TRAFFIC & TRANSPORT ASSESSMENT

Zoning Application on SLR-3 Site Douglas Cork

May 2020

Document Control Sheet

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1.0 INTRODUCTION

1.1 INTRODUCTION

1.1.1 MHL Consulting Engineers has been instructed by MOS Homes to prepare a Traffic & Transport Assessment (TTA) in support of a Zoning Application on lands designated SLR-3 (Strategic Land Reserve 3) as part of the City Council's Options document.

1.1.2 A draft layout for the lands has been developed by Deady Gahan Architects comprising of 750 number residential units, a local retail area and creche.

1.1.3 This TTA will assess how the proposed lands will impact the surrounding roads network. It will consider appropriate access arrangements and the transport choices available to future users of the application site and how the existing/proposed transport infrastructure surrounding the site will influence that choice. The impact of traffic demand generated by the proposals will be considered and quantified.

1.1.4 The scope of this study has been agreed with Cork City Council's Traffic & Transportation Department. Technical Notes have been produced to agree the key parameters relating to the traffic modelling carried out including, junctions to be assessed, trip generation, modal shift targets, trip distribution, assessment years and the presentation of results.

1.1.5 The key junctions in the area surrounding the proposed development are shown in **Figure 1.1** and are as follows:

- Junction 1: 50m Diameter Roundabout at the Junction of Maryborough Hill and the R609 ('The Fingerpost Roundabout').
- Junction 2. Traffic Signal Controlled cross-roads junction serving Maryborough Woods and Maryborough House Hotel.
- Junction 3: Slip -on to the N28 National Primary Road.
- Junction 4: N28 Interchange.
- Junction 5: The junction of R609 and Maryborough Woods.
- Junction 6: R609 Carrigaline Road Slip-off.
- Junction 7: Douglas Court Roundabout

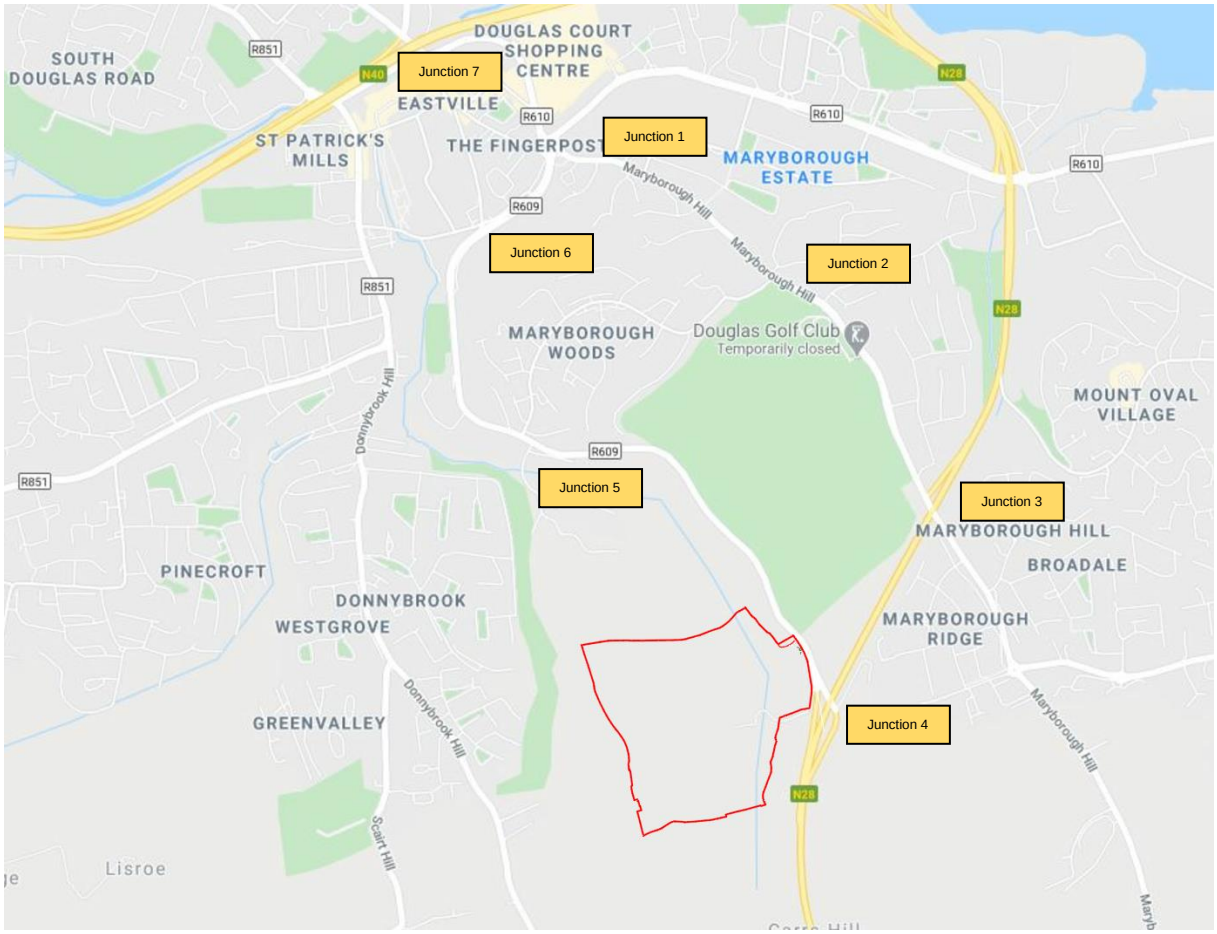

Figure 1.1: Critical Junction Locations

1.2 PLANNING BACKGROUND

1.2.1 The lands at Castletreasure labelled SLR-3 (27.5 ha) have been identified as part of the Metropolitan Cork Strategic Land Reserve site assessment process in-line with the requirements of the Cork County Development Plan 2014 to provide headroom within the residential land supply to account for anticipated economic and population growth within Metropolitan Cork.

1.2.2 The proposed zoning of these lands for residential development would be in accordance with the Core Strategy of the Cork County Development Plan which sees the Southern Environs as part of the main engine of population and employment growth for the region.

1.2.3 The lands immediately to the North of the site, designated SE-R-06 in the Ballincollig Carrigaline Municipal District Local Area Plan, have recently been granted planning permission under the Strategic Housing Development process (Planning Ref 304351). This permission will see the construction of 472 residential units and a creche and includes approximately 4.4 ha of landscaped parkland including a section of the Ballybrack Greenway, connecting to the existing Cork County Council Cycle Network in Douglas.
A 24 classroom Primary School (permitted under Cork County Council planning application ref. 18/5369) is located within these same lands and is to be developed in conjunction with the residential site. The Cork Cycle Network Plan seeks to link the Ballybrack greenway to Maryborough Hill via the existing junction on the N28 (Junction 4) and to continue the parkland south through the lands the subject of this application.

1.2.4 Two public road infrastructure schemes are proposed near the site. The M28 (Cork to Ringaskiddy) Motorway scheme which includes a full grade separated interchange immediately to the south of the SLR-3 lands.

The second is a proposed signalised junction and viaduct over the Ballybrack Valley linking the R609 to the Grange Road. This scheme was detailed in the Douglas Land Use & Transportation Study (DLUTS) and it is understood that it will be revisited as part of the recently published Cork Metropolitan Area Transport Strategy (CMATS) study. DLUTS outlines specific measures to promote sustainable transport options in Douglas, a number of which have been implemented such as on-road cycle lanes and bus stop provision. CMATS will identify additional measures to further promote public transport, cycle and walking solutions based on the density of population served.
The M28 road scheme received planning from An Bord Pleanala and has been confirmed following a Judicial Review (JR). It is understood that this JR decision is now the subject of an appeal to the courts. Transport Infrastructure Ireland (TII) remain committed to the delivery of this key strategic transport corridor to the deep-water harbour of Ringaskiddy.

1.3 STATUTORY CONSULTEE CONSULTATION

1.3.1 Notwithstanding ongoing consultation with the Traffic & Transportation Department of Cork City Council, the Design Team have engaged with Irish Water and with various departments within Cork City Council with a view to consider the respective issues raised as part of the SLR assessment process.

1.3.2 These engagements have informed this document including access arrangements for vehicular, pedestrian and cycle modes of transport.

1.4 DOCUMENT STRUCTURE

1.4.1 A TTA is an appropriate form of assessment for the scale of the proposed development and the scope has been agreed with the Local Authority. The structure of this TTA is in accordance with TII (Transport Infrastructure Ireland) Document, Traffic and Transport Assessment Guidelines, 2014.

The aim of this TTA is to identify the characteristics of the application site and surrounding area, examine the likely transport implications, ensure sustainable accessibility is maximised and appropriate infrastructure provided.

The key issues that need to be addressed within this TTA, with reference to the size and location of the development proposal, are as follows:

- Review of the site location, composition and local roads network.
- Analysis of Road Safety data for the most recent five-year period available.
- Accessibility critique reviewing pedestrian, cycle and public transport access to the site, plus any infrastructure currently available to promote travel by sustainable means.
- A review of the relevant planning and transport policy (CMATS).
- Forecast multi-modal trip rates and trip generation from the site.
- Justify future modal split assumptions used in the trip generation process.
- The use of appropriate and agreed traffic modelling software for the assessment of individual junctions (LinSig & Junction 9 Software (PICADY & ARCADY).
- Provide With/Without Development assessment for each of the critical junctions.
- Assess significance of development generated traffic upon the surrounding roads network and identify any necessary mitigation.

2.0 NON-TECHICAL SUMMARY

2.1 A TTA has been prepared in support of an application to Cork City Council for the residential zoning of SLR-3 comprising 27.50 ha.

2.2 The TTA methodology including the scope and means of assessment of the identified key junctions has been agreed with the Local Authority as part of the pre-application process. As a result of current Covid 19 restrictions on traffic flow the extent of the assessment has been limited to the junctions were traffic counts are available.

2.3 In assessing future year traffic generation from the site a modal shift of 30% is used which is a conservative 17% increase over 2016 census recorded data. National targets are set at 45% plus and given the sites location with the potential for a green route running adjacent the use of a higher figure would be justified. The results of the traffic modelling carried represent a worst-case scenario.

2.3 The TTA has demonstrated the following:

(i) The proposed SLR 3 lands are in accordance with the Local Area Plan and will form an important continuation in the delivery of planned growth in the area.

(ii) A review of the existing roads network and collision data in the vicinity of the site indicates that there are no significant problems in relation to the current safety of the Roads Network.

(iii) Junction 1: The Finger Post Roundabout is currently operating above capacity on the Douglas Bypass approach for evening peak. The circulating carriageway width and the lane configuration on this approach are contributing factors to the overall operation of the roundabout. An upgrade of this junction would deliver additional vehicular capacity.

(iv) Junction 2: The signal-controlled junction serving Maryborough Woods and Maryborough House Hotel is seen to operate within capacity both with and without development traffic.

(v) Junction 3, N28 Slip-On, is currently operating close to capacity during the morning peak with significant queuing occurring towards the south. Pedestrian facilities at this junction are poor at present. The upgrade of this junction forms part of the M28 Motorway Scheme which would result in significant improvements for all road users. In advance of these works the option of signalising this junction results in increased capacity whilst also addressing the pedestrian issue.

(vi) Junction 4: Existing N28 Slip-on, Slip-off is a free-flowing junction and will not be adversely affected by the development of the proposed lands.

(vii) Junction 5: The priority junction of the R609 and the existing Maryborough Woods residential development is seen to operate within capacity both with and without development traffic.

(viii) Junction 6: The slip-in to Douglas from the R609 via the Carrigaline Road is a free-flow junction and will not be adversely affected by proposed development traffic.

(ix) Junction 7: The roundabout junction serving the Douglas Court retail complex currently operates over capacity for the evening peak as a result of flows arriving from the City direction. Previous assessments of this junction including the DLUTS study have recommended the signalisation of this junction.

(x) The proposed site layout is permeable to the roads network and is connected to existing and proposed cycle/pedestrian linkages to public transport offerings, schools, retail and amenity destinations.

(xi) The proposed new access arrangement onto the R609 is safe and suitable and is in accordance with the Design Manual for Roads & Bridges (DMRB) and the Design Manual for Urban Roads & Streets (DMURS).

(xii) The site benefits from being in close proximity to regular transport provision, within walking distance of the site, which enables journeys throughout Cork City.

(xiii) The site is adjacent to the M28 Motorway Scheme which proposes a future interchange to the south of the site. This scheme has been granted permission by An Bord Pleanala and has only recently been confirmed following a judicial review. The delivery of this interchange would result in a fundamental change in direction of travel on the R609 and has been assessed as part of the M28 Design process.

(xiv) The Ballybrack Cycle Scheme includes for a connection through to Maryborough Hill via the lands to the east (Maryborough Ridge Housing Development). This infrastructure will provide off-road cycle/walking facilities to the wider area including Grange and Douglas.

Figure 2.1: Indicative Site Layout

(Refer to Architects Layout)

3.0 EXISTING CONDITIONS

3.1 INTRODUCTION

3.1.1 This section describes the base data used to develop the junction models, the critical links and junctions as agreed with the Local Authority, committed transport proposals to the area and other surrounding proposed development.

3.2 BASELINE TRAFFIC CONDITIONS

3.2.1 As part of the pre-application process the extent of data collection and the critical links and junctions was agreed with the Local Authority.

3.2.1 A variety of different data sources have been used, including:

- 12-hour classified turning counts (7 sites, refer **Figure 3.1**);
- Traffic data taken from the recently granted Cairn's Homes Development to the north of the lands as well as predicted traffic generation from this site;
- Background OS Mapping and aerial photography;
- On-site junction measurements including saturation flows, link speeds, queue length measurements, pedestrian movements at signalled crossings and geometric data for each of the modelled junctions;

3.2.2 On-site measurements including lane widths, junction turning radii, lane lengths and saturation flows were undertaken by MHL at various times in the intervening months. Further site-specific queue length and pedestrian crossing frequency surveys were undertaken as part of the calibration of the constructed models. These surveys were carried out when school and college traffic had resumed after the summer period.

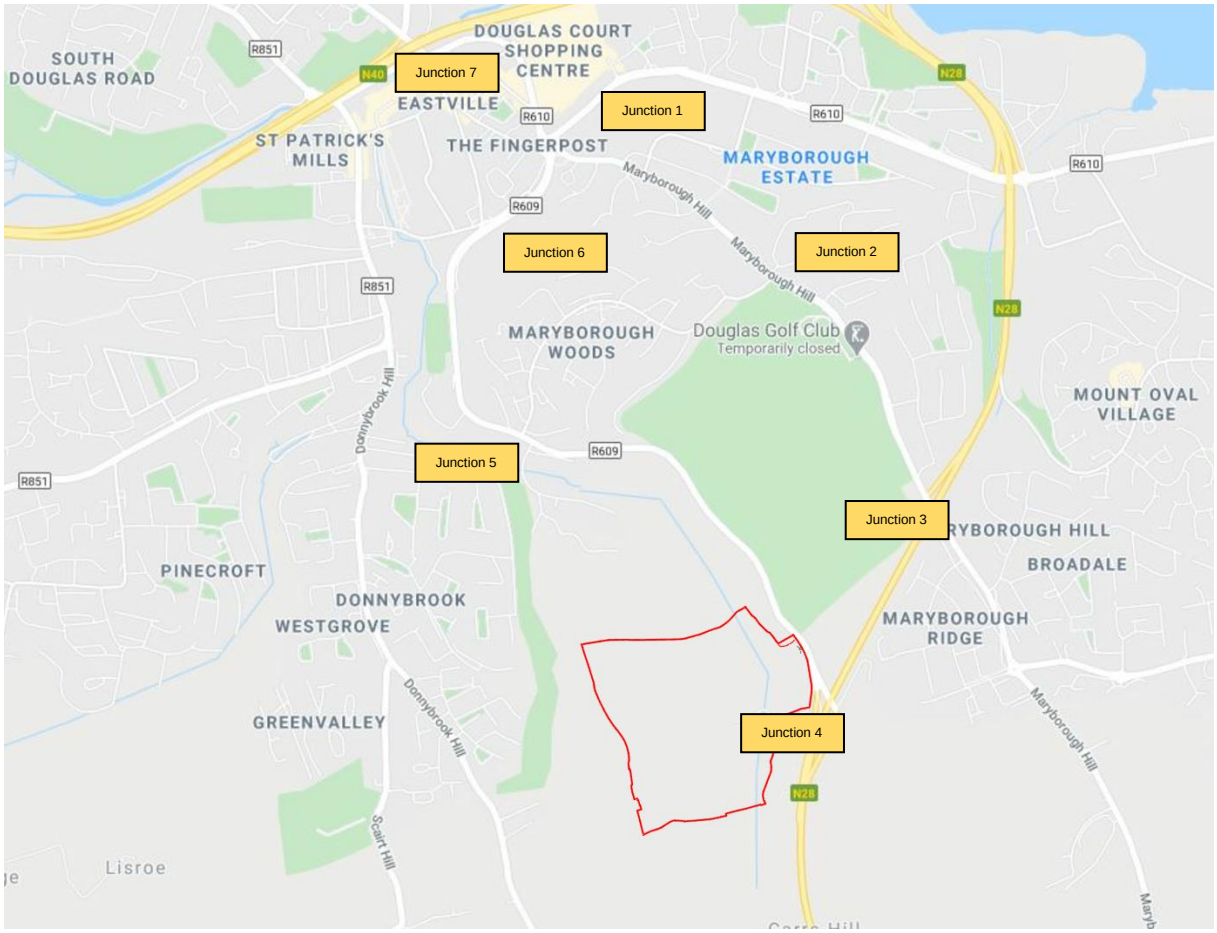

Figure 3.1: Traffic Count Survey Locations

3.2.4 The following figures present the recorded 12-hour traffic profile, percentage of classified vehicles and turning movements for each of the modelled junctions carried out on Thursday 23rd of January 2020:

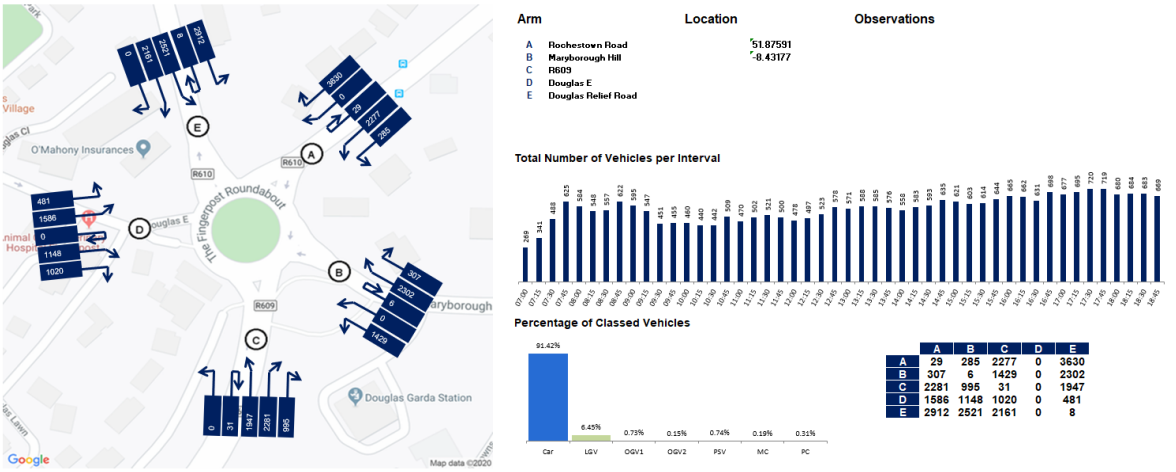

Figure 3.2: Junction 1: Fingerpost Roundabout

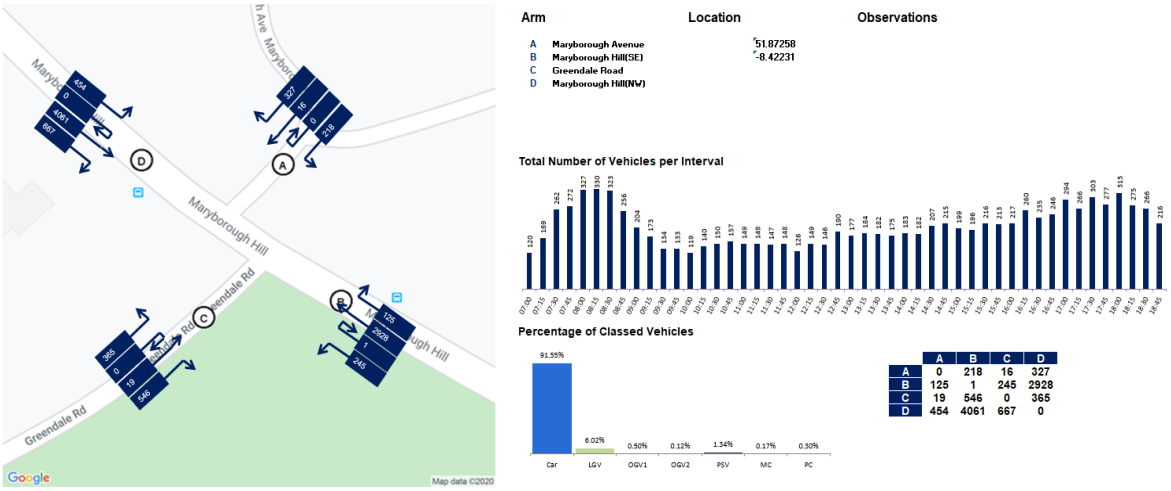

Figure 3.3: Junction 2: Maryborough Woods/Maryborough House Hotel

Figure 3.4: Junction 3: N28 Slip Road

3.2.5 The data presented in the above figures clearly shows the peak hour traffic periods for both morning and evening, 08:00-09:00 and 17:00-18:00 respectively.

