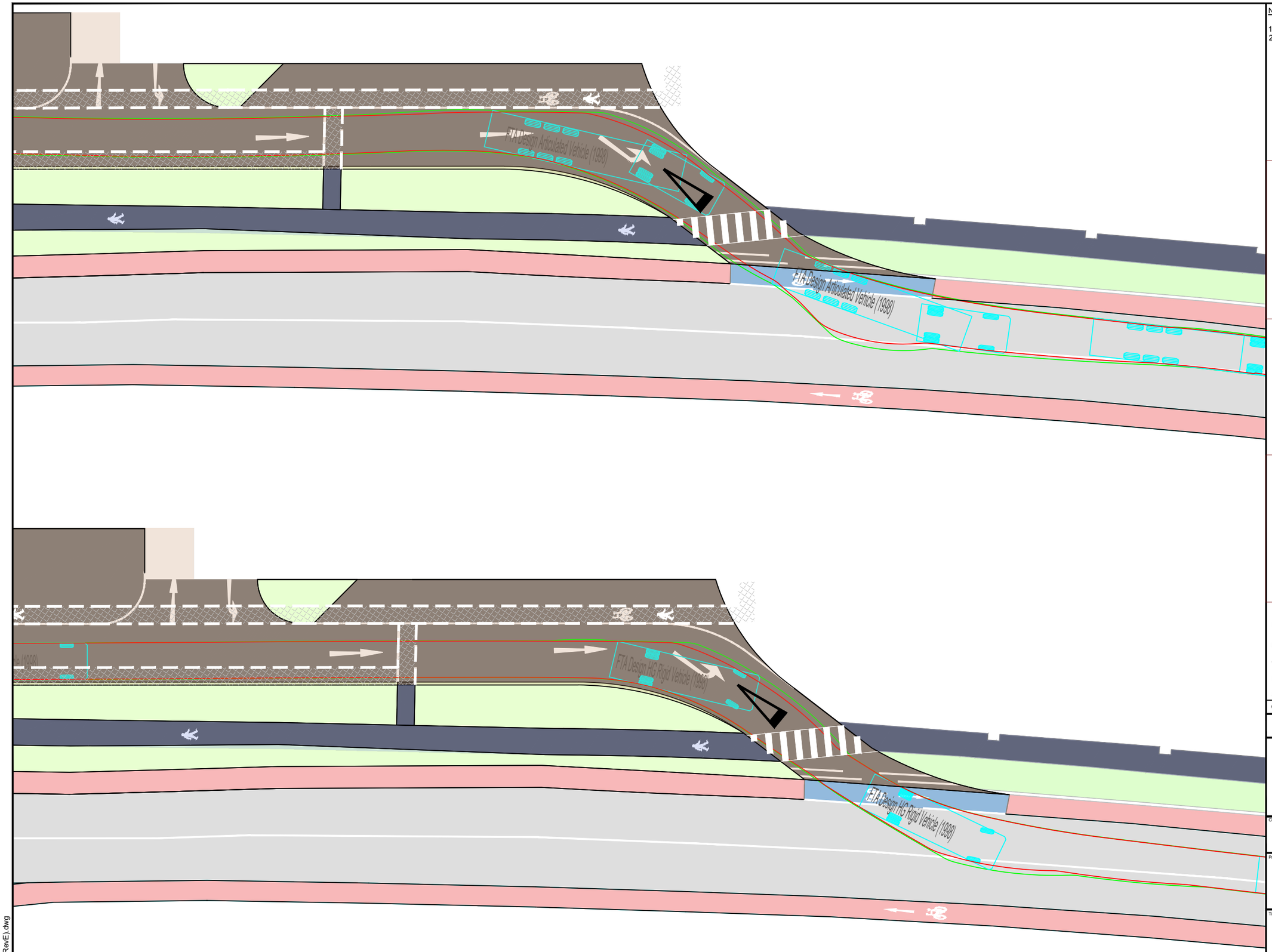
Title

Development Access Strategy

Swept Path Analysis
Sheet 2 of 5

Drawn	Checked	Approved
AS	SL	ADV
Original drg. size	Date	Scale
A3	Mar '22	1:250
Drawing Status	Drawing Number	Rev.
INFORMATION	109025-I-SPA-002	E

Access Drawings (RevE).dwg



Notes:

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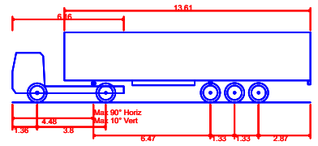

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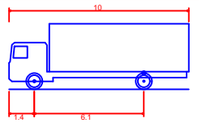
Overall Body Height	3.870m
Min Body Ground Clearance	0.515m
Max Track Width	2.470m
Lock to lock time	3.00s
Kerb to Kerb Turning Radius	6.550m



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Overall Length	10.000m
Overall Width	2.500m
Overall Body Height	3.645m
Min Body Ground Clearance	0.440m
Track Width	2.470m
Lock to lock time	3.00s
Kerb to Kerb Turning Radius	11.000m

Rev.	Date	Revision details	Drawn	Checked	Approved
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A	26-08-21	Raised table included across access road arm.	CH	ADV	ADV

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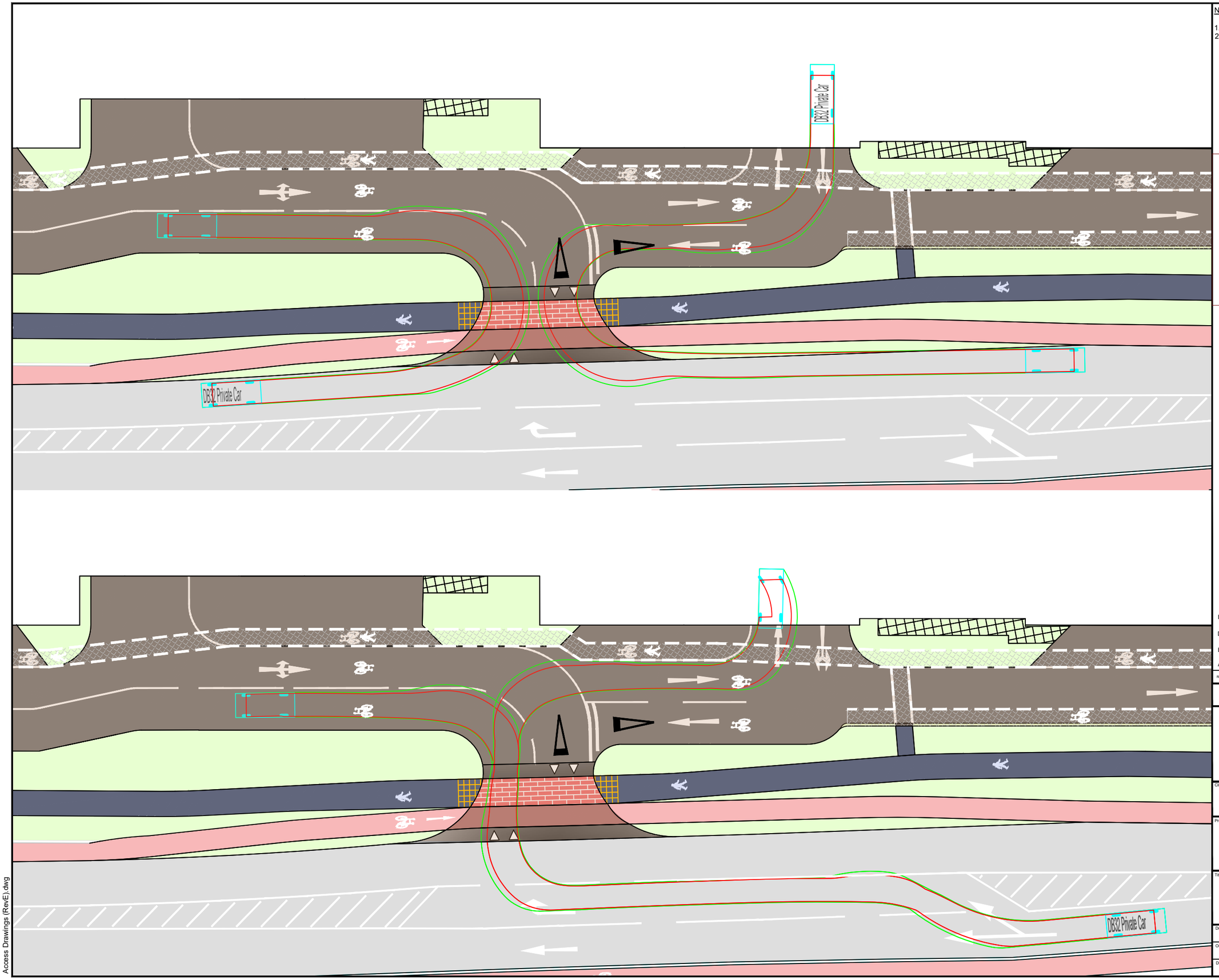
Development Access Strategy

Swept Path Analysis
Sheet 5 of 5

Drawn	Checked	Approved
AS	SL	ADV
Original drg. size	Date	Scale
A3	Mar '22	1:250
Drawing Status	Drawing Number	Rev.
INFORMATION	109025-I-SPA-005	E

Access Drawings (RevE).dwg



Notes:

1. Do not scale from drawing.
2. All dimensions in metres unless otherwise stated.

DB32 Private Car	
Overall Length	4.223m
Overall Width	1.715m
Overall Body Height	1.392m
Min Body Ground Clearance	0.233m
Max Track Width	1.629m
Lock to lock time	4.00s
Kerb to Kerb Turning Radius	5.780m

Rev.	Date	Revision details	Drawn	Checked	Approved
E	14-03-22	Revised site layout	AS	ADV	ADV
D	17-02-22	New site layout	AS	ADV	ADV
B	07-09-21	Zebra markings included across left-in and left-out accesses	CH	ADV	ADV
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Project

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Phase 2

Title

Development Access Strategy

Swept Path Analysis
Sheet 4 of 5

Drawn	Checked	Approved
AS	SL	ADV
Original drg. size	Date	Scale
A3	Mar '22	1:250
Drawing Status	Drawing Number	Rev.
INFORMATION	109025-I-SPA-004	E

Access Drawings (RevE).dwg

Notes:

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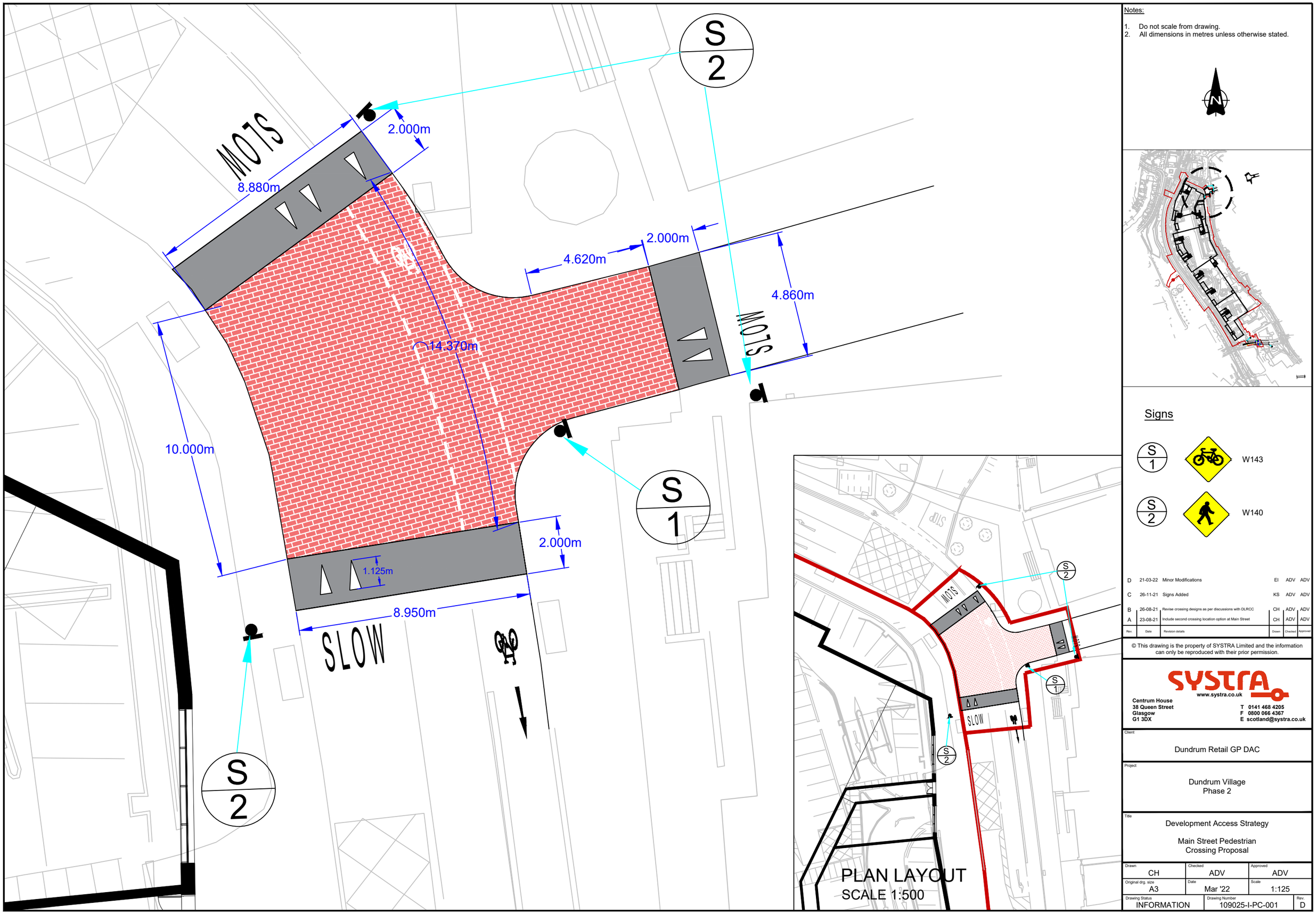
2. All dimensions in metres unless otherwise stated.



Signs

S 1 — W143

S 2 — W140

D	21-03-22	Minor Modifications	EI	ADV	ADV
C	26-11-21	Signs Added	KS	ADV	ADV
B	26-08-21	Revise crossing designs as per discussions with DLRCC	CH	ADV	ADV
A	23-08-21	Include second crossing location option at Main Street	CH	ADV	ADV
Rev.	Date	Revision details	Drawn	Checked	Approved

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Client: Dundrum Retail GP DAC

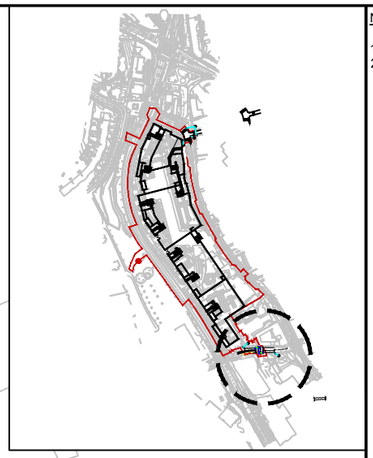
Project: Dundrum Village Phase 2

Title: Development Access Strategy

Main Street Pedestrian Crossing Proposal

Drawn	Checked	Approved
CH	ADV	ADV
Original drg. size	Date	Scale
A3	Mar '22	1:125
Drawing Status	Drawing Number	Rev.
INFORMATION	109025-I-PC-001	D

PLAN LAYOUT
SCALE 1:500



Notes:

1. Do not scale from drawing.
2. All dimensions in metres unless otherwise stated.

Key:

- Transition Kerb
- Dropped Kerb
- Tactile Paving
- Steel Pole
- Primary Signal Head
- Secondary Signal Head
- Pedestrian Demand Unit

Signs

S 1 — W143

S 2 — W140

D	21-03-22	Minor Modifications	EI	ADV	ADV
C	26-11-21	Signs Added	KS	ADV	ADV
B	26-08-21	Revise crossing designs as per discussions with DLRCC	CH	ADV	ADV
A	23-08-21	Include second crossing location option at Main Street	CH	ADV	ADV
Rev.	Date	Revision details	Drawn	Checked	Approved

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Client: Dundrum Retail GP DAC

Project: Dundrum Village Phase 2

Title: Development Access Strategy

Ballinteer Road Bridge Pedestrian Crossing

Drawn	Checked	Approved
CH	ADV	ADV
Original drg. size	Date	Scale
A3	Mar '22	1:250
Drawing Status	Drawing Number	Rev.
INFORMATION	109025-I-PC-002	D

APPENDIX B

TRICS SUMMARY REPORT AND CENSUS DATA

Calculation Reference: AUDIT-700706-210806-0841

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 03 - RESIDENTIAL
Category : C - FLATS PRIVATELY OWNED
MULTI-MODAL TOTAL VEHICLES

Selected regions and areas:

12	CONNAUGHT		
	GA	GALWAY	1 days
14	LEINSTER		
	LU	LOUTH	3 days
15	GREATER DUBLIN		
	DL	DUBLIN	3 days
16	ULSTER (REPUBLIC OF IRELAND)		
	MG	MONAGHAN	1 days
17	ULSTER (NORTHERN IRELAND)		
	AN	ANTRIM	1 days

This section displays the number of survey days per TRICS® sub-region in the selected set

Primary Filtering selection:

This data displays the chosen trip rate parameter and its selected range. Only sites that fall within the parameter range are included in the trip rate calculation.

Parameter: No of Dwellings
Actual Range: 20 to 140 (units:)
Range Selected by User: 18 to 372 (units:)

Parking Spaces Range: All Surveys Included

Parking Spaces per Dwelling Range: All Surveys Included

Bedrooms per Dwelling Range: All Surveys Included

Percentage of dwellings privately owned: All Surveys Included

Public Transport Provision:
Selection by: Include all surveys

Date Range: 01/01/13 to 28/11/14

This data displays the range of survey dates selected. Only surveys that were conducted within this date range are included in the trip rate calculation.

Selected survey days:

Monday	2 days
Tuesday	2 days
Wednesday	1 days
Thursday	2 days
Friday	2 days

This data displays the number of selected surveys by day of the week.

Selected survey types:

Manual count	9 days
Directional ATC Count	0 days

This data displays the number of manual classified surveys and the number of unclassified ATC surveys, the total adding up to the overall number of surveys in the selected set. Manual surveys are undertaken using staff, whilst ATC surveys are undertaking using machines.

Selected Locations:

Edge of Town Centre	4
Suburban Area (PPS6 Out of Centre)	4
Edge of Town	1

This data displays the number of surveys per main location category within the selected set. The main location categories consist of Free Standing, Edge of Town, Suburban Area, Neighbourhood Centre, Edge of Town Centre, Town Centre and Not Known.

Selected Location Sub Categories:

Residential Zone	7
No Sub Category	2

This data displays the number of surveys per location sub-category within the selected set. The location sub-categories consist of Commercial Zone, Industrial Zone, Development Zone, Residential Zone, Retail Zone, Built-Up Zone, Village, Out of Town, High Street and No Sub Category.

Secondary Filtering selection:

Use Class:

C3	9 days

This data displays the number of surveys per Use Class classification within the selected set. The Use Classes Order 2005 has been used for this purpose, which can be found within the Library module of TRICS®.

Population within 500m Range:

All Surveys Included

Population within 1 mile:

1,001 to 5,000	1 days
5,001 to 10,000	2 days
15,001 to 20,000	2 days
20,001 to 25,000	1 days
25,001 to 50,000	3 days

This data displays the number of selected surveys within stated 1-mile radii of population.

Population within 5 miles:

5,001 to 25,000	1 days
25,001 to 50,000	3 days
50,001 to 75,000	1 days
125,001 to 250,000	1 days
250,001 to 500,000	1 days
500,001 or More	2 days

This data displays the number of selected surveys within stated 5-mile radii of population.

Car ownership within 5 miles:

0.6 to 1.0	1 days
1.1 to 1.5	8 days

This data displays the number of selected surveys within stated ranges of average cars owned per residential dwelling, within a radius of 5-miles of selected survey sites.

Travel Plan:

No	9 days

This data displays the number of surveys within the selected set that were undertaken at sites with Travel Plans in place, and the number of surveys that were undertaken at sites without Travel Plans.

PTAL Rating:

No PTAL Present	9 days

This data displays the number of selected surveys with PTAL Ratings.

LIST OF SITES relevant to selection parameters

1 AN-03-C-02 BLOCK OF FLATS ANTRIM
SUMMERHILL AVENUE
BELFAST
KNOCK
Edge of Town
Residential Zone
Total No of Dwellings: 22
Survey date: FRIDAY *28/11/14* *Survey Type: MANUAL*

2 DL-03-C-12 BLOCK OF FLATS DUBLIN
BOOTERSTOWN AVENUE
DUBLIN

Suburban Area (PPS6 Out of Centre)
Residential Zone
Total No of Dwellings: 47
Survey date: TUESDAY *10/09/13* *Survey Type: MANUAL*

3 DL-03-C-14 BLOCKS OF FLATS DUBLIN
BALLINTEER ROAD
DUBLIN
DUNDRUM
Suburban Area (PPS6 Out of Centre)
Residential Zone
Total No of Dwellings: 140
Survey date: TUESDAY *10/09/13* *Survey Type: MANUAL*

4 DL-03-C-15 BLOCKS OF FLATS DUBLIN
MONKSTOWN ROAD
DUBLIN
MONKSTOWN
Suburban Area (PPS6 Out of Centre)
Residential Zone
Total No of Dwellings: 20
Survey date: WEDNESDAY *01/10/14* *Survey Type: MANUAL*

5 GA-03-C-01 FLATS GALWAY
BALLYLOUGHANE ROAD
GALWAY

Suburban Area (PPS6 Out of Centre)
No Sub Category
Total No of Dwellings: 34
Survey date: THURSDAY *31/10/13* *Survey Type: MANUAL*

6 LU-03-C-01 BLOCKS OF FLATS LOUTH
DONORE ROAD
DROGHEDA

Edge of Town Centre
Residential Zone
Total No of Dwellings: 52
Survey date: THURSDAY *12/09/13* *Survey Type: MANUAL*

7 LU-03-C-02 BLOCK OF FLATS LOUTH
NICHOLAS STREET
DUNDALK

Edge of Town Centre
Residential Zone
Total No of Dwellings: 33
Survey date: MONDAY *16/09/13* *Survey Type: MANUAL*

8 LU-03-C-03 BLOCK OF FLATS LOUTH
NICHOLAS STREET
DUNDALK

Edge of Town Centre
Residential Zone
Total No of Dwellings: 20
Survey date: MONDAY *16/09/13* *Survey Type: MANUAL*

LIST OF SITES relevant to selection parameters (Cont.)

9	MG-03-C-01 MALL ROAD MONAGHAN	BLOCK OF FLATS	MONAGHAN

Edge of Town Centre
No Sub Category
Total No of Dwellings: 28

Survey date: FRIDAY *06/09/13* *Survey Type: MANUAL*

This section provides a list of all survey sites and days in the selected set. For each individual survey site, it displays a unique site reference code and site address, the selected trip rate calculation parameter and its value, the day of the week and date of each survey, and whether the survey was a manual classified count or an ATC count.

TRIP RATE for Land Use 03 - RESIDENTIAL/C - FLATS PRIVATELY OWNED
MULTI-MODAL TOTAL VEHICLES
Calculation factor: 1 DWELLS
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	9	44	0.020	9	44	0.159	9	44	0.179
08:00 - 09:00	9	44	0.043	9	44	0.230	9	44	0.273
09:00 - 10:00	9	44	0.073	9	44	0.134	9	44	0.207
10:00 - 11:00	9	44	0.025	9	44	0.066	9	44	0.091
11:00 - 12:00	9	44	0.063	9	44	0.061	9	44	0.124
12:00 - 13:00	9	44	0.081	9	44	0.093	9	44	0.174
13:00 - 14:00	9	44	0.066	9	44	0.058	9	44	0.124
14:00 - 15:00	9	44	0.111	9	44	0.056	9	44	0.167
15:00 - 16:00	9	44	0.096	9	44	0.058	9	44	0.154
16:00 - 17:00	9	44	0.093	9	44	0.063	9	44	0.156
17:00 - 18:00	9	44	0.202	9	44	0.053	9	44	0.255
18:00 - 19:00	9	44	0.194	9	44	0.086	9	44	0.280
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			1.067			1.117			2.184

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

Parameter summary

Trip rate parameter range selected:	20 - 140 (units:)
Survey date date range:	01/01/13 - 28/11/14
Number of weekdays (Monday-Friday):	9
Number of Saturdays:	0
Number of Sundays:	0
Surveys automatically removed from selection:	0
Surveys manually removed from selection:	0

This section displays a quick summary of some of the data filtering selections made by the TRICS® user. The trip rate calculation parameter range of all selected surveys is displayed first, followed by the range of minimum and maximum survey dates selected by the user. Then, the total number of selected weekdays and weekend days in the selected set of surveys are show. Finally, the number of survey days that have been manually removed from the selected set outside of the standard filtering procedure are displayed.

