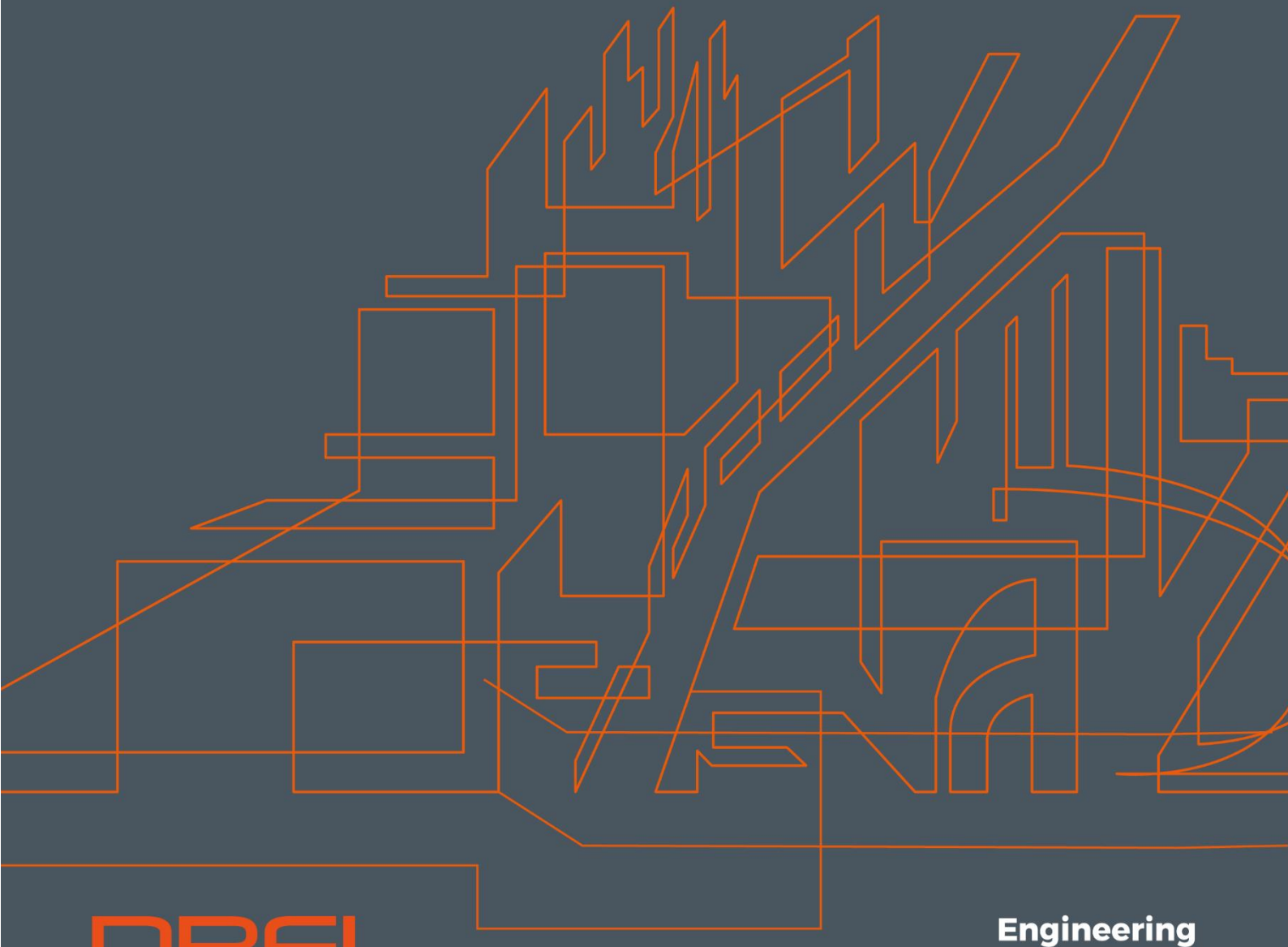
DLR Connector

Traffic Modelling Report

210093-DBFL-TR-XX-RP-C-004

May 2025



DBFL CONSULTING ENGINEERS

Engineering Sustainable Futures

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Executive Summary

This Traffic Modelling Report has been prepared by DBFL Consulting Engineers on behalf of Dún Laoghaire Rathdown County Council as part of the development of the proposed DLR Connector Active Travel Scheme. The subject scheme is approximately 8.4km in length and extends along Barton Road East (L3011), Ballinteer Road, Kilmacud Road Upper (R826), Kilmacud Road Lower (R825), Stillorgan Park Road (R825), Annaville Terrace, Rowanbyrn and Monkstown Avenue. Some sections have already been completed or are being progressed as separate DLRCC schemes. Therefore, the total length included in this subject scheme is approximately 6km.

The report sought to quantify the existing transport environment and summarise the results of the junction modelling conducted to assess the operational performance of the key junctions along the route under the Opening Year 2028 ('Do-Minimum') scenario. The results have compared the Do Minimum and Do Something scenarios for the AM and PM peak hours in the Opening Year (2028) for the assessed junctions along the route.

An assessment of the movement of people was also undertaken for a number of key junctions which took a more holistic view of the numbers of people travelling through junctions by all modes rather than traffic capacity alone. A summary of the results for each of the junctions is as follows:

1. **Barton Road East / Nutgrove Way / Broadford Road Roundabout**
   With the implementation of the proposed scheme changes, the delays increase during the AM peak hour, specifically on the southern arm (Stonemasons Way) which operated above capacity during the AM peak. All other arms operate within capacity in the AM and PM peak hours. Whilst there is a slight increase in delays in the AM peak hour, the proposed junction changes will support and encourage a significant increase in pedestrian and cyclists travelling through junction.

2. **Barton Road East / Beaumont Avenue Signalised Junction**
   With the implementation of the proposed scheme changes, whilst the delays increase slightly compared to the existing DM 2028 scenario, the junction still continues to operate within capacity.

3. **Barton Road East / Ballinteer Road Roundabout**
   With the implementation of the proposed scheme changes, delays on some of the arms increase slightly but overall the junction continues to operate well within capacity during booth the AM and PM peak hours.

4. **Main Street / Kilmacud Road Upper / Sandyford Road / Ballinteer Road Junction**
   Under the DM Scenario, the junction is shown to operate over capacity in both the AM and PM peak hours. With the implementation of the changes as per the Interim Option, the junction operates well within capacity and similarly for the Preferred Option, the junction will operate well within capacity for both the AM and PM peak hours. As such the Do Something scenario represents a junction with improved capacity as compared to the Do Minimum scenario in both peak hours.

5. **Kilmacud Road Upper / Overend Avenue / Birches Lane Signalised Junction**
   Under the DM scenario the junction is shown to be approaching capacity during the PM peak hour. However, with the implementation of the proposed scheme changes the junction operates well within capacity for both the AM and PM peak hours.

6. **Stillorgan Park Road / Carysfort Avenue / Fleurville Signalised Junction**
   Under the DM scenario the junction is shown to exceed capacity during both the AM and PM peak hours. With the implementation of the proposed scheme changes the junction will deteriorate and continue to operate over capacity for both the AM and PM peak hours, although the maximum recorded Degree of Saturation (DoS) for the PM is lower in the Do Something scenario compared to the Do Minimum. This is due to the high volume of vehicles travelling through the junction during both the AM and PM peak hours.

   However, there is also a significant increase in the number of pedestrians and cyclists travelling through the junction following the implementation of the proposed scheme changes. Whilst there are still delays experienced for motorists, the results indicate a more of a rebalancing towards sustainable modes compared to the existing and Do-Minimum scenarios.

7. **Annaville Terrace / Newtownpark Avenue / Rowanbyrn Signalised Junction**
   Under the DM 2028 Scenario, the junction will significantly exceed capacity during the AM and PM peak hours. With the implementation of the proposed scheme changes delays decrease significantly and overall performance of the junction improves compared to the Do Minimum scenario. However, the junction will continue to operate over capacity during the AM and PM peaks.

   However, the results also indicate a sizable increase in the proportion of peopling travelling through the junction via sustainable modes in both the AM and PM. Therefore, indicating a rebalancing towards active modes in terms of overall movement of people.

8. **Brookville Park / Deansgrange Road / Monkstown Link Road Signalised Junction**
   Under the DM 2028 scenario the junction will exceed capacity during both the AM and PM peak hours. However, with the implementation of the proposed scheme changes, the junction performance improves with all arms operating within capacity during both the AM and PM peak hours.

9. **Stradbrook Road / Monkstown Avenue / Abbey Road / Monkstown Link Road Rdbt**
   With the implementation of the proposed scheme changes, the junction will operate within capacity during the AM and PM peak hours with lower Degrees of Saturation (DoS) compared to the corresponding Ratios of Flow to Capacity (RFC) under the Do Minimum scenario.

10. **Monkstown Avenue / Monkstown Farm / Monkstown Grove Signalised Junction**
    With the implementation of the proposed scheme changes the junction performance improves compared to the Do Minimum scenario, with reduced delays and queues and operates well within capacity during both the AM and PM peaks.

11. **Monkstown Ave / Carrickbrennan Road / Mounttown Road Upper / Castle Park Rdbt**
    With the implementation of the proposed scheme changes, the junction will continue to operate well within capacity during both the AM and PM peak hours.

The traffic modelling results indicate that the vast majority of the junctions (8 out of 11junctions) will operate within capacity and / or see delays and queues to motorists reduced as a result of the proposed changes compared to the Do Minimum Scenarios.

The Barton Road East / Nutford Way / Broadford Road roundabout will experience delays on the southern arm as a result of the scheme during the AM peak, but this will be for a short period and all other arms will operate within capacity. The remaining two junctions, Stillorgan Park Road / Carysfort Avenue / Fleurville and the Annaville Terrace / Newtownpark Avenue / Rowanbyrn signalised junctions will operate over capacity, however it is noted that even without the proposed scheme changes these junctions would be operating over capacity in the Do Minimum 2028 scenario.

Furthermore, when overall people movement numbers for all modes travelling through these junctions were examined, it indicated a rebalancing towards sustainable modes rather than ever increasing vehicle traffic volumes through the junctions which would likely occur without physical interventions to encourage a significant modal shift to walking, wheeling and cycling.

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1 Introduction

1.1 Scheme Background

DBFL Consulting Engineers (DBFL) have been commissioned by Dún Laoghaire-Rathdown County Council (DLRCC) to develop the preliminary design for the DLR Connector Active Travel Scheme. The proposed scheme area extends along Barton Road East (L3011), Ballinteer Road, Kilmacud Road Upper (R826), Kilmacud Road Lower (R825), Stillorgan Park Road (R825), Annaville Terrace, Rowanbyrn and Monkstown Avenue.

The scheme from end to end is approximately 8.4km in length, however, some sections have already been completed or are being progressed as separate DLRCC schemes. Therefore, the total length included in this subject scheme is approximately 6km. The scheme is split into three sections, Section 1 and Section 2 lie to the west of the N11 while Section 3 lies to the east of the N11, as follows (The overall route and location of key junctions is illustrated in **Figure 1-1** below):

- Section 1: Barton Road East to Kilmacud Road Upper
- Section 2: Kilmacud Road Upper
- Section 3: Stillorgan Park Road to Monkstown Avenue

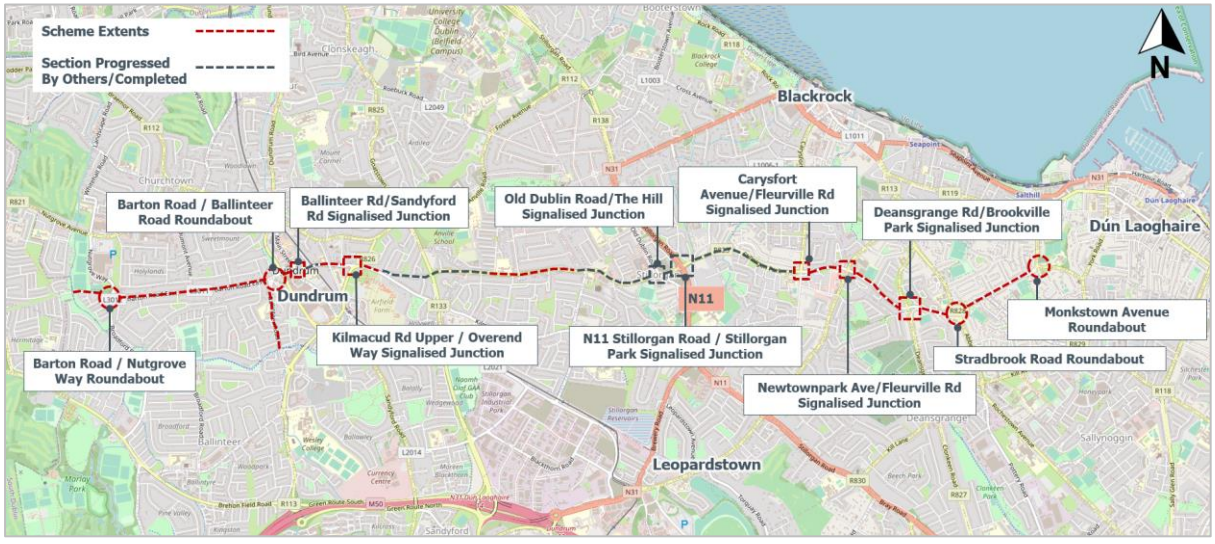

Figure 1-1: Study Area Location and Extents in Wider Context (Source: OpenStreetMap)

The proposed scheme includes substantial upgrades to existing pedestrian and cyclist facilities which will improve the overall journey experience for non-motorised road users. The scheme comprises a step change in the quality of cycling infrastructure through the provision of segregated facilities both at junctions and along link sections. This will be achieved through a

reconfiguration of several key junctions and changes to traffic management to facilitate, for example, one-way traffic systems and a bus gate.