3.2.6 The percentage of classified vehicles was used within the generated traffic models to accurately reflect existing conditions.

3.2.7 A link road count on the N28 to the west of the site was also carried out to inform a noise assessment for the site as impacted by the N28.

3.3 SITE LOCATION AND COMPOSITION

3.3.1 The application site is located in the townland of Moneygurney on the urban edge of Cork City. Access to the site will be directly onto the R609 Carrigaline Road. Currently this road provides direct access to the N28 southbound to Ringaskiddy and Carrigaline. To the north the R609 provides access to Douglas Village Centre via the one-way Carrigaline Road and at the 'Finger Post' Roundabout access to the R610 Rochestown Road with links to the N28 westbound.

3.4 LOCAL ROADS NETWORK

3.4.1 *Junction 1: 50m diameter roundabout of Maryborough Hill, The R609 Carrigaline Rd and the R610 Rochestown Road (The Fingerpost Roundabout).*

The Fingerpost Roundabout serves as the main vehicular access to Douglas Village and links the surrounding residential areas to the wider roads network.
The measured two-way AADT (Annual Average Daily Traffic) at the roundabout junction is, 8,500.

Image 3.4.1: Image of The Fingerpost Roundabout

Fig 3.4.1: Fingerpost Roundabout – AM Peak Hour Flows

Fig 3.4.2: Fingerpost Roundabout – PM Peak Hour Flows

3.4.2 *Junction 2: The Cross-Roads Signalised Junction of Maryborough Woods and Maryborough Hill (including Maryborough House Hotel).*

This signalised junction serves the Maryborough Woods residential development which includes a link to the R609 Carrigaline Road. It also facilitates access to the Maryborough House Hotel & Spa. This junction was upgraded as part of the Maryborough Hill Road Improvement Scheme and now includes cycle lanes.
The measured AADT (Annual Average Daily Traffic) at the roundabout junction is, 8,500.

Image 3.4.2: Image of Junction 2: Maryborough Woods/Maryborough House Hotel

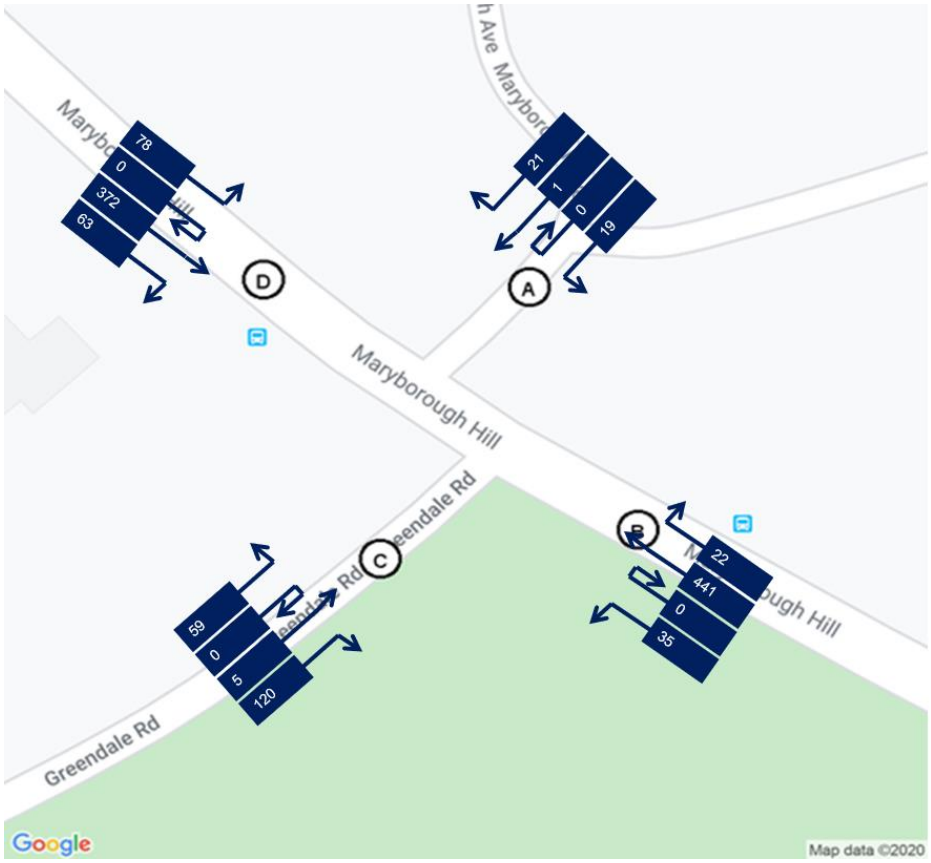

Fig 3.4.3: Maryborough Woods/Maryborough House Hotel – AM Peak Hour Flows

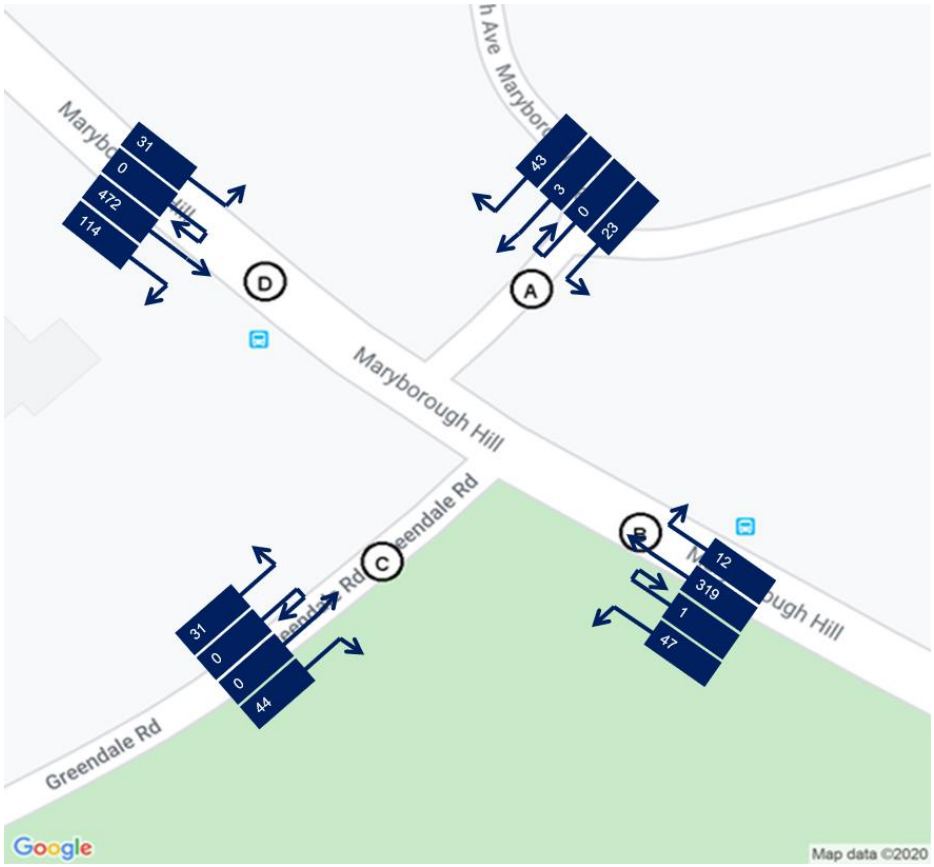

Fig 3.4.4: Maryborough Woods/Maryborough House Hotel – PM Peak Hour Flows

3.4.3 *Junction 3*: *Slip-on to the N28*:

The N28 slip road facilitates local access to the wider roads network serving Cork City. Traffic arriving from the development direction are required to cross the Maryborough Hill Road to access the slip-on.

Image 3.4.3: N28 Slip-on

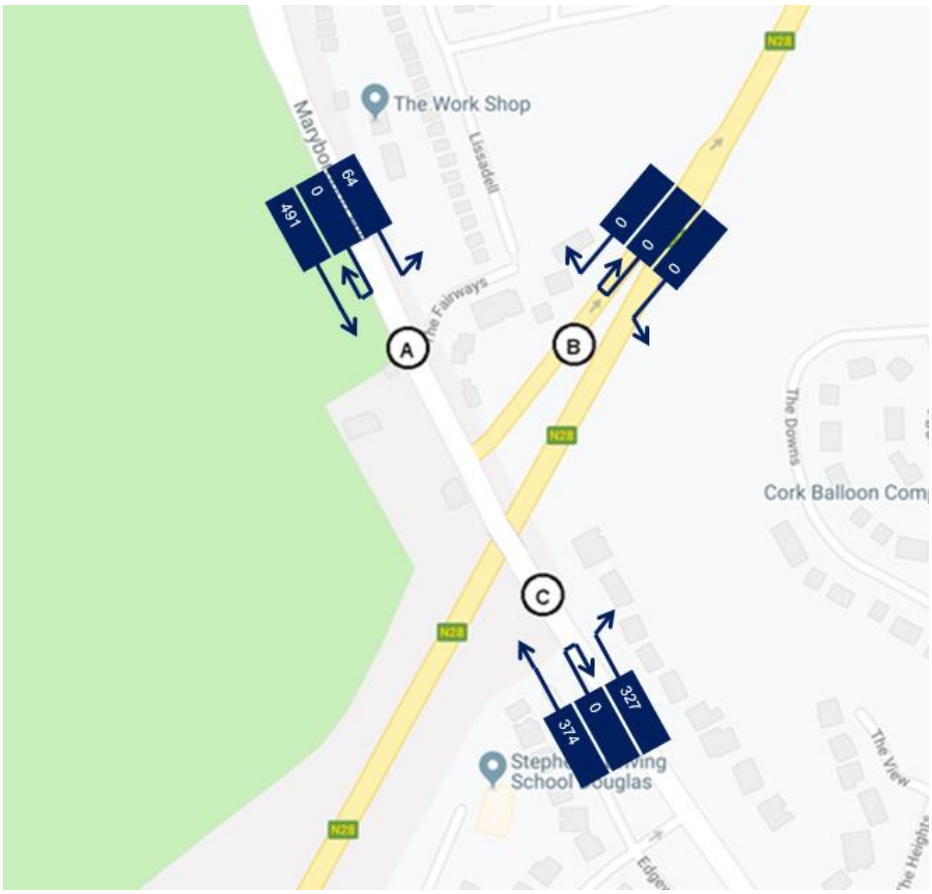

Fig 3.4.5: N28 Slip-on – AM Peak Hour Flows

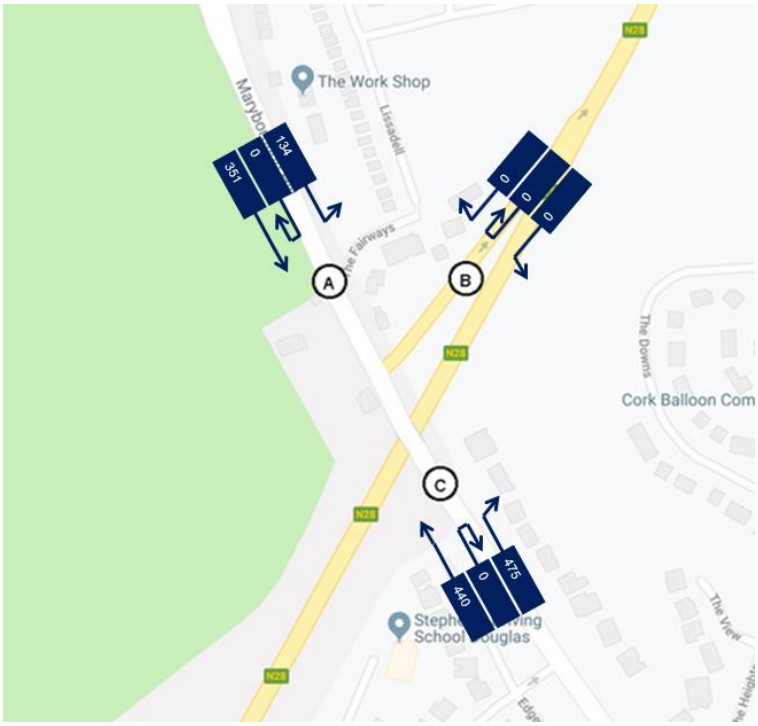

Fig 3.4.6: N28 Slip-on – PM Peak Hour Flows

3.4.4 *Junction 4: Slip-off and Slip on to the N28*

The existing Carrigaline Road (N28) connects to the R609 to the south of the site via a slip-on slip-off layout, Image 3.4.4. The future M28 Project proposes to use the existing overbridge whilst developing a fully graded separated interchange as shown in the following figure, Fig 3.4.5.

Image 3.4.4: Existing N28 Junction

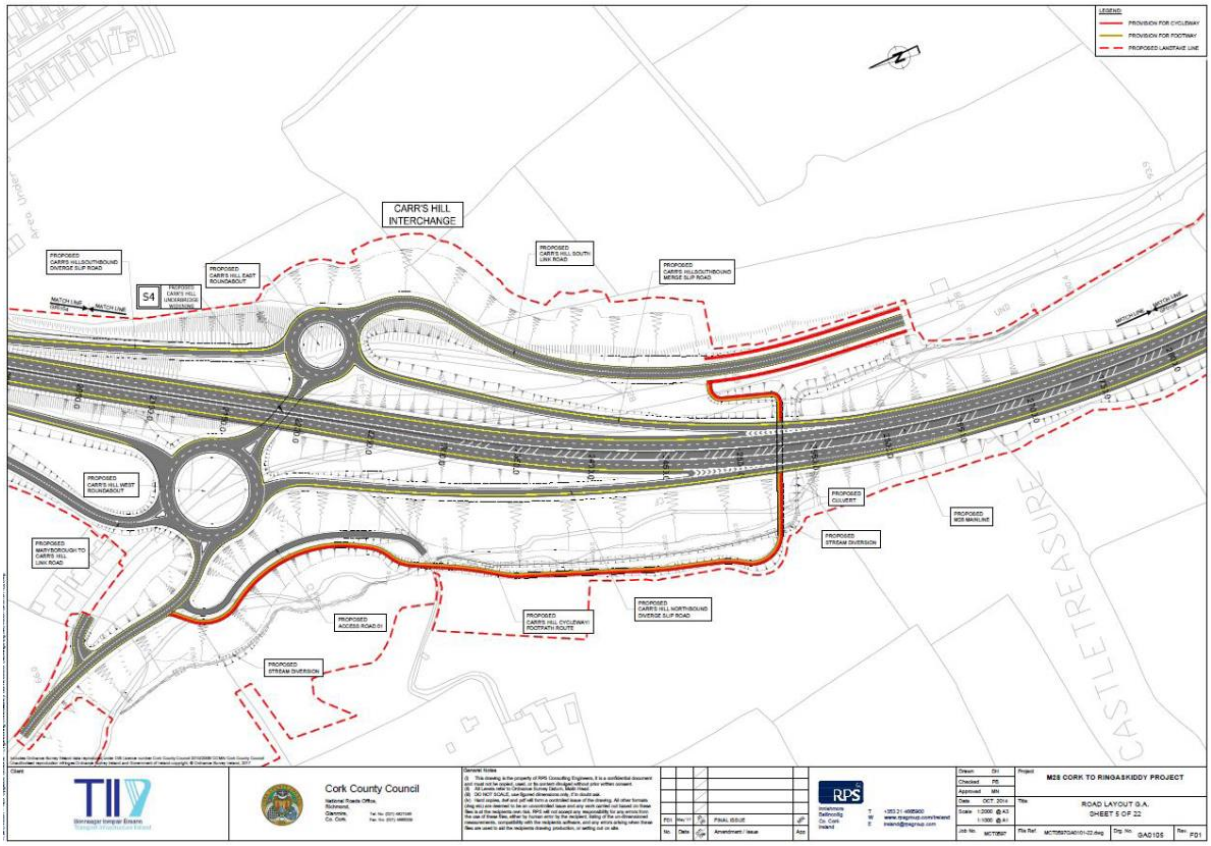

Figure 3.4.7: Proposed Future M28 Interchange

3.4.5 *Junction 5*: *Priority Junction of Maryborough Ridge and The R609.*

This junction facilitates access from Maryborough Ridge to the N28 via Junction 4 and also provides a link to Maryborough Hill via Junction 2 and on to Junction 3, Westbound Access to the N28 and the Bloomfield Interchange.

Image 3.4.6: Junction of R609 and Maryborough Ridge Residential Development.