TRIP RATE for Land Use 03 - RESIDENTIAL/C - FLATS PRIVATELY OWNED
MULTI-MODAL CYCLISTS
Calculation factor: 1 DWELLS
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	9	44	0.003	9	44	0.010	9	44	0.013
08:00 - 09:00	9	44	0.008	9	44	0.025	9	44	0.033
09:00 - 10:00	9	44	0.005	9	44	0.005	9	44	0.010
10:00 - 11:00	9	44	0.003	9	44	0.000	9	44	0.003
11:00 - 12:00	9	44	0.000	9	44	0.000	9	44	0.000
12:00 - 13:00	9	44	0.008	9	44	0.000	9	44	0.008
13:00 - 14:00	9	44	0.000	9	44	0.003	9	44	0.003
14:00 - 15:00	9	44	0.000	9	44	0.005	9	44	0.005
15:00 - 16:00	9	44	0.003	9	44	0.003	9	44	0.006
16:00 - 17:00	9	44	0.008	9	44	0.003	9	44	0.011
17:00 - 18:00	9	44	0.005	9	44	0.000	9	44	0.005
18:00 - 19:00	9	44	0.010	9	44	0.005	9	44	0.015
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			0.053			0.059			0.112

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 03 - RESIDENTIAL/C - FLATS PRIVATELY OWNED
MULTI-MODAL VEHICLE OCCUPANTS
Calculation factor: 1 DWELLS
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	9	44	0.020	9	44	0.192	9	44	0.212
08:00 - 09:00	9	44	0.053	9	44	0.306	9	44	0.359
09:00 - 10:00	9	44	0.086	9	44	0.162	9	44	0.248
10:00 - 11:00	9	44	0.040	9	44	0.078	9	44	0.118
11:00 - 12:00	9	44	0.076	9	44	0.071	9	44	0.147
12:00 - 13:00	9	44	0.104	9	44	0.109	9	44	0.213
13:00 - 14:00	9	44	0.093	9	44	0.071	9	44	0.164
14:00 - 15:00	9	44	0.146	9	44	0.063	9	44	0.209
15:00 - 16:00	9	44	0.164	9	44	0.086	9	44	0.250
16:00 - 17:00	9	44	0.116	9	44	0.081	9	44	0.197
17:00 - 18:00	9	44	0.250	9	44	0.076	9	44	0.326
18:00 - 19:00	9	44	0.227	9	44	0.114	9	44	0.341
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			1.375			1.409			2.784

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 03 - RESIDENTIAL/C - FLATS PRIVATELY OWNED
MULTI-MODAL PEDESTRIANS
Calculation factor: 1 DWELLS
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	9	44	0.015	9	44	0.058	9	44	0.073
08:00 - 09:00	9	44	0.035	9	44	0.091	9	44	0.126
09:00 - 10:00	9	44	0.083	9	44	0.093	9	44	0.176
10:00 - 11:00	9	44	0.061	9	44	0.040	9	44	0.101
11:00 - 12:00	9	44	0.051	9	44	0.056	9	44	0.107
12:00 - 13:00	9	44	0.038	9	44	0.076	9	44	0.114
13:00 - 14:00	9	44	0.045	9	44	0.053	9	44	0.098
14:00 - 15:00	9	44	0.076	9	44	0.043	9	44	0.119
15:00 - 16:00	9	44	0.081	9	44	0.028	9	44	0.109
16:00 - 17:00	9	44	0.061	9	44	0.040	9	44	0.101
17:00 - 18:00	9	44	0.093	9	44	0.061	9	44	0.154
18:00 - 19:00	9	44	0.045	9	44	0.045	9	44	0.090
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			0.684			0.684			1.368

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 03 - RESIDENTIAL/C - FLATS PRIVATELY OWNED
MULTI-MODAL PUBLIC TRANSPORT USERS
Calculation factor: 1 DWELLS
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	9	44	0.005	9	44	0.053	9	44	0.058
08:00 - 09:00	9	44	0.008	9	44	0.109	9	44	0.117
09:00 - 10:00	9	44	0.013	9	44	0.038	9	44	0.051
10:00 - 11:00	9	44	0.008	9	44	0.033	9	44	0.041
11:00 - 12:00	9	44	0.005	9	44	0.008	9	44	0.013
12:00 - 13:00	9	44	0.008	9	44	0.015	9	44	0.023
13:00 - 14:00	9	44	0.018	9	44	0.028	9	44	0.046
14:00 - 15:00	9	44	0.013	9	44	0.028	9	44	0.041
15:00 - 16:00	9	44	0.043	9	44	0.020	9	44	0.063
16:00 - 17:00	9	44	0.053	9	44	0.008	9	44	0.061
17:00 - 18:00	9	44	0.068	9	44	0.035	9	44	0.103
18:00 - 19:00	9	44	0.066	9	44	0.061	9	44	0.127
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			0.308			0.436			0.744

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

TRIP RATE for Land Use 03 - RESIDENTIAL/C - FLATS PRIVATELY OWNED
MULTI-MODAL TOTAL PEOPLE
Calculation factor: 1 DWELLS
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	9	44	0.043	9	44	0.313	9	44	0.356
08:00 - 09:00	9	44	0.104	9	44	0.530	9	44	0.634
09:00 - 10:00	9	44	0.187	9	44	0.298	9	44	0.485
10:00 - 11:00	9	44	0.111	9	44	0.152	9	44	0.263
11:00 - 12:00	9	44	0.131	9	44	0.134	9	44	0.265
12:00 - 13:00	9	44	0.157	9	44	0.199	9	44	0.356
13:00 - 14:00	9	44	0.157	9	44	0.154	9	44	0.311
14:00 - 15:00	9	44	0.235	9	44	0.139	9	44	0.374
15:00 - 16:00	9	44	0.290	9	44	0.136	9	44	0.426
16:00 - 17:00	9	44	0.237	9	44	0.131	9	44	0.368
17:00 - 18:00	9	44	0.417	9	44	0.172	9	44	0.589
18:00 - 19:00	9	44	0.348	9	44	0.225	9	44	0.573
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			2.417			2.583			5.000

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

Census 2016: Population aged 5 years and over by means of travel to work, school or college

Means of Travel	Work	School or College	Total
On foot	1,305	2,091	3,396
Bicycle	1,414	761	2,175
Bus, minibus or coach	810	847	1,657
Train, DART or LUAS	3,235	707	3,942
Motorcycle or scooter	150	7	157
Car driver	7,996	343	8,339
Car passenger	360	2,596	2,956
Van	438	14	452
Other (incl. lorry)	27	1	28
Work mainly at or from home	575	9	584
Not stated	399	152	551
Total	16,709	7,528	24,237

APPENDIX C

Letters of Support from Go Car and Yuko

T: 00353 1691 8816

E: support@yuko.toyota.ie

W: Www.yuko.ie

19th January 2022

Dundrum Village SHD. Dundrum Retail LP, Pembroke District, Dundrum Town Centre, Dublin 14.

To Whom It May Concern,

This is a letter to confirm that Yuko Toyota Car Club working in partnership with TJ O'Connor & Associates intends to provide shared car club vehicles at Dundrum Village SHD, Dundrum Town Centre, Dublin 14 subject to planning.

Toyota Motor Corporation chose Dublin as its global launch city in 2016 starting with 25 vehicles. Since then, the car sharing service has grown to 10,000 members in Dublin and now has 230 vehicles with ambitious plans to expand this service up to at least 2024.

Toyota has recently launched a new brand, KINTO, dedicated to offering mobility services to users across Europe. Yuko Ireland will rebrand to KINTO in the near future.

Dr Johan van Zyl, President and CEO of Toyota Motor Europe, said: "KINTO is part of our strategy to grow our total European business. In markets where it can be viable and sustainable, adding mobility services to our traditional business model will allow us to respond to new customer needs and support cities and regions' emerging mobility requirements."

The initial services that will be introduced in some European markets include:

1. KINTO Share: a car sharing service based on a large hybrid vehicle line-up available via a self-service concept, without the running costs. Toyota's existing car sharing service Yuko which is already operational in several cities in Europe (Dublin; Venice; Copenhagen; and Madrid), will be re-branded under KINTO.
2. KINTO Join: Carpooling, connecting employees who wish to share their daily commute to work, benefitting both employees and companies who can reduce their CO2 footprint.

Other services are being evaluated, such as ride-hailing and a multi-modal app.

The Department of Housing & Planning Design Standards for New Apartments - Guidelines for Planning Authorities 2018 outline: "For all types of location, where it is sought to eliminate or reduce car parking provision, it is necessary to ensure... provision is also to be made for alternative mobility solutions including facilities for car sharing club vehicles." Each Yuko self-charging hybrid has the potential to replace the journeys of up to 20- 30 private cars*. *Boston Consulting report 2017

Yuko Toyota Car Club members sign up online and can book cars via the mobile app. Our YUKO fleet will always avail of the most advanced technology to reduce or eliminate our carbon footprint. Any cars supplied to the Dundrum Village development will be hybrid or fully electric.

Currently our fleet is running at 62% zero emissions*. *Tested by UCD study 2019.

Yuko is ideal for residents who only need occasional access to a car. We would anticipate that the Yuko Cars available at Dundrum would supplement the public transport / cycling and walking options available to this community.

For any queries, please do not hesitate to contact me.

Kind regards,

Shane Higgins
Operations Manager
Toyota Ireland

Dundrum Retail LP
Pembroke District
Dundrum Town Centre
Dublin 14
FAO Rob Bloomer

21/01/2022

To Whom It May Concern,

This is a letter to confirm that GoCar intends to provide a service of up to 11 no. shared car club vehicles throughout the new Strategic Housing Development (SHD) in Dundrum Village. GoCar representatives have discussed the project with representatives of TJ O'Connor & Associates, who are the Civil and Structural Engineers for the development and are excited to provide a car sharing service at this location.

It is understood that the vehicles at this development will be positioned in a number of areas to allow for ease of access for all residents. While it is the intention for most of these vehicles to be used exclusively by the residents of the development, GoCar may agree with the eventual managers of the site to allow some vehicles to be open for access to other GoCar members nearby. This will depend on usership levels and will be reviewed at various periods to ensure adequate supply for the residents of the development.

GoCar is Ireland's leading car sharing service with over 60,000 members and over 800 cars and vans on fleet.
Each GoCar which is placed in a community has the potential to replace the journeys of up to 15 private cars.
The Department of Housing's Design Standards for New Apartments - Guidelines for Planning Authorities 2018 outline:
"For all types of location, where it is sought to eliminate or reduce car parking provision, it is necessary to ensure... provision is also to be made for alternative mobility solutions including facilities for car sharing club vehicles."

Carsharing is a sustainable service. By allowing multiple people to use the same vehicle at different times, car sharing reduces car ownership, car dependency, congestion, noise, and air pollution. It frees up land which would otherwise be used for additional parking spaces. Most GoCar users only use a car when necessary, and walk and use public transport more often than car owners.

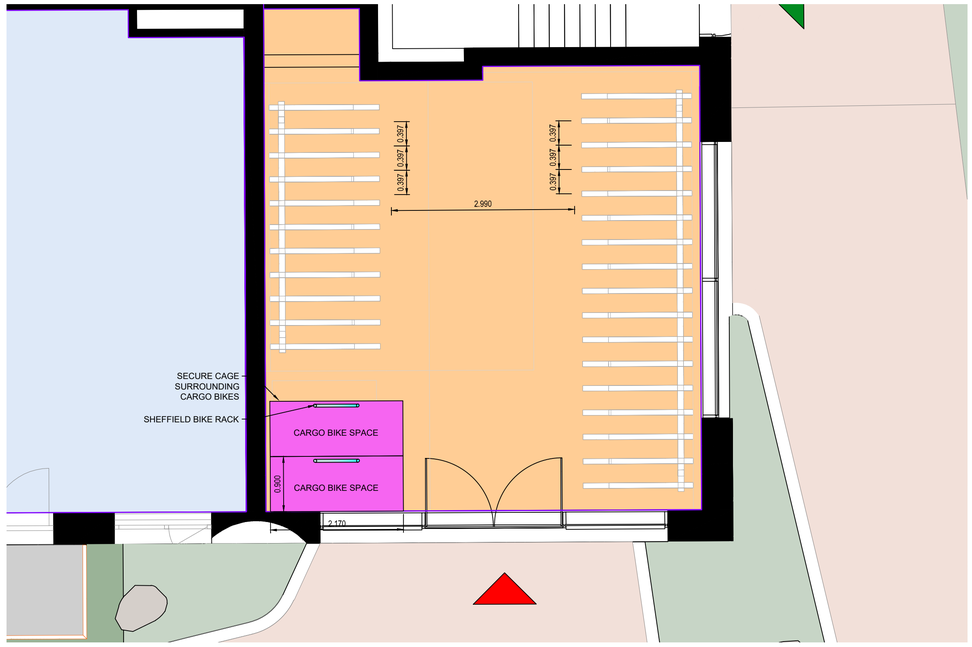
By having GoCar car sharing vehicles in a development such as this, the residents therein will have access to pay-asyou-go driving, in close proximity to their homes, which will increase usership of the service.

I trust that this information is satisfactory. For any queries, please do not hesitate to contact me.

Rob Montgomery
Revenue and Growth Manager
GoCar Carsharing Ltd
Mobile: 086 609 7096
E: robert.montgomery@gocar.ie

APPENDIX D

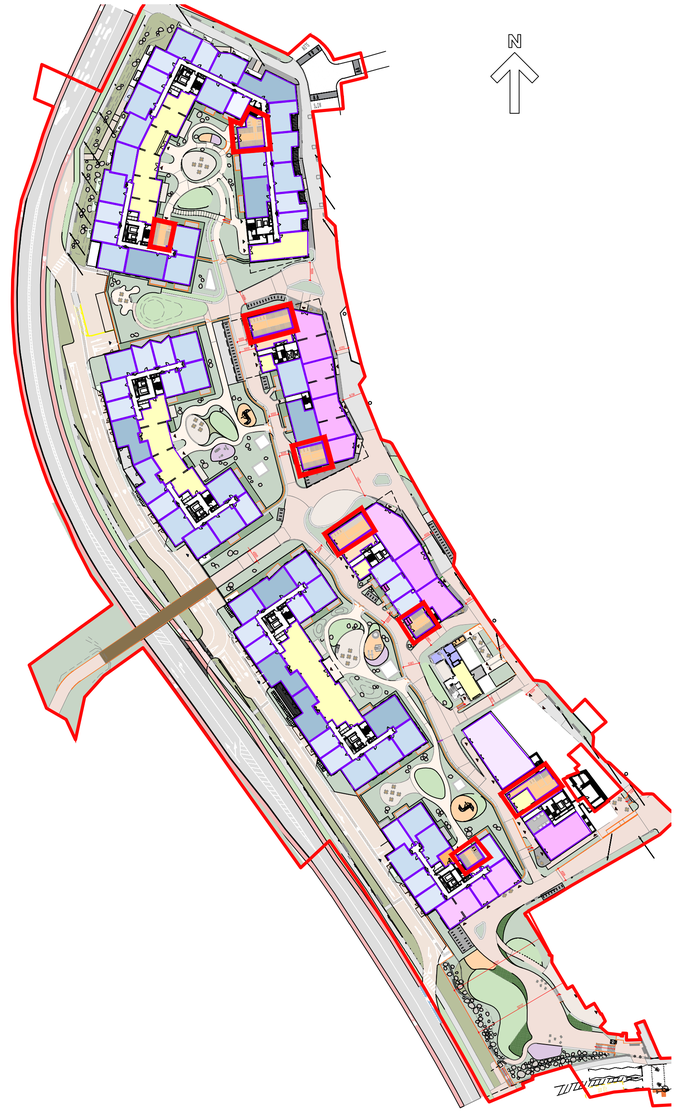
Cycle Parking Drawings



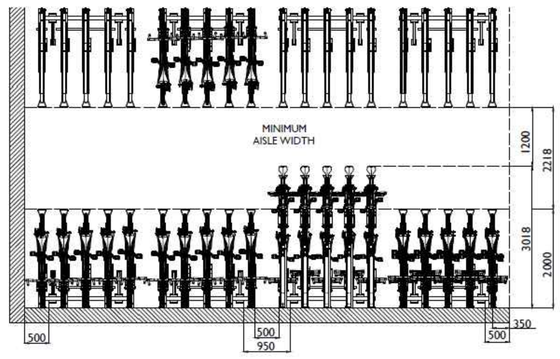
1 - TYPICAL BICYCLE RACK PLAN
SCALE 1:50

CYCLE PARKING PROVISION & BREAKDOWN:							
	PODIUM LEVEL - INTERNAL		LOWER GROUND FLOOR - INTERNAL			MEZZANINE LEVEL:	TOTAL INTERNAL SECURE CYCLE STORAGE PER ZONE:
	TWO-TIER:	SHEFFIELD:	TWO-TIER:	SHEFFIELD:	CARGO:	TWO-TIER:	
ZONE 1	134	12	130	68	3	178	525
ZONE 2	166	16	232	10	1		425
ZONE 3	160	12	198	18	1		389
ZONE 4	102	8	130	6	1		247
TOTALS:	562	48	690	102	6	178	1586
	Podium Level - Internal Total = 610 Cycle Spaces		Lower Ground Floor - Internal Total = 798 Secure Cycle Storage Spaces			Mezzanine Total = 178 Cycle Storage Spaces	

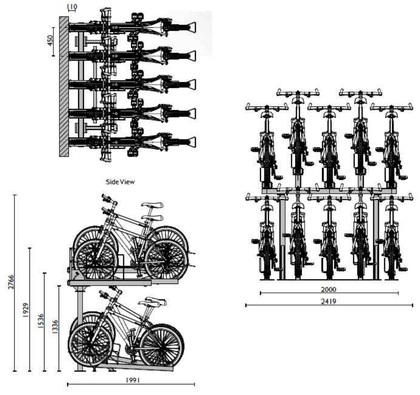
NOTE:
1,750 TOTAL CYCLE SPACES ALLOWED FOR, BREAKDOWN AS FOLLOWS:
1 SPACE PER BEDROOM = 1,508 SECURE INTERNAL SPACES (PROVIDED ON BOTH TWO-TIER AND SHEFFIELD TYPE RACKS)
242 VISITOR SPACES ALLOWED FOR, BREAKDOWN AS FOLLOWS:
78 NO. VISITOR CYCLE SPACES ALLOWED FOR INTERNALLY - ACCESSED WITH FOB FROM CONCIERGE.
REFER TO LANDSCAPE DRAWINGS FOR FURTHER DETAILS OF 164 EXTERNAL VISITOR SPACES PROVIDED ON 82 NO. SHEFFIELD TYPE COVERED BIKE RACKS."



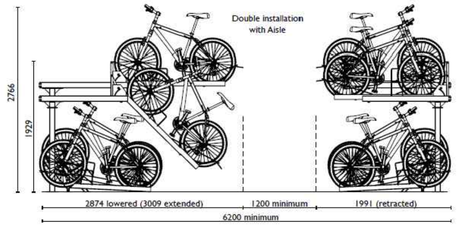
KEY PLAN
SCALE 1:1000



3 - STANDARD RACK PLAN
NTS



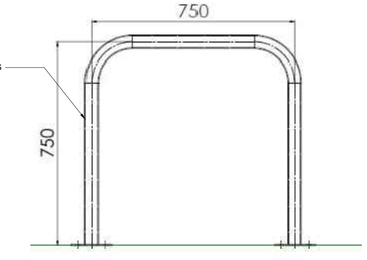
4 - STANDARD RACK
NTS



2 - STANDARD RACK SECTION
NTS

5 - CARGO BIKE
NTS

REQUIRES 8No. M10 RAWL EXPANDING SECURITY BOLTS PER BIKE STAND



6 - SHEFFIELD BIKE RACK
NTS

NOTE:
DRAWING TO BE READ IN CONJUNCTION WITH DRAWING 16031-TJOC-00-XX-DR-C-1022

REV	SUIT	DESCRIPTION	DATE
C02	AP	ISSUED FOR PLANNING	25.03.2022
C01	AP	ISSUED FOR PLANNING	30.09.2021

DRAWING STATUS: ISSUED FOR PLANNING

CHECKED BY:	REVIEWED BY:	APPROVED BY:
HH	KF	TG

TJ O'CONNOR & ASSOCIATES
CONSULTING ENGINEERS
CORRIG HOUSE, CORRIG ROAD, SANDYFORD, DUBLIN 18.
Tel: 01-295 2321 Fax: 01-295 4541 Email: tjoc@tjoc.ie Web: www.tjoc.ie

PROJECT: Dundrum Village - Strategic Housing Development

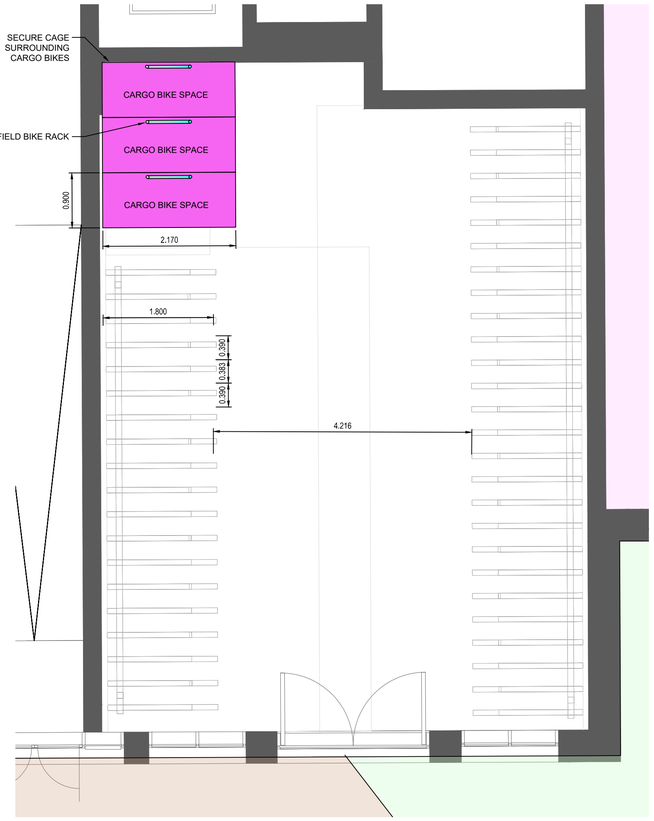
CLIENT: Dundrum Retail GP DAC (acting for and on behalf of Dundrum Retail Limited Partnership)

DRAWING TITLE: Typical Cycle Parking - Podium Level

SCALE: As Shown (A1)

PROJECT - ORIGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER
16031-TJOC-00-XX-DR-C-1020

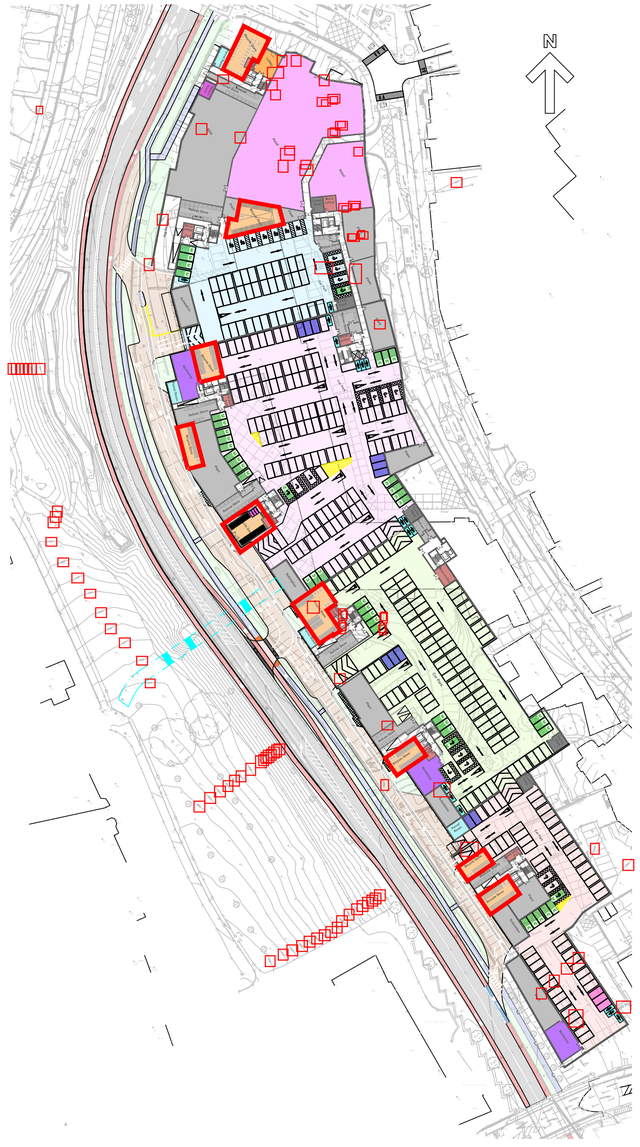
REV: C02



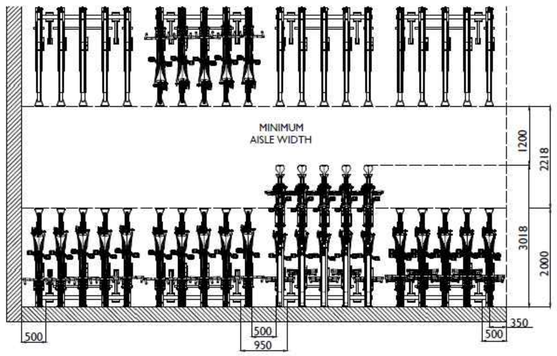
1 - TYPICAL BICYCLE RACK PLAN
SCALE 1:50

CYCLE PARKING PROVISION & BREAKDOWN:							
	PODIUM LEVEL - INTERNAL		LOWER GROUND FLOOR - INTERNAL			MEZZANINE LEVEL:	TOTAL INTERNAL SECURE CYCLE STORAGE PER ZONE:
	TWO-TIER:	SHEFFIELD:	TWO-TIER:	SHEFFIELD:	CARGO:	TWO-TIER:	
ZONE 1	134	12	130	68	3	178	525
ZONE 2	166	16	232	10	1		425
ZONE 3	160	12	198	18	1		389
ZONE 4	102	8	130	6	1		247
TOTALS:	562	48	690	102	6	178	1586
	Podium Level - Internal Total = 610 Cycle Spaces		Lower Ground Floor - Internal Total = 798 Secure Cycle Storage Spaces			Mezzanine Total = 178 Cycle Storage Spaces	

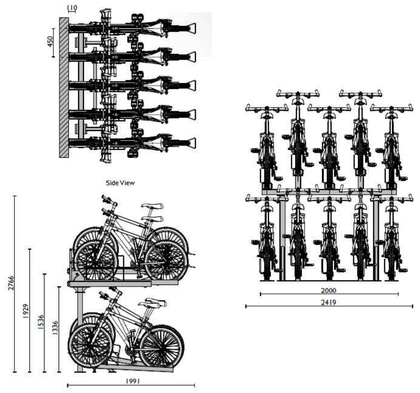
NOTE:
1,750 TOTAL CYCLE SPACES ALLOWED FOR, BREAKDOWN AS FOLLOWS:
1 SPACE PER BEDROOM = 1,508 SECURE INTERNAL SPACES (PROVIDED ON BOTH TWO-TIER AND SHEFFIELD TYPE RACKS)
242 VISITOR SPACES ALLOWED FOR, BREAKDOWN AS FOLLOWS:
78 NO. VISITOR CYCLE SPACES ALLOWED FOR INTERNALLY - ACCESSED WITH FOB FROM CONCIERGE.
REFER TO LANDSCAPE DRAWINGS FOR FURTHER DETAILS OF 164 EXTERNAL VISITOR SPACES PROVIDED ON 82 NO. SHEFFIELD TYPE COVERED BIKE RACKS."