These changes will enable the delivery of protected, segregated infrastructure for both pedestrians and cyclists, thereby offering a safer, more attractive and legible route for people travelling either on foot or by bike and support a shift towards sustainable modes.

1.2 Scope

The purpose of this report is to quantify the existing transport environment and to summarise the results of the junction modelling conducted to assess the operational performance of the local junctions under the Opening Year 2028 ('Do-Minimum') scenario.

The scope of the assessment covers transport and sustainable means of travel including access, pedestrian, cyclist, and public transport connections. Conclusions contained within this report are based on existing and proposed road layout plans, site visits, on site traffic observations, junction vehicle turning count data and assessments using the National Transport Authority's' (NTA's) Eastern Regional Model (ERM).

1.3 Methodology

Our approach to the study accords with policy and guidance both at a national and local level. Accordingly, the adopted methodology responds to best practices, current and emerging guidance, exemplified by a series of publications, all of which advocate this method of analysis. Key publications consulted include;

- 'Traffic and Transport Assessment Guidelines' (May 2014) National Road Authority
- 'Traffic Management Guidelines' Dublin Transportation Office & Department of the Environment and Local Government (May 2003)
- 'Guidelines for Traffic Impact Assessments', The Institution of Highways and Transportation (January 1999)

Our methodology incorporated a number of key inter-related stages, including;

- Site Audit: A site audit was undertaken to quantify existing road network issues and identify local infrastructure characteristics, in addition to establishing the level of accessibility to the site in terms of walking, cycling and public transport. An inventory of the local road network was also developed during this stage of the assessment.

- Data Gathering: the main sources of information used included traffic counts undertaken in 2021 and 2025 and the National Transport Authority's Eastern Regional Model 2016 Base Reference Model.
- Network Impact: Ascertain the specific level of influence generated by the proposed project upon road users, cyclists, and pedestrians.
- Active Modes Analysis: Undertake an analysis of the active modes of walking and cycling along the proposed project.
- Network Analysis: Undertaken using detailed computer simulations (ARCADY & TRANSYT) to assess the operational performance of key junctions in the Do Minimum and Do Something scenarios in the 2028 future year.

1.4 Report Structure

As introduced before, this Modelling Report seeks to assess the transport impact due to the new functionality of the DLR Connector Active Travel Scheme. It will cover transport and sustainability issues including access, pedestrian, cyclist, and public transport connections. The structure of the report responds to the various stages of this exercise including the key tasks summarised below.

- **Section 2** of this report describes the junctional operational tools used to assess the junctions of the proposed road scheme.
- **Section 3** of this report describes the regional model system and demand forecast used in the assessment of the proposed road scheme.
- The potential traffic impact of the proposals assessed for the 2028 design year are summarised within **Section 4**.
- The main conclusions derived from the analysis are summarised in **Section 5**.

2 Junction Operational Analysis Tools

2.1 Introduction

The operational assessment of the local road network within the DLR Connector Scheme has been undertaken using the Transport Research Laboratory (TRL) computer packages of ARCADY which assesses roundabouts and TRANSYT which is used to assess signalised junctions. Both software packages were utilised to predict capacities, queues, and delays at all the roundabouts and signalised junctions being studied, respectively.

2.2 TRANSYT

TRANSYT is an off-line computer program for studying everything from isolated road junctions to large signal-coordinated networks. TRANSYT produces optimised signal timings to progress platoons of traffic through a network. It is possible to model priority (non-signal controlled) intersections, including roundabouts within a TRANSYT model, but this is only appropriate where these intersections form part of a larger network comprised of signalised intersections.

TRANSYT contains two main components – a traffic model and a signal optimiser (**Figure 2-1**). The traffic model predicts a Performance Index (PI) for a network based on a fixed signal timing plan and set of average traffic flows. The PI is a measure of the overall cost associated with congestion and is a weighted combination of total vehicle delays and stops experienced by traffic within the modelled network. The performance index is the main method of comparing alternative network configurations.

The signal optimisation component within TRANSYT modifies signal timings and assesses whether those adjustments have reduced the PI. Optimisation is usually achieved using the Platoon Dispersion Model (PDM) which contains a simplified queuing model. Using this model TRANSYT cannot implicitly predict spatial phenomena such as cross intersection exit-blocking. However, the use of the alternative Cell Transmission Model (CTM) or Congested Platoon Dispersion Model (CPDM) modelling techniques can be applied to overcome this limitation.

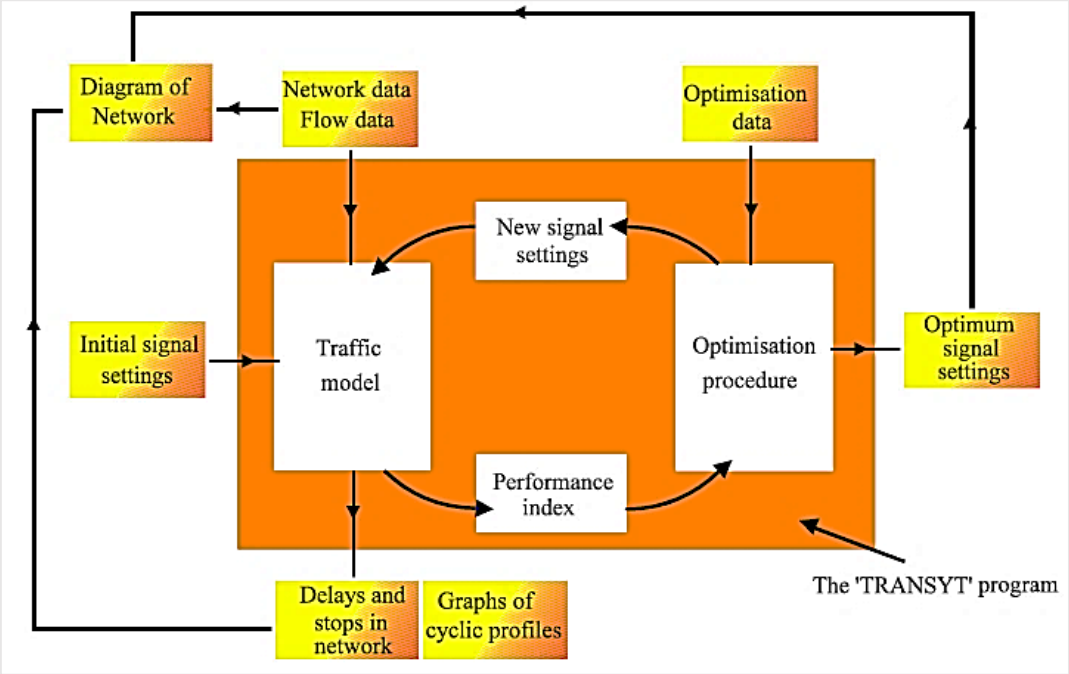

Figure 2-1: The Basic Structure of the TRANSYT Programme

When considering signalised junctions, a Degree of Saturation (DoS) of greater than 90% (0.90) would indicate a junction to be approaching capacity, as operation above this DoS value is considered poor and the junction deteriorates quickly. With a DoS of 100% or more, the junction is considered to be operating above capacity. For the TRANSYT analysis, a one-hour AM and PM period has been simulated, from 08:00 to 09:00 and 17:00 to 18:00.

2.3 ARCADY

Another software tool that will be used for this assessment is TRL's ARCADY software. ARCADY is used to predict capacities, queues, delays and accident risk at roundabouts. ARACDY uses empirical formulae to calculate the capacity of each entry arm as a function of the geometry of the entry and the circulating flow crossing in front of the entry. The programme takes into account key roundabout geometries such as entry width, approach width, flare length, conflict angle, inscribed circle diameter and entry radius where an empirical framework of calculations intrinsically links roundabout geometry to driver behaviour and in turn to predicted capacities, queues and delays.

When considering priority-controlled roundabouts a Ratio of Flow to Capacity (RFC) of greater than 85% (0.85) would indicate a junction to be approaching capacity, as operation above this RFC value is poor and deteriorates quickly. For the ARCADY analysis, a 90-minute AM and PM period has been simulated from 07:45 to 09:15 and 16:45 to 18:15, respectively. Traffic flows were entered using an Origin-Destination table.

3 Regional Model System & Demand Forecasts

3.1 Overview

The Regional Model System (RMS) for Ireland was developed by the National Transport Authority (NTA) to support its transport functions and to provide a consistent framework for transport assessment and appraisal nationally. The model was developed, calibrated and validated in line with current transport modelling guidance, primarily from UK Department for Transport's Transport Analysis Guidance (TAG).

The RMS has been developed to provide the NTA with the means to undertake comparative appraisals of a wide range of potential future transport and land use options, and to provide evidence to assist in the decision-making process.

The RMS has a hierarchical structure with three main components. These are the National Demand Forecasting Model (NDFM), the five Regional Multi-modal Models and the Appraisal Modules. The National Demand Forecasting Model provides consistent demand forecasts for input into each Regional Multi-modal Model. The Regional Multi-modal Models are strategic multi-modal, network-based transport models and include all the main surface modes of travel (including travel by car, bus, rail, Luas, walking, and cycling). They are complemented by the Appraisal Modules, which provide a full suite of appraisal tools in line with national guidance.

The five Regional Multi-modal Models are centred on the five main cities of Dublin, Cork, Galway, Limerick, and Waterford (**Figure 3-1**). Each regional model has the following key attributes:

- 24-hour average weekday travel demand for 33 different journey purposes;
- Five primary time periods;
- A detailed representation of the road network, the public transport network & services, and active modes (walking and cycling); and
- A comprehensive representation of the travel choices of residents, using from-home/to-home tours to ensure consistent modelling of changes in time of travel, mode, and parking behaviour.

Each of the five Regional Multi-modal Models (RMM) uses the same basic structure. This ensures that there is consistency across the regions for appraisal purposes. The structure is presented in **Figure 3-2**.