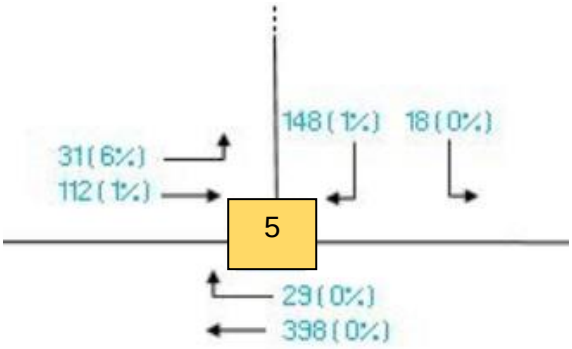

Fig 3.4.8: Junction of R609 & Maryborough Ridge – AM Peak Hour Flows

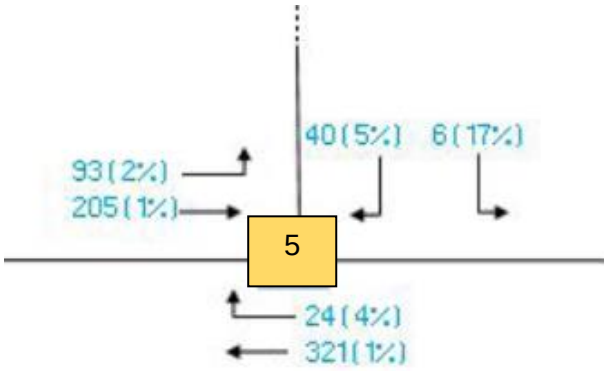

Fig 3.4.9: Junction of R609 & Maryborough Ridge – PM Peak Hour Flows

3.4.6 *Junction 6*: *Priority Controlled Junction of Clarke's Hill and the R610 Rochestown Road.*

This junction facilitates access from the R609 to Douglas Village via a one-way road, Carriagline Road. No traffic counts exist for this junction.

Image 3.4.7: Junction of Clarke's Hill and R610 Rochestown Road

3.5 COMMITTED TRANSPORT PROPOSALS

3.5.1 The M28 Cork to Ringaskiddy Project is the upgrade of approximately 12.5km of the N28 from the N49 South Ring Road Broomfield Junction to the port of Ringaskiddy. The M28 passes to the south of the proposed site with a new interchange being proposed facilitating full access to the M28 and to Maryborough Hill.

The project objectives are:

- To support the strategic development of the Port facilities at Ringaskiddy, in accordance with European and national Policy:
- To meet TEN-T core network level of service requirements, thereby facilitating economic development in the local area;
- To increase the safety and capacity of the N28 corridor to meet existing and estimated future traffic needs;
- To improve access to the M28 corridor in a safe and sustainable way.

3.5.2 The M28 Scheme has received planning from An Bord Pleanala and has been confirmed following a judicial review. An appeal to the Appeals Court has been undertaken by the objectors to the scheme. The scheme traffic assessment, which proposes an interchange as shown in **Fig 3.5.1**, accounted for traffic generation from zoned lands within the area including the proposed SLR lands.

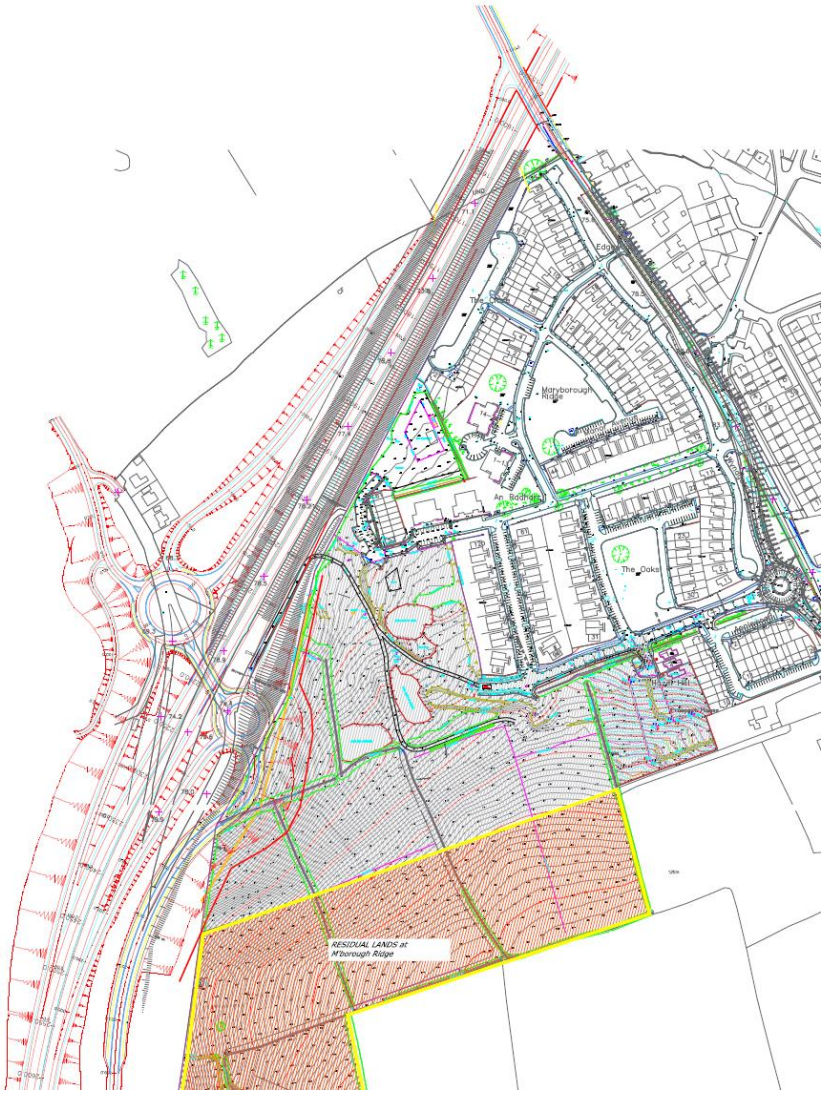

Fig 3.5.1: Proposed M28 Interchange

3.5.3 The Ballybrack Cycle Scheme is an extension of an existing off-road cycle/pedestrian facility that links Grange to Douglas Village. This scheme has been approved for construction and will tie-in with proposed cycle/pedestrian facilities within the proposed scheme. Once completed the proposed development will provide the link to Maryborough Hill via the Maryborough Ridge lands (currently the subject of a planning application to An Bord Pleanala) and it's on-road cycle facilities.

3.5.4 The publication of the CMATS (Cork Metropolitan Area Transport Strategy) document, currently awaiting formal approval, proposes significant upgrades to public transport provision in the Douglas Area, including Maryborough Hill. In line with DLUTS (Douglas Land Use Transportation Study) junction upgrades, bus priority and public transport facilities at bus stops are proposed to encourage public transport usage. These measures will contribute to an expected increase in modal shift towards sustainable travel resulting in a reduction in traffic generation from residential developments. As part of this assessment allowance was made for a modal shift of 30% (current sustainable travel usage in the area as per 2016 census was 13%) for development traffic only, in the Base Year 2026 (750 units and creche). This represents a 17% increase in modal shift over current levels and has been applied to 'new development traffic' only. It has not been applied to background traffic flows, refer to Chapter 6.0 of this report for further details.

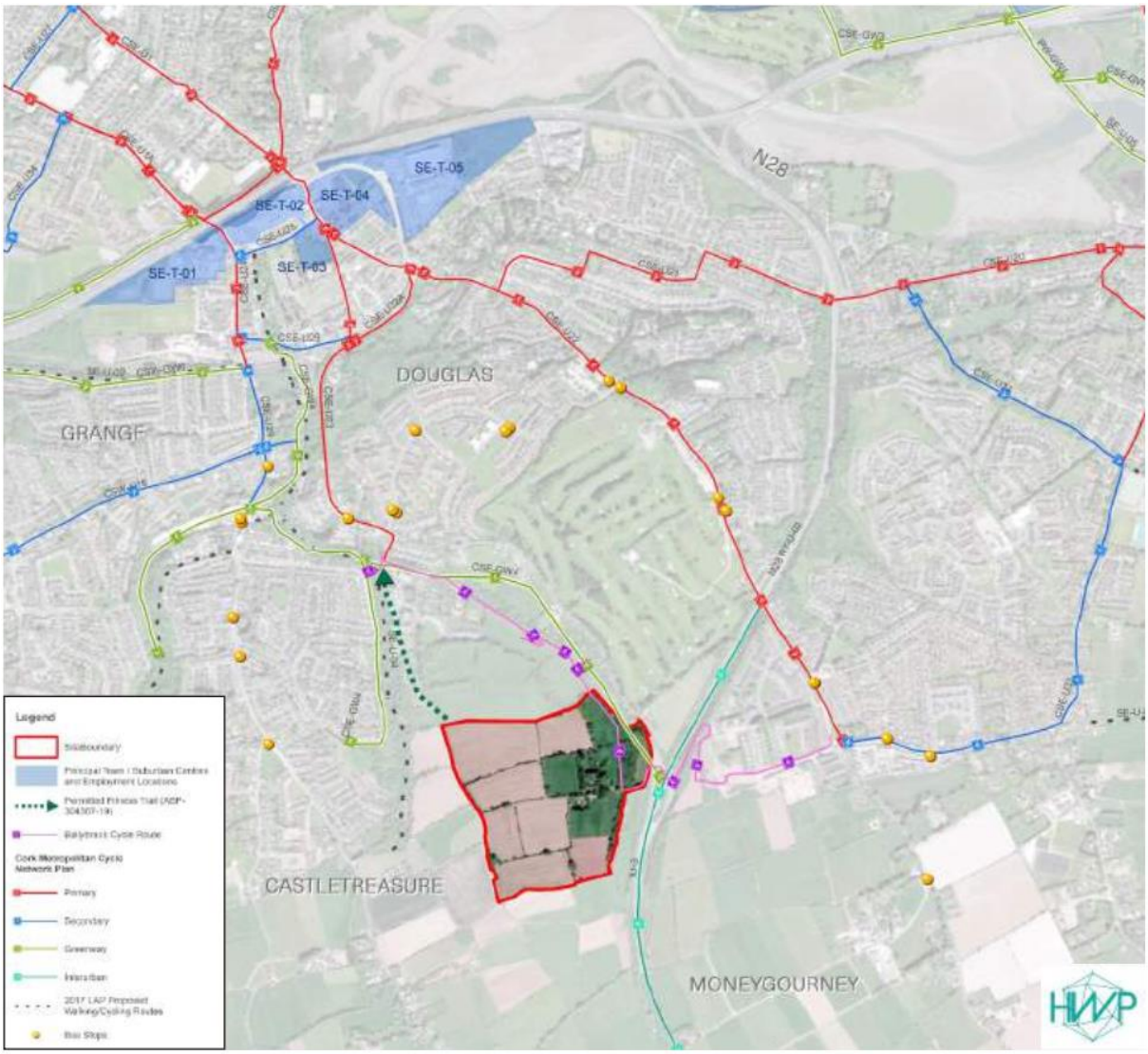

Fig 3.5.2: Cycle/Walking Connectivity (Current & Proposed)

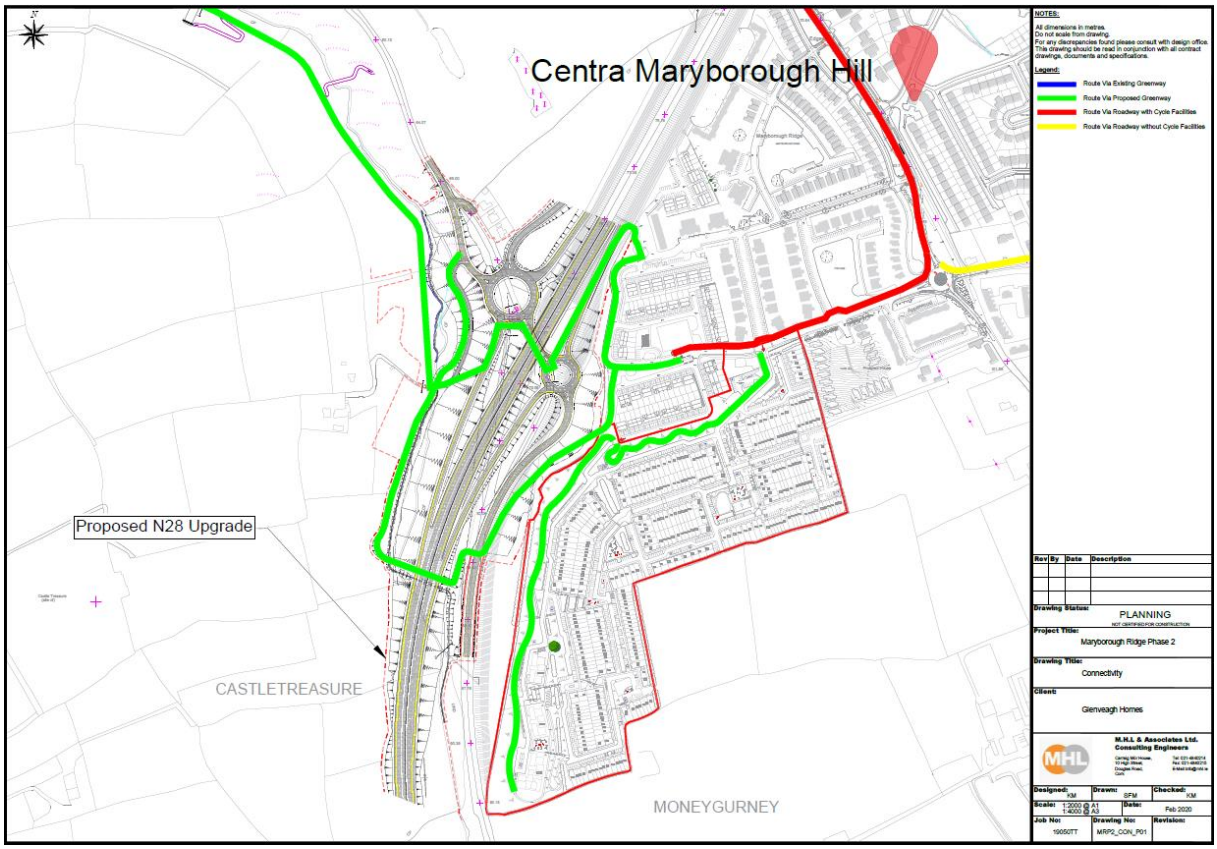

Fig 3.5.3: Cycle/Walking Connectivity Local to Site

4.0 PROPOSED DEVELOPMENT

4.1 INTRODUCTION

4.1.1 The proposed development on the 27.5 ha site will include for a broad mix of housing types, an associate creche facility and local retail area that could support the surrounding area as well as the public greenway.

4.1.2 The proposed primary access to the site is from the R609 and will include a potential vehicular link to the adjoining Carin Homes Site. Further links, both vehicular and pedestrian will be maintained on all boundaries to adjoining lands. The main access will involve the construction of a bridge structure over the Ballybrack Valley Park (includes the Ballybrack Cycle scheme) and will operate as a priority junction. The R609 will be widened to include a right turn lane at the entrance.

4.1.4 The following **Figure 4.1.2** presents a diagrammatic scheme layout showing the adjoining Carin Homes Site and the lands the subject of this application.

Fig 4.1.1: Proposed Entrance Detail

Fig 4.1.2: Schematic Layout

4.2 PHASING

4.2.1 The scheme of 750 units including the 80 child creche would be completed in a number of phases starting in 2021 and finishing by 2030. A comprehensive traffic assessment will be carried out on a fully developed layout as part of a future planning application once the lands have been zoned. It is anticipated that the development will commence with 75 units being delivered in the first year followed by 100 units per year thereafter.

4.2.2 Construction traffic per phase will consist of the following categories:

- Private vehicles owned and driven by site construction staff and by full time supervisory staff.
- Excavation plant and dumper trucks involved in site development works and material delivery vehicles for the following: granular fill materials, concrete pipes, manholes, reinforcement steel, ready-mix concrete and mortar, concrete blocks, miscellaneous building materials, etc.

It is envisaged that working hours will be from 07.00 to 18:00, Monday to Friday (08:00 to 14:00 Saturday) and the works will engage a peak maximum of 100 construction personnel through each phase of the development.

In general, the impact of construction traffic will be temporary in nature and less significant than the final development operational stage.

5.0 TRAFFIC GENERATION

5.1.1 This section describes the traffic generation from the development and is based on recorded traffic generation from existing occupied units in the general area. These counts were carried out in 2016. A detailed comparison with traffic generation used in the Cairn Homes assessment was also undertaken.

5.1.2 The existing Maryborough Hill Residential Development comprises 337 units including duplex apartments, townhouses and detached units. This unit mix is conservative in terms of the proposed development, the subject of this application, in terms of density, as is the car parking provision and hence its use would ensure a robust assessment of traffic impact from the proposed scheme will occur.

Using the collected data, traffic generation from the development would be as follows;

2016 (373 units)		IN	OUT
Rate per unit	AM	0.16	0.524
	PM	0.44	0.278

Table 5.3 Trip Generation Per Unit (Maryborough Ridge 2016 Count)

5.1.3 In order to carry out a sense check of the trip rates presented above, the TRICS database was used. Sites included the Greater Dublin Area, Cavan and Monaghan. Evident from the highlighted figures below in **Table 5.4**, the rates used as per **Table 5.3** are in general more conservative than those produced by TRICS. In order to ensure a robust assessment of the impacted junctions trip generation will be based on **Table 5.3**.

	ARRIVALS				DEPARTURES				TOTALS			
Time Range	No. Days	Ave. DWELLS	Trip Rate	Estimated Trip Rate	No. Days	Ave. DWELLS	Trip Rate	Estimated Trip Rate	No. Days	Ave. DWELLS	Trip Rate	Estimated 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	3	36	0.018	0.000	3	36	0.239	0.000	3	36	0.257	0.000
08:00 - 09:00	3	36	0.037	0.000	**3**	**36**	**0.514**	**0.000**	3	36	0.551	0.000
09:00 - 10:00	3	36	0.165	0.000	3	36	0.248	0.000	3	36	0.413	0.000
10:00 - 11:00	3	36	0.165	0.000	3	36	0.174	0.000	3	36	0.339	0.000
11:00 - 12:00	3	36	0.183	0.000	3	36	0.156	0.000	3	36	0.339	0.000
12:00 - 13:00	3	36	0.183	0.000	3	36	0.165	0.000	3	36	0.348	0.000
13:00 - 14:00	3	36	0.257	0.000	3	36	0.193	0.000	3	36	0.450	0.000
14:00 - 15:00	3	36	0.165	0.000	3	36	0.239	0.000	3	36	0.404	0.000
15:00 - 16:00	3	36	0.229	0.000	3	36	0.147	0.000	3	36	0.376	0.000
16:00 - 17:00	3	36	0.275	0.000	3	36	0.193	0.000	3	36	0.468	0.000
17:00 - 18:00	**3**	**36**	**0.422**	**0.000**	3	36	0.174	0.000	**3**	**36**	**0.596**	**0.000**
18:00 - 19:00	3	36	0.376	0.000	3	36	0.174	0.000	3	36	0.550	0.000
19:00 - 20:00												
20:00 - 21:00												
21:00 - 22:00												
22:00 - 23:00												
23:00 - 24:00												
Total Rates:			2.475	0.000			2.616	0.000			5.091	0.000

Table 5.4 Trip Generation Per Residential Unit (TRICS)

5.1.4 In the following chapter reference is made to the current (2016) Modal Shift by means of travel to work, school or college and is based on 2016 Census Data, ref. **Table 6.1.1**. This current year figure implies 13% of persons in this area use sustainable means of travel.