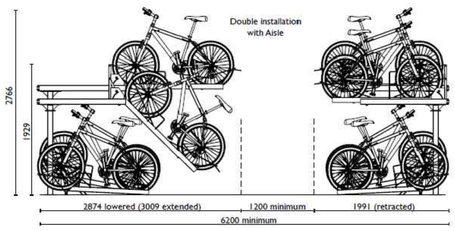
KEY PLAN
SCALE 1:1000



3 - STANDARD RACK PLAN
NTS



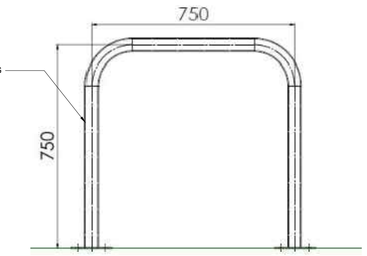
4 - STANDARD RACK
NTS



2 - STANDARD RACK SECTION
NTS

5 - CARGO BIKE
NTS

REQUIRES 8No. M10 RAWL EXPANDING SECURITY BOLTS PER BIKE STAND



6 - SHEFFIELD BIKE RACK
NTS

NOTE:
DRAWING TO BE READ IN CONJUNCTION WITH DRAWING 16031-TJOC-00-XX-DR-C-1022

REV	SUIT	DESCRIPTION	DATE
C02	AP	ISSUED FOR PLANNING	25.03.2022
C01	AP	ISSUED FOR PLANNING	30.09.2021

DRAWING STATUS: ISSUED FOR PLANNING

CHECKED BY: HH | REVIEWED BY: KF | APPROVED BY: TG

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Tel: 01-295 2321 Fax: 01-295 4541 Email: tjoc@tjoc.ie Web: www.tjoc.ie

PROJECT: Dundrum Village - Strategic Housing Development

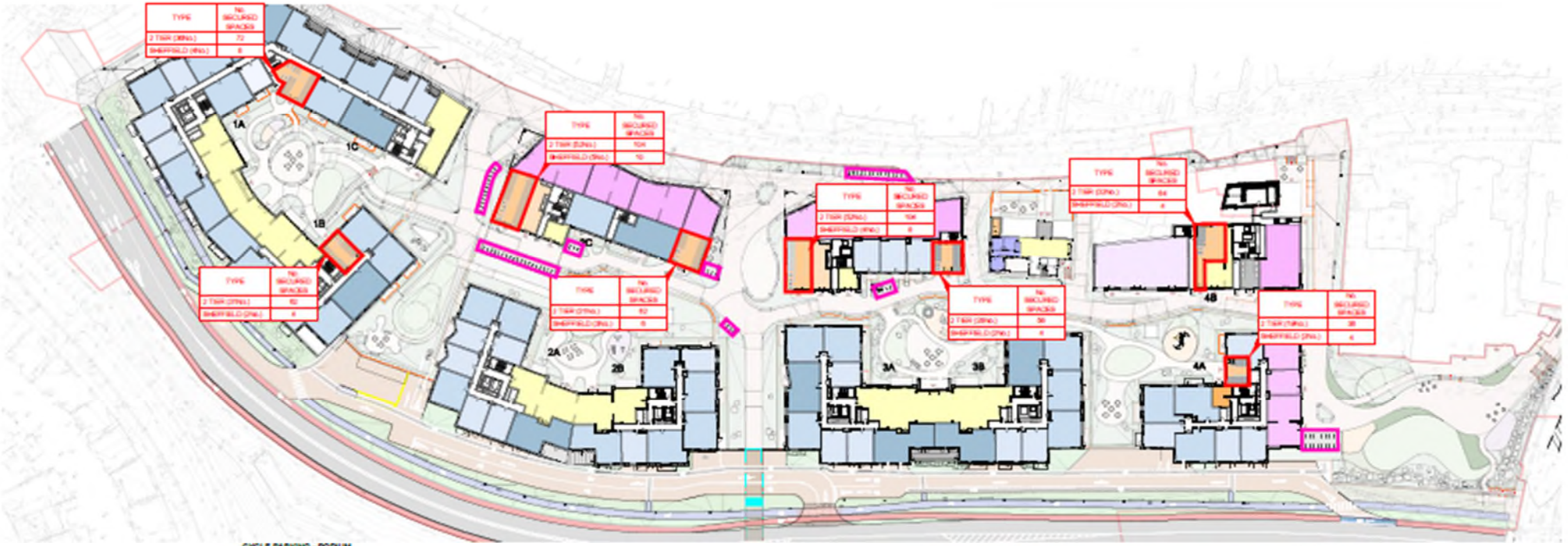
CLIENT: Dundrum Retail GP DAC (acting for and on behalf of Dundrum Retail Limited Partnership)

DRAWING TITLE: Typical Cycle Parking - Lower Ground Floor Layout

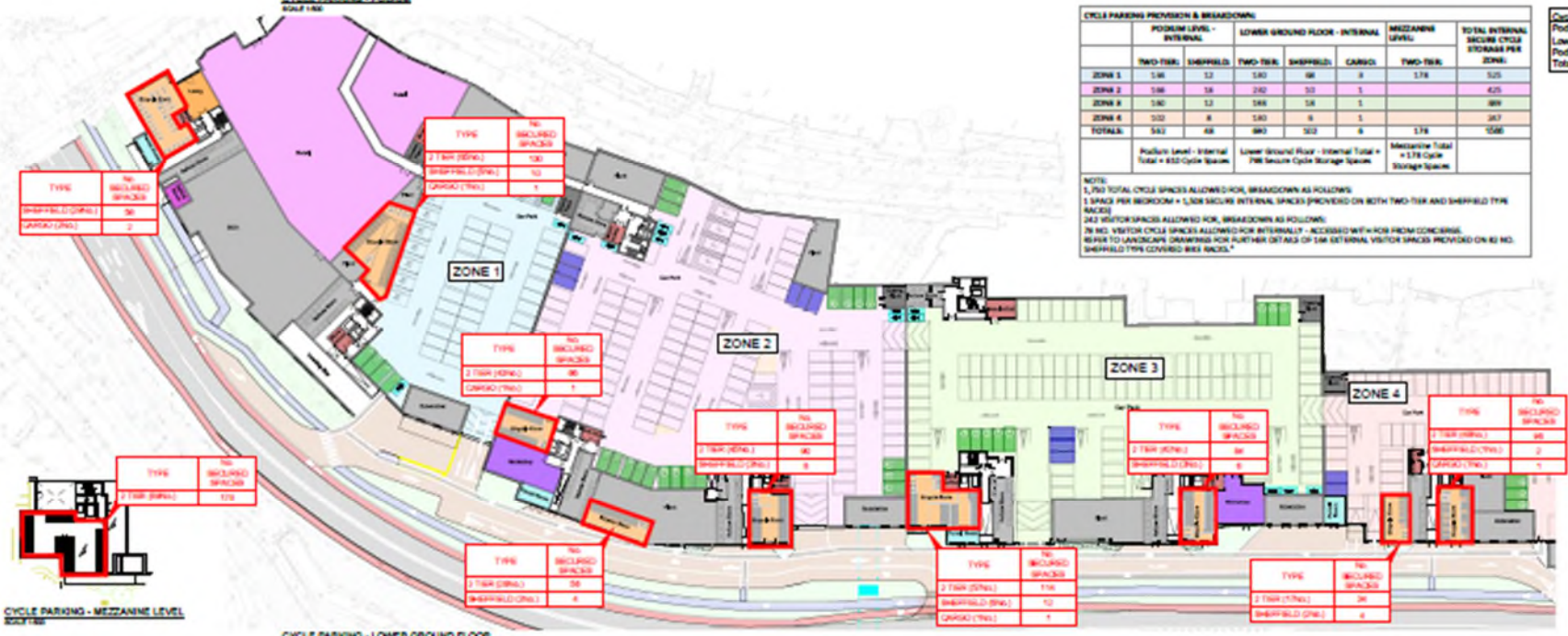
SCALE: As Shown (A1)

PROJECT - ORIGINATOR - VOLUME - LOCATION - TYPE - ROLE - NUMBER
16031-TJOC-00-XX-DR-C-1021

REV: C02



CYCLE PARKING - PODIUM



CYCLE PARKING - MEZZANINE LEVEL

CYCLE PARKING - LOWER GROUND FLOOR

CYCLE PARKING PROVISION & BREAKDOWN:

	PODIUM LEVEL - INTERNAL		LOWER GROUND FLOOR - INTERNAL			MEZZANINE LEVEL	TOTAL INTERNAL SECURE CYCLE STORAGE PER ZONE:
	TWO-TIER:	SHEFFIELD:	TWO-TIER:	SHEFFIELD:	CARGO:	TWO-TIER:	
ZONE 1	146	12	140	06	0	178	525
ZONE 2	166	16	242	10	1		425
ZONE 3	160	12	166	16	1		369
ZONE 4	102	8	140	6	1		267
TOTALS:	562	48	680	102	6	178	1586
	Podium Level - Internal Total = 610 Cycle Spaces		Lower Ground Floor - Internal Total = 788 Secure Cycle Storage Spaces			Mezzanine Total = 178 Cycle Storage Spaces	

NOTE:
1,750 TOTAL CYCLE SPACES ALLOWED FOR, BREAKDOWN AS FOLLOWS:
1 SPACE PER BEDROOM = 1,586 SECURE INTERNAL SPACES PROVIDED ON BOTH TWO-TIER AND SHEFFIELD TYPE RACKS)
242 VISITOR SPACES ALLOWED FOR, BREAKDOWN AS FOLLOWS:
76 NO. VISITOR CYCLE SPACES ALLOWED FOR INTERNALLY - ACCESSED WITH FOB FROM CONCIERGE.
45 PER TO LANDSCAPE DRAWINGS FOR FURTHER DETAILS OF 166 EXTERNAL VISITOR SPACES PROVIDED ON 82 NO. SHEFFIELD TYPE COVERED BIKE RACKS.*

Cycle Spaces:	
Podium (Internal) :	610
Lower Ground Floor (Internal) :	976
Podium (External Visitor):	164
Total:	1,750

GD	AP	ISSUED FOR PLANNING	24.09.2020
GH	AP	ISSUED FOR PLANNING	30.06.2021
REV.	BUILT	DESCRIPTION	DATE

DRAWING STATUS: ISSUED FOR PLANNING

DRAWN BY:	CHECKED BY:	APPROVED BY:
HH	AP	TG

TJ O'CONNOR & PARTNERS
CONSULTING ENGINEERS
CORRIG HOUSE, CORRIG ROAD, SANDYFORD, DUBLIN 18
Tel: 01-295 2321 Fax: 01-295 4547 Email: tjoc@tjoc.ie Web: www.tjoc.ie

PROJECT: Dundrum Village - Strategic Housing Development

CLIENT: Dundrum Retail GP DAC (acting for and on behalf of Dundrum Retail Limited Partnership)

DRAWING TITLE: Typical Cycle Parking - Overall

SCALE: As Shown (A1)

16031-TJOC-00-XX-DR-C-1022 GD2

APPENDIX E

Memo containing DLRCC Stage 2 Comments and Design Team Response

Memo Ref: 16031-TJOC-ZZ-XX-MO-Z-7044

MEMO

To:	Dundrum Village SHD - Design Team
From:	TJOC – (Thomas Griffin & Kate FitzGerald) & SYSTRA (Alan DeVenny)
Cc:	
Date:	21st February 2021
Project:	16031 Dundrum Village SHD
Subject:	Memo following DLRCoCo Response to ABP-311-533-21

Notes:

The following memo has been prepared in response to the opinion raised by DLRCoCo to the Dundrum Village SHD Pre-Planning Application.

The memo should be read in conjunction with the Opinion, ABP-311-533-21-Repsonse to Pre-Planning Submission.

Memo Prepared by Alan deVenny – Systra & Thomas Griffin & Kate Fitzgerald - TJOC

Topic	Issue Raised	Paragraph / Page Number	Systra / TJOC Response
Car Parking	Transport Section satisfied with ratio of 0.38 but planning section have concerns over this level of residential provision and have asked for the ratio to be reviewed in comparison to car park ownership levels.	Page 27-28, Para 2.2.12	The comparison with ownership levels in the area is not a realistic comparison. The ownership levels are based on general residential in the area and not the product that is coming forward here. A final parking ration of 0.361 is proposed which is based on: 1. Proximity to Luas & Bus Interchange 2. Also within walking distance of amenities of Town Centre 3. Club-Car provision 4. 3,500 car parking spaces available to cater for overspill 5. Well established parking controls in local residential estates 6. Good pedestrian and cycling infrastructure network The planning application is supported by a Transport Assessment which explains and justifies the final parking ratio.
Car Parking	56 spaces agreed by transport section and planning section	Page 28	Noted – final arrangements indicate 55 spaces.
Cycle Parking	Cycle provision needs to be in accordance with the S28 Apartment Guidelines (1 space per unit plus 0.5 spaces per unit for visitors)	Page 28 Section 2.2.12	There appears to be no recognition of the development scale and how the standards (if applied strictly) to the visitor element will result in a significant over-provision of spaces. It

			is considered that DLRCC should recognise that the direct linkage to high quality public transport options means that a reduction in visitor cycle parking can be realized at the proposed development. In light of the comments received, the cycle parking proposals have been updated to provide 1 space per bedroom in accordance with the Apartment Guidelines. This is a provision of 1,508 spaces. The visitor parking has been upped to 242 spaces giving an overall provision of 1,750 spaces.
Cycle Parking	Details required for quantity and quality of cycle parking	Page 29, section 2.2.12	Noted. The final submission includes details of the parking locations, access routes and quality of the facilities. The quantity of double stacked systems has been reduced and additional Sheffield type bike stands have been added. The Transport Assessment includes full details of cycle parking proposals.
Multi-modal Transport Interchange	Work is currently underway by the NTA for the construction of an interchange north of the subject site. This could result in changes to traffic patterns and could give rise to the need for bus stops and other infrastructure. The applicant is asked to liaise with the NTA in this regard to ensure that the development does not hinder NTA plans. The applicant may also wish to consult with the NTA on the current and future capacity of the LUAS Green Line.	Page 29, Section 2.2.12	Noted – A meeting has been held with the NTA & DLRCC to discuss the BusConnects proposals adjacent to the site. The design team has looked at ways of how the potential NTA infrastructure requirements can be accommodated once the development is in place. The discussions are on-going but the applicant is confident that the NTA requirements can be accommodated in the future with the development in place and is committed to continuing the dialogue with the NTA and DLRCC.
Bus Stops	A bus stop may be required on the bypass to the south of its junction with Main Street and possibly a re-design of slip roads and other features at the Taney Cross Junction.	Page 40	Taney changes should have no impact on the scheme. Bus stop should be able to be accommodated south of Main Street junction and to the north of our first access junction. An indicative drawing has been provided to the NTA to demonstrate how this may be achieved.
Vehicular Access / Service Road	Cyclists and pedestrian conflicts on the proposed bridge on entry points along the route. More details are needed on the proposed crossing from shopping centre to TC Phase 3, so that the interface between existing and proposed development is clear. Proposed footpaths around the development, especially on Dundrum Bypass seems not to	Page 41 Page 41 Page 41	Lining scheme can be used to reduce conflicts. Noted – additional details have been added and the updated preliminary design is included with the Transport Assessment. 2m Footways have been provided on Main Street and Dundrum bypass.

	comply with DMURS requirements, with the minimum width of 1.8m preferably 2m. Cycle safety – Conflict of proposed entrance slip lane and cycle lane as shown in drawing N0. 109025-I-GA-00. The applicant is advised to revise layout reducing the length of conflict between vehicles and cyclists. Option may include realignment of cycle lane to follow the alignment of the footpath and creating a formalised crossing point for both pedestrians and cyclists at the entrance of the shared area. Access / permeability from bypass level to the podium level and Dundrum Main Street. Applicant shall explore options to allow some permeability for pedestrians at lower level up to podium level. Viability of proposed connection between basement car parks under Ballinteer Road / bridge Proposed Loading Bays onto Main Street are noted. Adequate signage to be defined and agreed with DLR Parking Section	Page 41 Page 42 Page 42 Page 42	The cycle crossing detail has been revised and the updated design drawing is included as part of the scheme drawings with further details provided within the Transport Assessment. The development proposals have been updated to include a link up from bypass level to the podium level, Main Street and Ballinteer Bridge. A drawing has been developed for the link demonstrating how the existing connection will be maintained and used as a relief valve for the new residential car park Noted. Adequate signage to be agreed with DLR Parking Section and added to the Loading Bay drawings accordingly.
Quality Audit	The applicant is requested to submit a detailed Quality Audit (which shall include a Road Safety Audit, Access Audit, Cycle Audit and a Walking Audit) to demonstrate that appropriate consideration has been given to all relevant aspects of the development in accordance with the Design Manual for Urban Roads & Streets (DMURS)	Page 42	A Stage 1 Quality Audit (including a road safety audit) has now been undertaken by an independent auditor. A copy of the audit and the designer's response to the audit comments is included as an appendix to the Transport Assessment.
Taking in Charge	"The proposed areas to be taken in charge, as shown in the submitted drawing are somewhat confusing, overlapping with proposed works on lands already owned by the Council"	Page 42	Letters of Consent Noted – in progress. Taken in Charge Drawing has been reviewed and updated in line with all comments. New submitted drawings are at a larger scale to identify each of the areas around the site and the proposed taken-in-charge boundary lines. Landscaping paving layouts have been adjusted to collate with 'Taken in Charge' line.
DMURS	Applicant should highlight the measures to create a pedestrian safe environment, including	Page 43	Noted – A new pedestrian route has been included along the service road

	what measures provided along the proposed internal access road to create a 30km/hr zone, in accordance with DMURS.		along with crossing points to ensure low speeds are maintained.
Car Park Management Plan	The applicant is requested to submit a "Car Park Management Strategy" with proposed measures as follows: 1. Provision of safe, clean facilities for residents, incorporating safe access, security and signage. 2. Efficient use of allocated spaces and availability all hours and days of years. 3. Measures to avoid illegal parking and enforcement. 4. Measures to avoid illegal parking in the vicinity of the development. 5. Monitoring and evaluation, including the need to expand provision of EV charging points.	Page 44	A car park management plan will be developed and provided in advance of the development being occupied. This will be undertaken with the input of the management company.
Car Sharing	Applicant to state how many spaces will be allocated to car sharing and should follow up with letter of intent from car sharing companies.	Page 45	A total of 11 car share spaces have been included in the scheme proposals (see Transport Assessment for more details). Letters of intent provided by GoCar and Yuko which are appended to the Transport Assessment.
Visitor Spaces	"The Applicant will be requested to clarify the number and location of proposed visitor spaces"	Page 45	A small number of visitor spaces will be provided within the overall development provision and allocated to visitors via a booking system. Town Centre car park can be promoted for overspill to cater for additional visitor demand where there are approximately 3,500 spaces available within walking distance of the proposed development.
Cycle Parking	"The Applicant will be requested to submit revised drawings which clearly demonstrate a level of provision of cycle parking in accordance with DHLG Design Standards for New Apartments – December 2020 : Section 4.17	Page 46 and Page 50	In light of the comments received, the cycle parking proposals have been updated to provide 1 space per bedroom in accordance with the Apartment Guidelines. This is a provision of 1,508 spaces. The visitor parking has been upped to 242 spaces giving an overall provision of 1,750 spaces. The extent of double stacking systems has been reviewed and additional cargo bike spaces have been included on the revised scheme drawings. Provision has been made for electric bicycles, bike share facilities, cargo bike parking all in accordance with standards.

Motorbike Spaces	DLRCC would welcome an increase to the current provision of 9 spaces	Page 46	Noted - Section 8.2.4.8 states "It is an objective of the Council to require developments to provide motorcycle parking spaces at a minimum of four or more spaces per 100 car parking spaces. Following review, the provision has been increased to 17 spaces.
EV Charging Spaces	"The Applicant shall submit revised drawings and details which clearly demonstrate the provision of EV charging points in accordance with Section 8.2.4.12 of the current DLRCC County Development Plan 2016 – 2022	Page 50	A total of 43 spaces will be designated as EV charging spaces. Future ducting will be provided to allow 100% provision in the future. 4 no. of the disabled spaces will be EV charge spaces. These form part of the overall 43 EV charging spaces.
Car Parking Bays	"The Applicant shall submit a revised layout drawing showing the location, and numbering of all relevant designated parking (disable, EV, visitor, car sharing etc)	Page 50	Noted – Revised drawings now include dimensions, head height and how the proposed parking bays are designated.
Underground Car Parks	"Provision shall be made for an emergency access to underground car parks and, where more that 300 parking spaces are being provided, a second vehicular access point to an underground car park is required. To prevent flooding, drainage measures will be required to prevent run off from the public road into an underground car park.	Page 51	Noted – Zone 1 has 55 no. spaces and is separate from Zone 2,3,4 (Less than 300 total.) Zone 3 and 4 are linked also which provide a second access point to each zone. Further details of the below ground compensatory flood storage are provided with the Planning Application submission.
Construction Management Plan	The Applicant shall submit a detailed CMP indicating measures dealing with; "Traffic Management Plan, including vehicular access to the site in particular to avoid conflict between construction activities and public road network. How it will be intended to avoid conflict between construction activities and pedestrian movements Staff car parking during Construction Proposed measures to eliminate nuisance caused by noise, dust, proposed working hours and measures to clean public roads / gully's in the vicinity of the site and continuing replacement of roads line markings resulting therefrom etc	Page 51	All items noted and have been covered in the submitted Construction Management Plan.

APPENDIX F

Quality Audit and Designer's Response

2022

Quality Audit Report

Prepared by: L. Donadel

Engineering a Sustainable Future
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o: +353 1 5242060 | e: info@ors.ie | w: www.ors.ie

Quality Audit Report

Proposed Dundrum Village SHD, Dundrum Town Centre, Co. Dublin

Document Control Sheet

Client:	Dundrum Retail LP
Document No:	211448-ORS-XX-XX-RP-7d-001
Date:	31/01/2022

Revision	Status	Author:	Reviewed by:	Approved By:	Issue Date
P01	S2	LD	AP	DMcC	03/02/2022

Contents

1 Introduction

This report outlines the findings of a Quality Audit carried out with respect to the proposed Dundrum Village Strategic Housing Development, Dundrum Town Centre, Co. Dublin.

The audit team carried out a site visit on Monday the 10th of January 2022 in order to identify elements within the road environment which could impact the accessibility and mobility of road users as well as safety issues observed in the proposed scheme.

The audit team comprised of the following people:

Team Leader:
Adam Price BEng (Hons), CEng, MIEI

Team Member:
David McCormack BEng (Hons), Dip Eng, CEng, MIEI

Team Member**:**
Johannes de Klerk BEng, MIEI

Team Observer:
Laila Donadel BEng (Hons)

During the site visit, the weather was dry and overcast. The road surface was wet, and the traffic levels were noted to be moderate but consistent across the audit period.

The audit team reviewed the following drawings and documents provided by BDP, NMP, GRID architects, TJ O'Connor & Associates Systra:

(1) DVSHD - Drawing Schedule + Public Lighting Drawing
(2) DVSHD - Public Lighting Design Report
(3) DUNDRUM SHD STAGE III LANDSCAPE PLANNING DRAWINGS DRAFT
(4) DVSHD - Landscape Design Statement
(5) DND_NMP_ZZ_GF_M3_LA_00
(6) DND_NMP_ZZ_GF_M3_LA_00_Trees
(7) 16031-TJOC-00-XX-DR-C-1010_Prop_LGF
(8) Access Drawings (Rev C)-GA-002
(9) Access Drawings (Rev C)-GA-003
(10) Access Drawings (Rev C)-GA-004
(11) Access Drawings (Rev C)-GA-005
(12) Access Drawings (Rev C)-GA-006
(13) Access Drawings (Rev C)-SPA-001
(14) Access Drawings (Rev C)-SPA-002
(15) Access Drawings (Rev C)-SPA-003
(16) Access Drawings (Rev C)-SPA-004
(17) Crossing Drawings (Rev C)-PC-001
(18) Crossing Drawings (Rev C)-PC-002
(19) 16031-TJOC-00-XX-DR-C-1010_Prop_LGF
(20) 16031-TJOC-00-XX-DR-C-1069

(21) 16031-TJOC-00-XX-DR-C-1082
(22) 16031-TJOC-00-XX-DR-C-1083
(23) 16031-TJOC-00-XX-DR-C-1022_Cycle_parking_Overal
(24) 16031-TJOC-00-XX-DR-C-1020_Cycle_parking_Podium
(25) 16031-TJOC-00-XX-DR-C-1021_Cycle_parking.

Documents/Information not supplied:

(A) Speed Count Data
(B) Collisions Data
(C) Traffic Count Data

The terms of reference/procedure for the Audit were as per the relevant sections of **DMURS (Design Manual for Urban Roads and Streets)** and **Transport Infrastructure Ireland Road Safety Audit Standard *GE-STY-01024 (Dec 2017)*.** The audit examined only those issues within the design relating to the road safety implications and accessibility of the scheme and has therefore not examined or verified the compliance of the design in any other criteria. The Quality Audit should not be treated as a design check.

The problems identified and described in this report are considered by the Audit Team to require action to improve the safety of the scheme and to improve mobility.

All comments, references and recommendations in this audit are in respect of the review of information supplied by BDP; NMP; GRID architects; TJ O'Connor & Associates; Systra and subsequent site visit by the audit team.

2 Description of the Proposed Development

The proposed Dundrum Village SHD will be located in Dundrum, a residential suburb of Dublin. The site is bounded by Main Street and Dundrum Bypass on the western and eastern boundaries and will be accessed off the Dundrum Bypass. The site currently comprises the Dundrum Shopping Centre, as shown in **Figure 2.1** below.

The proposed Strategic Housing Development will comprise a total 92,207 sq.m development in a site of *circa* 2.62 ha. The proposal will consist of 7No. blocks raging between 9-16 stories over basement and car park areas with 373No. car parking spaces. The proposal provides 884No. dwellings, a creche and commercial spaces, several pedestrian accesses with dropped kerbs and tactile paving along Main Street and Ballinteer Rd, vehicular access off Dundrum Bypass, 1750No. cycle parking spaces, 17No. motorcycle parking spaces, footpaths, cycle lanes, communal spaces, public open spaces, landscaped areas, and all associated site works. **Figure 2.2** overleaf shows the proposed site plan.

The speed limit in the surrounding road network is 50km/h.

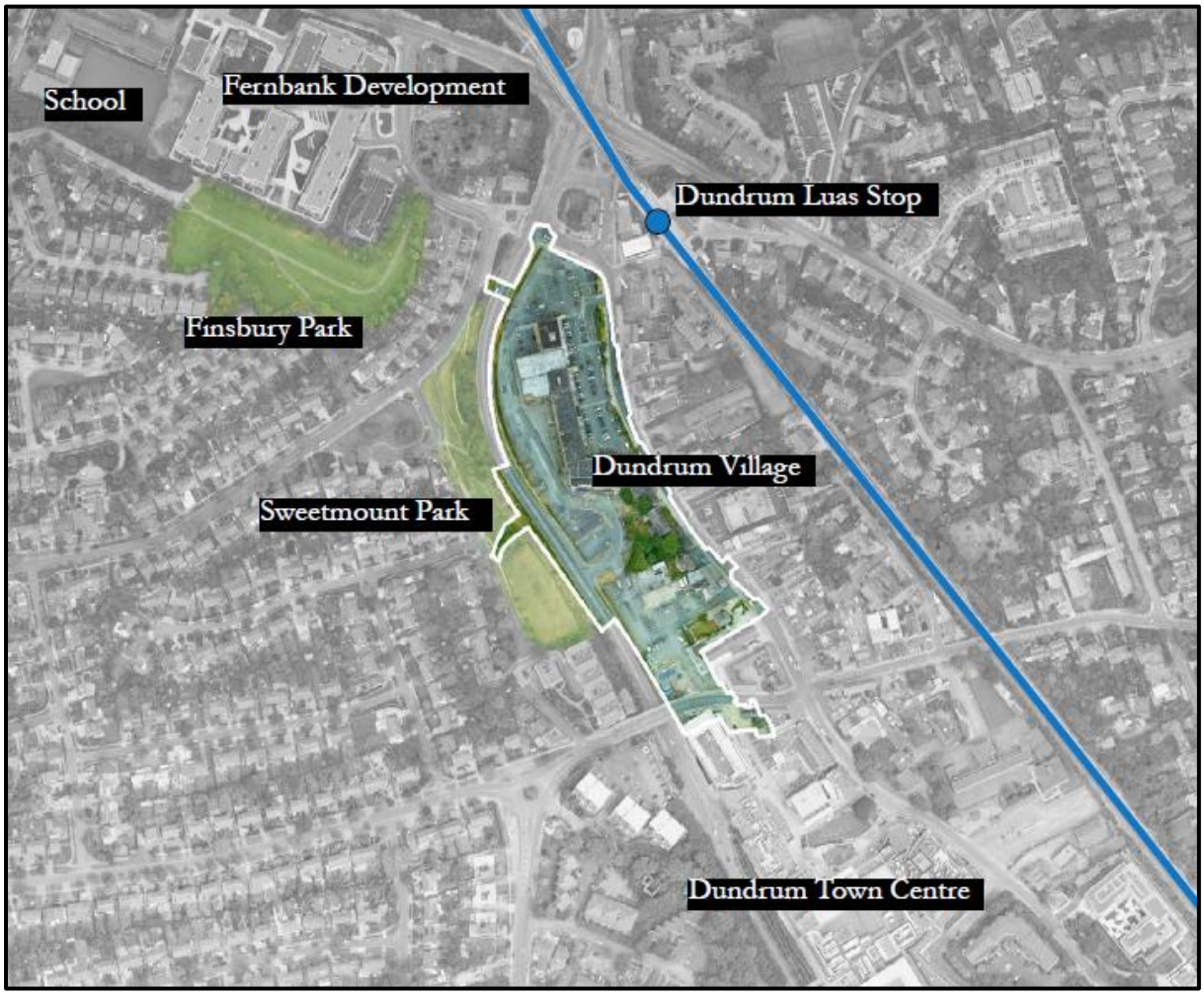


Figure 2.1 – Site Location (Source: Niall Montgomery + Partners Landscape Architects)

Figure 2.2 – Proposed Site Plan (Niall Montgomery + Partners Landscape Architects)

3 Quality Audit Scope

The scope of this Quality Audit is to review the proposed layouts supplied by the Design Team and make recommendations in line with guidelines as per the Design Manual for Urban Roads and Streets (DMURS) and the Transport Infrastructure Ireland Road Safety Audit Standard GE-STY-01024.