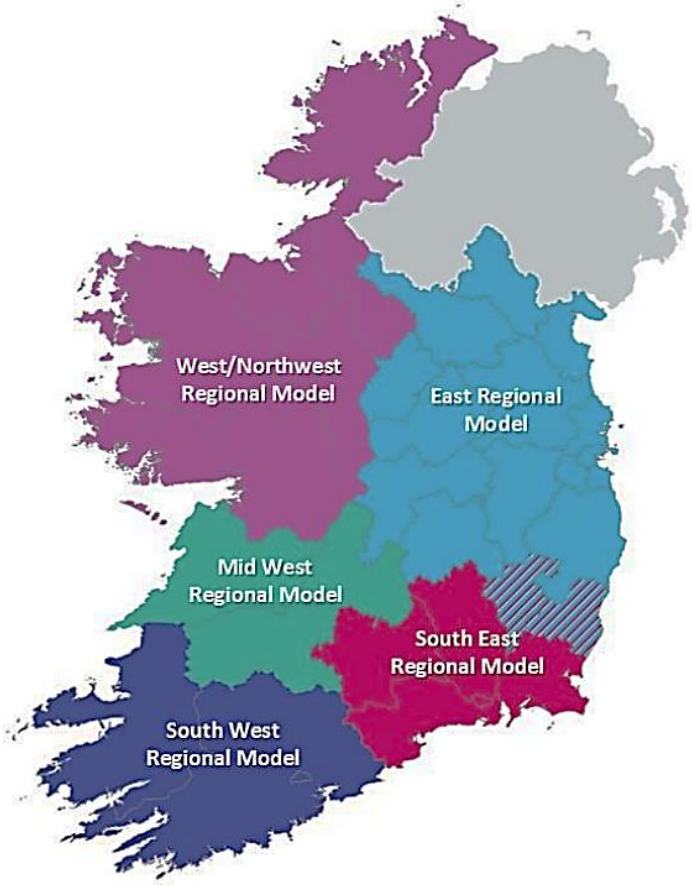

Figure 3-1: The Five Regional Multi-Modal Models

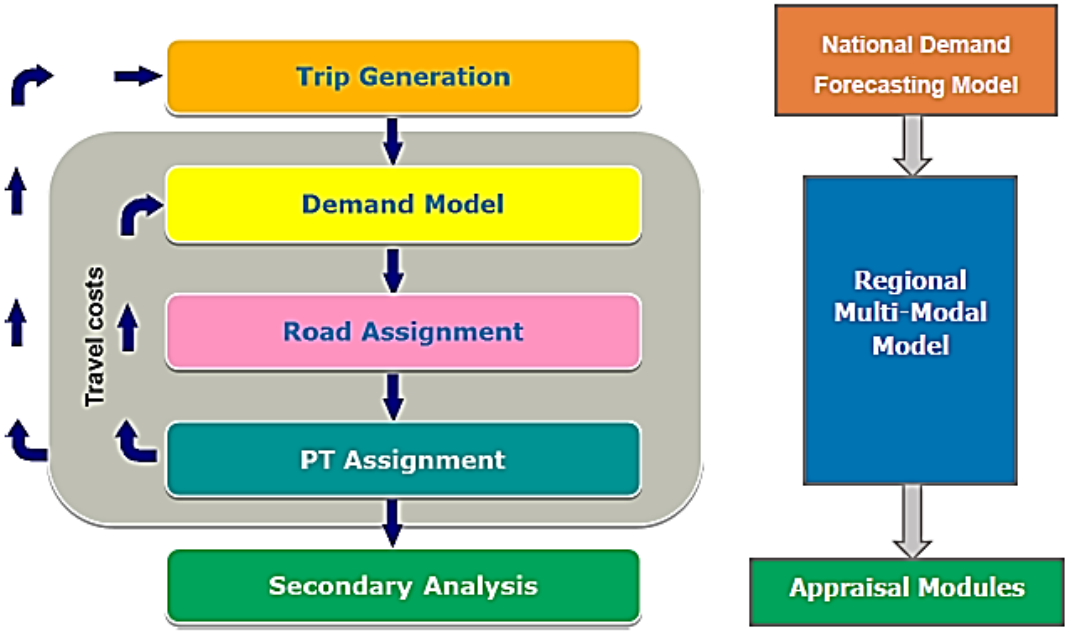

Figure 3-2: Basic Model Structure of Regional Model System

3.2 National Demand Forecasting Model

The National Demand Forecasting Model (NDFM) provides key sets of data inputs to each of the regional models.

The NDFM includes the set of models and tools that are used to derive levels of trip making (nationally) from planning data for input to each of the regional models. The NDFM outputs levels of trip making at the smallest available spatial aggregation (Census Small Area or CSA).

The key components of the NDFM are as follows:

- The **Planning Data Adjustment Tool (PDAT),** which controls the planning data inputs to the core NDFM system, and is used to amend planning data to represent the combination of general changes over time and the relevant land-use planning scenarios;
- The **Car Ownership/Car Competition Model**, a spreadsheet model which estimates the level of car ownership in a CSA, (sub-dividing the number of households in the CSA between 'No Car', 'Cars < Adults' and 'Cars >= Adults' households);
- The **National Trip-End Model (NTEM),** which converts the planning data into person trips, using the calculations described in this report;
- The **Car Availability Model**, which classifies the set of individual person trips as either 'Car Available' or 'Car-not-available' using calibrated relationships between the three car competition bands and the trip purpose and
- The **Regional Model Strategic Integration Tool (RMSIT),** which estimates the level of trip-making by main mode (car, bus, rail and goods vehicles) between 56 of the main urban settlements (including ports and airports) in Ireland.

Figure 3-3 shows the system of NDFM models and the key regional model components that the NDFM interacts with.

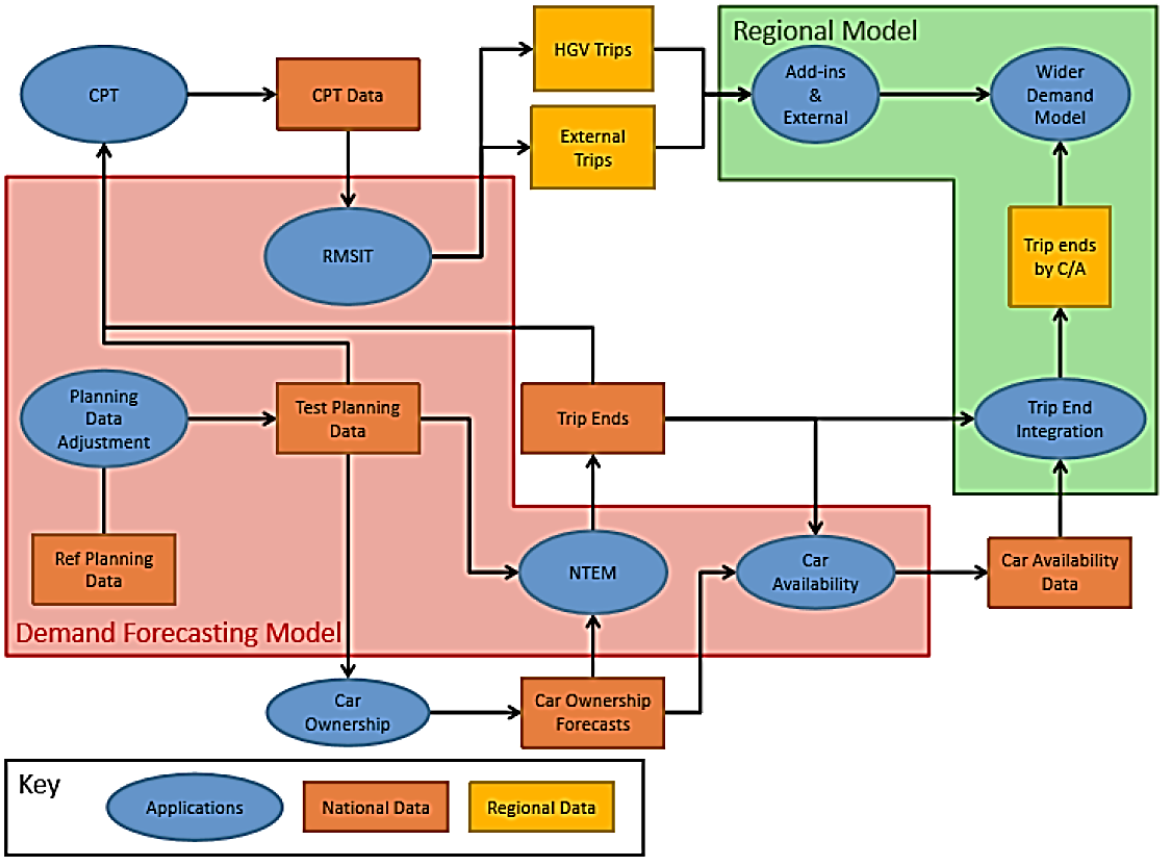

Figure 3-3: NDFM Placement within Modelling Hierarchy

Each regional model performs the following processing steps to utilise the NDFM output:

- Amalgamation of the CSA-based trip-ends to the relevant model zoning system;
- Amalgamation and/or splitting of the zone purposes to match the relevant demand model demand segments (e.g., splitting commuting trips between 'blue collar' and 'white collar' demand segments); and
- Incorporation of the relevant information from the RMSIT (i.e., trips to/from external zones and goods vehicle growth etc.).

An expanded diagram is shown (**Figure 3-4**) below which covers the interactions between the various modelling systems in more detail.

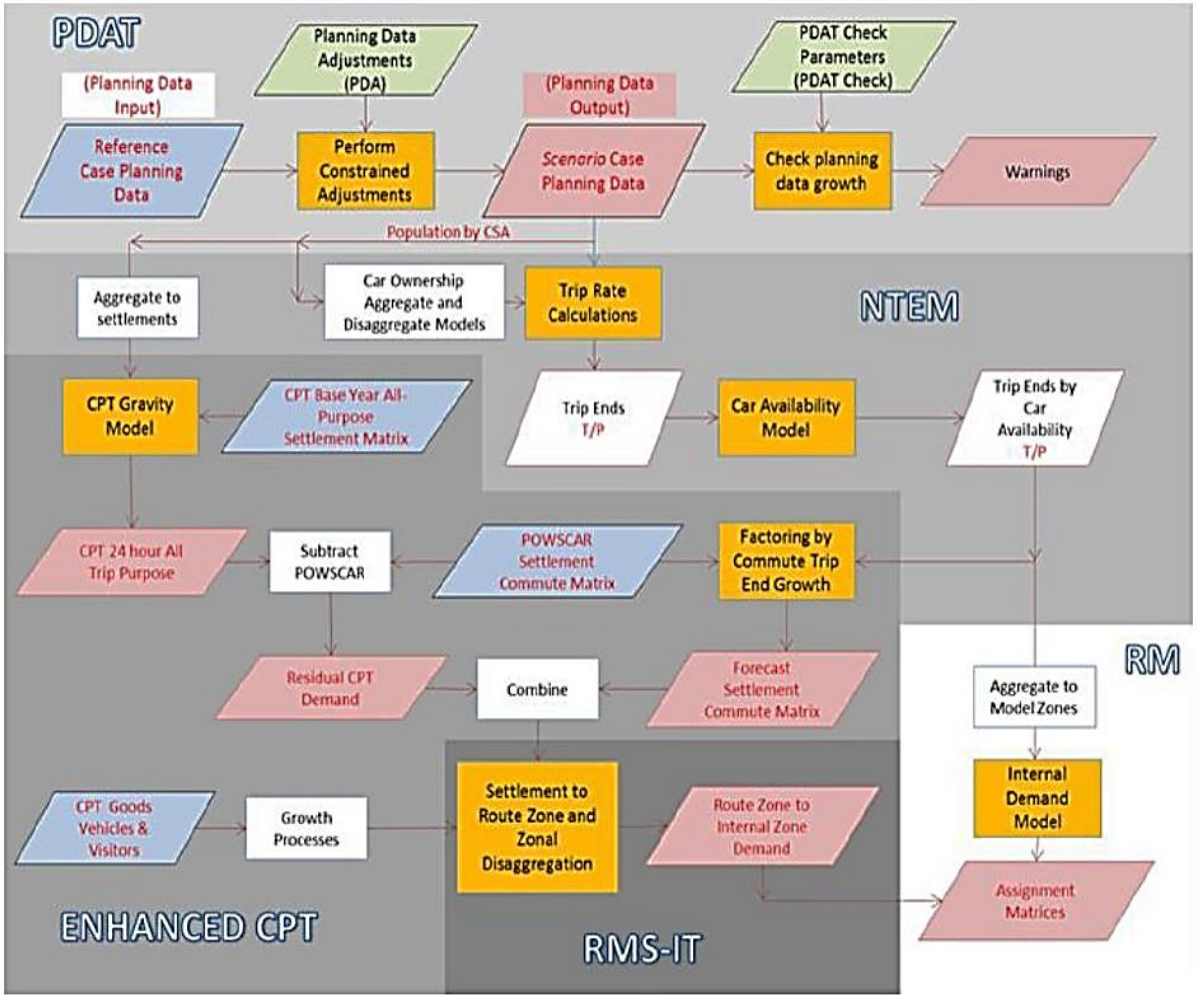

Figure 3-4: Expanded National Modelling System

4 Network Analysis

4.1 Assessment Scenarios

In order to analyse and assess the impact of the proposed scheme on the surrounding road network, the assessment was analysed under the Do-Minimum (DM) scenario (e.g. adjusted base do nothing traffic plus third party committed development traffic plus additional changes to the network e.g. Bus Connects). This scenario is comprised of the Eastern Regional Model (increased to the baseline network flows 2028) and junction movements without the proposed scheme in place.

The Do-Something (DS) scenario comprised the adjusted base, as per the Do-Minimum scenario, but includes for the proposed junction changes with the subject scheme implemented.

The assessment year 2028 corresponds with the anticipated Opening Year of the proposed scheme. It is noted that the scheme will be delivered in a phased approach, expected to commence in Q4 2026 / Q1 2027 and being completed in 2028.