5.1.5 Trip Generation from the proposed 80 pupil creche was derived using the TRICS database. The following table presents the peak hour trip rates for a standalone creche.

In this instance it is assumed that the creche will serve the proposed scheme and in the future will serve the wider area. In the interim it is anticipated that the creche will add to traffic entering and exiting the development during the morning/evening peak hours over and above 'pass-by' traffic (traffic already accounted for on the network (living within the estate)). This quantum is based on 20% of trips generated by a standalone facility. This factor is deemed reasonable based on an assessment of creche facilities in the area and on the planning guidelines where the size of the creche is based on the proposed residential density (the creche is primarily to serve the needs of the proposed development).

The following TRICS table will be used to assess this quantum.

Time Range	ARRIVALS			DEPARTURES			TOTALS		
	No. Days	Ave. PUPILS	Trip Rate	No. Days	Ave. PUPILS	Trip Rate	No. Days	Ave. PUPILS	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	1	52	0.038	1	52	0.019	1	52	0.057
08:00 - 09:00	1	52	0.519	1	52	0.385	1	52	0.904
09:00 - 10:00	**1**	**52**	**0.673**	**1**	**52**	**0.673**	**1**	**52**	**1.346**
10:00 - 11:00	1	52	0.038	1	52	0.058	1	52	0.096
11:00 - 12:00	1	52	0.192	1	52	0.058	1	52	0.250
12:00 - 13:00	1	52	0.231	1	52	0.346	1	52	0.577
13:00 - 14:00	1	52	0.058	1	52	0.115	1	52	0.173
14:00 - 15:00	1	52	0.077	1	52	0.038	1	52	0.115
15:00 - 16:00	1	52	0.135	1	52	0.154	1	52	0.289
16:00 - 17:00	1	52	0.250	1	52	0.269	1	52	0.519
17:00 - 18:00	1	52	0.423	1	52	0.500	1	52	0.923
18:00 - 19:00	1	52	0.000	1	52	0.096	1	52	0.096
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			2.634			2.711			5.345

Table 5.5 Trip Generation Per Pupil – Creche (TRICS)

6.0 MODAL SPLIT

6.1.1 This section describes the current level of modal shift (the use of sustainable modes of travel) based on available data and compares these to national targets.

6.1.2 The 2016 Census online SAP data was used to assess current modal shift patterns in the Moneygurney area, specifically the electoral division of Douglas which encompasses the site. 13% of people in this area said they were commuting on foot, bike or using public transport.

PDF Excel Print

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	310	457	767
Bicycle	154	27	181
Bus, minibus or coach	461	569	1,030
Train, DART or LUAS	22	11	33
Motorcycle or scooter	49	10	59
Car driver	7,815	417	8,232
Car passenger	389	3,346	3,735
Van	367	13	380
Other (incl. lorry)	33	2	35
Work mainly at or from home	285	10	295
Not stated	179	100	279
Total	10,064	4,962	15,026

Table 6.1.1: 2016 Modal Shift by means of travel to work, school or college.

(Electoral Division of Douglas)

6.1.3 The Moneygurney Modal Shift is significantly lower than national targets (45%) and will require continued investment by the Local Authority in sustainable transport provision in the area in order to 'close the gap'. The recent publication of CMATS (Cork Metropolitan Area Transport Study) has given some clarity to local projects such as the Ballybrack cycle/pedestrian scheme which will facilitate off-road connections to Douglas Village. Enhancements to existing bus services are also proposed which will have the effect of reducing journey times encouraging an increase in use. The construction of a 24 classroom Primary School on the adjoining lands will significantly reduce school associated traffic generation from the site.

6.1.4 A modal shift of 30% (implying an anticipated increase in public transport or active travel in the immediate area of 17%) for future year models is deemed to be reasonable. This modal shift increase of 17% will be applied to proposed development traffic from the opening year (when the development is fully completed) 2027, up to the design year, 2036.

7.0 TRAFFIC GENERATION / FORECASTING

7.1.1 This section describes the traffic generation from the development and is based on recorded traffic flows from the existing occupied estate as outlined in Section 5 and accounts for future modal shift targets as described in Section 6.

7.1.2 Based on the above trip generation rates the following table presents residential development traffic for future years. This traffic has been added to existing background flows and distributed through the network to model each of the identified junctions. The results are presented in Section 9 of this report.

2027 (750 units)			IN	OUT
750 units		AM	120	393
		PM	330	209

Table 7.2 Proposed Development Traffic (2026 Final Phase: 750 units)

7.1.3 As the proposed development site currently generates little or no traffic, no reduction has been applied to account for pass-by trips, transfer trips or combined trips from the residential element of the scheme.

7.1.4 It is assumed that the Creche will be used primarily for the proposed development however in order to carry out a robust assessment of the roads network it is assumed that 20% of traffic that would be generated by a standalone creche will be attracted to the proposed development. The following table presents the expected 'new' trips to be generated by the proposed creche.

80 pupil Creche			IN	OUT
External Creche based traffic	AM		8	6
	PM		7	8

Table 7.2 Proposed Creche Traffic

7.1.5 In addition to development traffic, recorded background traffic was factored using TII (Transport Infrastructure Ireland) Project Appraisal Guidelines (PE-PAG-02017) for use in future year scenarios. The following table presents the factors used on recorded pcu's based on Link Based Growth Rates (Central Growth) for the Southwest Region.

The percentage HGV content is based on that recorded on Maryborough Hill (1.8%).

Region	Vehicle Category	Medium Growth	
		2013-2030	2030-2050
Cork	Light Vehicle (LV)	1.0102	1.0012
	Heavy Vehicle (HV)	1.0237	1.0176

Table 7.3 Background Traffic Growth Rates Per Annum

8.0 TRIP ATTRACTION AND DISTRIBUTION

8.1.1 This section describes the methodology used in the distribution of development specific traffic onto the modelled network. **Figure 3.1** outlines the location of each of the junctions where turning count movements were recorded over a 12-hour timeframe. This 'snapshot' of existing traffic movements provides a basis for determining desire lines which can be used to assign development traffic at each of the modelled junctions.

8.1.2 Figure 8.1.1 presents the Distribution of development traffic on the modelled network for the AM peak period and Figure 8.1.2 presents the PM peak distribution.

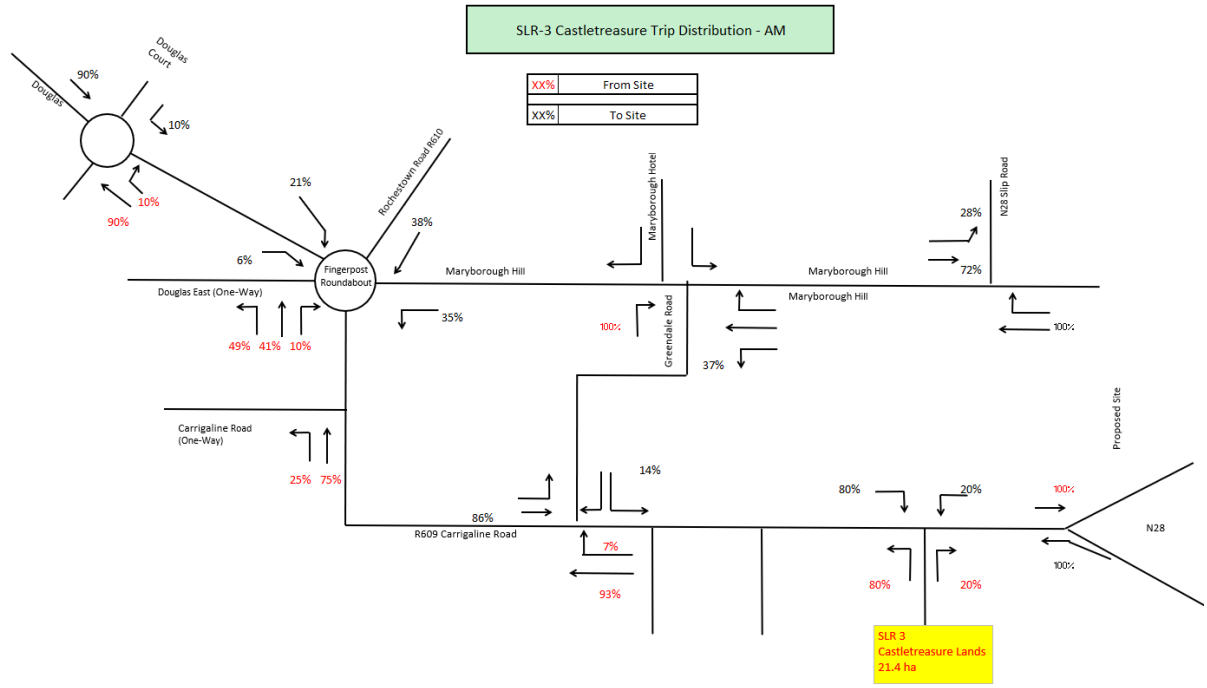

Fig 8.1.1: AM Development Traffic Distribution

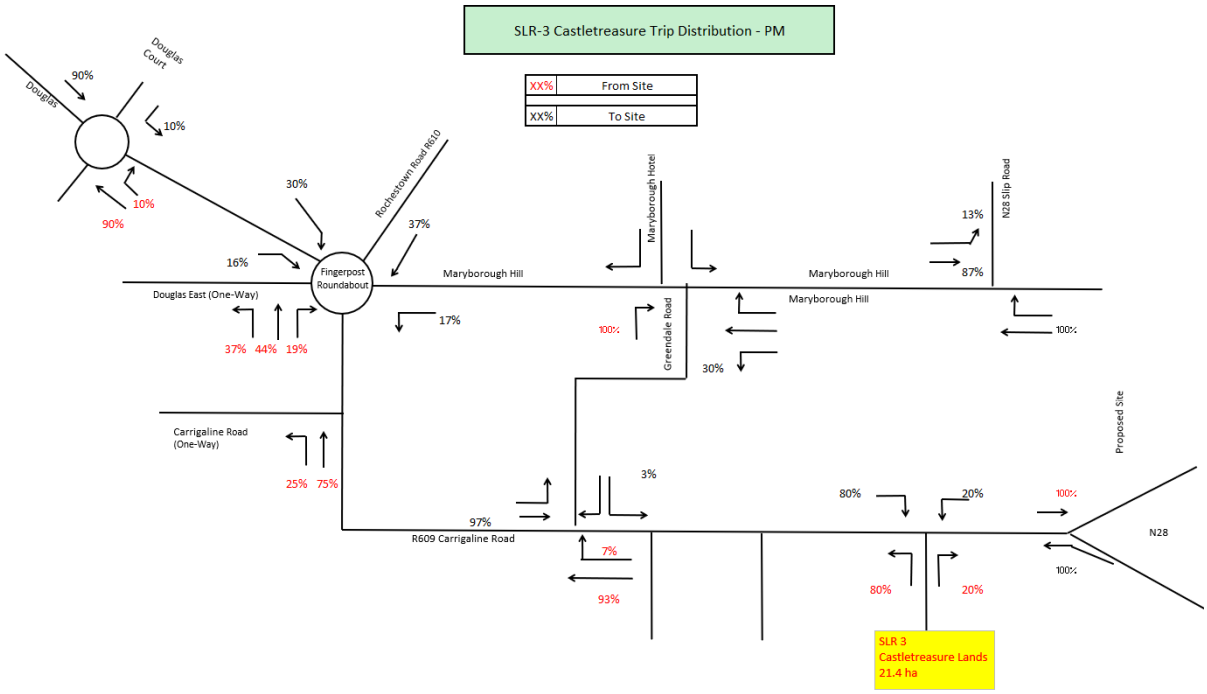

Fig 8.1.2: PM Development Traffic Distribution

8.1.3 Traffic flow matrices have been developed for each Junction for the following scenarios:

- 2019 Current Year Flows AM/PM
- 2027 AM/PM With/Without Dev (750 units)
- 2037 AM/PM With/Without Dev

8.1.4 Peak hour trip generation to and from the site for the proposed 750 residential units and creche are distributed on the modelled network as per the following diagrams.

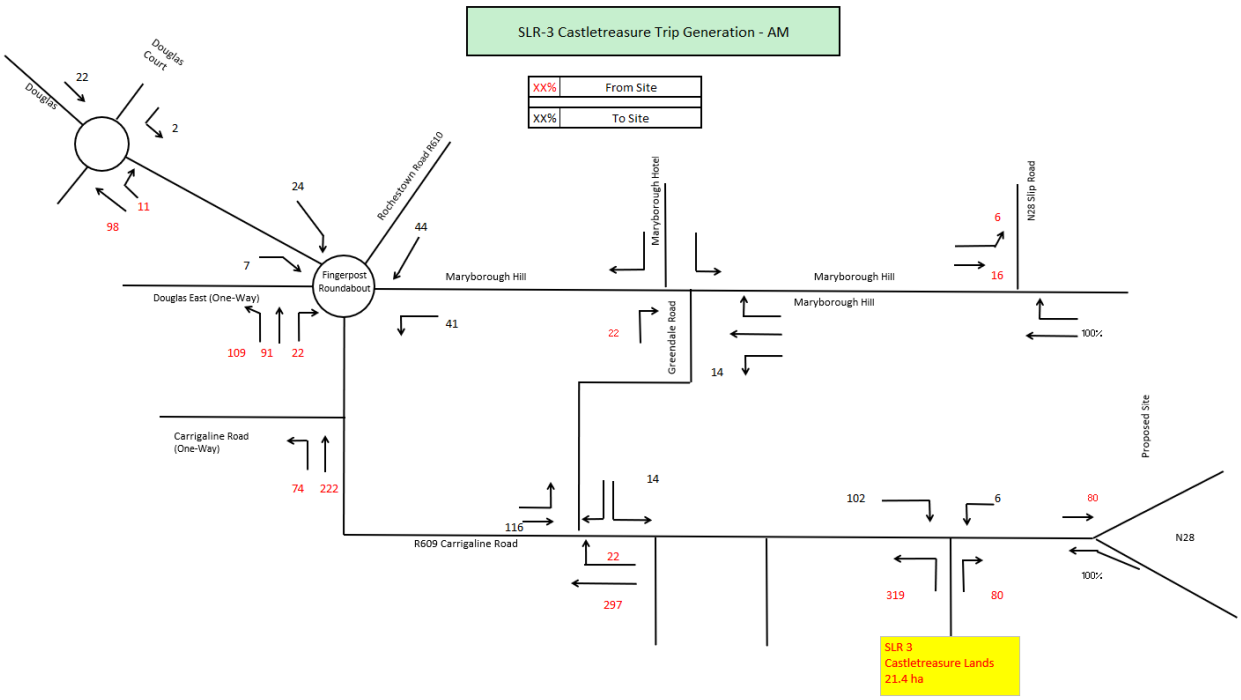

Fig 8.1.3: AM Development Trip Generation

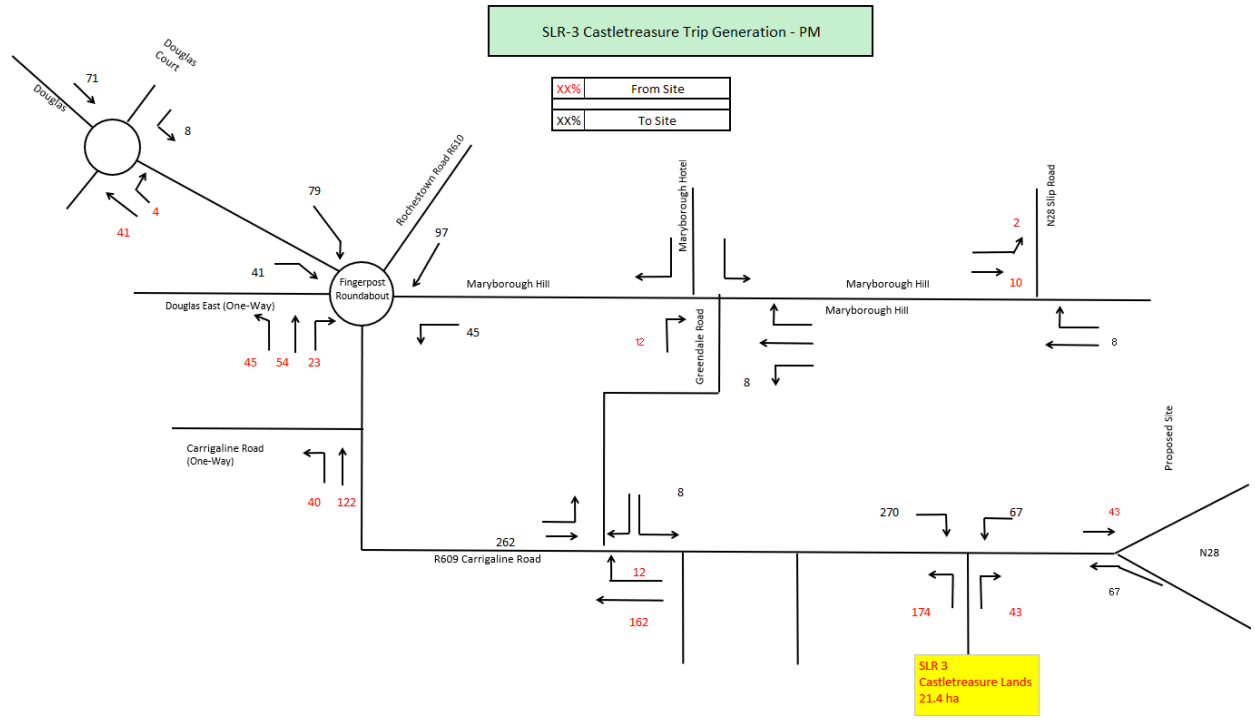

Fig 8.1.4: PM Development Trip Generation

8.1.5 *Junction 1: The Fingerpost Roundabout*

Fig 8.1.5: Junction 1 Arm Designation (A,B,C,D,E)

AM 2019

	A	B	C	D	E	Tot
A	1	23	154	0	266	444
B	14	1	273	0	277	565
C	144	91	1	0	229	465
D	109	92	44	0	24	269
E	238	243	102	0	0	583
Tot	506	450	574	0	796	2326

PM 2019

	A	B	C	D	E	Tot
A	1	22	244	0	325	592
B	29	0	132	0	237	398
C	195	138	5	0	145	483
D	191	161	103	0	46	501
E	314	258	262	0	0	834
Tot	730	579	746	0	753	2808