The introduction of DMURS have sought to improve the design of streets in urban areas and to facilitate the implementation of policy on sustainable living by achieving a better balance between all modes of transport and road users. The introduction of DMURS is intended to encourage more people to walk, cycle or use public transport by making the experience safer and more pleasant.

In general, the principles of DMURS are intended to lower traffic speeds, reduce unnecessary car use and create a built environment that promotes healthy lifestyles and responds more sympathetically to the distinctive nature of the individual communities and places.

DMURS Quality Audits are undertaken to demonstrate that appropriate consideration has been given to the relevant aspects of the design from a DMURS point of view. The benefits of undertaking a DMURS Quality Audit are as follows:

- The needs of all user groups and the design objectives of the project are fully considered
- An audit enables the project's objectives to be delivered by putting in place a check procedure
- It can contribute to cost efficiency in design and implementation
- A DMURS Quality Audit encourages engagement with stakeholders.

A Quality Audit is a check that all the potential Social, Economical & Environmental opportunities within the project are realised & integrated into a coherent design of Place. This Quality Audit will be divided into the following assessments:

- An Access Audit
- A Non-Motorized User (NMU) Audit (Walking and Cycling Audit)
- A Visual Audit
- A Road Safety Audit.

This Quality Audit was carried out to identify any potential difficulties road users, particularly mobility impaired users, older people and families with children may encounter when accessing the proposed Dundrum Village SHD and also to address any safety issues associated with the proposal. The elements found in this Audit that require further consideration with the guidelines set out in DMURS are outlined below.

3.1 Access Audit

An access audit can be carried out on a development to identify specific aspects associated with access and accessibility of the scheme. The purpose of an access audit is to assess the access requirements of a scheme for potential users. This access audit has considered only the external environment surrounding the site, therefore has not focused on issues within the proposed Strategic Housing Development.

As part of the proposed development, it is intended to divert all vehicular access from the Dundrum Main Road to the Dundrum Bypass. The loading bay and underground parking is serviced by a one way left-in left-out slip road with a central junction for vehicular access.

The proposed development is located near a Luas light rail station, various bus routes and a pedestrian and cycle path network. The proposed development will incorporate existing cycle and pedestrian paths into the internal layout leading to entrances and cycle storage facilities to facilitate sustainable transportation.

The surrounding road network include the Dundrum bypass to the west and Dundrum Main Road to the East. Vehicular access to the proposed development is from an internal access road leading off the Dundrum Bypass. The proposed layout will reduce exiting traffic volumes from the Main Road which has been upgraded to prioritise pedestrian and non-motorised transport. The proposed road works will also include uncontrolled raised pedestrian crossing on Main Road and a controlled pedestrian crossing on Ballinteer Rd.

Figure 3.1: Proposed location of the access junction

The internal site layout comprises of footpaths, communal areas, public open spaces, landscaped areas, bicycle storage. The internal access road of the Dundrum Bypass leads to the loading bay and underground car parks for residential and retail parking. The western site will be linked to Sweetmount Park via a new pedestrian and cycle bridge.

The sightlines for vehicle exits at the western Dundrum Bypass access comply with DMURS guidelines of 49m for a 50km/h road with bus services.

Pedestrian and cycle access to the podium level paths are from Main Road and to the underground car park from the Dundrum Bypass. Secure bicycle storage is proposed at podium level and in the underground carpark.

The site is located in close to established local amenities which is easily accessed by pedestrians or cyclists including the Dundrum Shopping Centre and the Dundrum Luas Station. Several schools, retail and commercial premises are in close proximity to the proposed development

3.1.1 Parking and Internal Road Layout

The proposed development includes a total of 373No vehicle parking spaces of which 43No. will provide electric charging points with 17No. motorcycle spaces for both the residential and

retail premises. Access from the Dundrum Bypass to the underground carpark is via a left-in left-out access road. In addition, 18No. accessible spaces with 4No. electric charging point and 14No. parent spaces and 11No. designed GoCar Vehicle Sharing spaces are proposed with 3No. designated creche staff parking spaces. All the proposed parking will be perpendicular parking.

Total bicycle parking amounts to 1750No., of which 1586No. is secure storage type and distributed throughout the development on podium level and the underground level. The residential allocation is 1508No. and 78No. for visitors. The balance of 164No. cycle parking is located in open spaces for visitors.

The internal access road leading off Dundrum Bypass include loading bay access for HGV use and passenger vehicle access to the underground carpark comprising of four access ramps. Travel direction along the internal access road is generally one-way with fragmented two-way sections for passenger vehicle movements to the central priority junction. Access is also provided for from an existing ramp for Zone 4 parking on the Southern end.

The internal access road includes sections of shared surface and segregated paths for pedestrian and cyclist access to the cycle stores and carpark.

The underground carpark is divided onto four zones with interconnected one-way and two-way aisles. Issues relating to the traffic management within the development is discussed in Section 3.1.5 and Section 3.2.5.

3.1.2 Traffic Signage and Road Markings

The proposal includes localised remarking of roads at new access junctions and proposed pedestrian crossings.

3.1.3 Drainage

The surface water runoff from the impermeable paving and landscaped areas at Podium level will be collected by conventional sub soil drains, gullies, and channels. Runoff is channelled to attenuation tanks positioned throughout the lower ground floor level with hydro brakes at the attenuation tank outlets. The entire site runoff will be discharge to the trunk sewer system. The drainage design does not allow for a petrol interceptor for the trafficked areas, including the access road and the underground car park.

Gully Locations and site levels need to be specified to ensure ponding will not occur in roadways and paths.

3.1.4 Public Transport Network

The proposed Development is serviced by a well-established and easily accessible public transport network. **Table 3.1** below shows the existing bus routes available adjacent to the site.

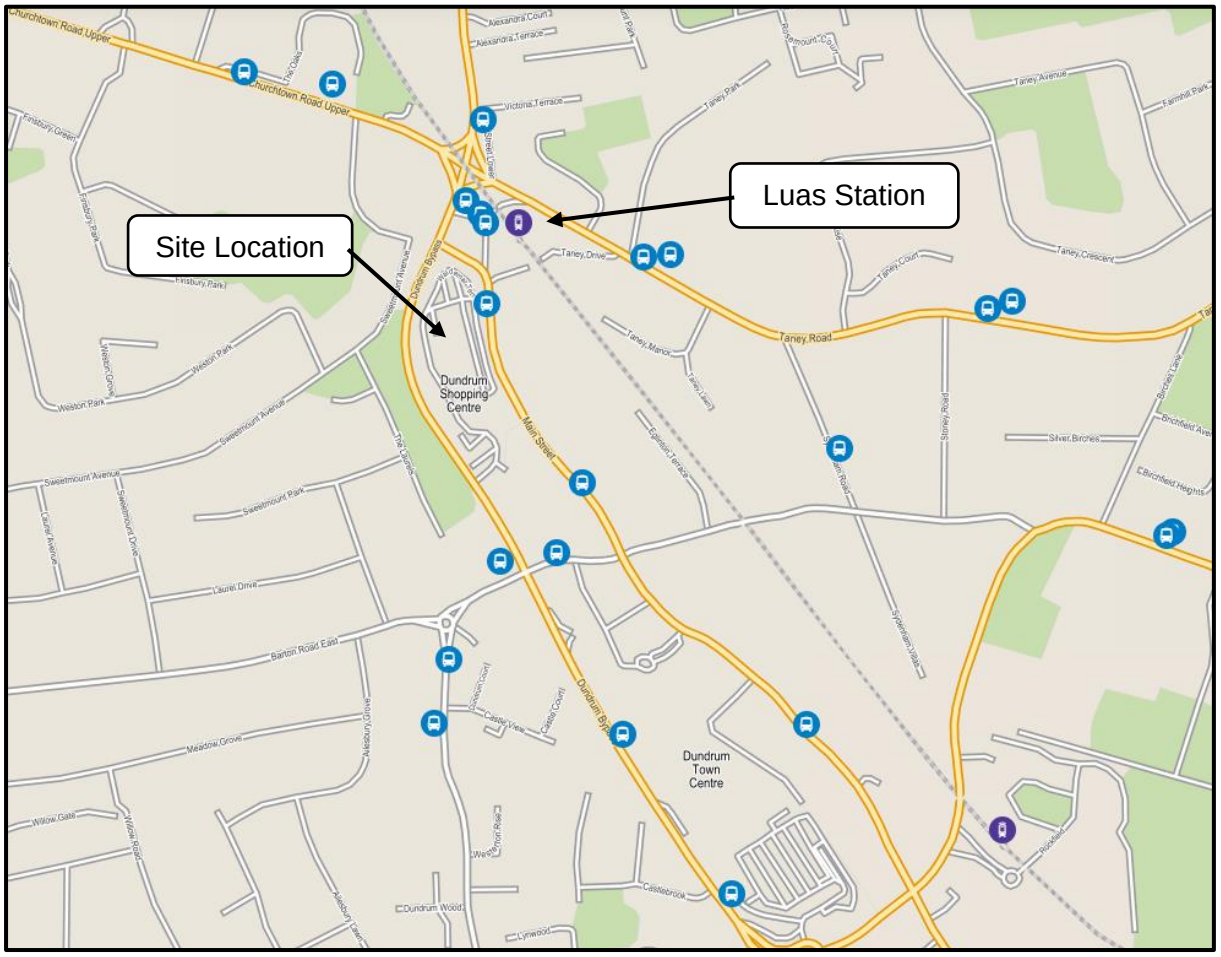


Figure 3.2: Connectivity to the Site (Source: TFI)

The closest bus stop to the site is located along Main Street, in front of the proposed development and serves the 14, 44, 44B, 75, 175 bus routes. which will be further enhanced by the future Bus Connects network expansion. **Figure 3.3** overleaf depicts the proposed bus connect routes which will service the development.

Table 3.1 – Bus Services Available near Dundrum SHD (Source: TFI)

Route No.	Bus Operator	Origin	Destination	Weekday Services
14	Dublin Bus	Maryfield Drive	Dundrum Luas Station	83
44		Enniskerry Village	The helix	17
44B		Dundrum Luas Station	Hill View	5

61		Edmondstown Road	Eden Quay	17
161		Rockbrook	Dundrum	8
175	Go-Ahead	UCD	Citywest	18
17		Rialto	Blackrock	42
75		Dun Laoghaire	The Square Tallaght	34

The existing Luas light rail station is located approximately 100m to the northeast of the site. The Luas Green Line service connects the site to northwest Dublin and the City Centre with connections to the expanded Luas network. In addition, the Green Line service connects to major industrial parks and office parks in South Dublin including Sandyford, Leopardstown and Cherrywood.

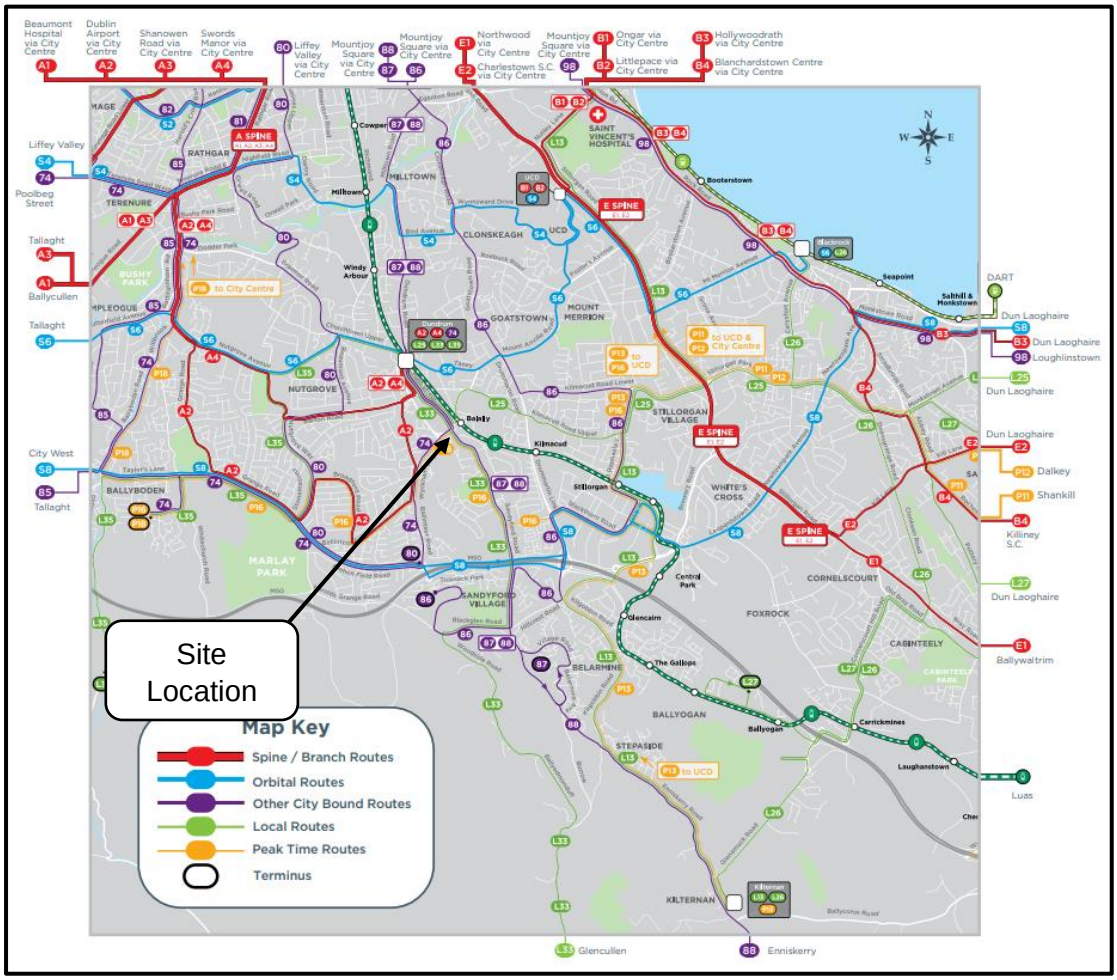


Figure 3.3: Proposed BusConnects network (Source: BusConnects.ie)

3.1.5 Potential Issues Identified in the Access Audit

The following items summarise some of the key issues found relating to the access to the site.

Issue 3.1: Overgrown Vegetation
The audit team noted from the site visit, as can be seen from **Figure 3.4**, that there is overgrown vegetation along the external edge of the footpath, which can cause slips, trips and falls for people walking along the western footpath of the development. The overgrown vegetation can be seen along all the extent of the Dundrum Bypass.

Figure 3.4: Overgrown vegetation along the footpath edges

Issue 3.2: Swept Path Analysis at the proposed underground carpark
The proposed underground car park will have a combination of one-way and two-way aisles. A swept path analysis was not completed to demonstrate the layout will safely accommodate passenger car turning movements.

Issue 3.3: Accessible car parking bays
It was proposed to install 18No. disabled parking bays across the car park area, however, it has been noted that those spaces are not in close proximity to exits and lifts. Vulnerable users will have to travel between internal traffic to reach these points, which may put them at risk of collision with vehicles manoeuvring on the car park.

Issue 3.4: Pedestrian and cycle permeability
It was noted from the drawing that no consideration was given for pedestrians and cyclists within the car park area. Inadequate segregation between pedestrians/cyclists and vehicles could lead to a collision, which poses a risk of injury to vulnerable road users.

Issue 3.5: Right of Way at car park access junctions
The proposed access points to the underground car park do not have the provision of the right of the way specified in the drawings. Traffic management should be considered within the overall road network on the plans. Lack of control measures may increase the risk of conflicts between vehicles.

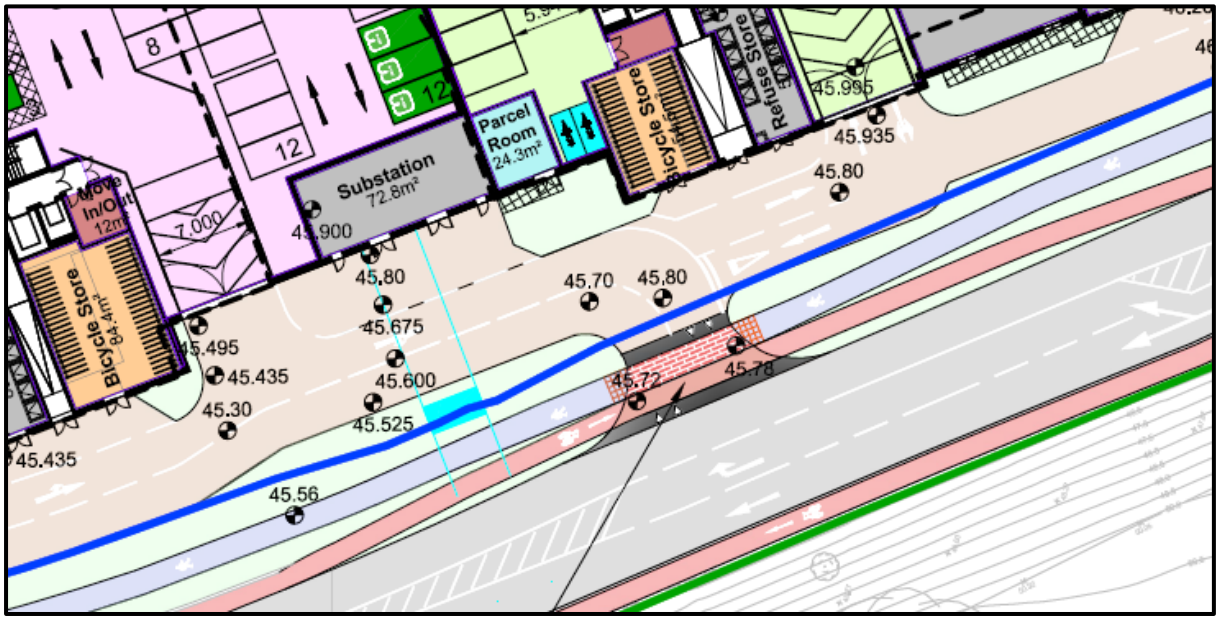


Figure 3.5: Access point into car park area (source: TJOC)

Issue 3.6: Bus Stops near proposed development
The bus stops located immediately in front of the proposed SHD does not have the provision for shelters or benches. There are also no provisions of bus lay-bys at the bus stops on Main Street and Ballinteer Rd, which leads to a risk of collisions between vehicles and vehicles-pedestrians.

Issue 3.7: Proposed Traffic Signs
It is proposed to install several traffic signs as part of the proposed development. No mention of mounting height and distance from the carriageway could be found on the drawings. Road signs should be located at least 450mm away from the road edge in order to provide sufficient road clearance and the mounting near cycle facilities should be 2.5m. Traffic signs should also be positioned in a way it does not compromises pedestrians and cyclists' routes.

Issue 3.8: Keep Left Traffic Signs
It is not stated in the drawings provided whether there will be 'Keep Left' traffic signs at the traffic island right after the proposed entry junction to the northwest of the site. Traffic signs aid to inform motorists of hazards ahead and the lack of traffic signs can cause driver's confusion.

Issue 3.9: Car Parking Bays
No information could be found in the drawings regarding the dimensions of any proposed parking bays located at the car park area. Disabled parking spaces should measure 6m in length and 2.4m in width, along with buffer zones with 1.2m to either side of the parking bay. Perpendicular parking measuring is 4.98x2.5 and 5.0x2.5m.

Issue 3.10: Carriageway Width
No information regarding carriageway widths could be found in the plans provided. DMURS states that perpendicular parking requires a minimum carriageway width of 6m, which can be reduced to a minimum of 5m if the parking bay width is 2.6m. Measures should be specified in the drawing to provide the safe distance required.

Issue 3.11: Motorcycle Parking
No information could be found in the drawings regarding the dimensions of the motorcycle parking bays.

Issue 3.12: Main Street Pedestrian Crossing
The raised table pedestrian crossing facility in Main Street do not specify pedestrian paths tie in and tactile paving positions. Inadequate identification of hazards for visually impaired users my result in crossing movements at inappropriate locations resulting in injury.

Issue 3.13: Pedestrian Crossing Road Markings
No information could be found on distances between road markings or the type of lines that will be installed at proposed pedestrian crossing points.

Other issues relating to the road and drainage system have been raised in Problems 04, 05, 06, 07, 10 and 11 of the Road Safety Audit.

3.1.6 Access Audit Recommendations

The overgrown vegetation along the Dundrum Bypass pedestrian footpath should be cleared.

The design team should review the access road entry and exit junctions for compliance to design guidelines, including type and position of signs. All traffic signs type and location and height should be specified on the drawings to ensure that they do not impose a risk all road users

The traffic island located at the mouth of the junction at the proposed entry road to the northwest of the site should have 'Keep Left' traffic signs with reflective bollards at either end of the island, according to the TII DN-GEO-03084 guidelines.

Drainage proposals should be clarified at the detailed design stage. All proposed gullies and manholes located within the development boundary should be clearly marked and be kept out of the desired path of vulnerable road users and the finish levels should be even with the roadway surface.

All disabled parking spaces should be in accordance with the Traffic Signs Manual Figure 2.27 and DMURS. All other parking bays should clearly be provided with dimensions and carriageway width on the plans.

3.2 Non-Motorised Users Audit

A non-motorised user audit is generally carried out on schemes which have been constructed to identify how user-friendly they are to users and identify improvements to enhance the functionality of the footpaths, cycle lanes and streets for pedestrians and cyclists.

In the case of this development, the designers have made provisions for footpaths, cycle lanes and crossing points within the scope of works.

3.2.1 Footpaths

As stated in Section 3.1 above, it is intended to segregate vehicular access into the Dundrum Strategic Housing Development from pedestrian access. There will be 3No. access junctions along the western boundary on Dundrum Bypass, split into entry only, entrance and egress, and exit only junctions.

The existing Dundrum Bypass footpath will be realigned to tie in with the proposed access road junctions with a parallel shared path to provide access to the development for pedestrians and cyclists. Shared paths should be minimum of 3m wide to accommodate pedestrian and cycle movements with road crossing locations in line with DMURS guidelines.

The extent of proposed work at along main street for existing vehicle access points are not detailed in the design drawings. The existing foot paths width and one way carriageway will be retained.

The podium level allows for pedestrian movements throughout the garden leisure area and to the pedestrian bridge connection with Sweetmount Park. Internal walkways vary between 1.0 to 8.13m in width and external footpaths are 1.5 to 4m wide.

The existing footpaths on Ballinteer Rd are in good condition and is the location for the new controlled pedestrian crossing linking the southern pedestrian access to the Garden Leisure Area.

3.2.2 Pedestrian Crossing Points

The proposed works include two new pedestrian crossings on public roads and three uncontrolled pedestrians crossing on the internal access road. The public road crossing includes a controlled crossing on Ballinteer Road to the south and an uncontrolled raised table junction crossing to the North in Main Road of which tactile paving position details are not shown on the design drawings.

Tactile paving positions for the access road crossings has not been specified and the design team should consider revising the road marking for the access road junction crossings. The existing pedestrian crossing locations at intersections along main road are fit for purpose and do not require any upgrade.

3.2.3 Cycleways

There is an extensive cycle network in the vicinity of the site that links the proposed Dundrum Strategic Housing Development to the wider community. Cycle journeys from the site to local amenities such as Sandyford and UCD, employment and education hub, are considered to be relatively short. The existing cycle lane provisions near the proposed site are generally in a good condition. The recent segregated cycle lane installed on Main Street extend along the eastern side of the development, connecting the site to the existing cycle infrastructure. Dundrum Bypass include cycle lanes with segregated sections for both carriageways.

The proposed development access road tie into the existing Dundrum Bypass and will incorporate the existing cycle lanes into the proposed junctions. The sections of cycle lanes at the auxiliary diverge and merge are coloured surfaces with sufficient lane widths to separate vehicle and cycle traffic.

3.2.4 Cycle Storage Provision

The site will have a total of 1750No. cycle parking spaces, which will be located both internally and externally. A total of 1508No. spaces will be designed for future residents, where they will be accommodated internally, spread through the blocks and the underground parking area. The remaining 242No. spaces will be for visitors, of which 78No. spaces will be located internally and 164No. cycle parking will be located on the surface throughout the landscape.

3.2.5 Potential Issues Identified in the Non-Motorized Users Audit

The following items summarise some of the key issues found related to the walkability and cyclability of the site.

Issue 3.14: Width of Crossing Points and Location
It is noted from the drawings that none of the proposed pedestrian crossings have widths displayed. Controlled and uncontrolled crossings should have widths between 2.0 to 5m, with an absolute maximum of 10m. It is also noted that the proposed crossing point on Main Street does not have crossing markings detailed on the drawing. According to section 9.3 of the Transport Infrastructure Ireland (TII) DN-GEO-03084 document, uncontrolled crossing points should be located at the mouth of the junction.

Issue 3.15: Uncontrolled Zebra Crossing Point
It is proposed to install uncontrolled zebra crossing points along Dundrum Bypass. Zebra crossing markings are provided when the crossing point is controlled. There is a potential for confusion, which may lead to a pedestrian-vehicle collision.

Issue 3.18: Shared Pedestrian and Cycle Path
Path widths for the shared pedestrian and cycle track along the internal access roads is not specified. Pedestrian crossings do not include tactile paving and dropped kerbs

Inadequate path width and crossing locations may lead to conflicts between road users resulting in injury. Refer to Item 3.4.2 for issues relating to pedestrian crossing facilities as per the Road Safety Audit.

3.2.6 Non-Motorized Users Audit Recommendations

The design team should ensure pedestrian and cyclist paths are maintained during construction and that all surfaces tie into existing surfaces.

All dimensions of crossing points within the proposal should be clearly marked in the drawings in accordance with relevant guidelines. All crossing points should be designed in a way to provide clearance for both pedestrians and cyclists to cross the road at the same time.

Pedestrian crossing types, including proposed road markings and signage should be clearly specified on the design drawings.

3.3 Visual Quality Audit

An audit on the visual quality of the development may be undertaken to ensure that the development ties in with the best practice recommendations for streetscapes as set out in DMURS.

The proposal will provide for the protection and provision of green infrastructure in a coherent and integrated manner. The Dundrum Village Strategic Housing Development will provide for a new public realm area, courtyards for residents and public open spaces that will incorporate walking and cycling facilities.

3.3.1 Landscape

The proposed site will have a lack in focal points and will be surrounded by landscaped areas creating a harmonious design with the surroundings.

It is proposed that the site has a number of pocket spaces with no focal exit points when transitioning and merging with the wider community. These pocket areas are public open areas and communal spaces designed to integrate and bring a sense of living to users. The communal spaces are designed for residents only, bounded by podium parapets and railings.

Within those spaces, there will be seating, exercise and playing areas bounded by dense and diversified planting. There will be a hierarchy between open spaces and variety in scale.

The western boundary of the site will have a buffer zone between Dundrum Bypass, the footpath and the internal roads, with lawn, shrub and tree plantings. It is also proposed to retain a row of trees located to the southwest of the site.

The master plan has been designed to enhance connections to the wider community and promote sustainable modes of transportation.

3.3.2 Building Height

The proposed development buildings are intended to range between 9 to 16 stories along Dundrum Bypass. The taller building will be located on the northern corner of the development.

No information on buildings height along Main Street could be found on the drawings provided.

3.3.3 Finish Materials

The proposed development aims to provide different finishes for each type of segment of the proposed site, e.g., high quality paving to the street footpath, soft surface playground finish, red brick paving, bike lane paving, resin bound gravel and self-binding gravel surface.

3.3.4 Street Furniture

Currently, Main Street, Dundrum Bypass and Ballinteer Road have the provision of street furniture, such as flowerpots, post boxes, bollards, shrubs, benches, bicycle stands and bins.

As part of the proposed works, it is intended to rearrange and redesign the street furniture along Main Street and Dundrum Bypass. The existing landscape will be removed and replaced with permanent planting, raised planter and seating, as well as proposed new ones which will be installed along Dundrum Bypass. The bicycle stands will be relocated, and additional ones will be installed, whereas post boxes and litter bins will be retained.