4.2 Emerging Preferred Junction Designs

A comprehensive options development and multi-criteria analysis (MCA) was undertaken to identify the emerging preferred junction design option at each of the key study junctions along the route, as shown in **Figure 4-1** below. The following sections provide the results and analysis of both the Do-Minimum and Do-Something scenarios for each of the key junctions along the proposed scheme.

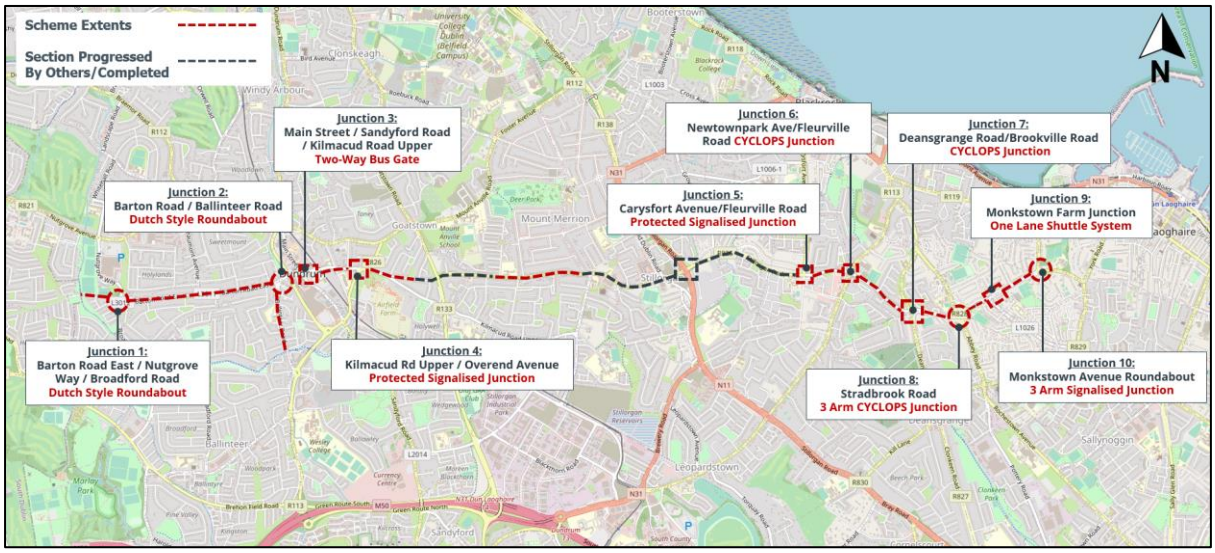

Figure 4-1: DLR Scheme Junctions & Proposed Treatments

4.3 Barton Road East / Nutgrove Way / Broadford Road Roundabout

This existing four-arm roundabout has been analysed in ARCADY for the Opening Year (2028) scenario. The arms were labelled as follows within the ARCADY model as:

1. Barton Road East
2. Stonemasons Way
3. Barton Road East Extension
4. Nutgrove Way

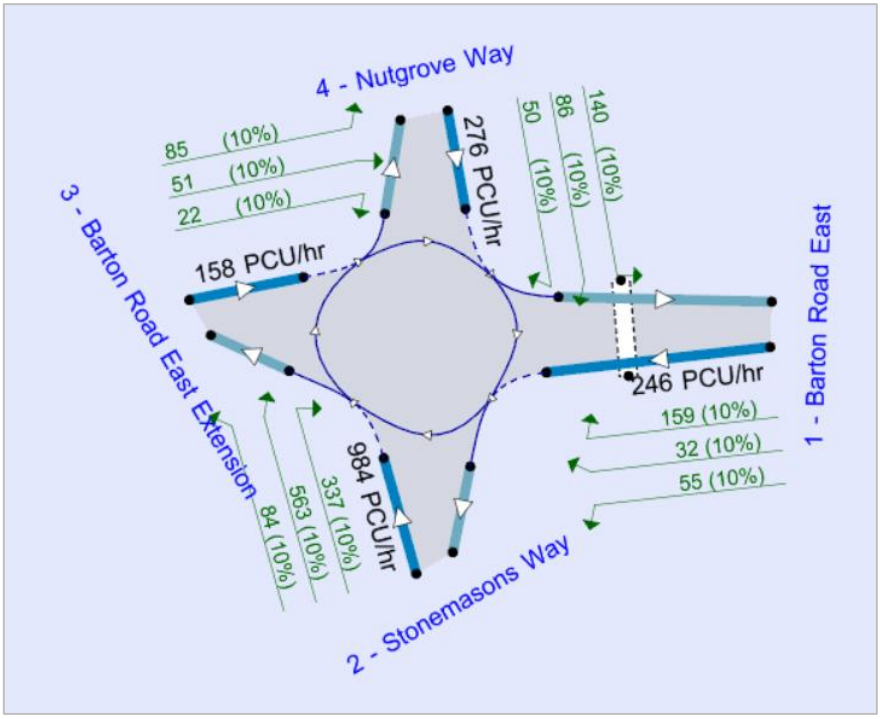

Figure 4-2: Barton Road / Nutgrove Way / Broadford Road DM 2028 ARCADY Model

4.3.1 Do Something Proposals

It is proposed to upgrade this junction to a 'Dutch' style or Protected Roundabout with segregated cycle lanes through the junction as illustrated in **Figure 4-3**. The approach and exit lane widths at each arm of the roundabout have been reduced and raised table zebra crossings have been provided on each of the junction arms. Each crossing benefits from a central refuge, meaning pedestrians are only crossing 3m vehicle lanes at any one time. Kerb build outs have been designed across the roundabout in order to provide a more pedestrian and cycle friendly environment, less dominated by the movement of vehicles.

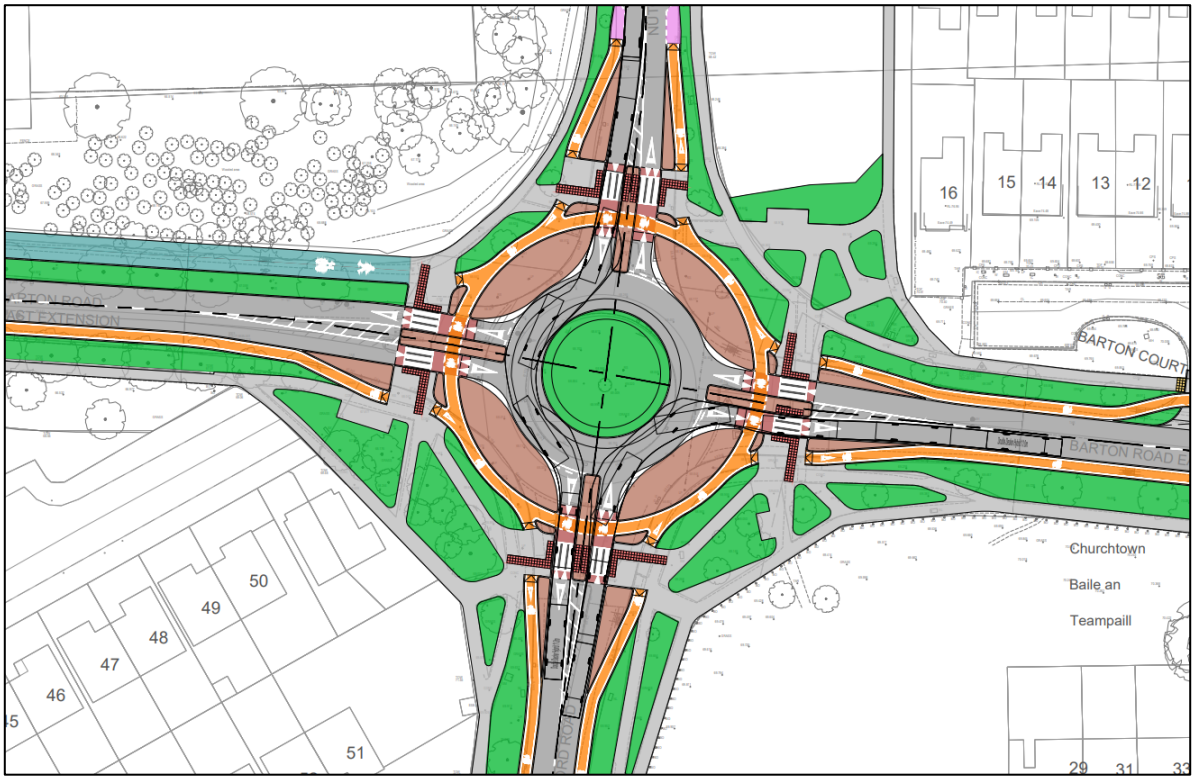

Figure 4-3: Barton Road / Nutgrove Way / Broadford Road DS 2028 Layout

4.3.2 Modelling Results

The ARCADY results during the DM 2028 Scenario indicates that the junction operates within capacity. The junction experiences a maximum Ratio of Flow to Capacity (RFC) value of 0.75 on Stonemasons Way (southern arm) with a corresponding queue of 3.3 PCUs and a delay of 11.08 seconds during the AM peak hour (08:00 to 09:00). During the PM peak hour between 17:00 to 18:00, Barton Road East (western arm) experiences a maximum RFC of 0.33, a delay of 5.05 seconds and a queue of 0.5 PCUs.

The ARCADY results during the DS 2028 Scenario indicates that the junction operates above capacity. The junction experiences a maximum Ratio of Flow to Capacity (RFC) value of 1.22 on Stonemasons Way (southern arm) with a corresponding queue of 114.4 PCUs and a delay of 434.30 seconds during the AM peak hour (08:00 to 09:00). During the PM peak hour between 17:00 to 18:00, Nutgrove Way (northern arm) experiences a maximum RFC of 0.43, a delay of 6.92 seconds and a queue of 0.8 PCUs.

Arm		AM Peak Hour			PM Peak Hour		
		Queue (PCUs)	Delay (s)	RFC	Queue (PCUs)	Delay (s)	RFC
1	Barton Road East	0.3	3.78	0.21	0.5	5.05	0.33
2	Stonemasons Way	3.3	11.08	0.75	0.4	3.65	0.25
3	Barton Road East Extension	0.3	5.70	0.20	0.2	3.42	0.12
4	Nutgrove Way	0.3	3.82	0.23	0.5	3.88	0.32

Table 4- 1: Barton Road / Nutgrove Way / Broadford Road DM 2028 ARCADY Analysis

Arm		AM Peak Hour			PM Peak Hour		
		Queue (PCUs)	Delay (s)	RFC	Queue (PCUs)	Delay (s)	RFC
1	Barton Road East	0.3	5.33	0.21	0.5	7.00	0.30
2	Stonemasons Way	114.4	434.30	1.22	0.7	6.88	0.38
3	Barton Road East Extension	0.7	14.15	0.38	0.3	5.99	0.20
4	Nutgrove Way	0.4	5.77	0.27	0.8	6.92	0.43

Table 4- 2: Barton Road / Nutgrove Way / Broadford Road DS 2028 ARCADY Analysis

As presented above, it is shown that under the Do Minimum 2028 Scenario the junction will operate within capacity during the AM peak hour. Under the Do Something 2028 scenario delays during the AM peak hour are increased specifically on the southern arm (Stonemasons Way), which operates above capacity during the AM peak; all other approach arms operate within capacity for the AM and PM peaks in the Do Something model.

Figure 4-4 below shows the extracted 2028 ERM traffic flows for the Do Minimum and Do Something scenarios for the Barton Road / Nutgrove Way / Broadford Road roundabout junction. It can be seen that the movement experiencing capacity issues in the AM Do Something scenario has an increase of over 100 pcus in the DS scenario as compared with the Do Minimum. As the movement was approaching capacity in the Do Minimum scenario, the ARCADY results are due to the increase in demand as well as the change in the roundabout geometry.