Table 8.1 Junction 1: AM/PM Peak Hour Traffic Movements

AM 2026 1.06

	A	B	C	D	E	Tot
A	1	24	163	0	282	471
B	15	1	289	0	294	599
C	153	96	1	0	243	493
D	116	98	47	0	25	285
E	252	258	108	0	0	618
Tot	536	477	608	0	844	2466

PM 2026 1.06

	A	B	C	D	E	Tot
A	1	23	259	0	345	628
B	31	0	140	0	251	422
C	207	146	5	0	154	512
D	202	171	109	0	49	531
E	333	273	278	0	0	884
Tot	774	614	791	0	798	2976

Table 8.2 Junction 1: 2026 Without Development AM/PM Peak Hour Traffic Movements

2026 AM With Development Traffic

	A	B	C	D	E	Tot
A	1	26	207	0	282	517
B	16	1	352	0	317	686
C	244	124	1	0	352	721
D	116	104	54	0	25	298
E	252	274	132	0	0	658
Tot	628	529	746	0	976	2880

2026 PM With Development Traffic

	A	B	C	D	E	Tot
A	1	25	356	0	345	727
B	34	0	198	0	275	507
C	261	185	5	0	199	650
D	202	189	150	0	49	590
E	333	302	357	0	0	992
Tot	831	702	1066	0	867	3465

Table 8.3 Junction 1: 2026 With Development AM/PM Peak Hour Traffic Movements

AM 2036	1.16					
	A	B	C	D	E	Tot
A	1	27	179	0	309	515
B	16	1	317	0	321	655
C	167	106	1	0	266	539
D	126	107	51	0	28	312
E	276	282	118	0	0	676
Tot	587	522	666	0	923	2698

PM 2036	1.16					
	A	B	C	D	E	Tot
A	1	26	283	0	377	687
B	34	0	153	0	275	462
C	226	160	6	0	168	560
D	222	187	119	0	53	581
E	364	299	304	0	0	967
Tot	847	672	865	0	873	3257

Table 8.4 Junction 1: 2036 Without Development AM/PM Peak Hour Traffic Movements

2036 AM With Development Traffic						
	A	B	C	D	E	Tot
A	1	29	223	0	309	561
B	17	1	380	0	344	742
C	258	134	1	0	375	767
D	126	113	58	0	28	325
E	276	298	142	0	0	716
Tot	679	574	804	0	1055	3112

2036 PM With Development Traffic						
	A	B	C	D	E	Tot
A	1	28	380	0	377	786
B	37	0	211	0	299	547
C	280	199	6	0	213	698
D	222	205	160	0	53	640
E	364	328	383	0	0	1075
Tot	904	760	1140	0	942	3746

Table 8.5 Junction 1: 2036 With Development AM/PM Peak Hour Traffic Movements

8.1.6 *Junction 2: Maryborough Ridge/Maryborough Woods Hotel Signalised Junction*

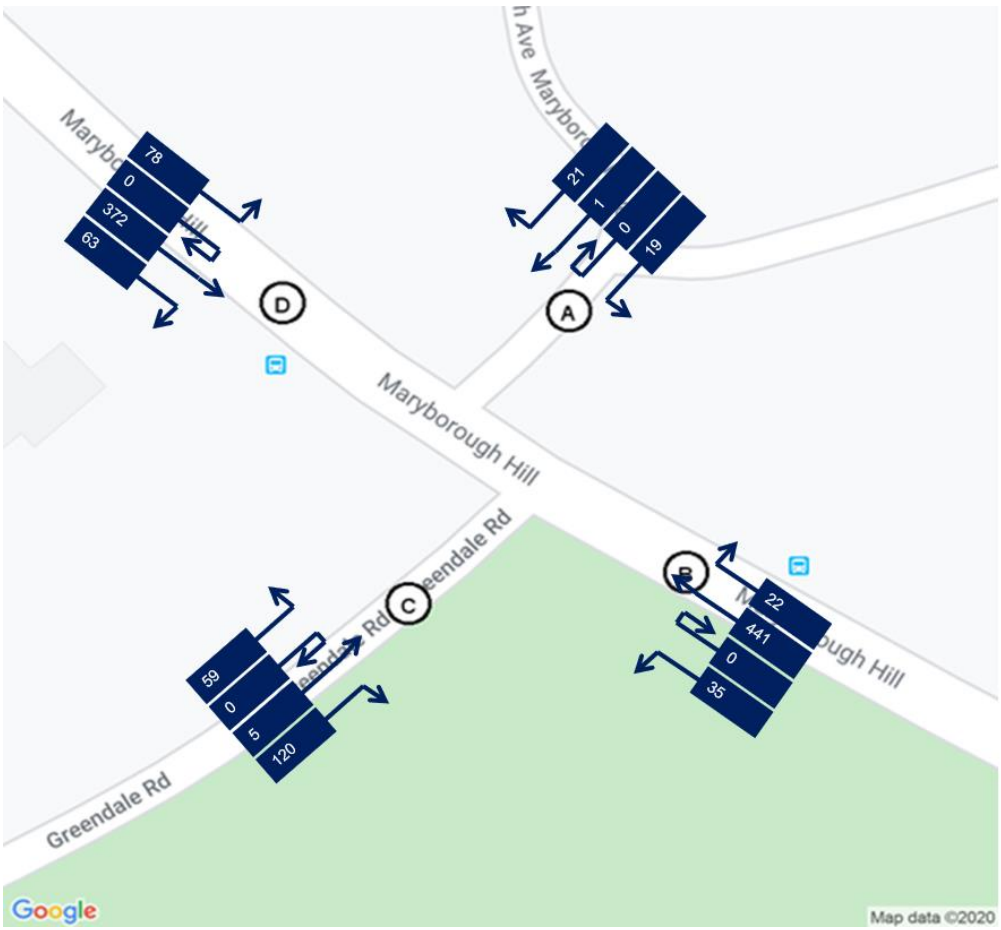

Fig 8.1.6: Junction 2 Arm Designation (A,B,C,D)

AM 2019					
	A	B	C	D	Tot
A	0	19	1	23	43
B	22	0	36	445	503
C	5	121	0	60	186
D	80	376	63	0	519
Tot	107	516	100	528	1251

PM 2019					
	A	B	C	D	Tot
A	0	23	3	43	69
B	12	1	48	321	382
C	0	44	0	31	75
D	31	473	113	0	617
Tot	43	541	164	395	1143

Table 8.6 Junction 2: AM/PM Peak Hour Traffic Movements

AM 2026	1.06				
	A	B	C	D	Tot
A	0	20	1	24	46
B	23	0	38	472	533
C	5	128	0	64	197
D	85	399	67	0	550
Tot	113	547	106	560	1326

PM 2026	1.06				
	A	B	C	D	Tot
A	0	24	3	46	73
B	13	1	51	340	405
C	0	47	0	33	80
D	33	501	120	0	654
Tot	46	573	174	419	1212

Table 8.7 Junction 2: 2026 Without Development AM/PM Peak Hour Traffic Movements

2026 AM With Development Traffic					
	A	B	C	D	Tot
A	0	22	1	24	48
B	25	0	56	517	598
C	5	159	0	64	228
D	85	429	67	0	580
Tot	115	610	124	605	1454

2026 PM With Development Traffic					
	A	B	C	D	Tot
A	0	27	3	46	76
B	15	1	65	380	461
C	0	65	0	33	98
D	33	566	120	0	719
Tot	48	659	188	459	1354

Table 8.8 Junction 2: 2026 With Development AM/PM Peak Hour Traffic Movements

AM 2036	1.16				
	A	B	C	D	Tot
A	0	22	1	27	50
B	26	0	42	516	583
C	6	140	0	70	216
D	93	436	73	0	602
Tot	124	599	116	612	1451

PM 2036	1.16				
	A	B	C	D	Tot
A	0	27	3	50	80
B	14	1	56	372	443
C	0	51	0	36	87
D	36	549	131	0	716
Tot	50	628	190	458	1326

Table 8.9 Junction 2: 2036 Without Development AM/PM Peak Hour Traffic Movements

2036 AM With Development Traffic					
	A	B	C	D	Tot
A	0	24	1	27	52
B	28	0	60	561	648
C	6	171	0	70	247
D	93	466	73	0	632
Tot	126	662	134	657	1579

2036 PM With Development Traffic					
	A	B	C	D	Tot
A	0	30	3	50	83
B	16	1	70	412	499
C	0	69	0	36	105
D	36	614	131	0	781
Tot	52	714	204	498	1468

Table 8.10 Junction 2: 2036 With Development AM/PM Peak Hour Traffic Movements

8.1.7 *Junction 3: N28 Slip-on*

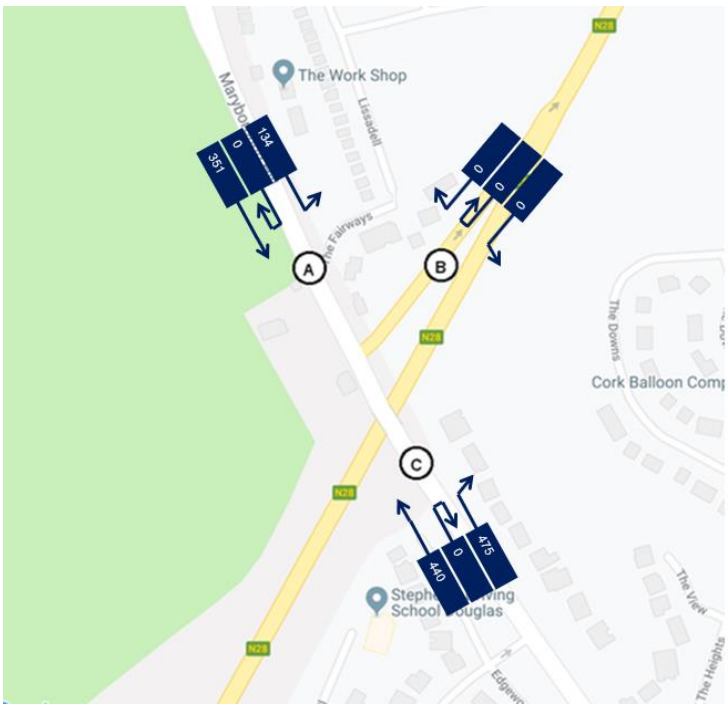

Fig 8.1.7: Junction 3 Arm Designation (A,B,C)

AM 2019				
	A	B	C	Tot
A	0	134	351	485
B	0	0	0	0
C	440	475	0	915
Tot	440	609	351	1400

PM 2019				
	A	B	C	Tot
A	0	64	491	555
B	0	0	0	0
C	374	327	0	701
Tot	374	391	491	1256

Table 8.15 Junction 3: AM/PM Peak Hour Traffic Movements

AM 2026	1.06			
	A	B	C	Tot
A	0	142	372	514
B	0	0	0	0
C	466	504	0	970
Tot	466	646	372	1484

PM 2026	1.06			
	A	B	C	Tot
A	0	68	520	588
B	0	0	0	0
C	396	347	0	743
Tot	396	414	520	1331

Table 8.18 Junction 3: 2026 Without Development AM/PM Peak Hour Traffic Movements

2026 AM With Development Traffic				
	A	B	C	Tot
A	0	148	398	546
B	14	0	0	14
C	475	514	0	989
Tot	489	662	398	1549

2026 PM With Development Traffic				
	A	B	C	Tot
A	0	70	544	614
B	8	0	0	8
C	406	356	0	762
Tot	414	425	544	1384

Table 8.19 Junction 3: 2026 With Development AM/PM Peak Hour Traffic Movements

AM 2036	1.16			
	A	B	C	Tot
A	0	155	407	563
B	0	0	0	0
C	510	551	0	1061
Tot	510	706	407	1624

PM 2036	1.16			
	A	B	C	Tot
A	0	74	570	644
B	0	0	0	0
C	434	379	0	813
Tot	434	454	570	1457

Table 8.20 Junction 3: 2036 Without Development AM/PM Peak Hour Traffic Movements

2036 AM With Development Traffic				
	A	B	C	Tot
A	0	161	433	595
B	14	0	0	14
C	519	561	0	1080
Tot	533	722	433	1689

2036 PM With Development Traffic				
	A	B	C	Tot
A	0	76	594	670
B	8	0	0	8
C	444	388	0	832
Tot	452	465	594	1510

Table 8.21 Junction 3: 2036 With Development AM/PM Peak Hour Traffic Movements

8.1.8 *Junction 4: Existing N28 Slip-on/Slip-off*

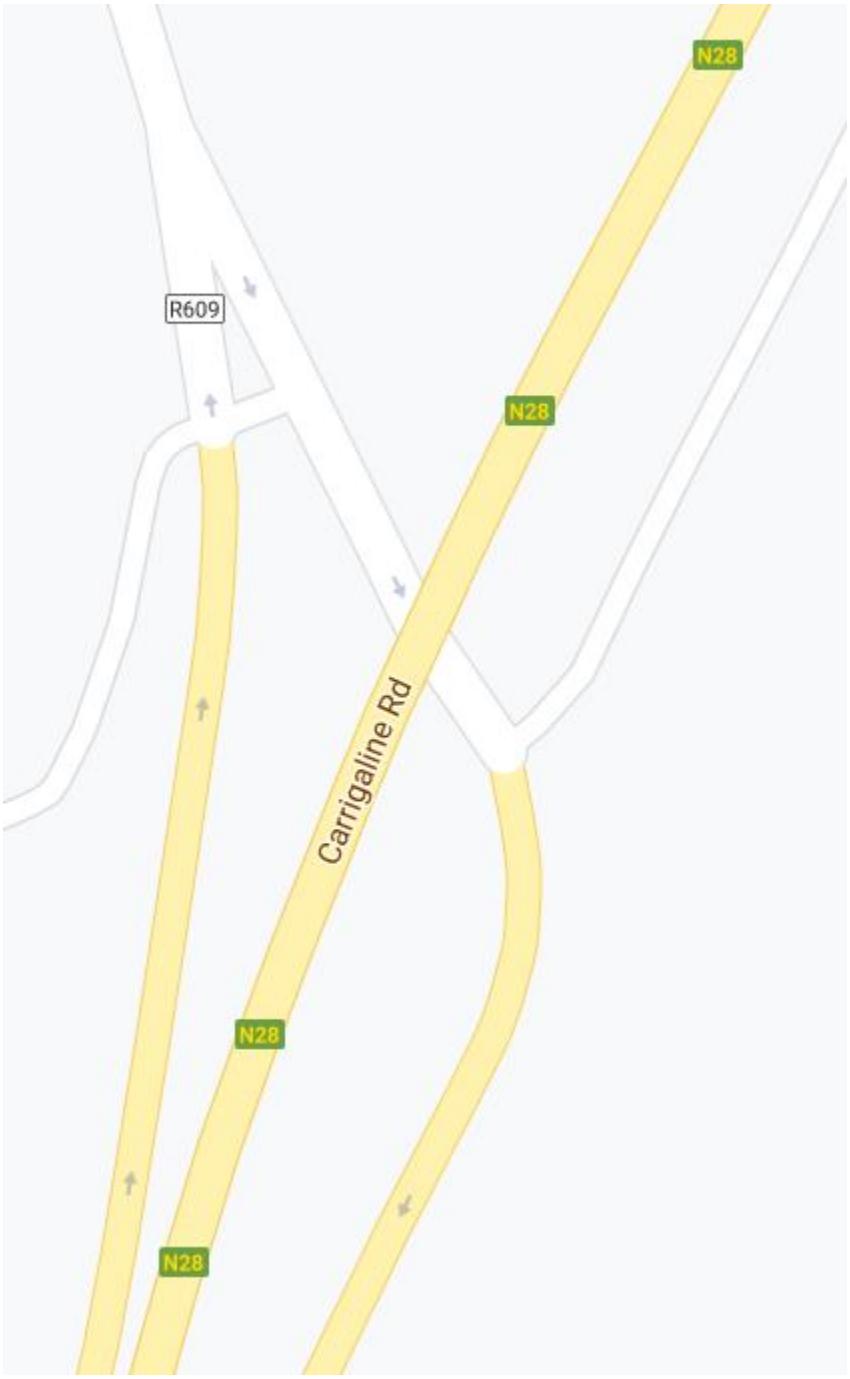

Fig 8.1.8: Junction 4 Junction Layout

This is a grade separated junction with free-flowing slip roads onto and off the N28. The R609 southbound travels underneath the N28 prior to accessing the slip road. Southbound access is only available at this junction.

No analysis was carried out at this junction as it is largely free flow. The proposed development of the SLR-3 lands would have a minimal impact on the operation of this junction from a traffic movement point of view. As evident in the distribution diagrams 20% of generated peak hour traffic has been assigned to this direction. This junction is set to be upgraded as part of the M28 Scheme to be replaced with a full grade separated interchange in all directions as well as a connection to Maryborough Hill.