There are no distances displayed on plans provided related to the proposed locations where the street furniture will be relocated. Street furniture should not obstruct footpaths and it should be placed be on the strip or verge area of the footway allowing minimum width designed for a footpath.

3.3.5 Lighting

Within the Dundrum SHD, the public lighting plan proposes new external lighting design for Main Street and Dundrum Bypass with a combination of 4 to 6 meters led streetlights. The

internal courtyards and public open areas will comprise of 4 meters column-mounted and low-level bollards of 0.9m in height, both types are led fittings.

There is no information on distance measurement where columns will be placed. Lighting should be located within a verge and/or build-outs zones, in accordance with DMURS.

No information regarding proposed lighting for the underground car parking could be found in the documentation supplied, therefore it is unclear if the proposed underground area will be appropriately lit.

3.3.6 Potential Issues Identified in the Visual Audit

The following items summarise some of the key issues found related to the visual quality of the site.

Issue 3.18: Street Furniture
Within the relocation of the existing street furniture, public light columns and installation of new features, there are no distances displayed on the drawings. It is unclear whether there will be appropriate footpath width specified in relevant guidelines.

Issue 3.19: Road Finish Surface
The surface of the proposed roads and the raised pedestrian crossing within the site have not been specified in the drawings, which can cause confusion among users, who become confused when travelling throughout the site.

Issue 3.20: Public Lighting
There are no proposed lighting plans for the underground car park. This may create conflicts where motorists may be unable to see other vehicles and vulnerable users. Leading to potential pedestrian-vehicle and vehicle-vehicle collisions which pose a risk of injury to all users.

Issues related to the internal landscaping have been raised in Problem 19 of the Road Safety Audit.

Other issues relating to lighting have been raised in Problem 13 of the Road Safety Audit.

3.3.7 Visual Quality Audit Recommendations

No information could be found in the drawings provided regarding the finish of the raised crossings, internal roads of the underground car park and access roads.

The design team should ensure sufficient lighting is provided within the underground car park and that the location of street furniture does not affect the navigability of non-motorised users of the site.

3.4 Road Safety Audit

3.4.1 Collision History Near the Proposed Development

The Road Safety Authority (RSA) website was consulted to obtain data regarding collisions in the vicinity of the proposed development site entrance. As can be seen from **Figure 3.6** below, 10No. collisions have been recorded along Main Street and Dundrum Bypass near the site accesses between 2005 and 2016. The majority of collisions were between vehicles or single cars. Out of the recorded data, there were 4No. minor incidents involving pedestrians, of which 3No. were along Main Street.

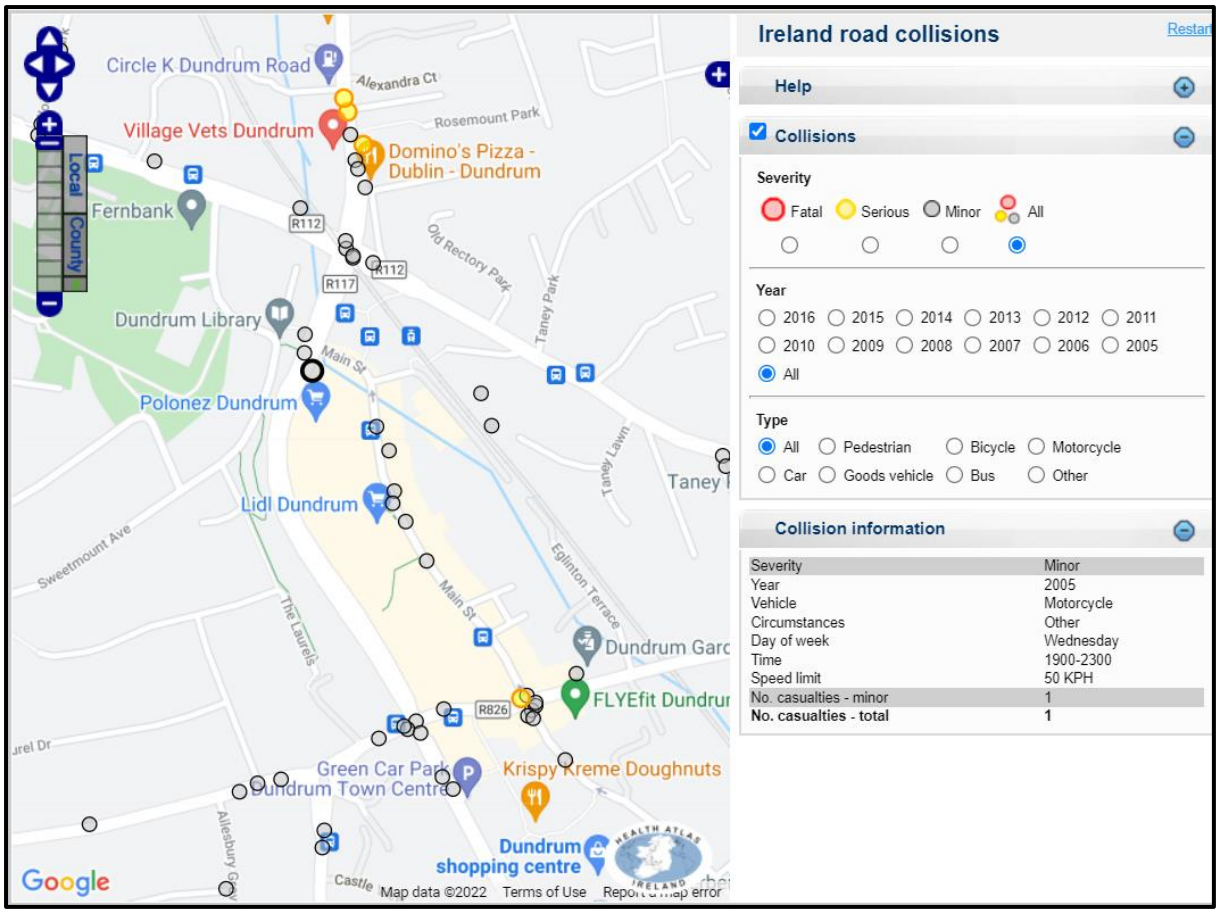


Figure 3.6: Collisions near the proposed development (Source: RSA.ie)

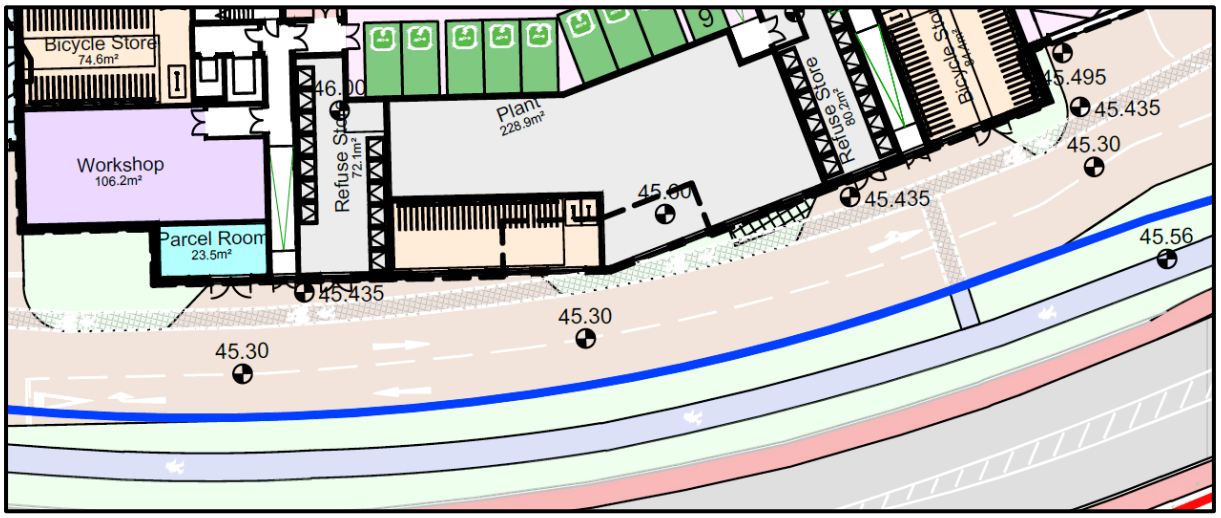
Table 3.2 – Incidents Recorded along the Dundrum Bypass, MainStreet & Ballinteer Rd				
Incident	**Year**	**Vehicle**	**Day of Week**	**Time**
1 – Dundrum Bypass	2006	Car	Friday	10:00-16:00
2 – Dundrum Bypass	2015	Car & Pedestrian	Monday	07:00-10:00
3 -– Dundrum Bypass	2005	Motorcycle	Wednesday	19:00-23:00
4 – Main Street	2013	Car	Sunday	16:00-19:00
5 – Main Street	2005	Undefined	Thursday	19:00-23:00
6 – Main Street	2009	Car & Pedestrian	Saturday	10:00-16:00
7 – Main Street	2015	Car	Tuesday	10:00-16:00
8 – Main Street	2015	Car & Pedestrian	Wednesday	16:00-19:00
9 – Main Street	2015	Undefined & Pedestrian	Tuesday	10:00-16:00
10 – Ballinteer Road	2009	Car	Saturday	10:00-16:00

3.4.2 Potential Problems Identified in the Road Safety Audit

The following are problems and recommendations to address the safety issues associated with the proposal. The recommendations are proposed to the designer of the scheme to reduce any safety risks associated with it.

Problem No. 01: Pedestrian and Cycle Permeability
Location: Shared Path (West)

The audit team note from the drawings provided that the proposed shared pedestrian and cycle path include several loading bays and car park ramp locations. The path seems to transition from a shared surface to a separated surface along the road. Minimum paths widths for shared cycle/pedestrian paths are required to adequately accommodate both users needs. Dropped kerbs and tactile paving is not specified at road crossing/ ramp crossing and it is unclear If the sections of shared surface (pedestrian/cycle/vehicle) are in line with DMURS specifications. Vehicle/pedestrian conflicts at the crossing locations and shared surface sections or pedestrian /cycle conflicts along the shared path may result in injury.



Recommendation:

The design team should consider revising the use and application of shared paths and shared surface sections in line with DMURS guidelines, including minimum width for shared paths (3m for combined cycle/pedestrian paths) and consider segregated paths at the shared surface sections in line with DMURS guidelines.

Problem No.02: Pedestrian & Cycle Permeability
Location: Podium Level

The audit team noted from the drawings that cycle stores are located throughout the podium level. It is not clear from the drawings if a shared path for pedestrian and cyclists is specified. Inadequate signage to make users aware of each other may cause confusion regarding right of way, travel direction and dedicated use which may lead to pedestrian-cyclist conflicts resulting in injury.

Recommendation:

The design team should review the podium level footpaths layout to ensure shared paths locations are clearly signposted in line with the National Cycle Manual and DMURS guidelines.

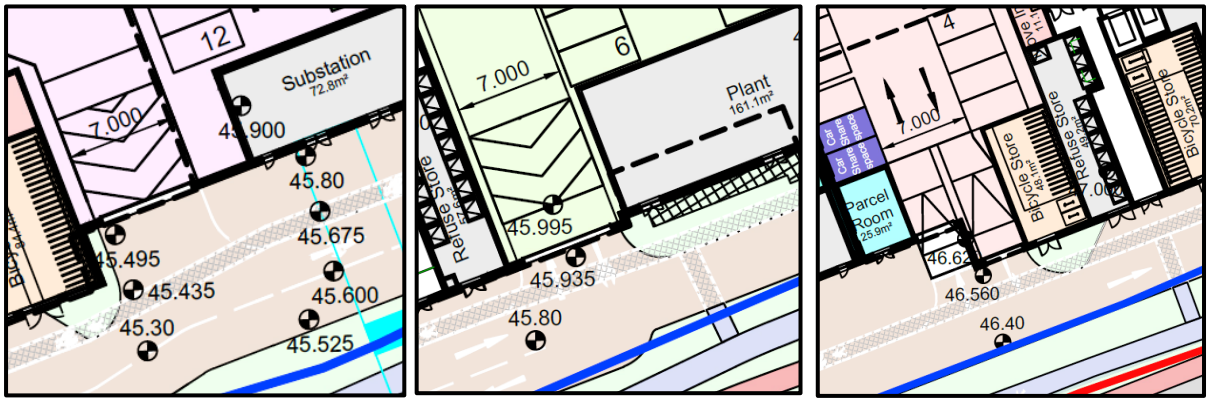
Problem No.03: Pedestrian Permeability
Location: Underground Carpark Zone 1 - 4
The audit team note from the drawings provided that proposed pedestrian paths are not shown for the underground car park layout. Pathway demarcation and crossing locations aid in the separation of vehicles and vulnerable users and prevent dispersed pedestrian movements in the parking facility. Dispersed pedestrian movements along the which may lead to vehicle-vehicle and vehicle-pedestrian conflicts causing injury.

Recommendation:
The design team should review the external footpath layout to ensure interconnectivity with all surrounding paths by means of pedestrian crossings in line with DMURS guidelines.

Problem No.04: Cycle Permeability
Location: Underground Carpark Zone 1 – 4
The audit team noted from the drawings that cycle stores are located throughout the underground car park. It is not clear from the drawings if a shared path to underground cycle stores is specified. Inadequate crossing facilities may result in slips trips or falls when stepping of a raised kerb into the roadway or vehicle-pedestrian conflict, resulting in injury.

Recommendation:
The design team should review the external footpath layout to ensure interconnectivity with all surrounding paths by means of pedestrian crossings in line with DMURS and Design recommendations for multi-storey and underground car parks.

Problem No.05: Access Ramp Traffic Management
Location: Access Ramps Zone 2-4
The audit team noted that the underground car park access ramps do not specify the right of way at the exits. Inadequate control measures at the access junctions may result in vehicle /vehicle or vehicle/pedestrian conflict causing injury.

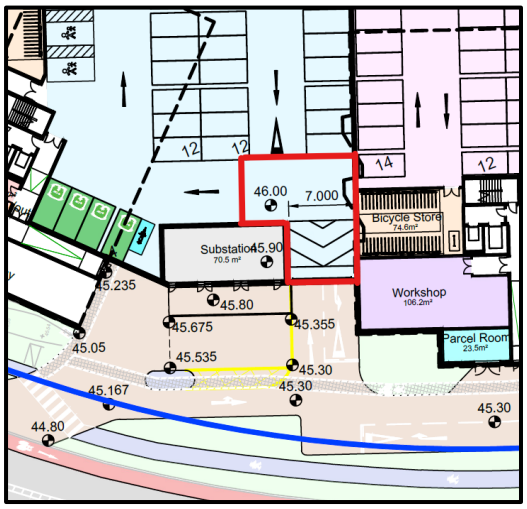


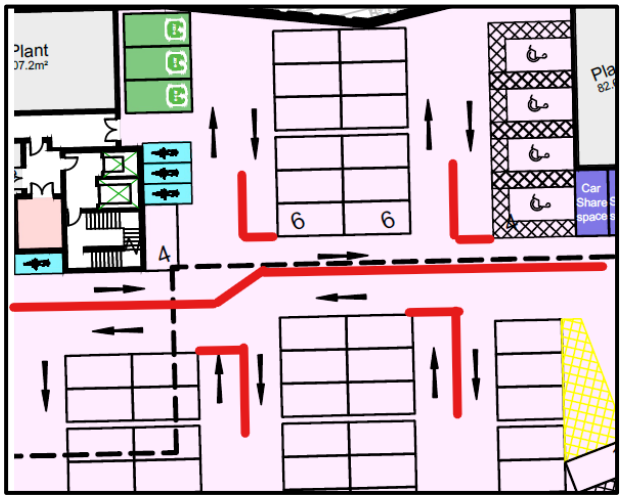
Recommendation:
The design team should consider specifying traffic control measures at the ramp exit junctions.

Problem No.06: Speed Control Measures
Location: Underground Car Park
The audit team noted that there is a lack of speed control measures for the circulatory roads with excessively long straights in the underground car park to reduce vehicle speeds. Increased speeds in the car park environment may result in vehicle-vehicle and vehicle-pedestrian conflicts resulting in injury.

Recommendation:
The design team should consider specifying speed control measures for long straight sections.

Problem No.07: Road Layout and Geometry
Location: Underground Carpark Zones 1-3
The audit team noted that there is a lack of regulatory type markings for the circulatory roads included. Stop and Yield locations are not clearly defined and transitions from two-way traffic to one way traffic seem to clash. The audit team are also concerned that the roads and footpaths narrow down to inappropriate widths at various locations throughout the car park which creates an increased risk of potential vehicle/pedestrian conflicts resulting in injury.





Recommendation:
The design team should ensure that appropriate roads layout markings are specified throughout the scheme in accordance with 'Design recommendations for multi-storey and underground car parks' and DMURS guidelines where applicable.

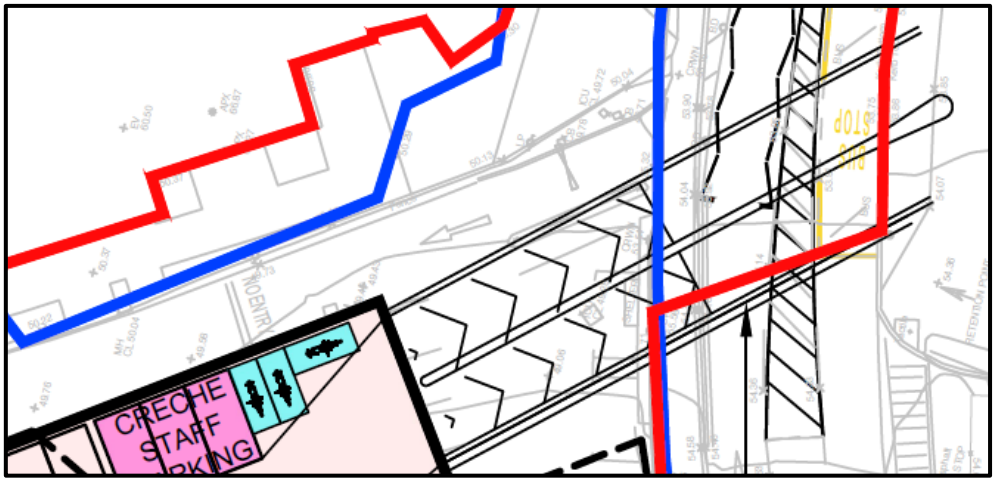
Problem No.08: Cul De Sac Parking Bay Quantity
Location: Zone 2 & 3
The audit team noted that the parking bin quantity exceeds six bins in length for several cul de sac lanes in the underground car park layout. Lanes with no without turning head. Vehicles will be required to reverse excessive lengths as turning movements will not be possible. This could increase vehicle-vehicle conflicts in a confined environment.

Recommendation:
The design team should ensure that adequate space is provided within the underground car park.

Problem No.09: Gate Positions
Location: Underground Carpark Zone 3 & 4
The audit team note that the underground carpark includes gates between Zones 2,3 & 4. It is unclear if zoned will be isolated permanently and how internal traffic flows will be managed. The double leaf swing gate is located next to parking bays and may pose a risk of injury to pedestrians if not secured properly.

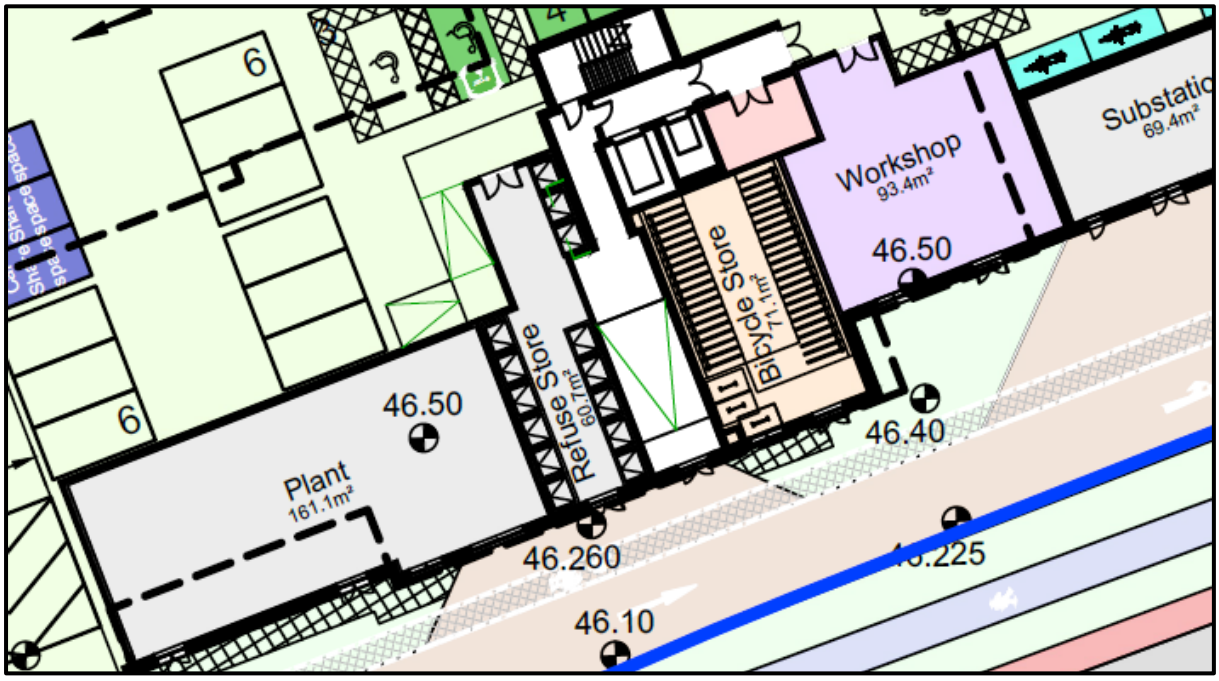
Recommendation:
The design team should clarify the purpose of the gates and consider specifying roller shutter or sliding gates.

Problem No.10: Existing Western Access Ramp
Location: Underground Carpark Zone 4
The audit team note that the Zone 4 of the underground cap park is serviced by an existing access ramp. It is unclear if the ramp will be used by pedestrians and cyclist and if intended how safe travel paths will be provided. Inadequate provision of vulnerable users' paths may result in vehicle-pedestrian or vehicle -cycle conflicts resulting in injury.



Recommendation:
The design team should consider means to accommodate vulnerable users on the ramp or include signage to discourage access to the ramp.

Problem No.11: Ramp termination Location
Location: Underground Carpark Zone 3
The audit team note that the ramp location is in close proximity to a parking bay. Vulnerable users may be exposed to risk due to the close proximity of vehicle performing parking manoeuvres resulting in injury.



Recommendation:
The design team should an consider alternative layout and termination point for the ramp.

Problem No.12: Pedestrian Disabled Access
Location: Underground Carpark
The audit team note that pedestrian disabled parking facilities are not consistently positioned near exit point and lifts. The location will require vulnerable road users to travel in the roadway putting them at risk with vehicle conflicts and injury.

Recommendation:
The design team should ensure that disabled parking bins are in close proximity to lifts and disabled exits.

Problem No.13: Lighting
Location: Underground Car Park
The audit team have not received drawings detailing lighting for the underground car park and it is not clear what level of illumination will be specified for the development. Areas in low light conditions may result in slips, trips and fall along pedestrian paths. Drivers may be unable to see pedestrians at pedestrian crossings which have the potential to lead to pedestrian-vehicle collisions resulting in injury to pedestrians.

Recommendation:
The design team should ensure that details and locations of all underground lighting columns are provided on detailed design and to ensure that positioning of columns does not cause any obstruction or hazard to vulnerable users.

Problem No.14: Drainage
Location: Underground Carpark
The audit team noted from the drawings provided that there is no provision for drainage gully inlets for the underground car park. Inadequate gully positioning may lead to issues of ponding which poses a risk of slips, trips or falls to vulnerable road users.

Recommendation:
The design team should ensure that details and locations of all drainage gullies etc are provided for the underground car park to enable accidental leaks and ingress of water to be drained to avoid the risk of ponding.

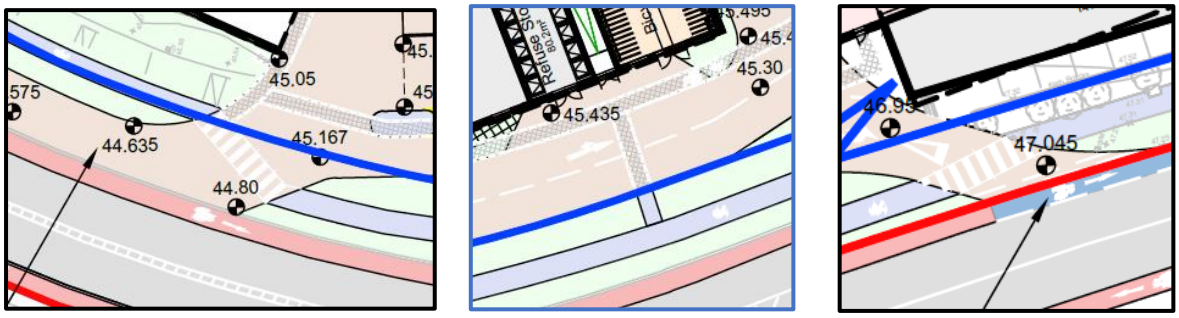
Problem No.15: Vehicle Swept Path Analysis
Location: Underground Carpark
The audit team note from the drawings provided that the vehicle swept path analysis for the underground car park does not include passenger vehicle turning movements. Swept path analysis should be conducted with the appropriate design vehicles to confirm the layout is suitable for the intended purpose. The swept path analysis should confirm that vehicles will not safely navigate circulatory routes without overrunning into parking bins and pedestrian paths resulting in vehicle/pedestrian conflicts. The analysis should also analyse all applicable vehicle maneuverers and turning movements to ensure sufficient dimensions for parking bins.

Recommendation:
The design team should analyse vehicle swept paths with industry-standard software to assess vehicle wheel paths during turning movements to confirm the suitability of the layout for intended purposes.

Problem No. 16: Signage
Location: Underground car park
The audit team noted that there is a lack of signage for the underground car park on the drawings provided. Signage aid in informing road users of the direction of travel and the presence of vulnerable road users and exit routes. Inadequate signage may lead to users not being alerted to pedestrian paths and travel directions and exit routes which may result in vehicle-vehicle or vehicle-pedestrian conflicts causing injury.

Recommendation:
The design team should ensure that details of signage is provided for the underground car park in line with appropriate design guidelines.