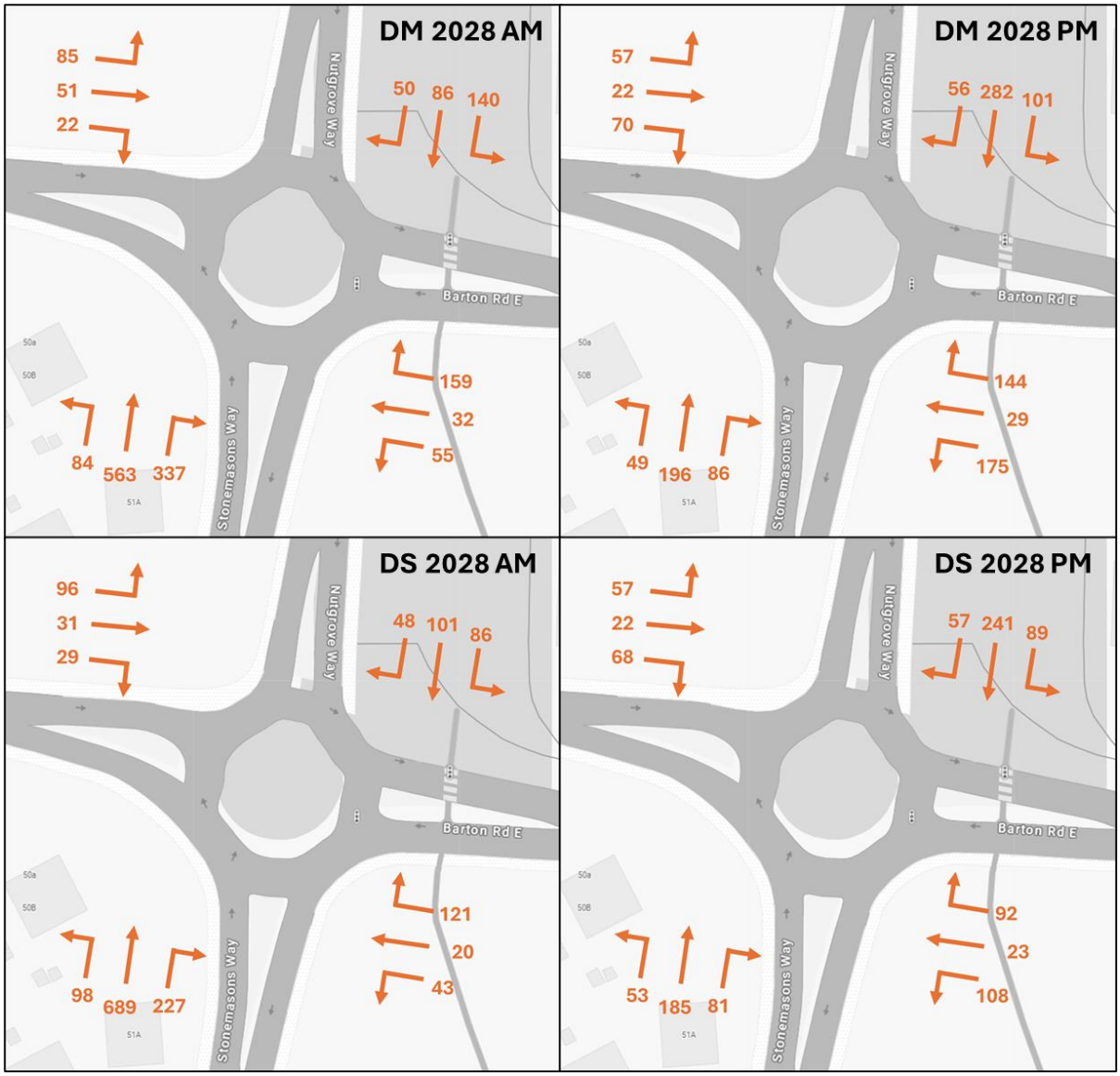

Figure 4-4: 2028 ERM Traffic Flows for Barton Road / Nutgrove Way / Broadford Road

4.4 Barton Road East / Beaumont Avenue Signalised Junction

This three-arm signalised junction has been analysed in TRANSYT for the Opening Year (2028) scenario. The arms were labelled as follows within TRANSYT as:

A. Barton Road East (W)

B. Beaumont Avenue

C. Barton Road East (E)

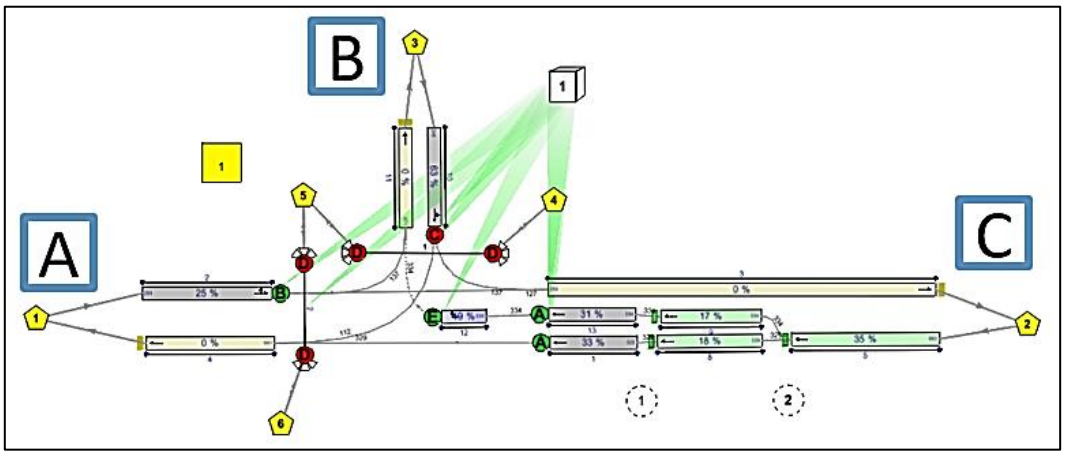

Figure 4-5: Barton Road East / Beaumont Avenue DM 2028 TRANSYT Model

4.4.1 Do Something Proposals

The Barton Road / Beaumont Avenue junction in the existing scenario has pedestrian crossings across two of its three arms and unprotected eastbound and westbound cycle lanes along Barton Road East. In the Do Something proposals the junction has been designed as a three-arm cycle-protected junction. The separate right-turn lane on Barton Road East has been removed and instead a combined straight and right turn lane provided. Lane widths have been reduced throughout which has enabled for a design with reduced pedestrian crossing widths of 6m over each of the three junction arms.

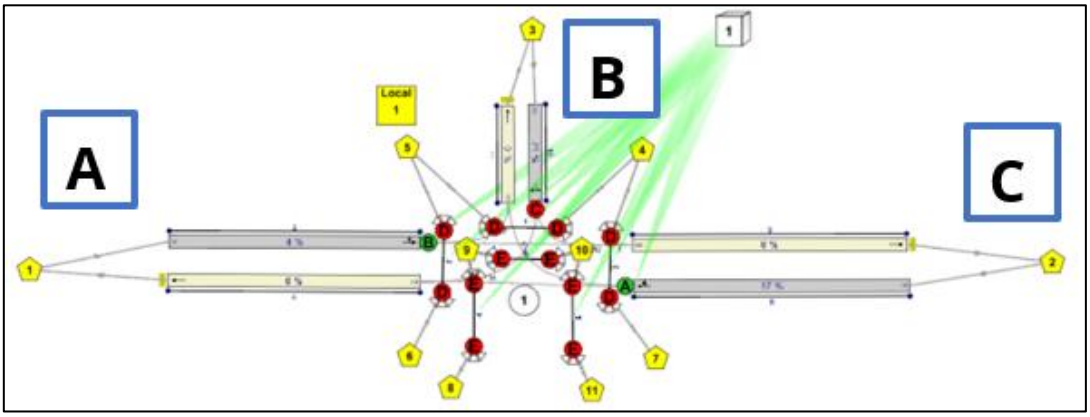

Figure 4-6: Barton Road East / Beaumont Avenue DS 2028 TRANSYT Model

4.4.2 Modelling Results

The TRANSYT results during the DM 2028 Scenario indicate that the junction operates within capacity. The junction experiences a maximum Degree of Saturation (DoS) of 58% on Beaumont

Avenue (northern arm) with a corresponding queue of 6.89 PCUs and a delay of 40.24 seconds during the AM peak hour. During the PM peak hour, the same arm experiences a maximum Degree of Saturation (DoS) of 51%, a delay of 38.33 seconds and a queue of 5.87 PCUs.

The TRANSYT results during the DS 2028 Scenario indicates that the junction operates within capacity. The junction experiences a maximum Degree of Saturation (DoS) of 45% on Barton Road East (eastern arm) with a corresponding queue of 4.60 PCUs and a delay of 38.63 seconds during the AM peak hour. During the PM peak hour, the same arm experiences a maximum Degree of Saturation (DoS) of 45%, a delay of 39.59 seconds and a queue of 4.46 PCUs.

Arm			AM Peak Hour			PM Peak Hour		
			DoS (%)	Delay (s)	Queue (PCUs)	DoS (%)	Delay (s)	Queue (PCUs)
A	Barton Road East (W)	Straight and Left	47	30.68	6.28	29	31.07	3.11
B	Beaumont Avenue	Left and Right	58	40.24	6.89	51	38.33	5.87
C	Barton Road East (E)	Straight	16	14.46	2.15	32	16.35	4.84
		Right-Turn Bay	56	36.03	3.95	33	24.59	2.84

Table 4- 3: Barton Road East / Beaumont Avenue DM 2028 TRANSYT Analysis

Arm			AM Peak Hour			PM Peak Hour		
			DoS (%)	Delay (s)	Queue (PCUs)	DoS (%)	Delay (s)	Queue (PCUs)
A	Barton Road East (W)	Straight and Left	42	45.49	2.79	37	54.64	1.23
B	Beaumont Avenue	Left and Right	40	26.27	6.01	44	21.64	7.60
C	Barton Road East (E)	Straight and Right	45	38.63	4.60	45	39.59	4.46

Table 4- 4: Barton Road East / Beaumont Avenue DS 2028 TRANSYT Analysis

As presented above, it is shown that under the Do Minimum 2028 Scenario the junction will operate within capacity during the AM and PM peak hour. Under the Do Something 2028 scenario delays during the PM peak hour are slightly increased specifically on the western arm (Barton Road East), however all arms operate well within capacity during both the AM and PM peaks.

The highest degree of saturation recorded for the AM and PM scenarios reduces in the Do Something scenario by 13% and 6% respectively. As such the Do Something scenario represents a junction with improved capacity as compared to the Do Minimum scenario in both peak hours.

4.5 Barton Road East / Ballinteer Road Roundabout

The existing five-arm roundabout has been analysed in ARCADY for the Year 2028 scenario. The arms were labelled as follows within the ARCADY model as:

1. Dundrum Gate
2. Ballinteer Road R826 (S)
3. Barton Road East
4. Local Access
5. Ballinteer Road R826 (NE)

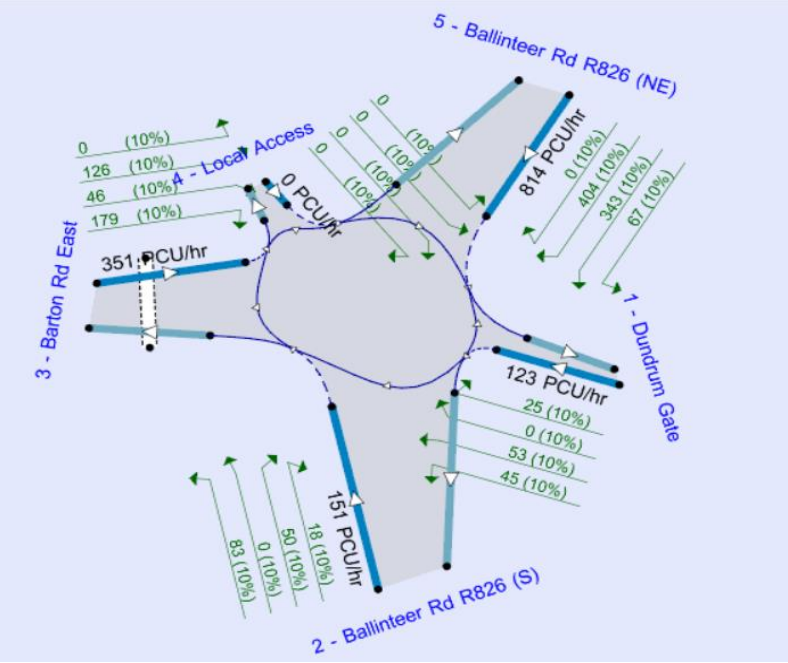

Figure 4-7: Barton Road East / Ballinteer Road Roundabout DM 2028 ARCADY Model

4.5.1 Do Something Proposals

It is proposed to upgrade this junction to a 'Dutch' style or Protected Roundabout with segregated cycle lanes through the junction as illustrated in **Figure 4-8**. The two-lane approach at Ballinteer Road South is reduced to a one-lane approach; carriageway widths are reduced throughout the roundabout in the Do Something scenario providing more space for public realm improvements. Raised table zebra crossings are provided on four of the five roundabout arms with a raised table provided at the northern arm leading to local parking/property access. The diameter of the central landscaped island is increased and the width of the circulatory lanes around the roundabout are reduced compared to the existing layout.