8.1.9 *Junction 5*: *Priority Controlled Junction R609 and Maryborough Ridge.*

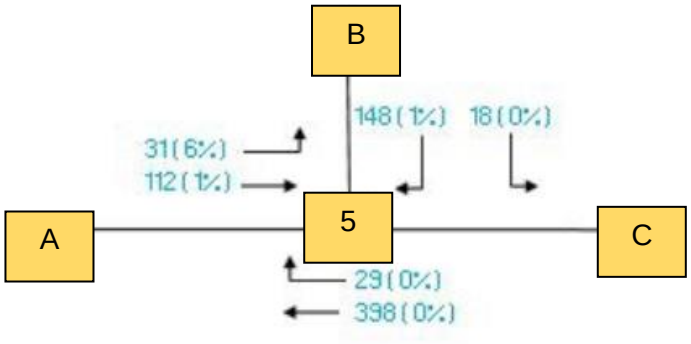

Fig 8.1.9: Junction 5 Arm Designation (A,B,C)

AM 2019

	A	B	C	Tot
A	0	31	112	143
B	148	0	18	166
C	398	29	0	427
Tot	546	60	130	736

PM 2019

	A	B	C	Tot
A	0	93	205	298
B	40	0	6	46
C	321	24	0	345
Tot	361	117	211	689

Table 8.23 Junction 5: AM/PM Peak Hour Traffic Movements

AM 2026 1.06

	A	B	C	Tot
A	0	33	119	152
B	157	0	19	176
C	422	31	0	453
Tot	579	64	138	780

PM 2026 1.06

	A	B	C	Tot
A	0	99	217	316
B	42	0	6	49
C	340	25	0	366
Tot	383	124	224	730

Table 8.24 Junction 5: 2026 Without Development AM/PM Peak Hour Traffic Movements

2026 AM With Development Traffic

	A	B	C	Tot
A	0	33	235	268
B	157	0	33	190
C	719	53	0	772
Tot	876	86	268	1229

2026 PM With Development Traffic

	A	B	C	Tot
A	0	99	479	578
B	42	0	14	57
C	502	37	0	540
Tot	545	136	494	1174

Table 8.25 Junction 5: 2026 With Development AM/PM Peak Hour Traffic Movements

AM 2036 1.16

	A	B	C	Tot
A	0	36	130	166
B	172	0	21	193
C	462	34	0	495
Tot	633	70	151	854

PM 2036 1.16

	A	B	C	Tot
A	0	108	238	346
B	46	0	7	53
C	372	28	0	400
Tot	419	136	245	799

Table 8.26 Junction 5: 2036 Without Development AM/PM Peak Hour Traffic Movements

2036 AM With Development Traffic

	A	B	C	Tot
A	0	36	246	282
B	172	0	35	207
C	759	56	0	814
Tot	930	92	281	1303

2036 PM With Development Traffic

	A	B	C	Tot
A	0	108	500	608
B	46	0	15	61
C	534	40	0	574
Tot	581	148	515	1243

Table 8.27 Junction 5: 2036 With Development AM/PM Peak Hour Traffic Movements

8.1.9 *Junction 6*: *Slip Road to Douglas Centre.*

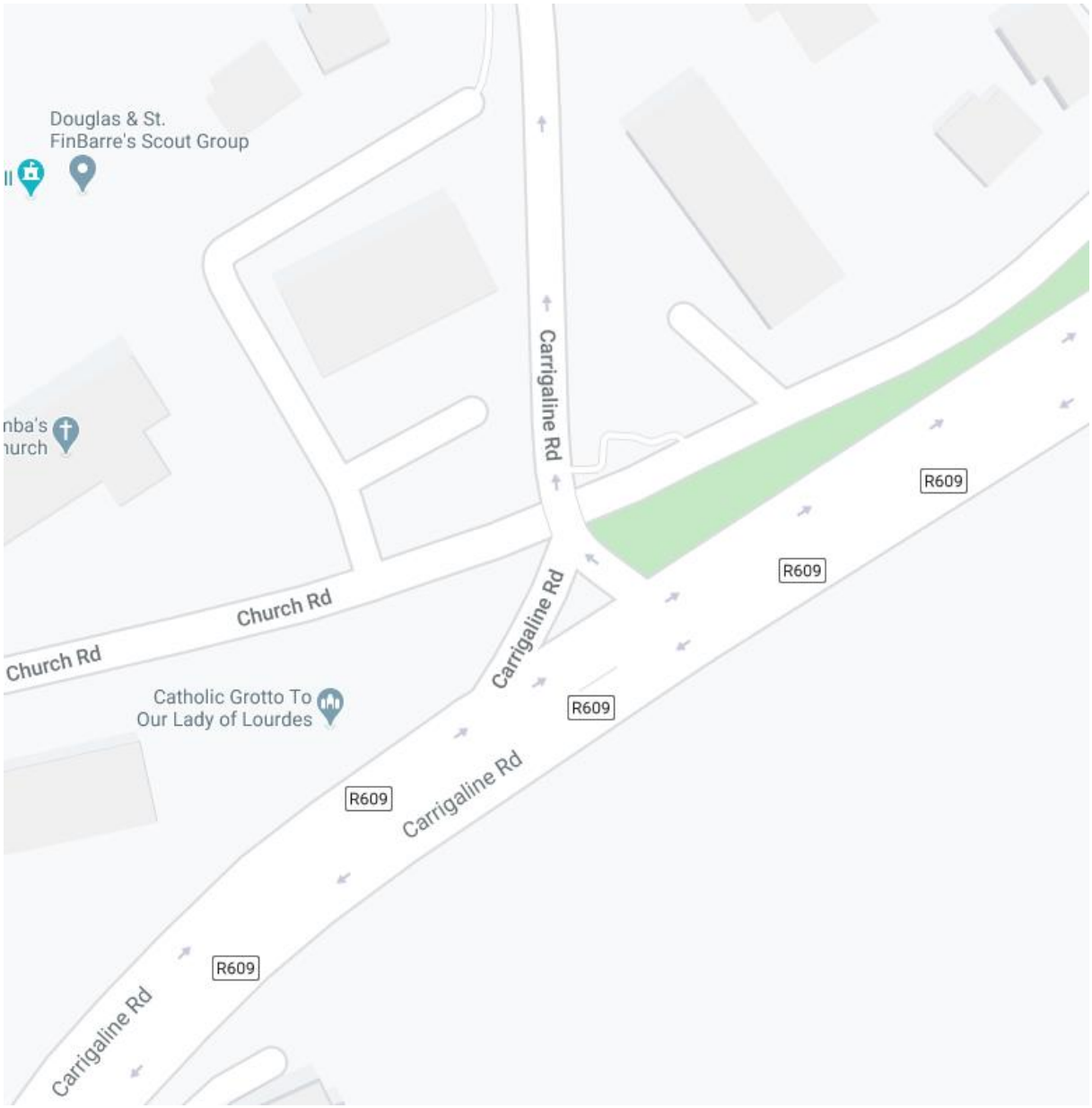

Fig 8.1.10: Junction 6 Layout

No analysis was carried out at this junction as it is largely free flow and there are no available up-to-date traffic counts.

The proposed development of the SLR-3 lands would have a minimal impact on the operation of this junction from a traffic movement point of view. As evident in the distribution diagrams a total of 74 vehicles from the development are expected to use this route in the morning peak with 40 vehicles using it in the evening peak. The junction includes a signal-controlled pedestrian crossing.

8.1.10 *Junction 7*: *Existing Roundabout Junction at Douglas Court Shopping Centre.*

Traffic counts for the evening peak recorded in 2015 were used to assess the impact on this junction for both with/without development.

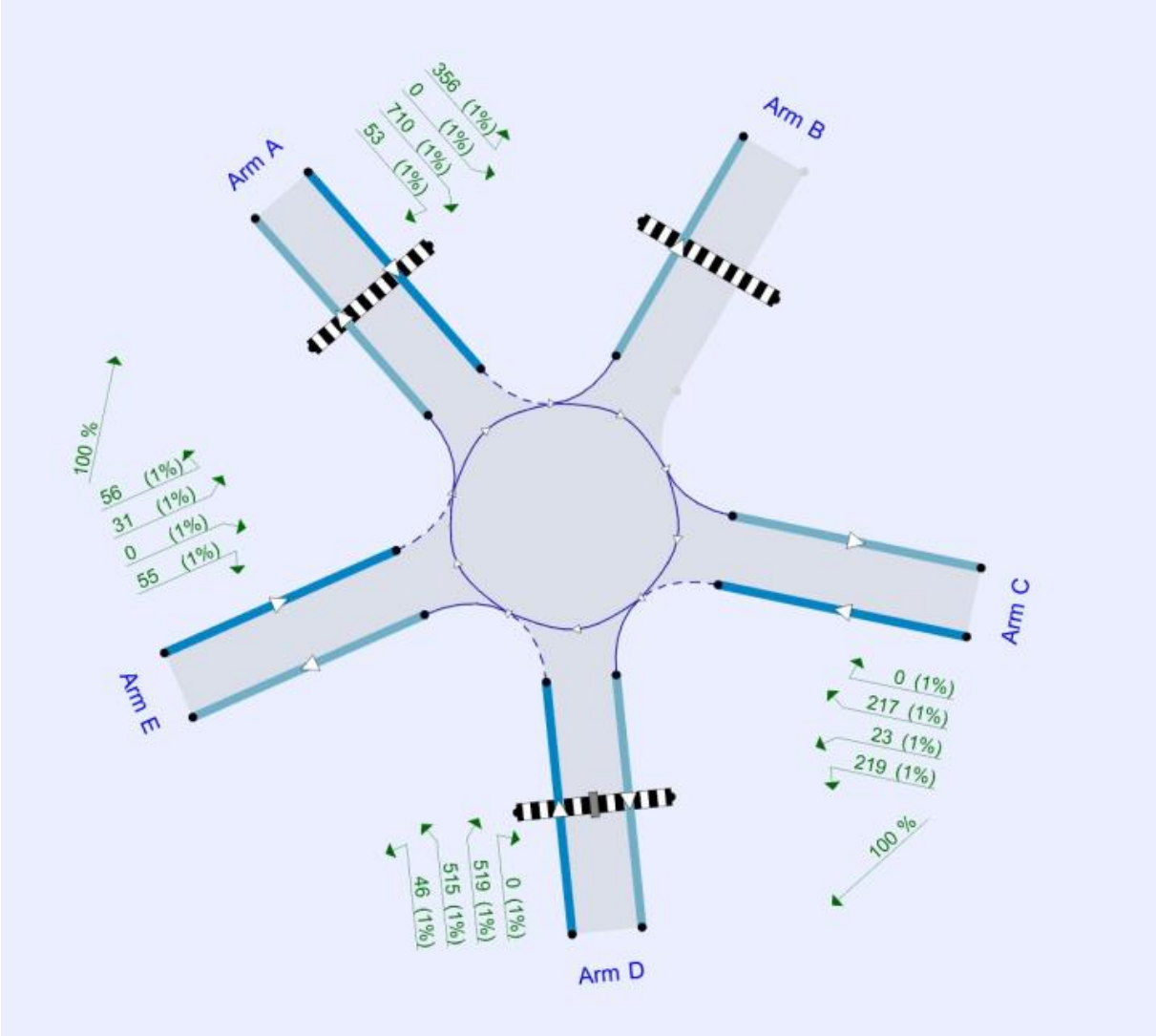

Fig 8.1.8: Junction 7 Arm Designation (A,B,C,D,E)

PM 2019

	A	B	C	D	E	Tot
A	0	307	0	551	46	904
B	0	0	0	0	0	0
C	187	0	0	182	20	389
D	409	444	0	0	40	893
E	48	27	0	47	0	122
Tot	644	778	0	780	106	2308

Table 8.28 Junction 7: PM Peak Hour Traffic Movements

PM 2026	1.06					
	A	B	C	D	E	Tot
A	0	325	0	584	49	958
B	0	0	0	0	0	0
C	198	0	0	193	21	412
D	434	471	0	0	42	947
E	51	29	0	50	0	129
Tot	683	825	0	827	112	2446

Table 8.29 Junction 7: 2026 Without Development PM Peak Hour Traffic Movements

2026 PM With Development Traffic						
	A	B	C	D	E	Tot
A	0	325	0	655	49	1029
B	3	0	0	0	0	3
C	198	0	0	201	21	420
D	475	475	0	0	42	992
E	51	29	0	50	0	129
Tot	727	829	0	906	112	2573

Table 8.30 Junction 7: 2026 With Development PM Peak Hour Traffic Movements

PM 2036	1.16					
	A	B	C	D	E	Tot
A	0	356	0	639	53	1049
B	0	0	0	0	0	0
C	217	0	0	211	23	451
D	474	515	0	0	46	1036
E	56	31	0	55	0	142
Tot	747	902	0	905	123	2677

Table 8.31 Junction 7: 2036 Without Development PM Peak Hour Traffic Movements

2036 PM With Development Traffic						
	A	B	C	D	E	Tot
A	0	356	0	710	53	1120
B	3	0	0	0	0	3
C	217	0	0	219	23	459
D	515	519	0	0	46	1081
E	56	31	0	55	0	142
Tot	791	906	0	984	123	2804

Table 8.32 Junction 7: 2036 With Development PM Peak Hour Traffic Movements

9.0 NETWORK MODELLING RESULTS

9.1 INTRODUCTION

9.1.1 This section presents the results of the traffic modelling of the seven identified junctions presented both with/without development in place for the current year 2019, the Base Year + 5 (2026) with 750 units completed and the Design year 2036. The Junction 9 Arcady Software Package was used to analyse the roundabout junction (Junction 1) whilst LinSig Version 3.3 was used to analyse Junction 2 and Junction 3, given its unusual configuration. For normal priority-controlled junctions, the PICADY software package is used however as traffic entering the slip from the south (Arm A) is required to yield to right turners coming from the development side (Arm C) this complexity is better analysed using LinSig. The complete results sheets as well as digital copies for all of the generated models are provided as an appendix (Appendix 2).

9.1.2 The LinSig modelling software produces a PRC % (Practical Reserve Capacity) and a Delay figure which are used to compare the effects the development will have on the junction being modelled. A PRC of 10% implies that the junction has reached capacity but is still operational with delay incurred. The delay figure produced (pcuHr) is a measure of the overall delay incurred on all arms of the junction and is based on the Demand Flow per arm multiplied by the Average Delay per PCU.

9.1.3 The Junctions 9: ARCADY modelling software produces an RFC % (Ratio of Flow to Capacity), a Delay figure measured in seconds and a LOS (Level of Service) which are used to compare the effects the development will have on the junction being modelled. An RFC of 85% on a roundabout junction implies that the junction has reached capacity but is still operational with delay incurred. The following table describes the different LOS and the implications for the junction being assessed.

Level of Service A	Free-Flow
Level of Service B	Reasonably Free-Flow (no delay incurred)
Level of Service C	Stable Operation (busy but operational with acceptable delay incurred)
Level of Service D	Borderline Unstable (Junctions reaching capacity – but still operational-delay incurred)
Level of Service E	Extremely Unstable (Junctions at capacity or over, any incident will cause a grid-lock situation- significant delay incurred)
Level of Service F	Breakdown (Junctions over capacity, unacceptable delay traffic at a standstill)

Table 9.1 Level of Service

9.2 Junction 1: 50m Diameter Roundabout (The Finger Post)

9.2.1 The Arcady results for the roundabout both with/without development are presented in **Table 9.2** below.

9.2.2 The current year (2019) results are representative of how the junction currently operates during peak periods. This is borne out in terms of measured queue and observed delay recorded as part of the data collection process. **Figure 3.4.1** is referred to for arm designation when interpreting the results. The constructed model is deemed to be fit for purpose.

9.2.3 The results indicate that the junction currently operates over-capacity for the PM peak with a measured R.F.C (Ratio of Flow to Capacity) of 96% on Arm E (Bypass Road approach to roundabout). This is resulting in a Level of Service F for this approach with an average delay of 80 seconds. Arm C (R609 Carrigaline Road) Approach is showing a LOS of C with moderate queuing occurring.

9.2.4 Future year results, both with and without development, show a steady degradation in capacity for both of these arms with significant queuing occurring.

9.2.5 The current configuration of the roundabout, specifically the two-lane approach at Arm E with the left-hand lane designated for Rochestown traffic only, results in capacity issues for the junction. When the junction is modelled with the normal configuration (left and straight on the outside lane) the junction is seen to operate within capacity both with/without development traffic. To implement this change, the circulating carriageway would need to be two-lane with a minimum width of 8.0m.

	AM							PM						
	Set ID	Queue (PCU)	Delay (s)	RFC	LOS	Junction Delay (s)	Junction LOS	Set ID	Queue (PCU)	Delay (s)	RFC	LOS	Junction Delay (s)	Junction LOS
	Finger Post Rbout - 2020													
Arm A	D1	0.7	4.82	0.39	A	8.36	A	D2	1.7	9.77	0.64	A	31.18	D
Arm B		0.9	5.14	0.47	A				0.7	5.58	0.40	A		
Arm C		2.3	16.30	0.70	C				2.8	19.47	0.74	C		
Arm D		0.4	4.71	0.28	A				1.1	7.53	0.53	A		
Arm E		1.0	9.51	0.50	A				12.1	79.59	0.96	F		
	Finger Post Rbout - 2026 without dev													
Arm A	D7	0.7	5.17	0.42	A	9.74	A	D8	2.2	11.47	0.69	B	57.33	F
Arm B		1.0	5.61	0.50	A				0.8	6.08	0.44	A		
Arm C		3.0	20.73	0.76	C				3.9	26.35	0.81	D		
Arm D		0.4	5.10	0.31	A				1.4	8.93	0.59	A		
Arm E		1.2	10.59	0.54	B				28.7	161.41	1.07	F		
	Finger Post Rbout - 2026 with dev													
Arm A	D9	0.9	5.96	0.48	A	63.08	F	D10	4.1	19.28	0.81	C	256.85	F
Arm B		1.5	7.22	0.60	A				1.3	8.62	0.57	A		
Arm C		53.5	225.15	1.13	F				28.0	134.98	1.05	F		
Arm D		0.6	6.22	0.36	A				2.5	14.13	0.72	B		
Arm E		1.7	14.36	0.64	B				132.8	782.04	1.44	F		
	Finger Post Rbout - 2036 without dev													
Arm A	D11	0.9	5.90	0.48	A	13.92	B	D12	3.0	14.70	0.75	B	132.76	F
Arm B		1.3	6.62	0.57	A				1.0	6.98	0.49	A		
Arm C		5.6	36.33	0.86	E				8.8	54.96	0.92	F		
Arm D		0.6	5.90	0.36	A				2.2	12.80	0.69	B		
Arm E		1.5	12.90	0.61	B				73.5	393.85	1.26	F		
	Finger Post Rbout - 2036 with dev													
Arm A	D13	1.2	6.85	0.54	A	115.32	F	D14	6.6	29.00	0.88	D	434.28	F
Arm B		2.0	8.98	0.67	A				1.7	10.62	0.64	B		
Arm C		94.3	434.72	1.25	F				64.3	281.80	1.17	F		
Arm D		0.7	6.79	0.40	A				3.8	20.42	0.80	C		
Arm E		2.3	17.31	0.70	C				205.8	1291.57	1.62	F		

Table 9.2: Junction 1: 50m Diameter Roundabout

9.3 Junction 2: Cross-Roads Signalised Junction at Maryborough Ridge

9.3.1 The LinSig results for Junction 2 both with/without development are presented in **Table 9.3** below.

9.3.2 The current year (2020) results are representative of how the junction currently operates during peak periods. This is borne out in terms of measured queue and observed delay recorded as part of the data collection process. **Figure 3.4.2** is referred to for arm designation when interpreting the results. The constructed model is deemed to be fit for purpose.

9.3.3 The results indicate that the junction currently operates within capacity for both AM and PM peaks with a measured R.F.C (Ratio of Flow to Capacity) of 81% and a resulting queue of 14 pcu's.

9.3.4 Future year results both with/without development show the junction continuing to operate within capacity albeit with a marginal increase in cycle time from 90 seconds to 100 seconds by 2036. It should be noted that each 90 second cycle includes a 10 second all-red pedestrian phase. This is a demand-based phase and is not utilised 'each and every cycle' implying that the presented results are conservative.

Junction 2: Maryborough Hill/Maryborough Woods		No Development		With Development	
		Deg Sat %	Mean Max Queue (pcu)	Deg Sat %	Mean Max Queue (pcu)
2019	AM	81.2	13.5	n/a	n/a
	PM	62	10.1	n/a	n/a
2026	AM	86.1	15.3	86.6	18.3
	PM	65.8	11.2	74	13.4
2036	AM	84.4	17.3	94	10.4
	PM	71.8	13.2	80.8	15.8

Table 9.3: Junction 2: Crossroads Signalised Junction Maryborough Ridge/Maryborough Hill

9.4 Junction 3: N28 Slip-On

9.4.1 The N28 Slip-on is a priority junction at the intersection of Maryborough Hill and the N28. Pedestrian provision at this junction is poor. **Table 9.4** presents the modelling of this junction in its current format as a priority controlled 'T' junction.