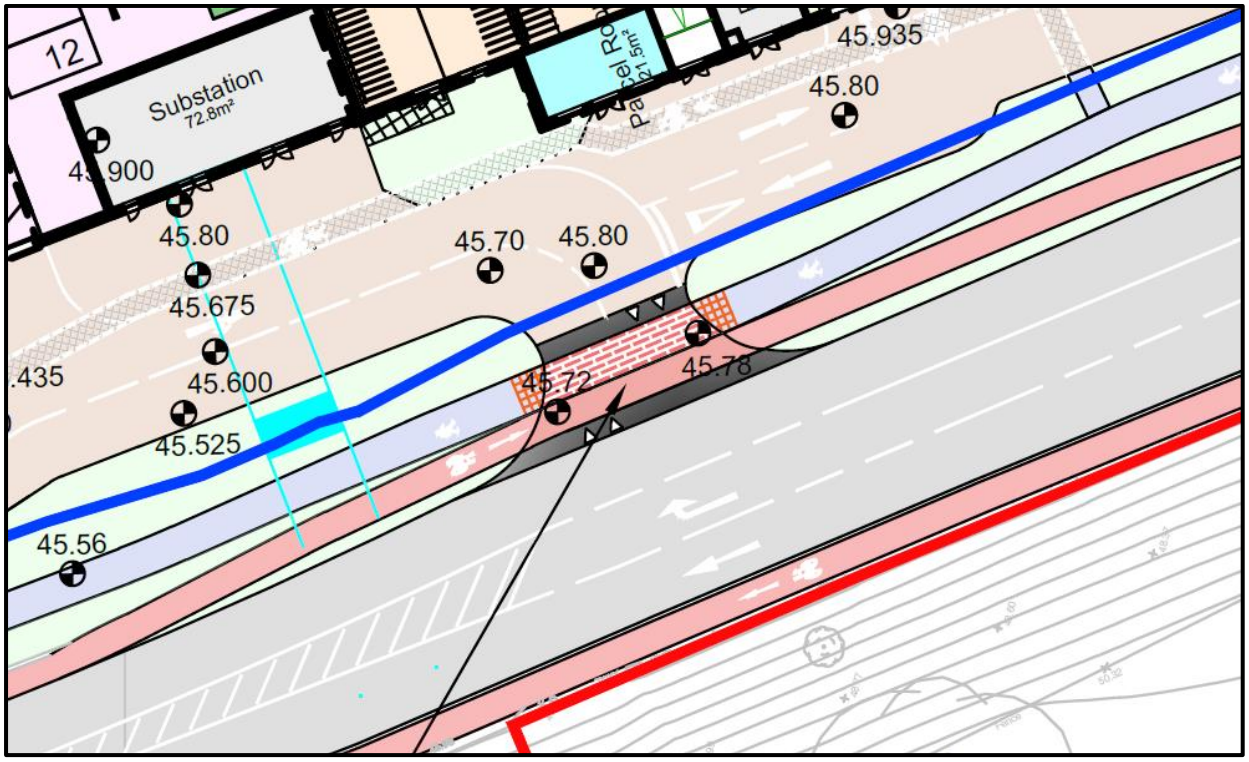
Problem No.17: Pedestrian Disabled Access
Location: Internal Access Road Junction
The audit team note that 'drop kerbs' and tactile paving are not identified at the uncontrolled crossings throughout the scheme. These facilities aid users with specific mobility needs in particular and the omission of dropped kerbs will require vulnerable road users to travel in the roadway putting them at risk with vehicle conflicts and injury.



Recommendation:
The design team should ensure that details and locations of 'drop kerbs' and tactile paving is provided at proposed crossing location. The Design team should also consider the revising the road markings in line with DMURS Specifications.

Problem No. 18: Regulatory Signage and Markings
Location: Dundrum Bypass Access Junction

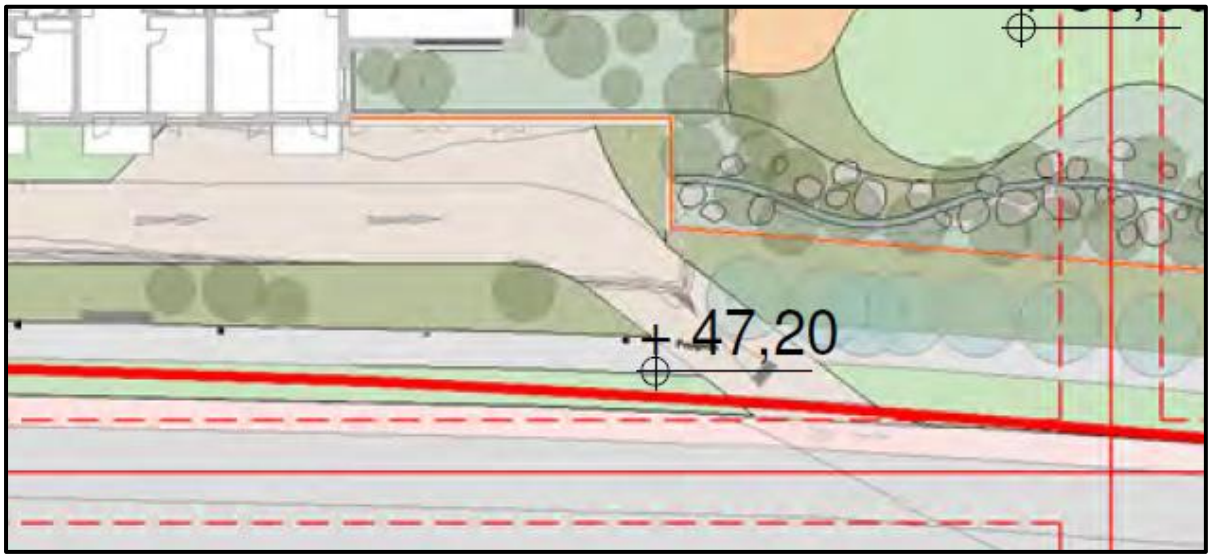
The audit team note from the proposed signage and road marking layouts that there is a lack of traffic control measures and/or regulatory signage and markings for the access junction. It is unclear if exit movements give right of way to pedestrians or cyclists and if vehicles performing exit movements are required to stop/yield before entering the Dundrum Bypass. Vehicles turning right into the development may block exit movements as no yellow box markings are specified to clear exit paths for westbound traffic. Road markings and traffic signals aid in informing road of right of way at access junctions. Inadequate traffic controls may lead to motorists becoming confused as to right of way which could pose a risk of pedestrian/vehicle or vehicle/vehicle collisions resulting in injury.



Recommendation:
The design team should include additional details including regulatory signage and markings and /or traffic control measures at the access junction.

Problem No.19: Landscaping
Location: Access Road Exit

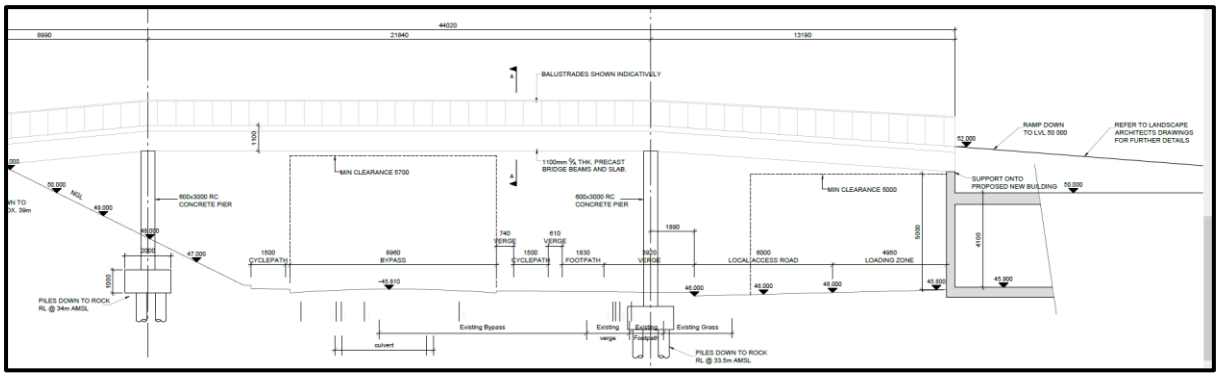
The audit team note from the drawings provided that proposed landscaping within the development may impact the visibility of road users if positioned inappropriately. Trees, high bushes and shrubbery should be avoided in areas where visibility is to be maintained to ensure that drivers are clearly able to see approaching vehicles and pedestrians at exits and designated pedestrian crossing locations. This could potentially lead to instances of vehicle-vehicle or pedestrian-vehicle collisions resulting in injury.



Recommendation:

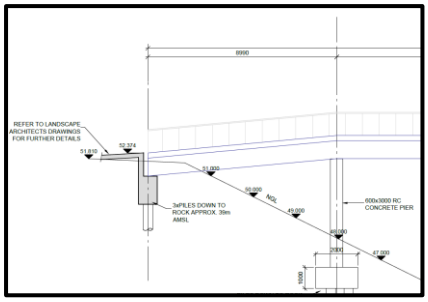
The design team should ensure that any proposed landscaping does not impact on the visibility of the internal roads and junctions or forward visibility at the proposed pedestrian crossings.

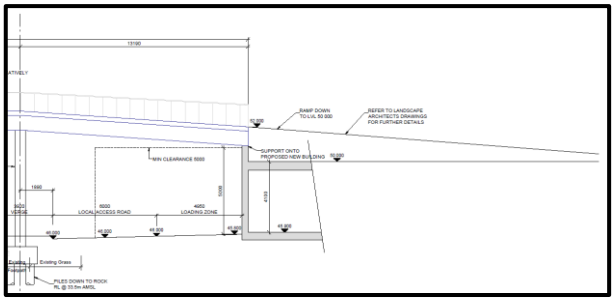
Problem No.20: Footbridge Headroom
Location: Footbridge
The audit team note from the drawings provided that the proposed headroom for the footbridge over the access road is 5.0m. the minimum specified clearance for Footbridges as per DN-GEO-03036 is 5.7m. Insufficient headroom may lead to HGV vehicles striking the soffit causing damage or injury.



Recommendation:
The design team should consider increasing the headroom clearance in line with DN-GEO-03036 specifications.

Problem No.21: Footbridge Ramp Gradients
Location: Footbridge
The audit team noted from the design drawing that the minimum width of the ramp and approach gradients including the frequency of landings are not specified. Minimum width and landing aid disabled users to safely navigate inclined surfaces and the omission of landing might create unsafe conditions for users resulting in injury.





Recommendation:
The design team should confirm ramp design specifications conform with DN-STR- 03005 specifications.

4 Quality Audit Team Statement

We certify that we have examined the drawings listed in **Appendix A** and examined the site by means of a site visit. This examination has been carried out with the sole purpose of identifying any features of the design that could be removed or modified to improve the safety of the scheme. The issues that we have identified have been noted in the report, together with suggestions for improvement, which we recommend should be studied for implementation.

Audit Team Leader: Adam Price: BEng (Hons), CEng, MIEI
ORS

Signed: 

Date: 31st January 2022

Audit Team Member: David McCormack: BEng (Hons), Dip Eng, CEng, MIEI

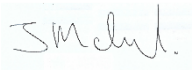
ORS

Signed: 

Date: 31st January 2022

Audit Team Member: Johannes de Klerk: BEng, MIEI

ORS

Signed: 

Date: 31st January 2022

Audit Team Observer: Laila Donadel BEng (Hons)
ORS

Date: 31st January 2022

Appendix A – Inspected Documentation

The audit team reviewed the following drawings and documents provided by BDP, NMP, GRID architects, TJ O'Connor & Associates and Systra:

(1) DVSHD - Drawing Schedule + Public Lighting Drawing
(2) DVSHD - Public Lighting Design Report
(3) DUNDRUM SHD STAGE III LANDSCAPE PLANNING DRAWINGS DRAFT
(4) DVSHD - Landscape Design Statement
(5) DND_NMP_ZZ_GF_M3_LA_00
(6) DND_NMP_ZZ_GF_M3_LA_00_Trees
(7) 16031-TJOC-00-XX-DR-C-1010_Prop_LGF
(8) Access Drawings (Rev C)-GA-002
(9) Access Drawings (Rev C)-GA-003
(10) Access Drawings (Rev C)-GA-004
(11) Access Drawings (Rev C)-GA-005
(12) Access Drawings (Rev C)-GA-006
(13) Access Drawings (Rev C)-SPA-001
(14) Access Drawings (Rev C)-SPA-002
(15) Access Drawings (Rev C)-SPA-003
(16) Access Drawings (Rev C)-SPA-004
(17) Crossing Drawings (Rev C)-PC-001
(18) Crossing Drawings (Rev C)-PC-002
(19) 16031-TJOC-00-XX-DR-C-1010_Prop_LGF
(20) 16031-TJOC-00-XX-DR-C-1069
(21) 16031-TJOC-00-XX-DR-C-1082
(22) 16031-TJOC-00-XX-DR-C-1083
(23) 16031-TJOC-00-XX-DR-C-1022_Cycle_parking_Overal
(24) 16031-TJOC-00-XX-DR-C-1020_Cycle_parking_Podium
(25) 16031-TJOC-00-XX-DR-C-1021_Cycle_parking.

Appendix B – Designer Response Form

Engineering a Sustainable Future
Dublin | Cork | Galway | Mullingar | Donegal | London
o: +353 1 5242060 | e: info@ors.ie | w: www.ors.ie

Road Safety Audit Feedback Form

Job: 211148 – Proposed Dundrum Village SHD, Dundrum Town Centre, Co. Dublin

Stage of Audit: Stage 1

Date Audit Completed: 31/01/2022

Problem Reference in Safety Audit Report	To Be Completed by the Designer			To Be Completed Audit Team Leader
	Problem Accepted (Yes/No)	Recommendation Accepted (Yes/No)	Alternative Option (Describe) (Only complete if recommendation not accepted)	Alternative Option Accepted by Auditors (Yes/No)
P1	Yes	Yes	In response to the audit, we have updated the proposals to remove the shared cyclepath / footpath along the edge of the building and replace with a footpath facility for pedestrians only. Under these proposals (presented in TJOC Drawing 16031-TJOC-00-XX-DR-C-1010RevP06), cyclists would share the access road and we have introduced a short section of contra-flow cycleway at the southern end of the scheme to bring the cyclists back to the all-movements junction. The final layout would be developed in consultation with DLRCC.	
P2	Yes	Yes	A signage strategy will be included for the shared surface areas at podium level as part of the detailed design process.	
P3	Yes	Yes	A detailed lining scheme will be developed at detailed design stage to clearly identify the pedestrian routes through the car park.	
P4	Yes	Yes	The majority of stores have dedicated access from the service road with the exception of two stores which access through the car park. At detailed design stage, the layout will set out how pedestrians gain access to the stores. This will include the internal lining scheme for the car parks.	
P5	Yes	Yes	The signing and lining strategy will be addressed at detailed design stage. The signing and lining will make sure that the priorities are clear at the car park junctions.	

P6	No	No	The car park will be for residential use rather than commercial car parks so people will be familiar with pedestrian circulation and crossing points. We would recommend that the situation is monitored after opening to see if any speed issues occur.	
P7	Yes / No	Yes / No	It is accepted that the line marking scheme developed at detailed design stage will need to be specified. There are no dedicated footpaths identified within the car parks at this point in time where widths could be deemed as inappropriate.	
P8	No	No	There are no cul-de-sacs within the commercial car park area. There are cul-de-sacs within the residential car parks but these have been designed to standard which states we can have cul-de-sacs up to a maximum of 6 spaces in length. The residential car parks will have dedicated spaces so there should be no instances of drivers turning into an aisle and not gaining access to their parking space.	
P9	Yes	Yes	Agreed – swing gates will be changed to roller shutters. Noted that internal gates / shutters will remain open for the vast majority of the time unless closed for management purposes.	
P10	Yes	Yes	An updated drawing has been prepared to capture these comments. New layout caters for vulnerable users. Signage will be addressed at detailed design stage.	
P11	Yes	Yes	Noted – layout being updated to facilitate easier access.	
P12	Yes	Yes	Noted – Layout now updated to relocate disabled parking spaces in zones 2&3 closer to lifts.	
P13	Yes	Yes	In relation to the comment on the underground carpark not being included, please note that internal lighting does not form part of the scope of the planning application. This will be included in the detailed design stage. We can confirm that all lighting will be designed in accordance with the Society of Light & Lighting Handbook 2018 and shall be designed to an average of 20 Lux with higher levels at the entrances from the ramps.	
P14	Yes	Yes	Gulleys have not been detailed at planning application stage. Detailed design will include for complete drainage design including gulley positions. A draft drainage layout drawing is now available	

			showing indicative gulley positions.	
P15	Yes	Yes	The car park has been designed with standard aisle widths and corner radii so no issues expected for cars. The final layout will be fully checked at detailed design stage with a full swept path analysis.	
P16	Yes	Yes	A full signing and lining strategy will form part of the detailed design process.	
P17	Yes	Yes	Tactile paving will be included and dropped kerbs at the crossing locations on the service road.	
P18	Yes	Yes	Some additional detail now added to design drawings. Final signing and lining scheme will be addressed at details design stage and as part of the technical approval process for the junction.	
P19	Yes	Yes	Noted.	
P20	No	No	The bridge clearance over the bypass (public road) is 5.7m. The clear height reduces to 5.0m over the private service road where the clearance is in excess of the design vehicle heights that will be using the road.	
P21	Yes	Yes	A drawing will be included with the planning application to identify the maximum gradients on the ramps. The design intent is to ensure that gradients do not exceed 1 in 20.	

Signed: …A.DeVenny…… **Design Team Leader** **Date:** …8/2/22…….

Please complete and return to safety auditor.

Safety Audit

Signed Off ……**Audit Team Leader** **Date:** …14/03/2022…….

Safety Audit

Signed Off..... ..... **Employer/ Employer's representative**

Date: ……21.03.22……

APPENDIX G

DMURS Statement of Consistency

DMURS STATEMENT OF CONSISTENCY

DUNDRUM VILLAGE – STRATEGIC HOUSING DEVELOPMENT

STATEMENT OF CONSISTENCY WITH PLANNING POLICY

IDENTIFICATION TABLE	
Client/Project owner	Dundrum Retail GP DAC (Acting for and on behalf of Dundrum Retail Limited Partnership)
Project	Dundrum Village – Strategic Housing Development
Title of Document	DMURS Statement of Consistency
Type of Document	DMURS Statement of Consistency
Date	17/03/2022
Reference number	GB01T19E96/109025
Number of pages	7

TABLE OF CONTENTS

1. STATEMENT

1.1.1 SYSTRA Ltd on behalf of Dundrum Retail GP DAC (acting for and on behalf of Dundrum Retail Limited Partnership) has prepared this Statement of Consistency with the Design for Urban Roads and Streets (DMURS) (2019) to accompany the planning application to An Bord Pleanala in relation to the proposed Dundrum Village Strategic Housing Development on the site of the existing Dundrum Village Development in Dundrum Town Centre.

1.1.2 The proposed development comprises a Strategic Housing Development as defined within Section 3 of the Planning and Development (Housing) and Residential Tenancies Act 2016.

1.1.3 The purpose of this Statement of Consistency is to examine the proposed development in terms of consistency with the core principles of the DMURS.

1.1.4 The proposals are to create a new development consisting of 881 apartments along with retail and commercial uses, associated car parking and public realm space. The indicative development mix at this stage is as follows:

- 881 new apartment units;
- 3,424.7 sqm retail (including 2,028 sqm foodstore)
- 523.1 sqm Creche;
- 403.5 sqm café / restaurant;
- 107.4 sqm Commercial Plant / Ancillary;
- 1,750 cycle parking spaces: and
- 373 car parking spaces including 55 spaces to serve the retail/commercial uses (including 3no. for staff of the creche in Zone 4).

1.1.5 This statement of consistency confirms that the roads and streets contained within the proposed strategic housing development at Dundrum Village have been designed in accordance with the principles set out in the DMURS.

2. SPECIFIC CONSIDERATIONS

2.1.1 DMURS sets out design guidance and standards for constructing new and reconfiguring existing urban roads and streets in Ireland. It also outlines practical design measures to encourage more sustainable travel patterns in urban areas.

2.1.2 DMURS encourages safer and more sustainable forms of travel, prioritising users in a hierarchy of travel modes (from first to last); pedestrians, cyclists, public transport and private motor vehicles.

2.1.3 The design of the proposed development has followed the four core principles as outlined by DMURS:

Design Principle 1:

To support the creation of integrated street networks which promote higher levels of permeability and legibility for all users, and in particular more sustainable forms of transport.

2.1.4 In keeping with the recent infrastructure upgrades for pedestrians and cyclists on Main Street, the proposed access strategy is to eliminate all vehicular access points from Main Street. The purpose of this strategy is to further enhance the priority which is given to pedestrians under the new street layout and to create a more pleasant environment for walking and cycling in this corridor.

2.1.5 The street network (and interconnecting pedestrian / cycle routes) have been designed to maximise connections to local amenities, local services and local public transport infrastructure. High levels of permeability and legibility are provided that will enable residents of (and visitors to) the new development to move in a sustainable manner without the use of the private car as the prominent choice of travel.

2.1.6 The pedestrian and cycle networks that have been provided follow the natural features and topography of the site and these connect with the existing pedestrian infrastructure on Main Street and the Dundrum Bypass. The routes connect with the existing pedestrian and cycle networks on Main Street and on the Dundrum Bypass, the nearest bus stops on Main Street to the east and north, the Dundrum Luas Station to the east, the retail and leisure offerings within the existing Dundrum Town Centre development to the South, the local amenities on Main Street (shops, bank etc) and to the Sweetmount Park area to the west via a new combine pedestrian / cycle bridge over the Dundrum Bypass.

2.1.7 Pedestrian and cycling provision is very much at the forefront of the design criteria of the proposed development, ensuring that a high-level of pedestrian accessibility and permeability is provided with a network of continuous footways and footpaths throughout the development. This network of footways and paths will in turn offer safe, convenient and pleasant links through the site and to the wider pedestrian network.

2.1.8 For example, pedestrians and cyclists will be able to access the proposed development from Main Street approximately half way along the site frontage and head west through the development to meet a new combined pedestrian / cycle bridge over the Dundrum Bypass. The bridge provides a link across to Sweetmount Park and the residential area which lies to the west. This link will be available to residents to the new development providing leisure opportunities to the west whilst residents in the west will now have a direct link to Main Street and its various amenities (including the Dundrum LUAS station) as well as a link to the pedestrian and cycle infrastructure present in the Main Street corridor.

2.1.9 The proposals to upgrade the pedestrian accessibility of the site include the creation of a public square to the rear of Dundrum Church. It is intended to promote pedestrian movements across Dom Marmion Bridge between Dundrum Town Centre, Dundrum Village and the Main Street by providing a new raised pedestrian crossing on the bridge. A new raised pedestrian crossings will also be introduced on Main Street to link the proposed development with the Dundrum Luas Station. Pedestrian / cycle access will be possible through the development in both a north-south axis and in an east-west axis via a network of shared surface areas.

2.1.10 The pedestrian / cycle link connections through the site are indicated by Figure 1 below including the new bridge link to Sweetmount Park whilst Figure 2 indicates the masterplan for the proposed development. From Figure 2, it is possible to see the sustainable transport connections to the surrounding network as well as the extensive on-site routes which demonstrate the permeability of the site.

Figure 1 – Key Internal Sustainable Transport Links

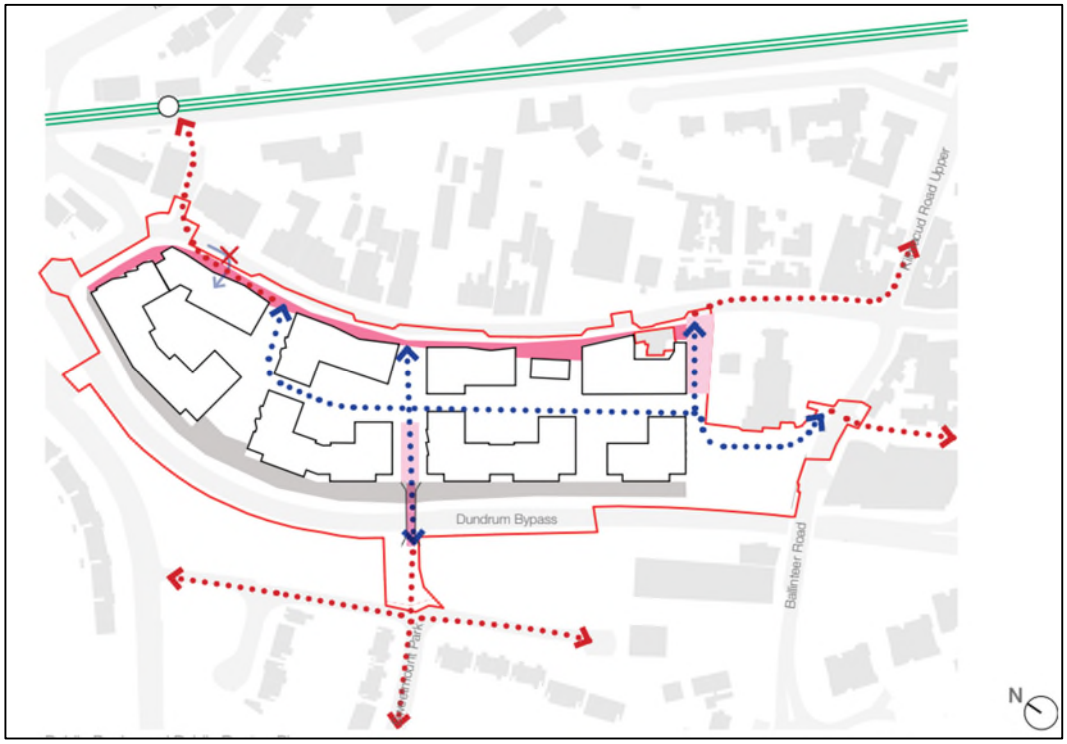
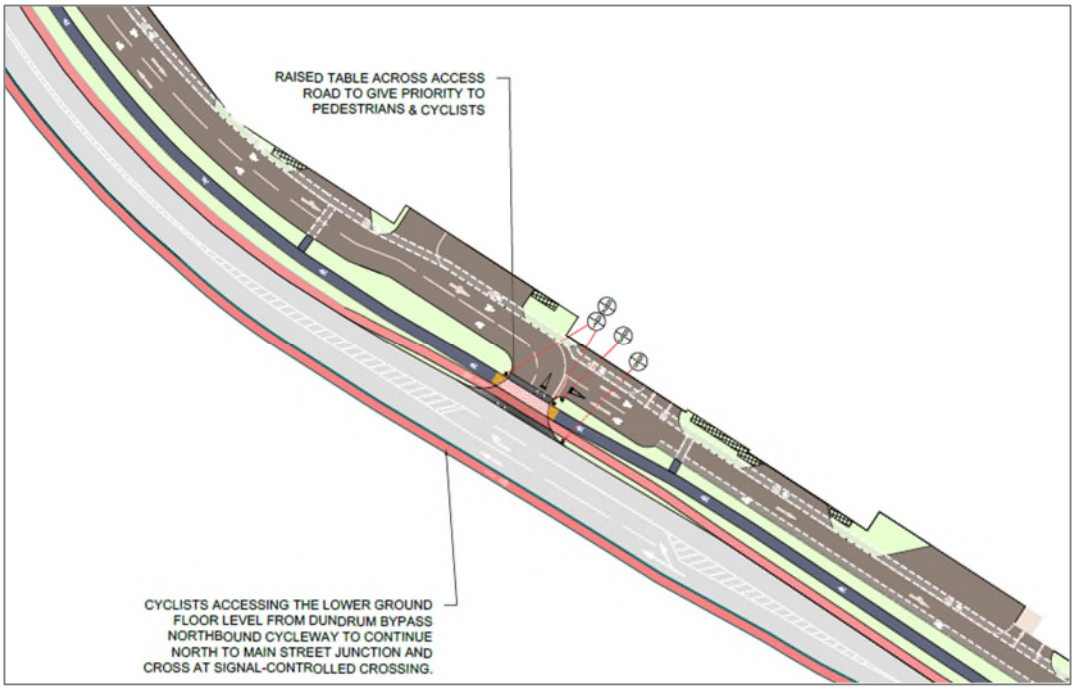


Figure 2 – Development Masterplan

2.1.11 Shared surfaces have been introduced as much as possible and cars accessing the development will do so from the Dundrum Bypass at the lower level of the development. This takes traffic away from the Main Street corridor which is the key sustainable transport corridor. An internal service road is provided from the Dundrum Bypass for development traffic and this will be a shared route with cyclists who can access cycle storage areas contained within the lower ground floor area. A designated pedestrian route is also provided along the western edge of the service road as well as the external cycleway and footpath that run along the edge of the Dundrum Bypass. Pedestrians and cyclists have right of way across the access junctions and a raised table has been introduced at the primary access point to ensure that the priorities are reinforced.

2.1.12 The new infrastructure will ensure that there is a high level of permeability for sustainable transport modes via a range of highly legible routes. The service road and associated sustainable transport provision is demonstrated by Figure 3.