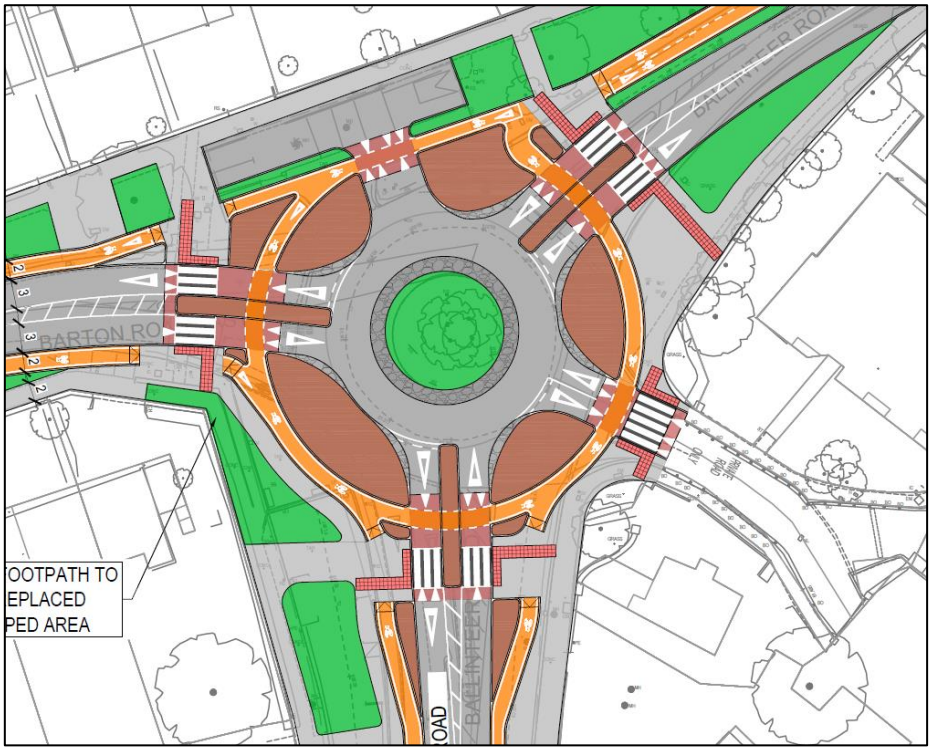

Figure 4-8: Barton Road East / Ballinteer Road Roundabout DS 2028 ARCADY Model

4.5.2 Modelling Results

The ARCADY results indicates that this junction operates within capacity during the DM 2028 Scenario. The junction experiences a maximum RFC value of 0.77 on Barton Road East (western arm) with a corresponding queue of 3.6 PCUs and a delay of 15.19 seconds during the AM peak hour. During the PM peak hour, the Ballinteer Road (R826) NE arm experiences a maximum RFC of 0.85, a delay of 24.26 seconds and a queue of 5.7 PCUs.

The ARCADY results indicates that this junction operates within capacity during the DS 2028 Scenario. The junction experiences a maximum RFC value of 0.71 on Barton Road East (western arm) with a corresponding queue of 2.6 PCUs and a delay of 16.44 seconds during the AM peak hour. During the PM peak hour, the same arm experiences a maximum RFC of 0.58, a delay of 11.42 seconds and a queue of 1.5 PCUs.

Arm		AM Peak Hour			PM Peak Hour		
		Queue (PCUs)	Delay (s)	RFC	Queue (PCUs)	Delay (s)	RFC
1	Dundrum Gate	0.1	3.92	0.11	0.2	5.20	0.15
2	Ballinteer Rd R826 (S)	0.2	2.18	0.16	0.1	2.30	0.09
3	Barton Rd East	3.6	15.19	0.77	0.5	4.74	0.32
4	Local Access	0.0	0.00	0.00	0.0	0.00	0.00
5	Ballinteer Rd R826 (NE)	0.3	5.70	0.21	5.7	24.26	0.85

Table 4- 5: Barton Road / Ballinteer Road Roundabout DM 2028 ARCADY Analysis

Arm		AM Peak Hour			PM Peak Hour		
		Queue (PCUs)	Delay (s)	RFC	Queue (PCUs)	Delay (s)	RFC
1	Dundrum Gate	0.4	10.88	0.25	0.4	9.84	0.25
2	Ballinteer Rd R826 (S)	0.4	5.76	0.28	0.6	6.46	0.35
3	Barton Rd East	2.6	16.44	0.71	1.5	11.42	0.58
4	Local Access	0.0	0.00	0.00	0.0	0.00	0.00
5	Ballinteer Rd R826 (NE)	0.0	6.22	0.03	0.0	5.72	0.02

Table 4- 6: Barton Road / Ballinteer Road Roundabout DS 2028 ARCADY Analysis

As presented above, it is shown that under the Do Minimum 2028 Scenario the junction will operate within capacity during the AM and PM peak hour. Under the Do Something 2028 scenario delays increase slightly; however all arms continue to operate well within capacity during both the AM and PM peak hours.

4.6 Main Street / Sandyford Road / Kilmacud Road Upper / Ballinteer Road Signalised Junction

This four-arm signalised junction has been analysed in TRANSYT for the Opening Year (2028) scenario. The arms were labelled as follows within TRANSYT as:

A. Main Street
B. Kilmacud Road Upper
C. Sandyford Road
D. Ballinteer Road

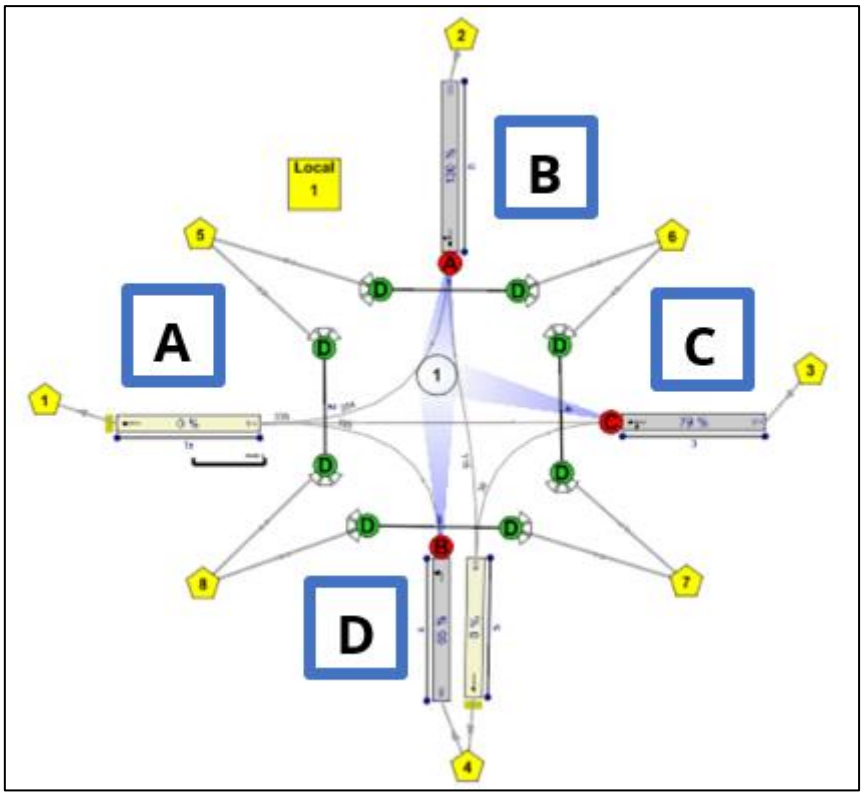

Figure 4-9: Sandyford Road / Kilmacud Rd Upper / Ballinteer Road DM 2028 TRANSYT Model

Figure 4-9 above shows the junction's existing Do Minimum arrangement and permitted movements; with one-way systems along the Main Street, Sandyford Road and Kilmacud Road Upper.

4.6.1 Do Something Proposals

The Do Something junction layout for the Interim Option, illustrated in **Figure 4-10,** proposes to retain two traffic lanes between the new toucan crossing and the junction. A segregated cycle track is facilitated on the northern side of the road, however due to space constraints westbound cyclists

would be required to share the road with motorists up to the toucan crossing where they could then join the two-way cycle track on the northern side.

The segregated cycle track is proposed on the northern side (eastbound direction) rather than the southern side (westbound direction) between the junction and the toucan crossing for the following reasons:

- Westbound cyclists coming from Kilmacud Road Upper and Sandyford Road will be able to appropriate position themselves at the Advanced Stop Lines (ASLs) and be afforded an early green start to get ahead of traffic
- If there was no segregated path on the northern side, then this would require eastbound cyclists to re-enter the carriageway after the toucan crossing and mix with left turning traffic which would give rise to more potential for conflicts compared to the proposed arrangement

Under the Do Something layout of the Interim Option, general traffic movements at the junction will be restricted to:

- Right turn and Straight Ahead only from Kilmacud Road Upper
- Northbound (ahead) and Left turn only from Sandyford Road
- Left turn only from Ballinteer Road to Main Street

Under the Do Something, public transport will be permitted the following movements:

- Left turn only from Ballinteer Road to Main Street
- Right turn from Kilmacud Road Upper to Main Street
- Westbound (ahead) from Kilmacud Road Upper to Ballinteer Road
- Northbound (ahead) only from Sandyford Road to Main Street

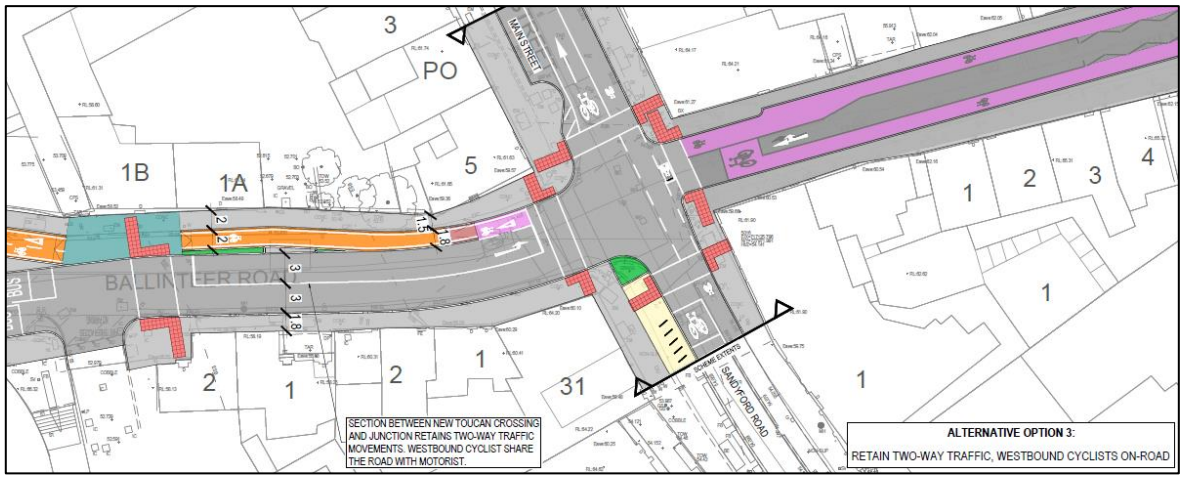

Figure 4-10: Sandyford Road / Kilmacud Road Upper / Ballinteer Road DS (Interim Option) 2028 Layout

There is also a second Do Something Scenario which is the Preferred Option, as shown in **Figure 4-11**, which makes alterations to the existing junction layout to provide a full bus gate arrangement on the western arm of the junction. In this scenario general traffic movements at the junction will be restricted to:

- Right turn only from Kilmacud Road Upper to Main Street
- Northbound (ahead) only from Sandyford Road to Main Street

Under this layout public transport will be permitted the following movements:

- Left turn only from Ballinteer Road to Main Street
- Right turn from Kilmacud Road Upper to Main Street
- Westbound (ahead) from Kilmacud Road Upper to Ballinteer Road
- Northbound (ahead) only from Sandyford Road to Main Street

It is noted, that as a result of these proposed changes current access arrangements for general traffic wishing to access the Dundrum Town Centre car park would be restricted to right in / left out only movements.