Junction 3: N28 Slip-on		No Development		With Development	
		Deg Sat %	Mean Max Queue (pcu)	Deg Sat %	Mean Max Queue (pcu)
2020	AM	88.6	3.7	n/a	n/a
	PM	67.9	1.1	n/a	n/a
2026	AM	94.7	7.1	96.9	9.7
	PM	72.8	1.3	75.1	1.5
2036	AM	104.8	112.2	107.1	123.3
	PM	81.2	2.1	83.5	2.5

Table 9.4 Junction 3: N28 Slip-On (Operating as a Priority Junction)

9.4.2 Evident from the results of the modelling is that the junction operates close to capacity during the morning peak. The evening peak shows ample capacity up to and including the design year. On-site measurements of queue lengths confirm that the approach from the southern direction is especially busy during the morning peak.

9.4.3 As this junction is included as part of the M28 Motorway Scheme any remedial measures proposed would need to be compatible with this overall plan. In the absence of the M28 motorway scheme receiving a formal go ahead the option of signalising this junction was assessed.

9.4.4 **Table 9.5** presents the traffic modelling results for the signalisation of this junction. The results indicate that the junction operates within capacity using a cycle time increasing from 60 seconds to 90 seconds for future year models. Included as part of this signalisation is an all-red pedestrian phase each-and-every cycle which in reality will be demand activated, implying that the results represent a worst-case scenario for the junction.

9.4.5 The signalisation of this junction, including a dedicated pedestrian phase, will address issues of pedestrian connectivity in advance of the M28 works being delivered. Junction capacity is improved by signalisation.

Junction 3: N28 Slip-on signalised		No Development		With Development	
		Deg Sat %	Mean Max Queue (pcu)	Deg Sat %	Mean Max Queue (pcu)
2020	AM	80	13.4	n/a	n/a
	PM	58.2	6.5	n/a	n/a
2026	AM	83.5	15.7	79.4	19.5
	PM	62.8	7.7	65.1	11.9
2036	AM	90.2	27.4	88.4	25.8
	PM	70.7	10	73.3	16.2

Table 9.5 Junction 3: N28 Slip-On (Operating as a Signalised Junction)

9.4.6 When both sets of results are compared the signalisation of this junction results in increased capacity whilst facilitating pedestrian movement. In the absence of the M28 works this option should be considered.

9.5 Junction 5: R609 Maryborough Woods Development Junction

9.5.1 The Picady results for this junction both with/without development are presented in **Table 9.6** below.

	AM							PM						
	Set ID	Queue (PCU)	Delay (s)	RFC	LOS	Junction Delay (s)	Junction LOS	Set ID	Queue (PCU)	Delay (s)	RFC	LOS	Junction Delay (s)	Junction LOS
	R609 Carrigaline Road / Maryborough Woods - 2020													
Stream B-AC	D1	0.7	13.13	0.40	B	3.33	A	D2	0.1	9.22	0.11	A	0.94	A
Stream C-AB		0.1	5.03	0.08	A				0.1	5.43	0.07	A		
	R609 Carrigaline Road / Maryborough Woods - 2021 No Dev													
Stream B-AC	D3	0.7	13.42	0.41	B	3.40	A	D4	0.1	9.31	0.12	A	0.94	A
Stream C-AB		0.2	5.02	0.08	A				0.1	5.41	0.07	A		
	R609 Carrigaline Road / Maryborough Woods - 2021 with dev													
Stream B-AC	D5	0.7	13.64	0.42	B	3.51	A	D6	0.1	9.37	0.12	A	0.98	A
Stream C-AB		0.2	5.02	0.08	A				0.1	5.44	0.07	A		
	R609 Carrigaline Road / Maryborough Woods - 2026 without dev													
Stream B-AC	D7	0.7	14.04	0.43	B	3.55	A	D8	0.1	9.47	0.12	A	0.95	A
Stream C-AB		0.2	4.98	0.09	A				0.1	5.39	0.07	A		
	R609 Carrigaline Road / Maryborough Woods - 2026 with dev													
Stream B-AC	D9	1.2	21.87	0.56	C	3.99	A	D10	0.2	12.44	0.17	B	0.99	A
Stream C-AB		0.7	4.48	0.21	A				0.3	5.18	0.14	A		
	R609 Carrigaline Road / Maryborough Woods - 2036 without dev													
Stream B-AC	D11	0.9	15.84	0.48	C	3.98	A	D12	0.2	9.92	0.14	A	1.01	A
Stream C-AB		0.2	4.89	0.10	A				0.2	5.33	0.08	A		
	R609 Carrigaline Road / Maryborough Woods - 2036 with dev													
Stream B-AC	D13	1.6	26.77	0.63	D	4.89	A	D14	0.2	13.32	0.20	B	1.08	A
Stream C-AB		0.8	4.43	0.23	A				0.4	5.13	0.15	A		

Table 9.6 Junction 5: Priority Controlled Junction

9.5.2 The current year (2019) results are representative of how the junction currently operates during peak periods. The constructed model is fit for purpose.

9.5.3 The results indicate that the junction operates within capacity currently and will continue to do so up to and including the design year 2036 with the development in place. The maximum future year RFC (Ratio of Flow to Capacity) is 63% in 2036 AM peak. The Level of Service is A – Free-Flow. The full results are included in the Appendix section of this report.

9.6 Junction 7: Douglas Court Shopping Centre Roundabout Junction.

9.6.1 The results of the Arcady analysis carried out are presented below. The PM period will have the highest impact, so no AM peak assessment was carried out. (Note: The most recent traffic counts for this junction were PM only).

9.6.2 **Table 9.7** presents the results of the Arcady analysis.

	PM						
	Set ID	Queue (PCU)	Delay (s)	RFC	LOS	Junction Delay (s)	Junction LOS
	Douglas Court SC Roundabout - 2020						
Arm A	D1	23.7	85.44	1.01	F	34.90	D
Arm C		0.1	1.93	0.11	A		
Arm D		0.6	2.21	0.37	A		
Arm E		0.1	4.84	0.10	A		
	Douglas Court SC Roundabout - 2026 without dev						
Arm A	D2	52.9	165.63	1.09	F	66.34	F
Arm C		0.1	1.95	0.11	A		
Arm D		0.7	2.30	0.40	A		
Arm E		0.1	5.15	0.11	A		
	Douglas Court SC Roundabout - 2026 with dev						
Arm A	D3	91.9	284.13	1.17	F	115.23	F
Arm C		0.1	1.97	0.12	A		
Arm D		0.7	2.37	0.42	A		
Arm E		0.1	5.37	0.11	A		
	Douglas Court SC Roundabout - 2036 without dev						
Arm A	D4	117.4	396.21	1.23	F	156.75	F
Arm C		0.1	1.96	0.12	A		
Arm D		0.8	2.45	0.43	A		
Arm E		0.2	5.74	0.13	A		
	Douglas Court SC Roundabout - 2036 with dev						
Arm A	D5	165.1	586.27	1.31	F	235.99	F
Arm C		0.1	1.98	0.13	A		
Arm D		0.9	2.76	0.47	A		
Arm E		0.2	6.01	0.14	A		

Table 9.7 Junction 7: Douglas Court Shopping Centre Roundabout Junction

9.6.3 The results of the modelling show that the junction operates over capacity for current year PM peak. Future year scenarios, both with and without the development traffic included, indicate that the junction degrades with time.

9.6.4 Previous studies (DLUTS) have concluded that the signalisation of this junction would increase capacity whilst improving pedestrian connectivity in the area.

10.0 CUMMULATIVE IMPACT

10.1.1 As outlined in **Section 7.0** of this report, industry standard growth rates have been applied to background traffic for future year assessments (to account for further development within the area). These growth rates make allowance for modal shift targets as set by national policy but do not take account of site-specific measures that may be implemented to mitigate against traffic generation from a particular development. In this instance the development of strategic transport corridors in-line with the CMATS study.

10.1.2 Traffic generation from the recently granted Cairn Homes Site has been included in future year models in addition to background traffic growth.

10.1.3 The Ballybrack Cycle/Pedestrian scheme is currently at detailed design stage and will have a direct link to the proposed development, crossing the N28. This scheme will provide a high-quality off-road pedestrian/cycle connection to Douglas and further afield when the full cycle network is completed.

10.1.4 Recently completed upgrade works on Maryborough Hill include cycle lane provision in the uphill direction as well as dedicated off-road bus stops to serve the entire area. The cycle lane is a continuation of the works previously carried out by Cork County Council. Access to this facility will be via the continuation of the Ballybrack Cycle Scheme crossing the N28.

10.1.5 The M28 Motorway Scheme proposes a new interchange to replace Junction 4 which will provide significant improvements for Douglas Village as well as better connectivity to the national network (M28) for the entire area. The following figure presents the proposed junction:

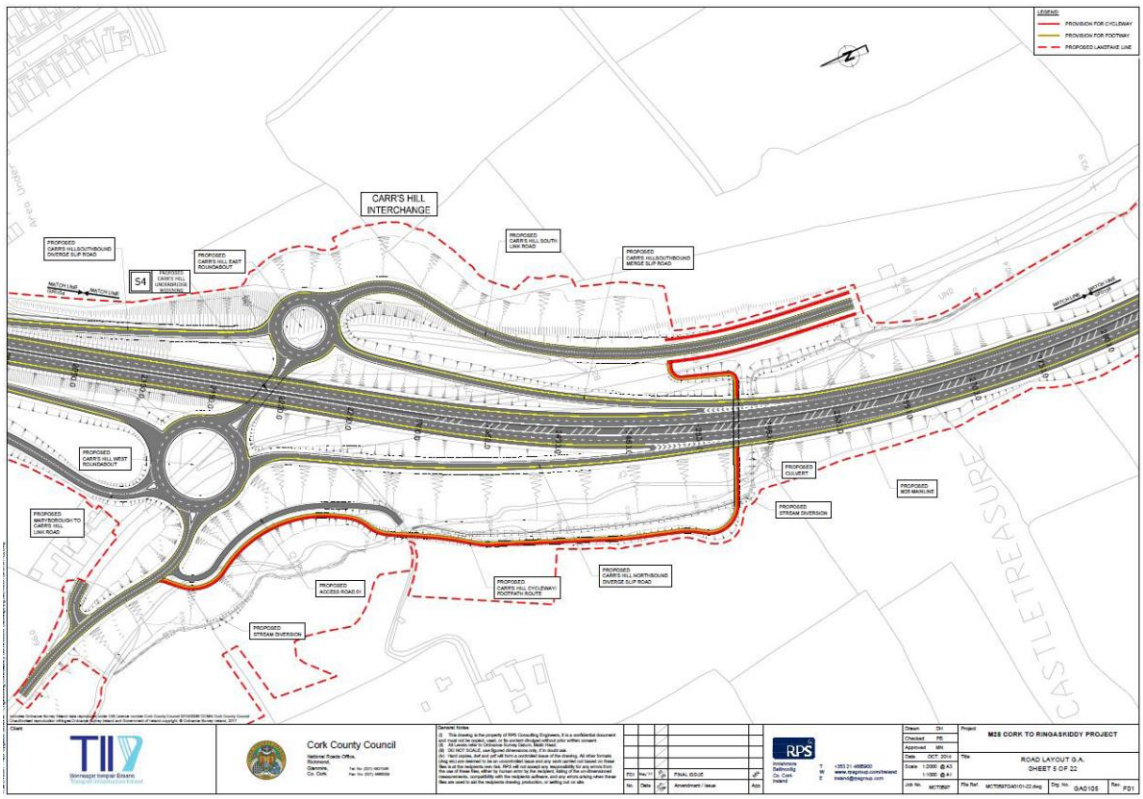

Fig 10.1: Proposed M28 Interchange

The M28 Motorway Scheme will have a capacity of upwards of 40,000 AADT with the proposed interchange capable of a peak hour flow of 2,000 pcu's (passenger carrying units). Current two-way peak hour flow on the R609 is on average 550 pcu's and with the addition of the Cairn Homes development traffic this is expected to increase to 1,100 pcu's. In the absence of the M28 upgrade this traffic is split 80% towards Douglas Village and 20% towards the N28 (Carrigaline) based on recorded traffic flows. Assuming that the direction of travel on the R609 will flip with the interchange in place this would imply approximately 880 pcu's will use the

interchange in future years. Applying similar methodology to traffic being generated from the SLR 3 lands this would imply that an additional 660 pcu's would go to or come from the M28 during peak hours as a result of the proposed development. With the full completion of development of the Cairns Homes site and the SLR 3 lands the interchange would be required to cater for 1,540 pcu's on average during peak periods. This would result in a spare capacity at the interchange of approximately 23%. It is understood that the M28 traffic assessment allowed for the development of the SLR 3 lands as part of the traffic modelling.

10.1.6 The DLUTS study proposed a new Link Road joining Carrigaline Road and Grange Road (Transport Policy T-04): The proposed link road is located to the south of Douglas Village between the existing junction of Donnybrook hill with Grange Road and Carrigaline Road.

Figure 10.12 below shows the location of the proposed link road in the context of the local road network.

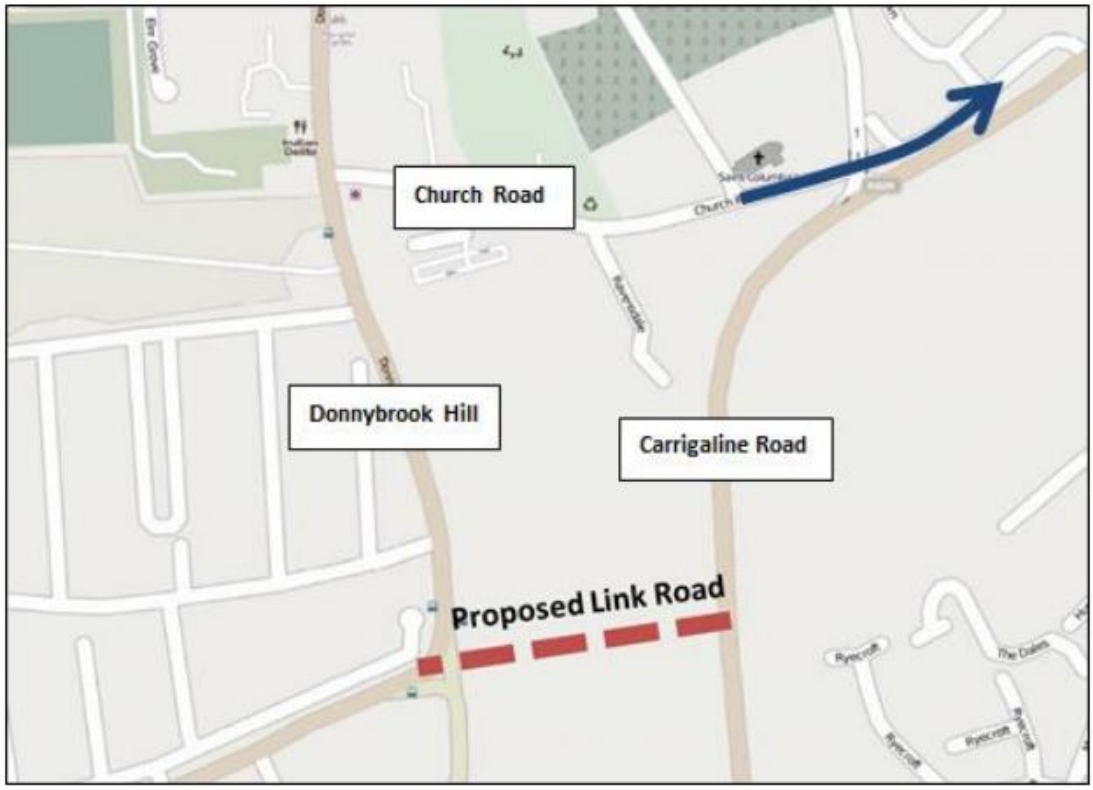

Fig 10.2: Image taken from DLUTS

The proposed link road is approximately 180m in length and will consist of a single carriageway in each direction with a flared right turn lane at either end on the approach to the junctions with the existing road network. It will also include a bridge to carry the road over the Ballybrack Valley River. Designated walking and cycling lanes, in both directions, will also be provided on the New Link Road. This will provide an alternative and more direct route for pedestrians and cyclists who travel from east to west (and vice versa) through Douglas and provides a convenient route for students travelling from the Maryborough Woods area to schools on Grange Road and Donnybrook Hill.

The New Link Road will create the opportunity to provide a new, east to west / west to east, bus route potentially linking Cork International Airport with the suburban developments of Douglas, Carrigaline and Ringaskiddy. Church Road, which currently carries the majority of the east to west movement to the south of Douglas, will experience the greatest impact on traffic movements as a result of the construction. The construction of the new link road will allow the transfer of the majority of this traffic from Church Road and will therefore help to ease the congestion currently experienced during peak times, particularly at Daly's Corner. The new road will also improve the connectivity between the Maryborough Hill area and Frankfield / Grange and will provide improved access between the new residential estates on Maryborough Hill with the Primary schools in Douglas.

It is understood that this proposed link has been analysed as part of the DLUTS study and will be revisited as part of CMATS. In the absence of up to date traffic counts at the existing Grange Cross junction and without knowing the base line assumptions made for the assumed redirection of traffic flow, assessing the impact of the proposed lands on this proposed future upgrade is difficult to say the least. The results of any traffic modelling would be of limited use. It is also noted that the Cairn Homes Application were not required to analyse these junctions as part of their submission.

10.1.7 The recently granted Cairn Homes development on the R609 Carrigaline Road includes the provision of a bus stop on the R609, Carrigaline Road and a Primary School Campus which will be accessible from the proposed development by vehicular/walking/cycle. This will have a positive impact on traffic generation from the site.

11.0 ROAD SAFETY

11.1 Existing Road Network Safety

The R609 adjoining the proposed site operates at an 60kph speed limit and has no cycle pedestrian facilities at present. The route in the vicinity of the site is rural in nature and leads to increased speed.

11.2 Road Collision Database

A review of the road collision database for the area shows a number of minor accidents occurring over an 11-year period primarily with vehicles exiting the N28 onto the R609, refer to **Figure 11.1**.

11.3 Proposed Road Safety Mitigation Measures

The proposed development will include a number of measures that are deemed necessary to improve road safety in the area. These measures include:

- The development of a right turn lane into the scheme with allowance for pedestrian facilities along the R609 which will significantly enhance the urban nature of this route, thus improving safety.