Figure 3 – Service Road and Associated Sustainable Transport Provision



Design Principle 2:

The promotion of multifunctional streets that balance the needs of all users within a self-regulating environment.

2.1.13 The aim is to enhance the value of place while at the same time calming traffic and improving pedestrian and cyclist amenity. This has been achieved by the design of safe streets that encourage low speeds by the use of short road lengths and varied surfacing while at the same time providing cycle and pedestrian routes within the site which enable free movement for these users. This will be achieved using different coloured and textured surfaces between the shared surface areas, raised footpath areas and the street finishes surrounding the development.

Design Principle 3:

The quality of the street is measured by the quality of the pedestrian environment.

2.1.14 Street design has focused on the provision of high quality footways and conveniently located access points to enhance the amenity of the pedestrian environment within and adjacent to the proposed development. The materials, finish and street furniture will be rationally and strategically applied.

Design Principle 4:

Greater communication and cooperation between design professionals through the promotion of a plan-led, multi-disciplinary approach to design.

2.1.15 The design of the proposed Dundrum Village Strategic Housing Development at Dundrum Village has been carried out by a team of consultants comprising: Town Planning; Architecture; Landscape Architecture; Transport Planning; Civil, Structural, Mechanical and Electrical Engineering; and Environmental specialists.

2.1.16 The design team has had a clear understanding of the process required to produce collaborative and coordinated design, taking into account plans and policies, spatial requirements and movement patterns. The Design Team have developed a layout between the Architect, Civil Engineer, Transport Planning and Landscape Architect to provide a street scape and masterplan that is predominately focused on permeability for pedestrians and cyclists whilst addressing vehicle access in a way which reduces traffic from key areas and maintains the safety of sustainable transport users.

APPROVAL					
Version	**Name**		**Position**	**Date**	**Modifications**
1	Author	B Fleming	Senior Consultant	17/03/2022	FV1
	Checked by	A DeVenny	Projects Director	17/03/2022	
	Approved by	A DeVenny	Projects Director	17/03/2022	
2					

APPENDIX H

Traffic Model Input and Output Files

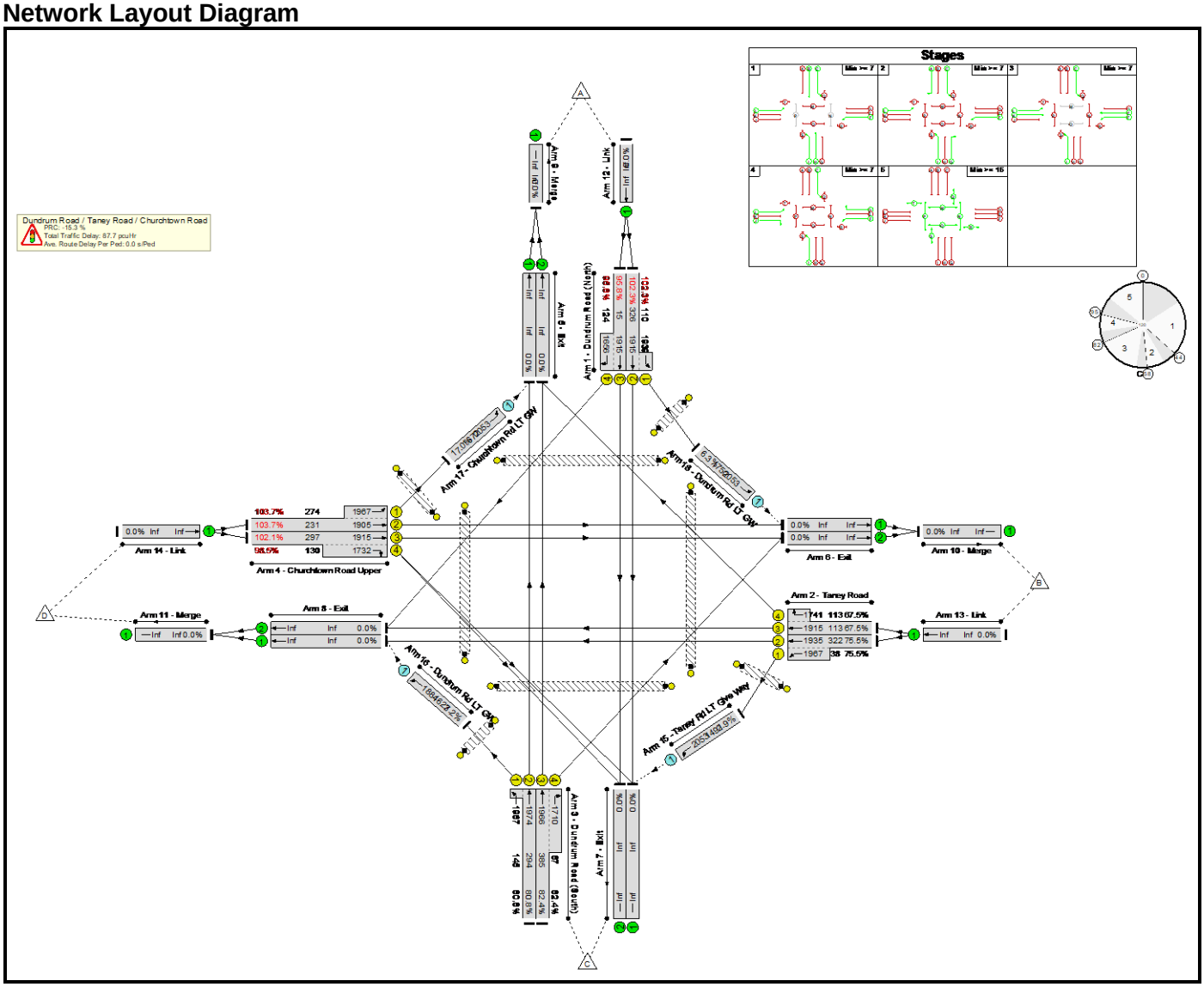
Basic Results Summary

User and Project Details

Project:	**Dundrum Phase 2**
Title:	
Location:	Dundrum, Dublin
Client:	Dundrum Retail GP DAC
Date Started:	23-Aug-21
Model Purpose:	Capacity Assessment of Dundrum Bypass / Main Street / Dundrum Road + Dundrum Road / Churchtown Road Upper / Taney Road
Flow Details:	See Network Flow Diagrams
Additional detail:	
File name:	Junction 1 - Dundrum-Churchtown-Taney.lsg3x
Author:	C Hunt
Company:	SYSTRA Ltd.
Address:	

Scenario 1: '2021 Base AM' (FG1: '2021 Base AM', Plan 1: 'Network Control Plan 1')

Network Layout Diagram



Basic Results Summary

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	-	-	-		-	-	-	-	-	-	**103.7%**	**144**	**395**	**0**	**87.7**	-	-
Dundrum Road / Taney Road / Churchtown Road	-	-	-		-	-	-	-	-	-	**103.7%**	**144**	**395**	**0**	**87.7**	-	-
1/2+1/1	Dundrum Road (North) Ahead Left	U	B C		1	25:88	-	445	1915:1939	326+110	102.3 : 102.3%	-	-	-	19.1	154.4	27.9
1/3+1/4	Dundrum Road (North) Ahead Right	U	B A		1	25:8	-	133	1915:1656	15+124	95.8 : 95.8%	-	-	-	6.5	175.0	8.4
2/2+2/1	Taney Road Ahead Ahead2	U	E F		1	19:88	-	272	1935:1967	322+38	75.5 : 75.5%	-	-	-	4.8	63.4	9.5
2/3+2/4	Taney Road Right Ahead	U	E D		1	19:8	-	152	1915:1741	113+113	67.5 : 67.5%	-	-	-	3.1	72.4	3.5
3/2+3/1	Dundrum Road (South) Ahead Left	U	H I		1	25:88	-	355	1974:1967	294+145	80.8 : 80.8%	-	-	-	6.0	61.1	12.7
3/3+3/4	Dundrum Road (South) Ahead Right	U	H G		1	25:9	-	389	1966:1710	385+87	82.4 : 82.4%	-	-	-	7.2	66.2	12.8
4/2+4/1	Churchtown Road Upper Ahead Ahead2	U	K L		1	19:88	-	524	1905:1967	231+274	103.7 : 103.7%	-	-	-	21.7	149.3	29.8
4/3+4/4	Churchtown Road Upper Ahead Right	U	K J		1	19:8	-	431	1915:1732	297+130	102.1 : 98.5%	-	-	-	18.9	157.8	24.1
15/1	Taney Rd LT Give Way Left	O	-		-	-	-	29	2053	1492	1.9%	0	29	0	0.0	2.7	0.2
16/1	Dundrum Rd LT GW Ahead	O	-		-	-	-	117	1884	1623	7.2%	53	64	0	0.2	6.0	2.1
17/1	Churchtown Rd LT GW Left	O	-		-	-	-	284	2053	1670	17.0%	52	232	0	0.2	1.9	1.3
18/1	Dundrum Rd LT GW Ahead	O	-		-	-	-	112	2053	1750	6.3%	39	70	0	0.2	5.0	2.1

Basic Results Summary

Ped Link: P1	Unnamed Ped Link	-	M		1	18	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P2	Unnamed Ped Link	-	N		1	20	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P3	Unnamed Ped Link	-	O		1	17	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P4	Unnamed Ped Link	-	P		1	20	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P5	Unnamed Ped Link	-	S		1	20	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P6	Unnamed Ped Link	-	T		1	20	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P7	Unnamed Ped Link	-	Q		1	20	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P8	Unnamed Ped Link	-	R		1	20	-	0	-	0	0.0%	-	-	-	-	-	-

C1	PRC for Signalled Lanes (%):	-15.3	Total Delay for Signalled Lanes (pcuHr):	87.21	Cycle Time (s):	120
	PRC Over All Lanes (%):	-15.3	Total Delay Over All Lanes(pcuHr):	87.73		

Basic Results Summary

Scenario 2: '2021 Base PM' (FG2: '2021 Base PM', Plan 1: 'Network Control Plan 1')

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	-	-	-		-	-	-	-	-	-	**97.3%**	**77**	**500**	**0**	**71.1**	-	-
Dundrum Road / Taney Road / Churchtown Road	-	-	-		-	-	-	-	-	-	**97.3%**	**77**	**500**	**0**	**71.1**	-	-
1/2+1/1	Dundrum Road (North) Ahead Left	U	B C		1	22:88	-	376	1915:1939	292+95	97.3 : 97.3%	-	-	-	12.0	114.5	19.2
1/3+1/4	Dundrum Road (North) Ahead Right	U	B A		1	22:11	-	269	1915:1656	129+151	95.9 : 95.9%	-	-	-	9.4	125.7	11.0
2/2+2/1	Taney Road Ahead Ahead2	U	E F		1	13:88	-	235	1935:1967	226+44	87.3 : 87.3%	-	-	-	5.9	89.7	9.7
2/3+2/4	Taney Road Right Ahead	U	E D		1	13:14	-	218	1915:1741	188+64	86.6 : 86.6%	-	-	-	5.8	96.2	9.0
3/2+3/1	Dundrum Road (South) Ahead Left	U	H I		1	22:88	-	383	1974:1967	154+274	89.5 : 89.5%	-	-	-	7.3	68.6	14.2
3/3+3/4	Dundrum Road (South) Ahead Right	U	H G		1	22:12	-	385	1966:1710	343+87	89.6 : 89.6%	-	-	-	8.8	81.9	14.2
4/2+4/1	Churchtown Road Upper Ahead Ahead2	U	K L		1	13:88	-	381	1905:1967	188+212	95.3 : 95.3%	-	-	-	9.0	84.9	13.0
4/3+4/4	Churchtown Road Upper Ahead Right	U	K J		1	13:14	-	420	1915:1732	223+217	97.1 : 93.8%	-	-	-	12.5	107.4	13.6
15/1	Taney Rd LT Give Way Left	O	-		-	-	-	38	2053	1480	2.6%	7	31	0	0.0	2.0	0.2
16/1	Dundrum Rd LT GW Ahead	O	-		-	-	-	245	1884	1684	14.5%	20	225	0	0.3	5.0	4.0
17/1	Churchtown Rd LT GW Left	O	-		-	-	-	202	2053	1794	11.3%	25	177	0	0.1	1.1	0.1
18/1	Dundrum Rd LT GW Ahead	O	-		-	-	-	92	2053	1838	5.0%	25	67	0	0.1	3.6	1.3

Basic Results Summary

Ped Link: P1	Unnamed Ped Link	-	M		1	18	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P2	Unnamed Ped Link	-	N		1	20	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P3	Unnamed Ped Link	-	O		1	17	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P4	Unnamed Ped Link	-	P		1	20	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P5	Unnamed Ped Link	-	S		1	20	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P6	Unnamed Ped Link	-	T		1	20	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P7	Unnamed Ped Link	-	Q		1	20	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P8	Unnamed Ped Link	-	R		1	20	-	0	-	0	0.0%	-	-	-	-	-	-

C1	PRC for Signalled Lanes (%):	-8.1	Total Delay for Signalled Lanes (pcuHr):	70.60	Cycle Time (s):	120	
	PRC Over All Lanes (%):	-8.1	Total Delay Over All Lanes(pcuHr):	71.12			

Basic Results Summary

Scenario 3: '2024 B+C AM' (FG3: '2024 B+C AM', Plan 1: 'Network Control Plan 1')

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	-	-	-		-	-	-	-	-	-	**102.4%**	**139**	**429**	**0**	**88.0**	-	-
Dundrum Road / Taney Road / Churchtown Road	-	-	-		-	-	-	-	-	-	**102.4%**	**139**	**429**	**0**	**88.0**	-	-
1/2+1/1	Dundrum Road (North) Ahead Left	U	B C		1	23:88	-	408	1915:1939	289+119	100.0 : 100.0%	-	-	-	14.8	130.9	22.7
1/3+1/4	Dundrum Road (North) Ahead Right	U	B A		1	23:8	-	208	1915:1656	79+124	102.3 : 102.3%	-	-	-	11.5	198.2	12.8
2/2+2/1	Taney Road Ahead Ahead2	U	E F		1	21:88	-	290	1935:1967	351+41	74.0 : 74.0%	-	-	-	4.8	59.8	9.9
2/3+2/4	Taney Road Right Ahead	U	E D		1	21:8	-	152	1915:1741	103+114	70.0 : 70.0%	-	-	-	3.2	74.7	3.7
3/2+3/1	Dundrum Road (South) Ahead Left	U	H I		1	23:88	-	371	1974:1967	273+134	91.3 : 91.3%	-	-	-	8.7	84.3	15.8
3/3+3/4	Dundrum Road (South) Ahead Right	U	H G		1	23:9	-	406	1966:1710	359+81	92.3 : 92.3%	-	-	-	10.1	89.1	16.2
4/2+4/1	Churchtown Road Upper Ahead Ahead2	U	K L		1	21:88	-	542	1905:1967	245+297	100.0 : 100.0%	-	-	-	15.8	105.0	23.8
4/3+4/4	Churchtown Road Upper Ahead Right	U	K J		1	21:8	-	454	1915:1732	319+130	100.6 : 102.4%	-	-	-	18.6	147.2	24.1
15/1	Taney Rd LT Give Way Left	O	-		-	-	-	30	2053	1527	2.0%	1	29	0	0.0	2.0	0.2
16/1	Dundrum Rd LT GW Ahead	O	-		-	-	-	122	1884	1603	7.6%	64	58	0	0.2	6.8	2.5
17/1	Churchtown Rd LT GW Left	O	-		-	-	-	297	2053	1668	17.8%	26	271	0	0.2	2.1	1.7
18/1	Dundrum Rd LT GW Ahead	O	-		-	-	-	119	2053	1725	6.9%	48	71	0	0.2	5.4	2.3

Basic Results Summary

Ped Link: P1	Unnamed Ped Link	-	M		1	18	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P2	Unnamed Ped Link	-	N		1	20	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P3	Unnamed Ped Link	-	O		1	17	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P4	Unnamed Ped Link	-	P		1	20	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P5	Unnamed Ped Link	-	S		1	20	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P6	Unnamed Ped Link	-	T		1	20	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P7	Unnamed Ped Link	-	Q		1	20	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P8	Unnamed Ped Link	-	R		1	20	-	0	-	0	0.0%	-	-	-	-	-	-

C1	PRC for Signalled Lanes (%):	-13.8	Total Delay for Signalled Lanes (pcuHr):	87.36	Cycle Time (s):	120
	PRC Over All Lanes (%):	-13.8	Total Delay Over All Lanes(pcuHr):	87.96		

Basic Results Summary

Scenario 4: '2024 B+C PM' (FG4: '2024 B+C PM', Plan 1: 'Network Control Plan 1')

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	-	-	-		-	-	-	-	-	-	**100.7%**	**55**	**551**	**0**	**93.0**	-	-
Dundrum Road / Taney Road / Churchtown Road	-	-	-		-	-	-	-	-	-	**100.7%**	**55**	**551**	**0**	**93.0**	-	-
1/2+1/1	Dundrum Road (North) Ahead Left	U	B C		1	21:88	-	364	1915:1939	274+99	97.6 : 97.6%	-	-	-	11.9	117.7	18.8
1/3+1/4	Dundrum Road (North) Ahead Right	U	B A		1	21:12	-	314	1915:1656	167+156	97.2 : 97.2%	-	-	-	11.1	127.3	12.7
2/2+2/1	Taney Road Ahead Ahead2	U	E F		1	13:88	-	246	1935:1967	226+44	91.3 : 91.3%	-	-	-	7.0	102.5	11.0
2/3+2/4	Taney Road Right Ahead	U	E D		1	13:14	-	228	1915:1741	188+64	90.4 : 90.4%	-	-	-	6.8	108.0	10.2
3/2+3/1	Dundrum Road (South) Ahead Left	U	H I		1	21:88	-	402	1974:1967	150+260	98.0 : 98.0%	-	-	-	12.2	109.4	19.7
3/3+3/4	Dundrum Road (South) Ahead Right	U	H G		1	21:13	-	406	1966:1710	330+84	98.2 : 98.2%	-	-	-	13.8	122.5	19.9
4/2+4/1	Churchtown Road Upper Ahead Ahead2	U	K L		1	13:88	-	401	1905:1967	188+215	99.7 : 99.7%	-	-	-	12.8	114.5	17.2
4/3+4/4	Churchtown Road Upper Ahead Right	U	K J		1	13:14	-	436	1915:1732	223+217	100.7 : 97.5%	-	-	-	16.8	138.3	17.9
15/1	Taney Rd LT Give Way Left	O	-		-	-	-	40	2053	1492	2.7%	6	34	0	0.0	1.8	0.2
16/1	Dundrum Rd LT GW Ahead	O	-		-	-	-	255	1884	1675	15.2%	10	245	0	0.4	5.6	4.6
17/1	Churchtown Rd LT GW Left	O	-		-	-	-	214	2053	1789	12.0%	22	192	0	0.1	1.2	0.1
18/1	Dundrum Rd LT GW Ahead	O	-		-	-	-	97	2053	1829	5.3%	16	81	0	0.1	3.9	1.4

Basic Results Summary

Ped Link: P1	Unnamed Ped Link	-	M		1	18	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P2	Unnamed Ped Link	-	N		1	20	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P3	Unnamed Ped Link	-	O		1	17	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P4	Unnamed Ped Link	-	P		1	20	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P5	Unnamed Ped Link	-	S		1	20	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P6	Unnamed Ped Link	-	T		1	20	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P7	Unnamed Ped Link	-	Q		1	20	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P8	Unnamed Ped Link	-	R		1	20	-	0	-	0	0.0%	-	-	-	-	-	-

C1	PRC for Signalled Lanes (%):	-11.9	Total Delay for Signalled Lanes (pcuHr):	92.39	Cycle Time (s): 120
	PRC Over All Lanes (%):	-11.9	Total Delay Over All Lanes(pcuHr):	92.98	

Basic Results Summary

Scenario 5: '2024 B+C+D AM' (FG5: '2024 B+C+D AM', Plan 1: 'Network Control Plan 1')

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	-	-	-		-	-	-	-	-	-	**105.5%**	**116**	**510**	**0**	**134.6**	-	-
Dundrum Road / Taney Road / Churchtown Road	-	-	-		-	-	-	-	-	-	**105.5%**	**116**	**510**	**0**	**134.6**	-	-
1/2+1/1	Dundrum Road (North) Ahead Left	U	B C		1	24:88	-	444	1915:1939	308+113	105.4 : 105.4%	-	-	-	24.2	196.5	32.9
1/3+1/4	Dundrum Road (North) Ahead Right	U	B A		1	24:8	-	159	1915:1656	31+124	102.3 : 102.3%	-	-	-	9.7	219.3	11.6
2/2+2/1	Taney Road Ahead Ahead2	U	E F		1	20:88	-	301	1935:1967	332+48	79.2 : 79.2%	-	-	-	5.4	64.6	10.6
2/3+2/4	Taney Road Right Ahead	U	E D		1	20:8	-	149	1915:1741	99+115	69.6 : 69.6%	-	-	-	3.1	75.3	3.7
3/2+3/1	Dundrum Road (South) Ahead Left	U	H I		1	24:88	-	444	1974:1967	251+178	103.5 : 103.5%	-	-	-	21.0	170.5	29.8
3/3+3/4	Dundrum Road (South) Ahead Right	U	H G		1	24:9	-	494	1966:1710	359+117	103.8 : 103.8%	-	-	-	23.9	174.5	31.6
4/2+4/1	Churchtown Road Upper Ahead Ahead2	U	K L		1	20:88	-	545	1905:1967	238+285	104.1 : 104.1%	-	-	-	23.1	152.8	31.7
4/3+4/4	Churchtown Road Upper Ahead Right	U	K J		1	20:8	-	455	1915:1732	307+130	103.5 : 105.5%	-	-	-	23.3	184.3	28.8
15/1	Taney Rd LT Give Way Left	O	-		-	-	-	38	2053	1509	2.5%	0	38	0	0.0	2.4	0.2
16/1	Dundrum Rd LT GW Ahead	O	-		-	-	-	184	1884	1603	11.1%	49	129	0	0.4	7.9	4.0
17/1	Churchtown Rd LT GW Left	O	-		-	-	-	297	2053	1660	17.9%	23	274	0	0.1	1.7	1.7
18/1	Dundrum Rd LT GW Ahead	O	-		-	-	-	119	2053	1737	6.5%	44	69	0	0.2	5.5	2.4

Basic Results Summary

Ped Link: P1	Unnamed Ped Link	-	M		1	18	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P2	Unnamed Ped Link	-	N		1	20	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P3	Unnamed Ped Link	-	O		1	17	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P4	Unnamed Ped Link	-	P		1	20	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P5	Unnamed Ped Link	-	S		1	20	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P6	Unnamed Ped Link	-	T		1	20	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P7	Unnamed Ped Link	-	Q		1	20	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P8	Unnamed Ped Link	-	R		1	20	-	0	-	0	0.0%	-	-	-	-	-	-

C1	PRC for Signalled Lanes (%):	-17.2	Total Delay for Signalled Lanes (pcuHr):	133.83	Cycle Time (s):	120
	PRC Over All Lanes (%):	-17.2	Total Delay Over All Lanes(pcuHr):	134.55		

Basic Results Summary

Scenario 6: '2024 B+C+D PM' (FG6: '2024 B+C+D PM', Plan 1: 'Network Control Plan 1')

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	-	-	-		-	-	-	-	-	-	**104.0%**	**58**	**570**	**0**	**117.8**	-	-
Dundrum Road / Taney Road / Churchtown Road	-	-	-		-	-	-	-	-	-	**104.0%**	**58**	**570**	**0**	**117.8**	-	-
1/2+1/1	Dundrum Road (North) Ahead Left	U	B C		1	19:88	-	351	1915:1939	248+95	102.6 : 102.6%	-	-	-	16.6	170.1	23.2
1/3+1/4	Dundrum Road (North) Ahead Right	U	B A		1	19:11	-	347	1915:1656	189+148	103.0 : 103.0%	-	-	-	17.5	181.5	21.0
2/2+2/1	Taney Road Ahead Ahead2	U	E F		1	14:88	-	278	1935:1967	232+84	88.0 : 88.0%	-	-	-	6.2	80.5	10.4
2/3+2/4	Taney Road Right Ahead	U	E D		1	14:16	-	230	1915:1741	200+67	86.0 : 86.0%	-	-	-	5.9	91.6	9.3
3/2+3/1	Dundrum Road (South) Ahead Left	U	H I		1	19:88	-	382	1974:1967	134+246	100.4 : 100.4%	-	-	-	14.1	133.1	21.2
3/3+3/4	Dundrum Road (South) Ahead Right	U	H G		1	19:12	-	392	1966:1710	302+87	100.6 : 100.6%	-	-	-	16.1	147.5	21.6
4/2+4/1	Churchtown Road Upper Ahead Ahead2	U	K L		1	14:88	-	418	1905:1967	197+207	103.4 : 103.4%	-	-	-	18.0	155.3	23.7
4/3+4/4	Churchtown Road Upper Ahead Right	U	K J		1	14:16	-	456	1915:1732	200+238	104.0 : 104.0%	-	-	-	22.9	180.4	25.8
15/1	Taney Rd LT Give Way Left	O	-		-	-	-	74	2053	1494	5.0%	3	71	0	0.0	1.7	0.2
16/1	Dundrum Rd LT GW Ahead	O	-		-	-	-	247	1884	1673	14.7%	25	221	0	0.4	5.8	4.8
17/1	Churchtown Rd LT GW Left	O	-		-	-	-	214	2053	1813	11.8%	14	200	0	0.1	1.1	0.1
18/1	Dundrum Rd LT GW Ahead	O	-		-	-	-	97	2053	1813	5.2%	17	77	0	0.1	4.3	1.6

Basic Results Summary

Ped Link: P1	Unnamed Ped Link	-	M		1	18	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P2	Unnamed Ped Link	-	N		1	20	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P3	Unnamed Ped Link	-	O		1	17	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P4	Unnamed Ped Link	-	P		1	20	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P5	Unnamed Ped Link	-	S		1	20	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P6	Unnamed Ped Link	-	T		1	20	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P7	Unnamed Ped Link	-	Q		1	20	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P8	Unnamed Ped Link	-	R		1	20	-	0	-	0	0.0%	-	-	-	-	-	-

C1	PRC for Signalled Lanes (%):	-15.6	Total Delay for Signalled Lanes (pcuHr):	117.23	Cycle Time (s): 120
	PRC Over All Lanes (%):	-15.6	Total Delay Over All Lanes(pcuHr):	117.84	