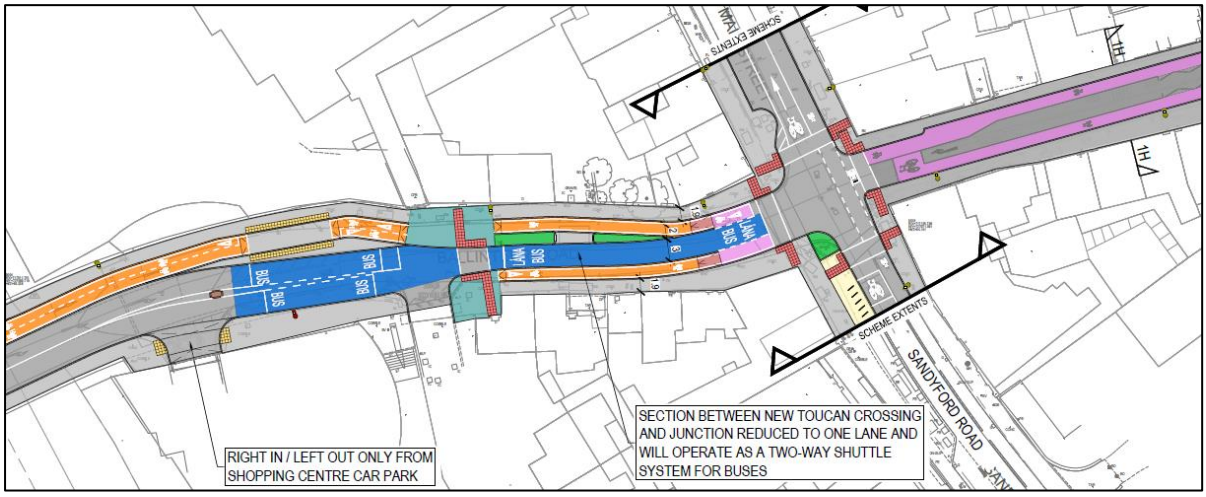

Figure 4-11: Sandyford Road / Kilmacud Road Upper / Ballinteer Road DS (Preferred Option) 2028 Layout

4.6.2 Modelling Results

The TRANSYT results during the DM 2028 Scenario indicates that this junction operates within capacity. The junction experiences a maximum DoS of 97% on Kilmacud Road Upper with a corresponding queue of 14.36 PCUs and a delay of 116.30 seconds during the AM peak hour. During the PM peak hour, Kilmacud Road Upper experiences a maximum DoS of 130%, a delay of 465.45 seconds and a queue of 56.47 PCUs.

The TRANSYT results for the Future Year 2028 (Interim Option) Scenario indicate that this junction operates within capacity. The junction experiences a maximum DoS of 38% on Kilmacud Road

Upper (eastern arm) with a corresponding queue of 2.64 PCUs and a delay of 43.27 seconds during the AM peak hour. During the PM peak hour, Sandyford Road (southern arm) experiences a maximum DoS of 63%, a delay of 45.06 seconds and a queue of 6.56 PCUs.

The TRANSYT results for the Future Year 2028 (Preferred Option) Scenario indicate that the junction operates well within capacity. The junction experiences a maximum DoS of 35% on Sandyford Road (souther arm) with a corresponding queue of 3.80 PCUs and a delay of 35.12 seconds during the AM peak hour. During the PM peak hour, Kilmacud Road Upper (eastern arm) experiences a maximum DoS of 44%, a delay of 49.94 seconds and a queue of 2.31 PCUs.

Arm			AM Peak Hour			PM Peak Hour		
			DoS (%)	Delay (s)	Queue (PCUs)	DoS (%)	Delay (s)	Queue (PCUs)
A	Main Street	*(exit lane only)*	-	-	-	-	-	-
B	Kilmacud Rd Upper	Straight and Right	97	116.30	14.36	130	465.45	56.47
C	Sandyford Rd	Straight and Left	47	38.69	4.65	79	48.40	10.96
D	Ballinteer Rd	Left Only	6	35.17	0.44	65	51.03	5.69

Table 4- 7: Sandyford Road / Kilmacud Road Upper / Ballinteer Road DM 2028 TRANSYT Analysis

Arm			AM Peak Hour			PM Peak Hour		
			DoS (%)	Delay (s)	Queue (PCUs)	DoS (%)	Delay (s)	Queue (PCUs)
A	Ballinteer Road	Left Only	36	45.04	2.20	27	49.27	0.99
B	Main Street	*(exit lane only)*	-	-	-	-	-	-
C	Kilmacud Road Upper	Straight and Right	38	43.27	2.64	62	33.71	9.28
D	Sandyford Road	Straight and Left (cars only)	28	39.09	2.28	63	45.06	6.56

Table 4- 8: Sandyford Road / Kilmacud Road Upper / Ballinteer Road DS (Interim Option) 2028 TRANSYT Analysis

Arm			AM Peak Hour			PM Peak Hour		
			DoS (%)	Delay (s)	Queue (PCUs)	DoS (%)	Delay (s)	Queue (PCUs)
A	Ballinteer Road	Left Only	10	44.11	0.39	10	44.11	0.39
B	Main Street	*(exit lane only)*	-	-	-	-	-	-
C	Kilmacud Road Upper	Straight (buses only) and Right	27	49.10	0.96	44	49.94	2.31
D	Sandyford Road	Straight	35	35.12	3.80	43	38.25	4.41

Table 4- 9: Sandyford Road / Kilmacud Road Upper / Ballinteer Road DS (Preferred Option) 2028 TRANSYT Analysis

As presented above, it is shown that under the Do Minimum 2028 Scenario the junction will operate over capacity during the AM and PM peak hour. Under the Do Something (Interim Option) 2028 scenario delays decrease significantly with all arms operating within capacity during the AM and PM peaks. Similarly in the Do Something (Preferred Option) delays also decrease significantly with all arms operating within capacity during the AM and PM peaks.

The degree of saturation recorded for the Kilmacud Road Upper in the AM peak hour shows an 11% decrease from the Do Minimum scenario to the Do Something scenario. For the PM scenarios, the highest degree of saturation recorded across the junction reduces by 20% for the Do Something scenario. As such the Do Something scenario represents a junction with improved capacity as compared to the Do Minimum scenario in both peak hours.

4.7 Kilmacud Road Upper / Overend Avenue / Birches Lane Signalised Junction

Due to its close proximity, Overend Avenue and Birches Lane, both of which form a three-arm signalised junction with Kilmacud Road Upper has been combined and assessed together on TRANSYT for the Opening Year 2028 scenario.

The arms were labelled as follows within TRANSYT as:

A. Overend Avenue
B. Kilmacud Road Upper (NW)
C. Kilmacud Road Upper (E)
D. Kilmacud Road Upper (W)
E. Birches Lane
F. Kilmacud Road Upper (E)

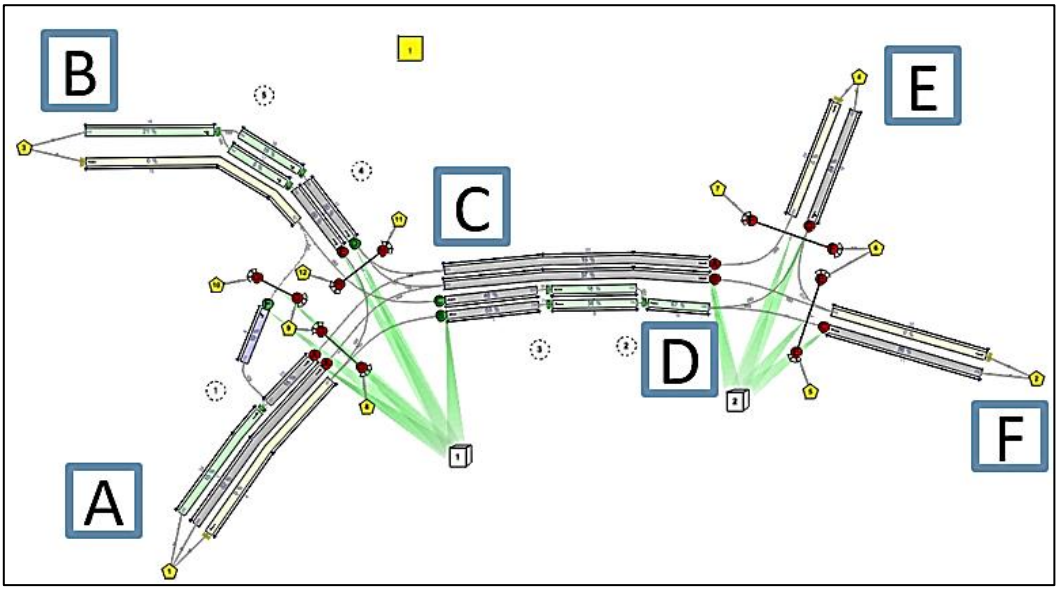

Figure 4-12: Kilmacud Road Upper / Overend Avenue / Birches Lane DM 2028 TRANSYT Model

The Do Minimum layout, as illustrated in Figure 4-12, comprises the existing junction layout. Under the Do Minimum scenario Kilmacud Road Upper (NW) (Arm B) is a two-way road and the R826 Overend Avenue / Kilmacud Road Upper has two approach lanes on both arms.

4.7.1 Do Something Proposals

The existing Kilmacud Road Upper / Overend Avenue has two vehicle lanes on each of its approach arms, including a left-turn slip on Overend Avenue. There are also on-road cycle lanes in both directions on Overend Avenue and pedestrian crossings across two arms with the longest of these spanning 16m in width.

The Do Something junction redesigns the Kilmacud Road Upper (W) arm into an eastbound one-way system. All approach arms were limited to one vehicle lane with carriageway widths reduced to facilitate a generous grassed verge giving segregation to the cycle lanes. Pedestrian crossings are provided on two of the three approach arms, with the longest crossing width now being 6.5m. Cyclist crossings are also provided across two of the junction's arms.

Likewise, the proposals for the Birches Lane junction introduce direct and short pedestrian crossings across all arms with the two-lane approach on Kilmacud Road Upper (western arm) being reduced to a one-lane approach. A two-way cycle facility is provided, crossing the junction at the Birches Lane approach.

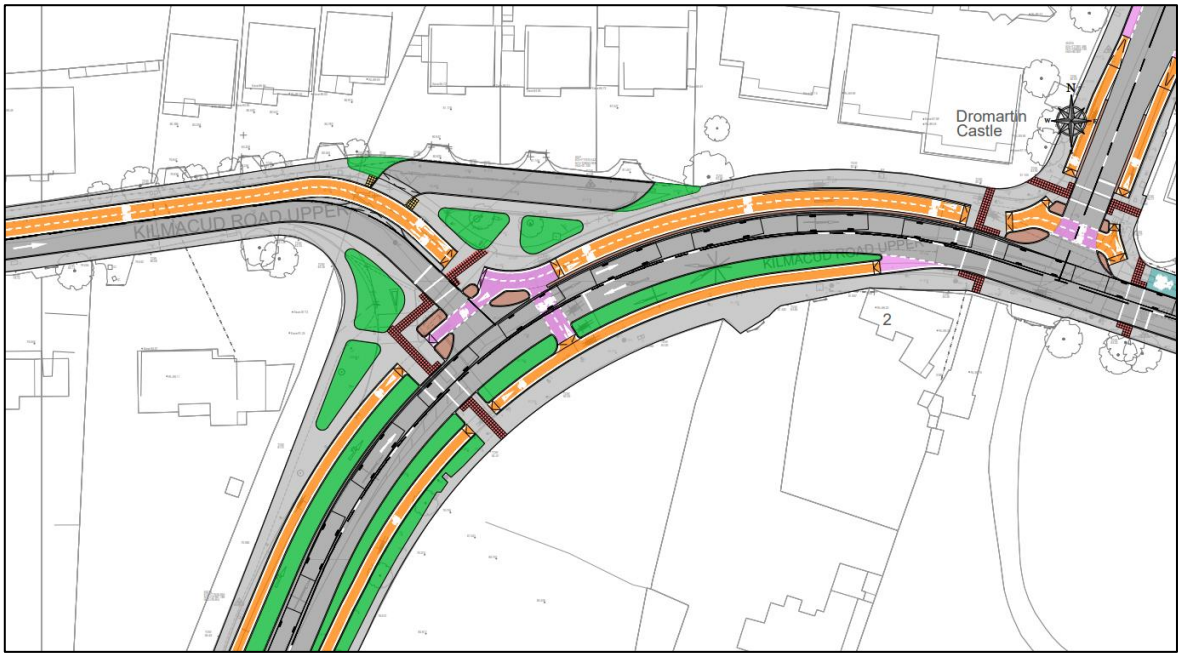

Figure 4-13: Kilmacud Road Upper / Overend Avenue / Birches Lane DS 2028 Layout

4.7.2 Modelling Results

The TRANSYT results during the DM 2028 Scenario indicates that this junction operates within capacity. The junction experiences a maximum DoS of 57% on Kilmacud Road Upper (eastern arm – straight ahead movement towards Overend Avenue) with a corresponding queue of 8.73 PCUs and a delay of 41.67 seconds during the AM peak hour. During the same peak hour, the eastern arm of Kilmacud Road Upper, which meets Birches Lane at this junction experiences a maximum DoS of 51%, a delay of 24.45 seconds and a queue of 8.28 PCUs.