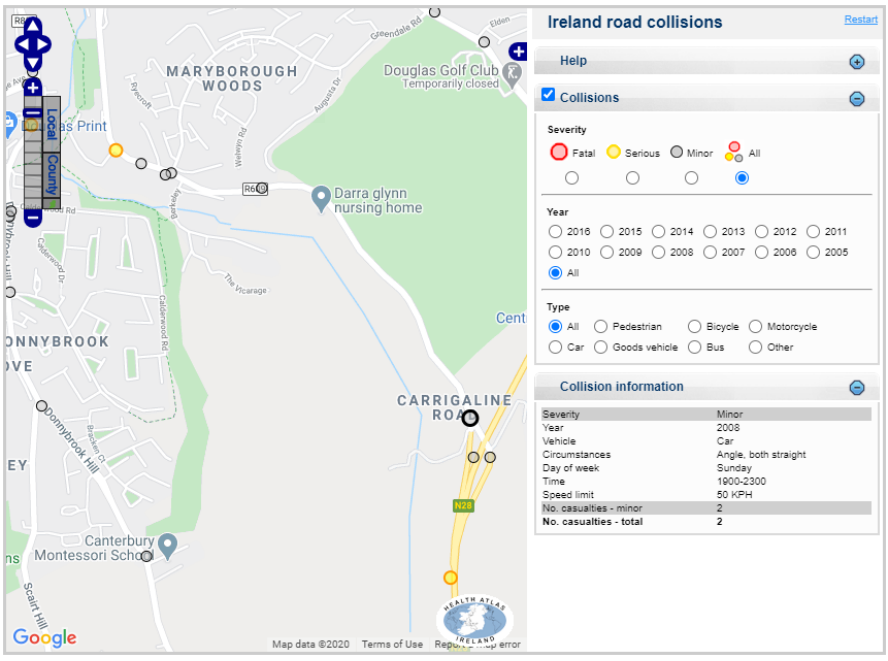

Fig 11.1: Accident statistics for Roads in the vicinity of the site

12.0 ENVIRONMENTAL IMPACT

12.1 The SLR 3 lands lend themselves to be designed in accordance with the principles of DMURS (Design Manual for Urban Roads and Streets) ensuring an environmentally compliant development can be delivered.

12.2 As outlined in this report the development of the site will need to encourage and promote the use of sustainable transport solutions. The recently granted permission for a school campus site and a Local Retail Centre site (Cairns Holdings site), in conjunction with the continued development of the Strategic Transport Corridors, should result in a reduction of trips generated by the scheme helping to achieve the target modal split as set out by Government (45%).

13.0 INTERNAL LAYOUT & PARKING PROVISION

13.1 **Figure 4.1.1** presents the proposed layout which includes the provision of an on-road bus stop at the main entrance, shared cycle/footpaths, pedestrian/cycle permeability throughout the site on designated off-road routes and speed control measures where appropriate.

13.2 Parking will be provided in accordance with the LAP and is suitably located on site in residential properties, in shared parking areas or in areas where there are apartment provisions (in sub levels). With respect to cycle parking, dedicated cycle parking provision spaces are provided as part of the proposed development.

14.0 PUBLIC TRANSPORT

14.1 The expansion of residential development in this area also presents the opportunity to improve public transport in the area for existing and future residents. Such improvements would serve the future students at the permitted national school, the future residents of the SE-R-06, SE-R-08 permitted developments, and the subject lands. At present the only service within15 minutes walking distance is the 216 service between Mount Oval (Monswood Est) and CUH (Bishopstown Rd) which operates at a frequency of approximately 30 minutes.

The stated objective of the Cork Metropolitan Area Transport Strategy 2040 (CMATS) is 'to deliver an accessible, integrated transport network that enables the sustainable growth of the Cork Metropolitan Area' with the emphasis on aligning land use and transport planning to reduce the need to travel by car and support the functioning of a sustainable, integrated transport system. Given, the significant proposed developments planned for this area, there is an opportunity to make provision for improvements to the public transport service in the area, with pedestrian access to that provision being enhanced by the Ballybrack Valley Pedestrian and Cycle Path.
The introduction to CMATS states that:

"*Land use and transport planning will need to be far more closely aligned to reduce the need to travel by car and support the functioning of a sustainable, integrated transport system.*"

Similarly, the guiding principles upon which CMATS is based include the following:

- Principle 1 – To support the future growth of the CMA through the provision of an efficient transport network.
- Principle 6 – To increase public transport capacity and frequencies where needed to achieve the strategy outcomes.

Permitted developments in the area and the delivery of the subject lands can assist in the achievement of these objectives. The proposed development could deliver and facilitate the extension of the transport network along the Old Carrigaline Road (R-609). This could be achieved efficiently and without significant infrastructural investment by extending the BA – DO Ballyvolane Donnybrook (10 minute frequency) BusConnects route,

proposed and identified in Draft CMATS. The extended route would serve the permitted national school and support the future sustainable development of the area as a whole.
A new bus-stop / lay-by within the subject site where it meets the Ballybrack Cycle Track would allow for the formation of a mini transportation hub and act as a focal point at the entrance to the proposed development.

14.2 The following isochrone map shows the areas accessible by public transport based on time of travel from the site.
Note: The distances include transfers to different services so are indicative only (delay may be experienced during transfer)

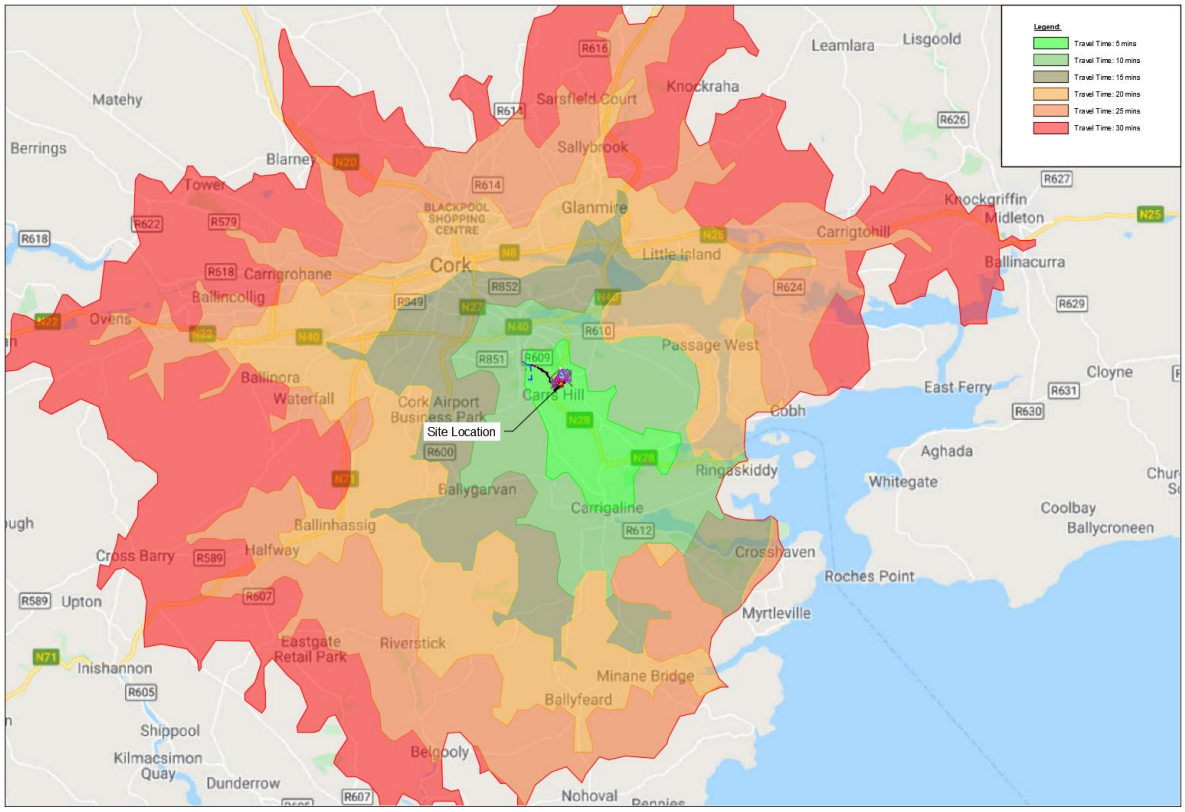

Fig 14.2: Time of travel by Public Transport Options

14.6 Evident from the above map is that current bus provision in the area allows travel to a wide area within 30 mins, with many of the main employment centres being within the 20 mins range. This is significantly shorter than CSO figures for other areas such as Dublin City 28.9 mins, South Dublin 30.6 mins, Waterford City & County 22.4 mins, Limerick City & County 24.2 mins.

A commute time by public transport in excess of 45 mins results in a change in behavioural preference away from public transport. It can be concluded that the proposed development site by its location will encourage the use of public transport in-line with national policy.

14.7 The aforementioned travel times are set to significantly improve as a result of CMATS which will include bus priority at junctions, additional on-road facilities such as covered shelters, real-time arrival departure boards and an increase in frequency of service. These measures, scheduled for delivery in 2023, will require the density of population in the area served, to justify this expenditure by the NTA.

15.0 ACCESSIBILITY AND INTEGRATION

15.1 A desktop assessment of existing permeability for cyclists and pedestrians from the site was carried out. Presented in the following isochrone maps are the range of distances, for both pedestrians and cyclists, based on travel time.

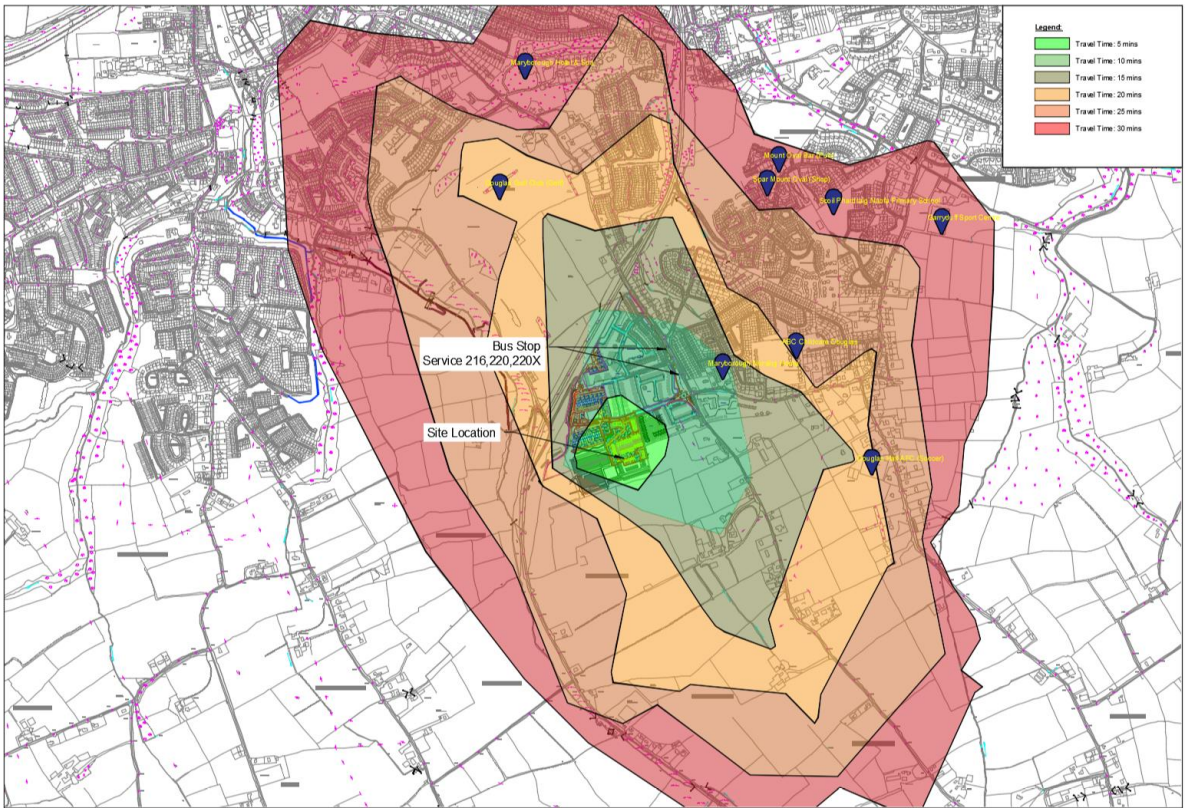

Fig 15.1: Proposed Development: Walking distance to local area

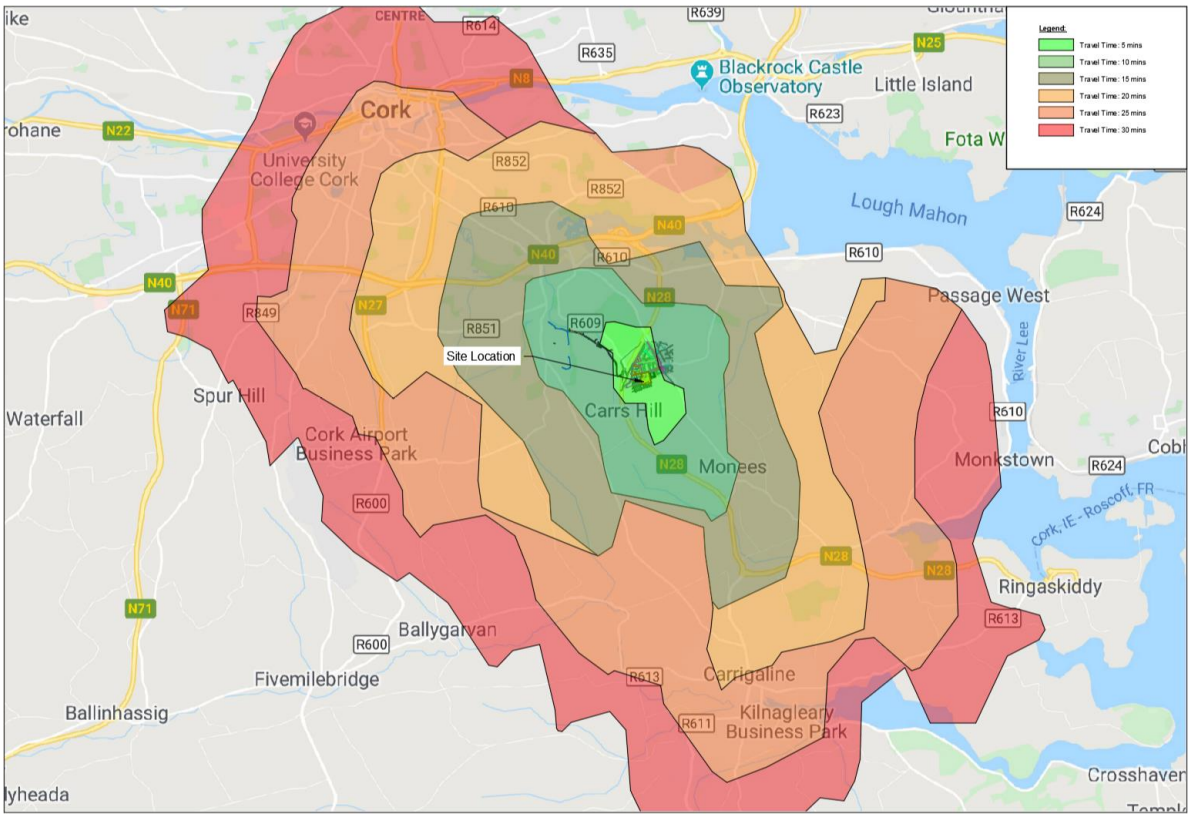

Fig 15.2: Proposed Development: Cycle distance to local area

15.2 Within 10 mins walk time from the site:

- Broadale Retail Units
- Maryborough Nursing Home
- Bus Stop Broadale (Service 220,220x & 216)

Within 15 mins walk time from the site:

- Stephen's Driving School Douglas
- Milan's Garage
- Applebee Bakes
- Douglas Hall AFC Kennedy Park Pitch
- Cork Balloon Company
- Bus Stop Clarkes Hill (The Borough) (Service 216)

Within 20 mins walk time from the site:

- Douglas Hall AFC (Main Grounds)
- ABC Childcare Douglas
- Douglas Nursing Home
- BootCamp Ireland
- John Berry Photography & Video
- The Work Shop
- LaserAge
- Bus Stop Clarkes Hill (Landsborough) (Service 216)
- Bus Stop Lissadell (Service 220,220x & 216)

Within 30 mins walk time from the site:

- Maryborough Hotel & Spa
- Ballybrack Greenway (Current Scheme)
- Spar Mount Oval
- Mount Oval Bar
- Scoil Phardraig Naofa Primary School
- Garryduff Sports Centre
- Douglas Court Shopping Centre
- Ivor Trinder Crash Repairs
- Ardagh Driving School
- Douglas Yoga Centre
- Devereaux Beauty Clinic
- Bus Stop Clarkes Hill (Foxwood) (Service 216)
- Bus Stop Maryborough Hotel & Spa (Service 220,220x & 216)

15.3 The cycle range is presented in similar terms and relates to the average distance travelled in a specific time (16-19 kmh). Cork City Centre falls within the 25 min category based on unrestricted flow through junctions. The 30 mins range includes all of the city including the southern suburbs.

Note: The travel speed used is on the low side, an experienced cyclist would have a 26-30kph average speed, however the speed used is more reflective of the topography in and around Cork City. It should also be noted that as a result of the aforementioned topography the inbound from the site to, say the City Centre, would be considerably quicker than the outbound trip, so on average it is considered that the speed used is appropriate.

16.0 ACCESS FOR PEOPLE WITH DISABILITIES

16.1 As previously outlined the proposed development of the subject lands will be carried out in accordance with DMURS.

16.2 The proposed new bus stop will include accessible kerbs which allow ease of access for wheelchair users.

17.0 MOBILITY MANAGEMENT PLAN (SUSTAINABLE ACCESS STRATEGY)

17.1 A mobility management plan relating to a residential development would form part of the sales/promotion package presented to would-be purchasers and would highlight the proximity of local services, public transport provision, schools and walking/cycle distances to same. The proposed 'hard measures' that will facilitate safer pedestrian, cycle and public bus access will be provided as part of the application and will be further complimented by scheduled Local Authority Works (CMATS).

17.2 An overview of the sustainable infrastructure proposed is as follows:

- Over 10km of upgraded or new footway/cycleway provision both within the site and on approaches to the site (Ballybrack Cycle Scheme).
- The provision of a new bus-stop on the Main Spine Road to be provided as part of this application. This new bus-stop will facilitate the re-routing of the existing service or the provision of additional services in the area. This proposal is compatible with the CMATS Project.
- The provision of a combined footway/cycleway within the development to serve the site promoting walking and cycling as a safe option.

18.0 MITIGATION

18.1 It has been clearly demonstrated that the SLR 3 site falls within the category of development where the use of sustainable transport solutions will be a real option. This premise is further supported by the Local Authority and the National Transport Authority's commitment to the delivery of CMATS measures in the coming years.

18.2 The proposed development will impact on the surrounding roads network for both construction and operational phases. Public realm works necessary for the development have already been completed as part of earlier studies (DLUTS). To minimise disruption to the local roads network during both phases, mitigation measures will be proposed as part of a full application.

19.0 REFERENCES

National Roads Authority (May 2014) Traffic and Transport Assessment Guidelines NRA, Dublin

Institution of Highways & Transportation (1994) Guidelines for Traffic Impact Assessment IHT, London

National Roads Authority (2000) Road Geometry Handbook NRA, Dublin

National Roads Authority (revised 2003) Design Manual For Roads and Bridges NRA, Dublin

National Roads Authority (November 2004) Draft Traffic and Transport Assessment Guidelines NRA, Dublin

RSA Ireland Road Collisions

http://www.rsa.ie/RSA/Road-Safety/Our-Research/Ireland-Road-Collisions/

APPENDIX 1: TRAFFIC MODELLING RESULTS