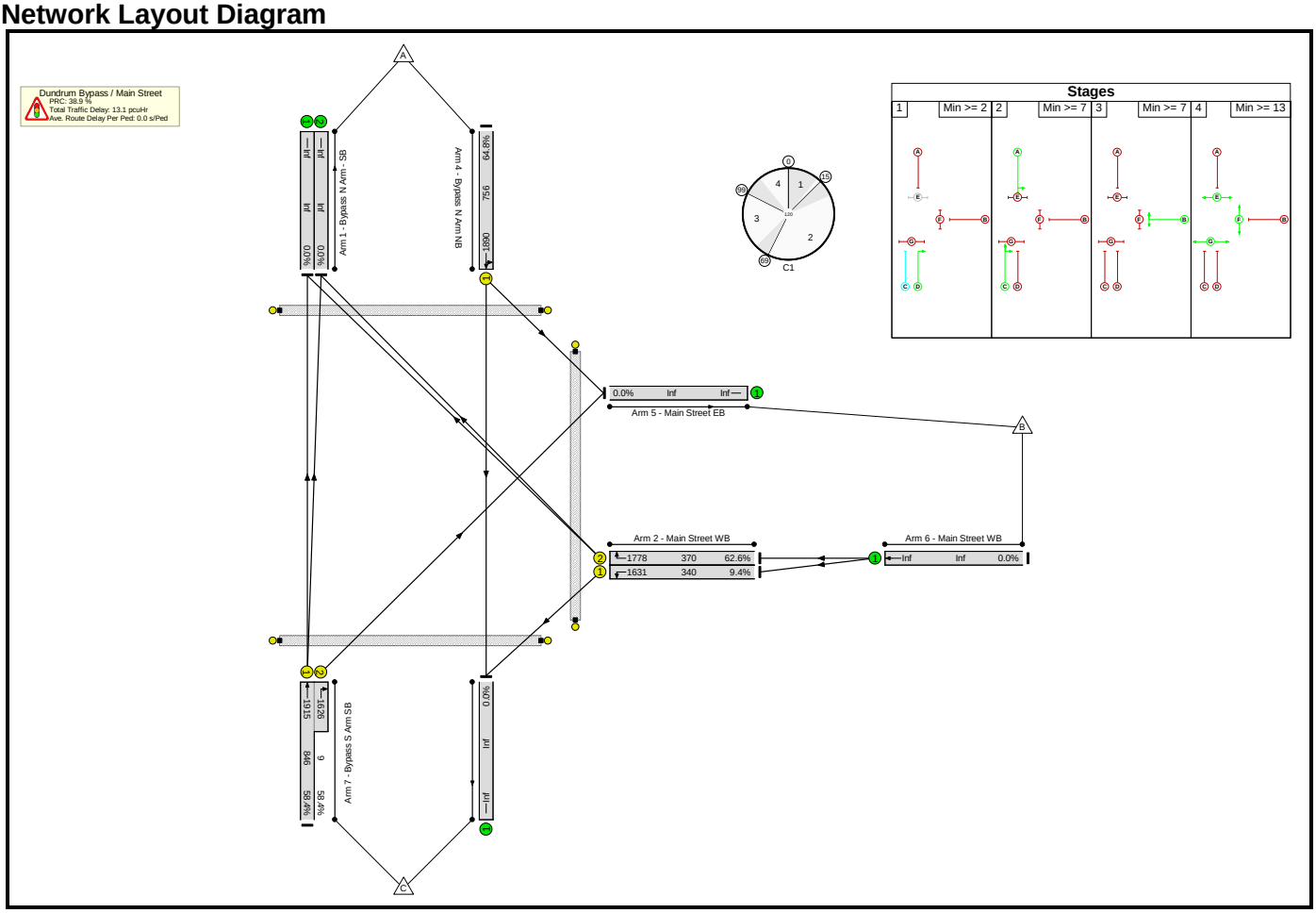
Basic Results Summary

User and Project Details

Project:	
Title:	
Location:	
Additional detail:	
File name:	Junction 2 - Dundrum Bypass - Main Street.lsg3x
Author:	
Company:	
Address:	

Scenario 1: '2021 AM' (FG1: '2021 AM', Plan 1: 'Network Control Plan 1')

Network Layout Diagram



Basic Results Summary

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	-	-	-		-	-	-	-	-	-	**64.8%**	**0**	**0**	**0**	**13.1**	-	-
Dundrum Bypass / Main Street	-	-	-		-	-	-	-	-	-	**64.8%**	**0**	**0**	**0**	**13.1**	-	-
1/1	Bypass N Arm - SB Left Ahead	U	A		1	47	-	490	1890	756	64.8%	-	-	-	4.9	35.9	14.1
2/1	Main Street WB Left	U	B		1	24	-	32	1631	340	9.4%	-	-	-	0.4	44.2	0.9
2/2	Main Street WB Right	U	B		1	24	-	232	1778	370	62.6%	-	-	-	3.6	56.1	7.9
3/1+3/2	Bypass South Arm NB Ahead Right	U	C	D	1	52:56	4	499	1915:1626	846+9	58.4 : 58.4%	-	-	-	4.2	30.2	13.0
Ped Link: P1	Unnamed Ped Link	-	E		1	13	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P2	Unnamed Ped Link	-	F		1	16	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P3	Unnamed Ped Link	-	G		1	15	-	0	-	0	0.0%	-	-	-	-	-	-

C1

PRC for Signalled Lanes (%): 38.9
PRC Over All Lanes (%): 38.9

Total Delay for Signalled Lanes (pcuHr): 13.08
Total Delay Over All Lanes(pcuHr): 13.08

Cycle Time (s): 120

Basic Results Summary

Scenario 2: '2021 PM' (FG2: '2021 PM', Plan 1: 'Network Control Plan 1')

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	-	-	-		-	-	-	-	-	-	**78.7%**	**0**	**0**	**0**	**17.5**	-	-
Dundrum Bypass / Main Street	-	-	-		-	-	-	-	-	-	**78.7%**	**0**	**0**	**0**	**17.5**	-	-
1/1	Bypass N Arm - SB Left Ahead	U	A		1	51	-	638	1891	819	77.9%	-	-	-	6.9	38.8	19.8
2/1	Main Street WB Left	U	B		1	20	-	99	1631	285	34.7%	-	-	-	1.5	53.1	3.2
2/2	Main Street WB Right	U	B		1	20	-	245	1778	311	78.7%	-	-	-	5.0	73.2	9.5
3/1+3/2	Bypass South Arm NB Ahead Right	U	C	D	1	56:60	4	545	1915:1626	905+17	59.1 : 59.1%	-	-	-	4.2	27.7	13.6
Ped Link: P1	Unnamed Ped Link	-	E		1	13	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P2	Unnamed Ped Link	-	F		1	16	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P3	Unnamed Ped Link	-	G		1	15	-	0	-	0	0.0%	-	-	-	-	-	-

C1

PRC for Signalled Lanes (%): 14.3
PRC Over All Lanes (%): 14.3

Total Delay for Signalled Lanes (pcuHr): 17.51
Total Delay Over All Lanes(pcuHr): 17.51

Cycle Time (s): 120

Basic Results Summary

Scenario 3: '2024 B+C AM' (FG3: '2024 B+C AM', Plan 1: 'Network Control Plan 1')

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	-	-	-		-	-	-	-	-	-	**68.1%**	**0**	**0**	**0**	**14.0**	-	-
Dundrum Bypass / Main Street	-	-	-		-	-	-	-	-	-	**68.1%**	**0**	**0**	**0**	**14.0**	-	-
1/1	Bypass N Arm - SB Left Ahead	U	A		1	48	-	518	1890	772	67.1%	-	-	-	5.2	36.0	15.0
2/1	Main Street WB Left	U	B		1	23	-	33	1631	326	10.1%	-	-	-	0.4	45.3	0.9
2/2	Main Street WB Right	U	B		1	23	-	242	1778	356	68.1%	-	-	-	4.0	60.0	8.5
3/1+3/2	Bypass South Arm NB Ahead Right	U	C	D	1	53:57	4	522	1915:1626	862+10	59.9 : 59.9%	-	-	-	4.3	29.9	13.6
Ped Link: P1	Unnamed Ped Link	-	E		1	13	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P2	Unnamed Ped Link	-	F		1	16	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P3	Unnamed Ped Link	-	G		1	15	-	0	-	0	0.0%	-	-	-	-	-	-

C1

PRC for Signalled Lanes (%): 32.2
PRC Over All Lanes (%): 32.2

Total Delay for Signalled Lanes (pcuHr): 13.97
Total Delay Over All Lanes(pcuHr): 13.97

Cycle Time (s): 120

Basic Results Summary

Scenario 4: '2024 B+C PM' (FG4: '2024 B+C PM', Plan 1: 'Network Control Plan 1')

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	-	-	-		-	-	-	-	-	-	**82.9%**	**0**	**0**	**0**	**19.4**	-	-
Dundrum Bypass / Main Street	-	-	-		-	-	-	-	-	-	**82.9%**	**0**	**0**	**0**	**19.4**	-	-
1/1	Bypass N Arm - SB Left Ahead	U	A		1	51	-	668	1892	820	81.5%	-	-	-	7.7	41.3	21.6
2/1	Main Street WB Left	U	B		1	20	-	103	1631	285	36.1%	-	-	-	1.5	53.4	3.3
2/2	Main Street WB Right	U	B		1	20	-	258	1778	311	82.9%	-	-	-	5.7	79.0	10.5
3/1+3/2	Bypass South Arm NB Ahead Right	U	C	D	1	56:60	4	573	1915:1626	906+16	62.1 : 62.1%	-	-	-	4.5	28.5	14.7
Ped Link: P1	Unnamed Ped Link	-	E		1	13	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P2	Unnamed Ped Link	-	F		1	16	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P3	Unnamed Ped Link	-	G		1	15	-	0	-	0	0.0%	-	-	-	-	-	-

C1

PRC for Signalled Lanes (%): 8.5
PRC Over All Lanes (%): 8.5

Total Delay for Signalled Lanes (pcuHr): 19.40
Total Delay Over All Lanes(pcuHr): 19.40

Cycle Time (s): 120

Basic Results Summary

Scenario 5: '2024 B+C+D AM' (FG5: '2024 B+C+D AM', Plan 1: 'Network Control Plan 1')

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	-	-	-		-	-	-	-	-	-	**75.5%**	**0**	**0**	**0**	**16.0**	-	-
Dundrum Bypass / Main Street	-	-	-		-	-	-	-	-	-	**75.5%**	**0**	**0**	**0**	**16.0**	-	-
1/1	Bypass N Arm - SB Left Ahead	U	A		1	51	-	517	1900	823	62.8%	-	-	-	4.6	32.3	14.2
2/1	Main Street WB Left	U	B		1	20	-	34	1631	285	11.9%	-	-	-	0.5	48.9	1.0
2/2	Main Street WB Right	U	B		1	20	-	231	1778	311	74.2%	-	-	-	4.4	68.6	8.6
3/1+3/2	Bypass South Arm NB Ahead Right	U	C	D	1	56:60	4	693	1915:1626	910+8	75.5 : 75.5%	-	-	-	6.5	33.7	20.2
Ped Link: P1	Unnamed Ped Link	-	E		1	13	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P2	Unnamed Ped Link	-	F		1	16	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P3	Unnamed Ped Link	-	G		1	15	-	0	-	0	0.0%	-	-	-	-	-	-

C1

PRC for Signalled Lanes (%): 19.2
PRC Over All Lanes (%): 19.2

Total Delay for Signalled Lanes (pcuHr): 15.99
Total Delay Over All Lanes(pcuHr): 15.99

Cycle Time (s): 120

Basic Results Summary

Scenario 6: '2024 B+C+D PM' (FG6: '2024 B+C+D PM', Plan 1: 'Network Control Plan 1')

Network Results

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	-	-	-		-	-	-	-	-	-	**82.6%**	**0**	**0**	**0**	**18.6**	-	-
Dundrum Bypass / Main Street	-	-	-		-	-	-	-	-	-	**82.6%**	**0**	**0**	**0**	**18.6**	-	-
1/1	Bypass N Arm - SB Left Ahead	U	A		1	57	-	760	1903	920	82.6%	-	-	-	7.9	37.6	24.1
2/1	Main Street WB Left	U	B		1	14	-	104	1631	204	51.0%	-	-	-	1.9	66.9	3.8
2/2	Main Street WB Right	U	B		1	14	-	181	1778	222	81.4%	-	-	-	4.6	90.9	7.8
3/1+3/2	Bypass South Arm NB Ahead Right	U	C	D	1	62:66	4	618	1915:1626	1000+18	60.7 : 60.7%	-	-	-	4.2	24.3	14.8
Ped Link: P1	Unnamed Ped Link	-	E		1	13	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P2	Unnamed Ped Link	-	F		1	16	-	0	-	0	0.0%	-	-	-	-	-	-
Ped Link: P3	Unnamed Ped Link	-	G		1	15	-	0	-	0	0.0%	-	-	-	-	-	-

C1

PRC for Signalled Lanes (%): 8.9
PRC Over All Lanes (%): 8.9

Total Delay for Signalled Lanes (pcuHr): 18.61
Total Delay Over All Lanes(pcuHr): 18.61

Cycle Time (s): 120

Junctions 9

PICADY 9 - Priority Intersection Module

Filename: Site Central Access.j9
Path: \\GLASGOWFILE\Jobs\SCT\2021\T&T\109025 - Dundrum Phase 2\CALCULATIONS\TRAFFIC\PICADY
Report generation date: 12/13/2021 1:53:26 PM

Summary of junction performance

	AM					PM				
	Set ID	Queue (PCU)	Delay (s)	RFC	LOS	Set ID	Queue (PCU)	Delay (s)	RFC	LOS
	2024 B+C+D									
Stream B-AC	D1	1.0	18.90	0.52	C	D2	0.4	14.96	0.29	B
Stream C-AB		0.0	7.75	0.04	A		0.1	9.63	0.13	A

There are warnings associated with one or more model runs - see the 'Data Errors and Warnings' tables for each Analysis or Demand Set.

Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle.

File summary

File Description

Title	
Location	
Site number	
Date	12/13/2021
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	ADSYSTRA\cdenton
Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	PCU	PCU	perHour	s	-Min	perMin

Analysis Options

Calculate Queue Percentiles	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
		0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2024 B+C+D	AM	ONE HOUR	08:00	09:30	15
D2	2024 B+C+D	PM	ONE HOUR	17:00	18:30	15

Analysis Set Details

ID	Network flow scaling factor (%)
A1	100.000

2024 B+C+D, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	untitled	T-Junction	Two-way		2.97	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description	Arm type
A	Dundrum Bypass N		Major
B	Site Access Point		Minor
C	Dundrum Bypass South		Major

Major Arm Geometry

Arm	Width of carriageway (m)	Has kerbed central reserve	Has right turn bay	Visibility for right turn (m)	Blocks?	Blocking queue (PCU)
C	9.00			45.0	✓	6.00

Geometries for Arm C are measured opposite Arm B. Geometries for Arm A (if relevant) are measured opposite Arm D.

Minor Arm Geometry

Arm	Minor arm type	Lane width (m)	Visibility to left (m)	Visibility to right (m)
B	One lane	4.50	70	70

Slope / Intercept / Capacity

Priority Intersection Slopes and Intercepts

Stream	Intercept (PCU/hr)	Slope for A-B	Slope for A-C	Slope for C-A	Slope for C-B
B-A	616	0.097	0.246	0.155	0.352
B-C	768	0.102	0.259	-	-
C-B	600	0.202	0.202	-	-

The slopes and intercepts shown above do NOT include any corrections or adjustments.

Streams may be combined, in which case capacity will be adjusted.

Values are shown for the first time segment only; they may differ for subsequent time segments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2024 B+C+D	AM	ONE HOUR	08:00	09:30	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A		✓	515	100.000
B		✓	185	100.000
C		✓	528	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A	B	C
From	A	0	10	505
	B	172	0	13
	C	509	19	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A	B	C
From	A	0	0	0
	B	0	0	0
	C	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
B-AC	0.52	18.90	1.0	C
C-AB	0.04	7.75	0.0	A
C-A				
A-B				
A-C				

Main Results for each time segment

08:00 - 08:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-AC	139	467	0.298	138	0.4	10.871	B
C-AB	14	522	0.027	14	0.0	7.092	A
C-A	383			383			
A-B	8			8			
A-C	380			380			

08:15 - 08:30

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-AC	166	436	0.381	166	0.6	13.253	B
C-AB	17	506	0.034	17	0.0	7.355	A
C-A	458			458			
A-B	9			9			
A-C	454			454			

08:30 - 08:45

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-AC	204	394	0.517	202	1.0	18.591	C
C-AB	21	485	0.043	21	0.0	7.750	A
C-A	560			560			
A-B	11			11			
A-C	556			556			

08:45 - 09:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-AC	204	394	0.517	204	1.0	18.899	C
C-AB	21	485	0.043	21	0.0	7.750	A
C-A	560			560			
A-B	11			11			
A-C	556			556			

09:00 - 09:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-AC	166	436	0.381	168	0.6	13.492	B
C-AB	17	506	0.034	17	0.0	7.359	A
C-A	458			458			
A-B	9			9			
A-C	454			454			

09:15 - 09:30

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-AC	139	467	0.298	140	0.4	11.034	B
C-AB	14	522	0.027	14	0.0	7.095	A
C-A	383			383			
A-B	8			8			
A-C	380			380			

2024 B+C+D, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	untitled	T-Junction	Two-way		1.24	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D2	2024 B+C+D	PM	ONE HOUR	17:00	18:30	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A		✓	765	100.000
B		✓	89	100.000
C		✓	614	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A	B	C
From	A	0	36	729
	B	66	0	23
	C	563	51	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A	B	C
From	A	0	0	0
	B	0	0	0
	C	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
B-AC	0.29	14.96	0.4	B
C-AB	0.13	9.63	0.1	A
C-A				
A-B				
A-C				

Main Results for each time segment

17:00 - 17:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-AC	67	439	0.152	66	0.2	9.628	A
C-AB	38	484	0.079	38	0.1	8.074	A
C-A	424			424			
A-B	27			27			
A-C	549			549			

17:15 - 17:30

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-AC	80	397	0.201	80	0.2	11.318	B
C-AB	46	461	0.099	46	0.1	8.667	A
C-A	506			506			
A-B	32			32			
A-C	655			655			

17:30 - 17:45

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-AC	98	339	0.289	97	0.4	14.888	B
C-AB	56	430	0.131	56	0.1	9.627	A
C-A	620			620			
A-B	40			40			
A-C	803			803			

17:45 - 18:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-AC	98	339	0.289	98	0.4	14.962	B
C-AB	56	430	0.131	56	0.1	9.635	A
C-A	620			620			
A-B	40			40			
A-C	803			803			

18:00 - 18:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-AC	80	397	0.201	81	0.3	11.385	B
C-AB	46	461	0.099	46	0.1	8.677	A
C-A	506			506			
A-B	32			32			
A-C	655			655			

18:15 - 18:30

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-AC	67	439	0.153	67	0.2	9.683	A
C-AB	38	484	0.079	38	0.1	8.090	A
C-A	424			424			
A-B	27			27			
A-C	549			549			

Junctions 9

PICADY 9 - Priority Intersection Module

Version: 9.5.1.7462

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Filename: Site Southern Ecit.j9
Path: \\GLASGOWFILE\Jobs\SCT\2021\T&T\109025 - Dundrum Phase 2\CALCULATIONS\TRAFFIC\PICADY
Report generation date: 12/13/2021 2:13:56 PM

Summary of junction performance

	AM					PM				
	Set ID	Queue (PCU)	Delay (s)	RFC	LOS	Set ID	Queue (PCU)	Delay (s)	RFC	LOS
	2024 B+C+D									
Stream B-AC	D1	0.0	6.12	0.02	A	D2	0.1	7.17	0.05	A
Stream C-AB		0.0	0.00	0.00	A		0.0	0.00	0.00	A

There are warnings associated with one or more model runs - see the 'Data Errors and Warnings' tables for each Analysis or Demand Set.

Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle.

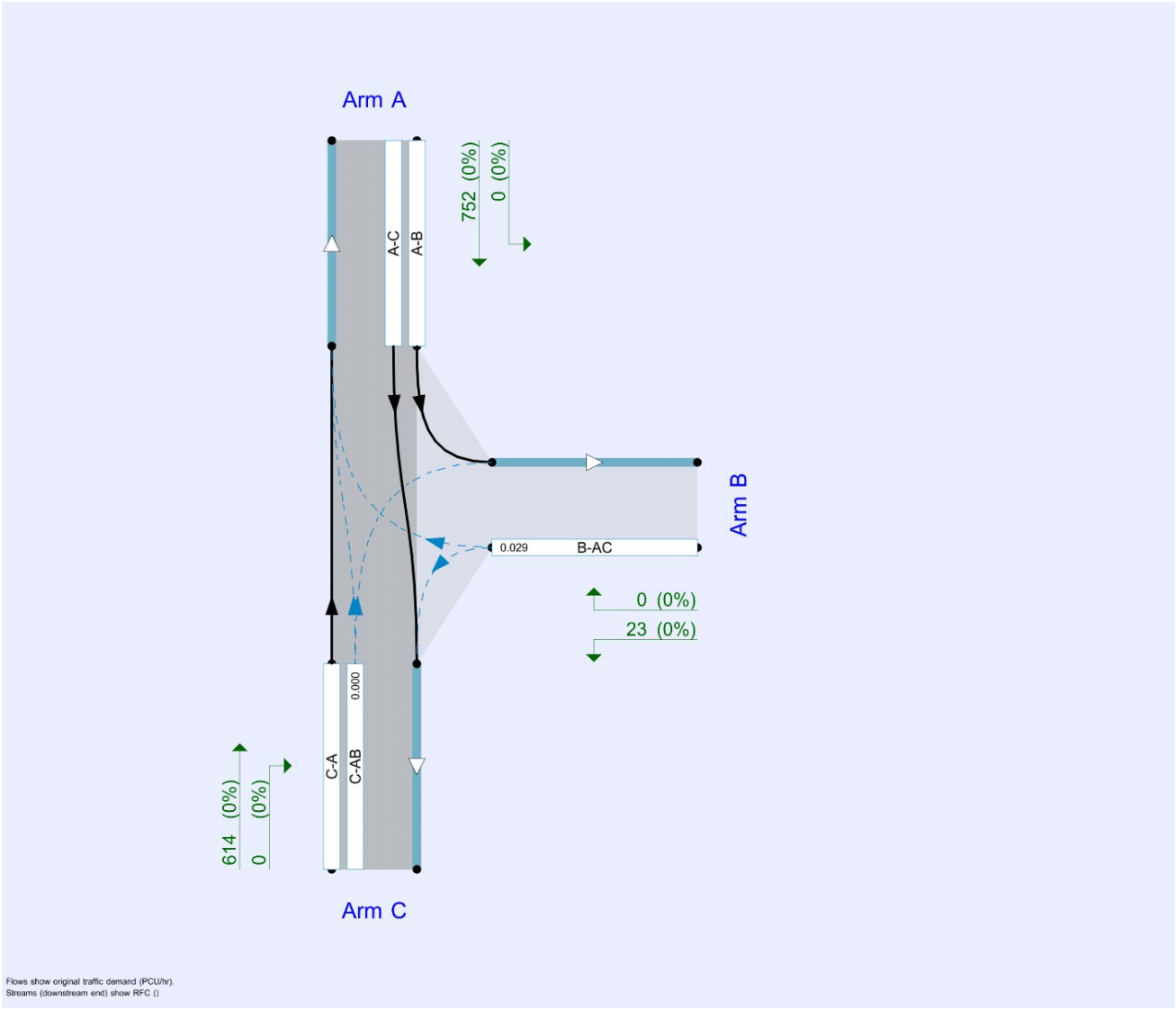
File summary

File Description

Title	
Location	
Site number	
Date	12/13/2021
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	ADSYSTRA\cdenton
Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	PCU	PCU	perHour	s	-Min	perMin



The junction diagram reflects the last run of Junctions.

Analysis Options

Calculate Queue Percentiles	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
		0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2024 B+C+D	AM	ONE HOUR	08:00	09:30	15
D2	2024 B+C+D	PM	ONE HOUR	17:00	18:30	15

Analysis Set Details

ID	Network flow scaling factor (%)
A1	100.000

2024 B+C+D, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	untitled	T-Junction	Two-way		0.08	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description	Arm type
A	Dundrum Bypass N		Major
B	Site South Exit		Minor
C	Dundrum Bypass South		Major

Major Arm Geometry

Arm	Width of carriageway (m)	Has kerbed central reserve	Has right turn bay	Visibility for right turn (m)	Blocks?	Blocking queue (PCU)
C	6.50			95.0	✓	6.00

Geometries for Arm C are measured opposite Arm B. Geometries for Arm A (if relevant) are measured opposite Arm D.

Minor Arm Geometry

Arm	Minor arm type	Lane width (m)	Visibility to left (m)	Visibility to right (m)
B	One lane	4.50	70	70

Slope / Intercept / Capacity

Priority Intersection Slopes and Intercepts

Stream	Intercept (PCU/hr)	Slope for A-B	Slope for A-C	Slope for C-A	Slope for C-B
B-A	616	0.110	0.277	0.174	0.396
B-C	768	0.115	0.291	-	-
C-B	629	0.238	0.238	-	-

The slopes and intercepts shown above do NOT include any corrections or adjustments.

Streams may be combined, in which case capacity will be adjusted.

Values are shown for the first time segment only; they may differ for subsequent time segments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2024 B+C+D	AM	ONE HOUR	08:00	09:30	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A		✓	518	100.000
B		✓	13	100.000
C		✓	529	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A	B	C
From	A	0	0	518
	B	0	0	13
	C	529	0	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A	B	C
From	A	0	0	0
	B	0	0	0
	C	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
B-AC	0.02	6.12	0.0	A
C-AB	0.00	0.00	0.0	A
C-A				
A-B				
A-C				

Main Results for each time segment

08:00 - 08:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-AC	10	655	0.015	10	0.0	5.581	A
C-AB	0	1072	0.000	0	0.0	0.000	A
C-A	398			398			
A-B	0			0			
A-C	390			390			

08:15 - 08:30

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-AC	12	633	0.018	12	0.0	5.796	A
C-AB	0	1036	0.000	0	0.0	0.000	A
C-A	476			476			
A-B	0			0			
A-C	466			466			

08:30 - 08:45

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-AC	14	602	0.024	14	0.0	6.122	A
C-AB	0	986	0.000	0	0.0	0.000	A
C-A	582			582			
A-B	0			0			
A-C	570			570			

08:45 - 09:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-AC	14	602	0.024	14	0.0	6.122	A
C-AB	0	986	0.000	0	0.0	0.000	A
C-A	582			582			
A-B	0			0			
A-C	570			570			

09:00 - 09:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-AC	12	633	0.018	12	0.0	5.798	A
C-AB	0	1036	0.000	0	0.0	0.000	A
C-A	476			476			
A-B	0			0			
A-C	466			466			

09:15 - 09:30

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-AC	10	655	0.015	10	0.0	5.583	A
C-AB	0	1072	0.000	0	0.0	0.000	A
C-A	398			398			
A-B	0			0			
A-C	390			390			

2024 B+C+D, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	untitled	T-Junction	Two-way		0.12	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D2	2024 B+C+D	PM	ONE HOUR	17:00	18:30	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A		✓	752	100.000
B		✓	23	100.000
C		✓	614	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A	B	C
From	A	0	0	752
	B	0	0	23
	C	614	0	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A	B	C
From	A	0	0	0
	B	0	0	0
	C	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
B-AC	0.05	7.17	0.1	A
C-AB	0.00	0.00	0.0	A
C-A				
A-B				
A-C				

Main Results for each time segment

17:00 - 17:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-AC	17	603	0.029	17	0.0	6.138	A
C-AB	0	988	0.000	0	0.0	0.000	A
C-A	462			462			
A-B	0			0			
A-C	566			566			

17:15 - 17:30

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-AC	21	571	0.036	21	0.0	6.535	A
C-AB	0	936	0.000	0	0.0	0.000	A
C-A	552			552			
A-B	0			0			
A-C	676			676			

17:30 - 17:45

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-AC	25	527	0.048	25	0.1	7.172	A
C-AB	0	863	0.000	0	0.0	0.000	A
C-A	676			676			
A-B	0			0			
A-C	828			828			

17:45 - 18:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-AC	25	527	0.048	25	0.1	7.172	A
C-AB	0	863	0.000	0	0.0	0.000	A
C-A	676			676			
A-B	0			0			
A-C	828			828			

18:00 - 18:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-AC	21	571	0.036	21	0.0	6.536	A
C-AB	0	936	0.000	0	0.0	0.000	A
C-A	552			552			
A-B	0			0			
A-C	676			676			

18:15 - 18:30

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-AC	17	603	0.029	17	0.0	6.144	A
C-AB	0	988	0.000	0	0.0	0.000	A
C-A	462			462			
A-B	0			0			
A-C	566			566			

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