During the PM peak hour, the aforementioned arms (eastern arms) at both junction locations experience high degree of saturations; straight ahead movements towards Overend Avenue experiences a maximum DoS of 89%, a delay of 52.78 seconds and a queue of 14.20 PCUs while Kilmacud Road Upper near Birches Lane experiences a maximum DoS of 61%, a delay of 26.85 seconds and a queue of 10.57 PCUs.

The TRANSYT results during the DS 2028 Scenario indicates that this junction operates within capacity. The junction experiences a maximum DoS of 55% on Kilmacud Road Upper (northwestern arm) with a corresponding queue of 6.83 PCUs and a delay of 36.42 seconds during the AM peak hour. During the same peak hour, the Birches Lane arm of the Kilmacud Road Upper/Birches Lane Junction experiences a maximum DoS of 63%, a delay of 35.17 seconds and a queue of 9.68 PCUs.

During the PM peak hour, the Kilmacud Road Upper (northwestern arm) experiences a maximum DoS of 65%, a delay of 37.16 seconds and a queue of 9.28 PCUs while the Birches Lane arm of the Kilmacud Road Upper/Birches Lane Junction experiences a maximum DoS of 59%, a delay of 34.06 seconds and a queue of 9.05 PCUs.

Arm			AM Peak Hour			PM Peak Hour		
			DoS (%)	Delay (s)	Queue (PCUs)	DoS (%)	Delay (s)	Queue (PCUs)
A	Overend Avenue	Straight	46	38.90	5.04	38	37.25	4.01
		Straight and Left (towards Birches Ln)	50	39.94	5.08	41	37.95	4.08
		Left Slip Lane	15	5.48	2.10	11	5.25	1.50
B	Kilmacud Road Upper (NW)	Right	14	20.11	2.09	23	21.17	3.57
		Left	17	5.03	2.04	9	4.62	1.02
C	Kilmacud Road Upper (E)	Straight	57	41.67	8.73	89	52.78	14.20
		Right	43	23.52	5.49	44	42.61	6.99
D	Kilmacud Road Upper (W)	Straight	43	17.41	9.09	31	10.31	1.92
		Left	15	0.89	0.51	11	1.82	0.88
E	Birches Lane	Left and Right	45	23.75	7.65	45	23.72	7.66
F	Kilmacud Road Upper (E)	Straight	51	24.45	8.28	61	26.85	10.57

Table 4- 10: Kilmacud Road Upper / Overend Avenue / Birches Lane DM 2028 TRANSYT Analysis

Arm			AM Peak Hour			PM Peak Hour		
			DoS (%)	Delay (s)	Queue (PCUs)	DoS (%)	Delay (s)	Queue (PCUs)
A	Overend Avenue	All	34	15.91	6.10	36	17.86	6.35
B	Kilmacud Road Upper (NW)	All	55	36.42	6.83	65	37.16	9.28
C	Kilmacud Road Upper (E)	All	36	13.59	4.66	53	15.24	9.93
D	Kilmacud Road Upper (W)	All	54	15.39	6.03	54	16.59	9.05
E	Birches Lane	All	63	35.17	9.68	59	34.06	9.05
F	Kilmacud Road Upper (E)	All	27	15.71	4.01	30	16.08	4.54

Table 4- 11: Kilmacud Road Upper / Overend Avenue / Birches Lane DS 2028 TRANSYT Analysis

As presented above, it is shown that under the Do Minimum 2028 Scenario the junction will operate within capacity during the AM peak hour and is approaching capacity during the PM peak hour. Under the Do Something 2028 AM and PM peak hour scenarios the junction operates well within capacity for all arms with the maximum degree of saturation being recorded as 65% indicating that the junction has ample reserve capacity.

4.8 Stillorgan Park Road / Carysfort Avenue / Fleurville Signalised Junction

This four-arm signalised junction has been analysed in TRANSYT for the Opening Year (2028) scenario. The arms were labelled as follows within TRANSYT as:

A. Stillorgan Park Road
B. Carysfort Avenue (N)
C. Fleurville
D. Carysfort Avenue (S)

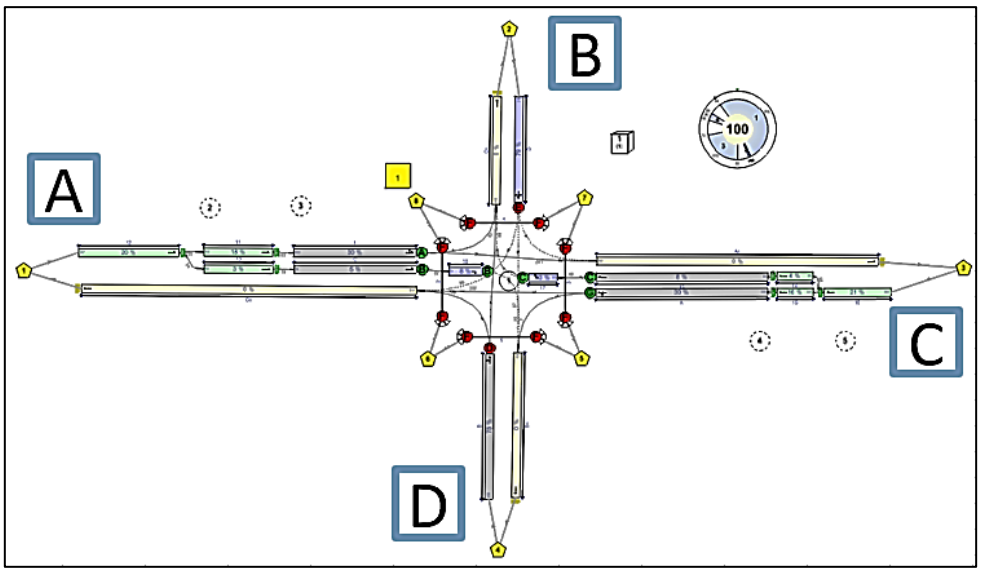

Figure 4-14: Stillorgan Park Road / Carysfort Avenue / Fleurville DM 2028 TRANSYT Model

4.8.1 Do Something Proposals

The Carysfort Avenue / Fleurville Road junction was developed into a CYCLOPS Junction for the Do Something proposals as shown in **Figure 4-15** below. The separate right turn lane at Fleurville was removed and instead there will be a combined left/straight/right turn lane. The Advanced Cyclist Stop Lines are also removed from three of the approaches. The cyclist facilities at the junction will be fully segregated from the carriageway with a series of traffic islands designed to protect cyclists from collisions from both vehicles and other cyclists as they traverse the two-way facilities at the junction. The lengths of the pedestrian crossings across all four arms of the junction were also reduced as a result of the aforementioned measures.

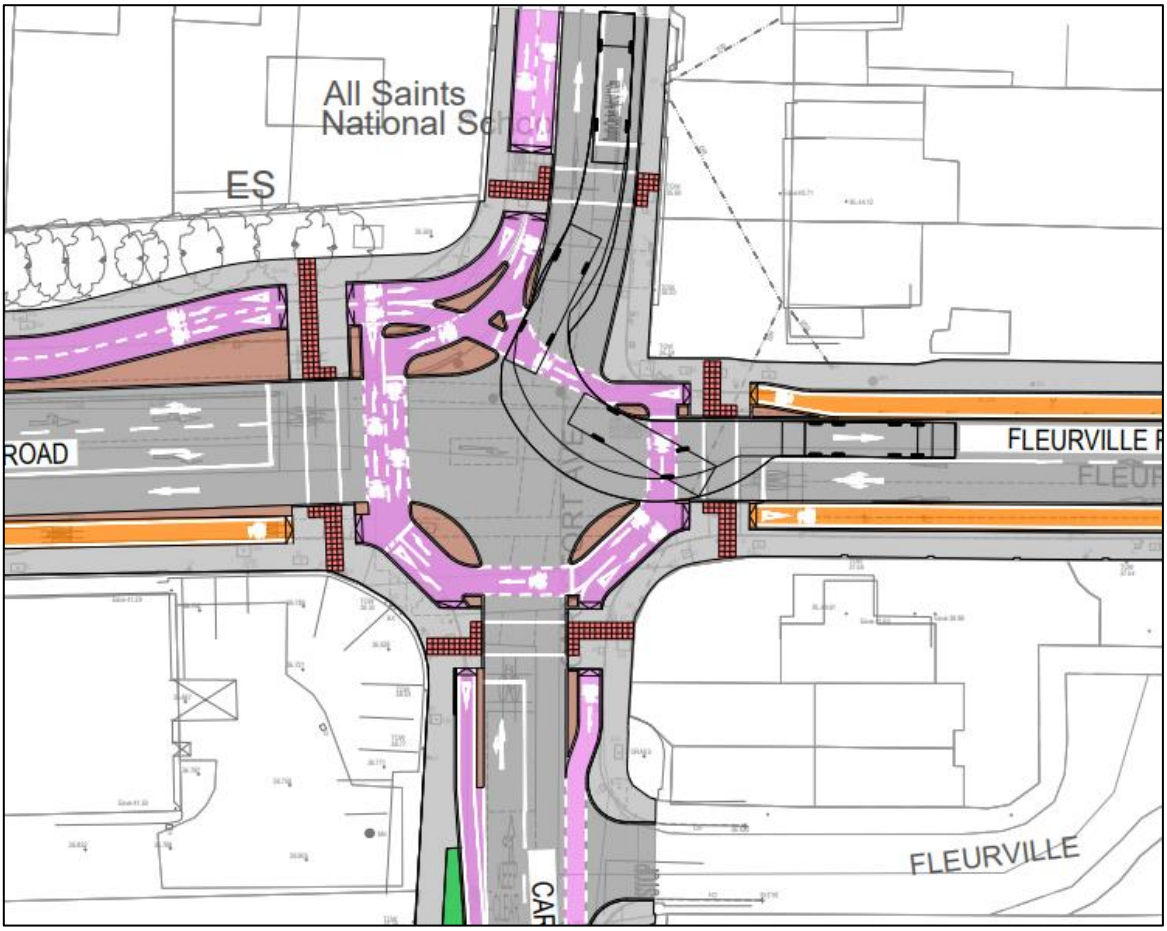

Figure 4-15: Stillorgan Park Road / Carysfort Avenue / Fleurville DS 2028 Layout

4.8.2 Modelling Results

The TRANSYT results indicates that this junction, during the DM 2028 Scenario, operates over capacity. The junction experiences a maximum DoS of 102% on Carysfort Avenue (northern arm) with a corresponding queue of 17.14 PCUs and a delay of 159.64 seconds during the AM peak hour. During the PM peak hour, the same arm experiences a maximum DoS of 170%, a delay of 770.20 seconds and a queue of 100.46 PCUs.

The TRANSYT results indicates that this junction, during the DS 2028 Scenario, operates over capacity. The junction experiences a maximum DoS of 147% on Fleurville with a corresponding queue of 85.75 PCUs and a delay of 613.91 seconds during the AM peak hour. During the PM peak hour, the Carysfort Avenue (northern arm) experiences a maximum DoS of 156%, a delay of 686.33 seconds and a queue of 89.41 PCUs.

Arm			AM Peak Hour			PM Peak Hour		
			DoS (%)	Delay (s)	Queue (PCUs)	DoS (%)	Delay (s)	Queue (PCUs)
A	Stillorgan Park Rd	Straight and Left	83	29.19	20.62	87	35.44	22.33
		Right-Turn Bay	50	18.03	8.79	14	14.30	2.14
B	Carysfort Ave (N)	Straight, Left and Right	102	159.64	17.14	170	770.20	100.46
C	Fleurville	Straight and Left	50	18.03	8.79	58	22.25	10.73
		Right-Turn Bay	4	11.89	0.61	8	14.23	1.14
D	Carysfort Ave (S)	Straight and Left	64	42.08	7.67	45	37.17	4.67

Table 4- 12: Stillorgan Park Road / Carysfort Avenue / Fleurville DM 2028 TRANSYT Analysis

Arm			AM Peak Hour			PM Peak Hour		
			DoS (%)	Delay (s)	Queue (PCUs)	DoS (%)	Delay (s)	Queue (PCUs)
A	Stillorgan Park Rd	Straight and Left	146	605.68	127.06	155	669.98	146.75
		Right-Turn Bay	22	36.76	2.96	29	37.78	3.87
B	Carysfort Ave (N)	Straight, Left and Right	99	146.37	16.56	156	686.33	89.41
C	Fleurville	Straight, Left and Right	147	613.91	85.75	148	625.62	88.14
D	Carysfort Ave (S)	Straight and Left	114	302.45	28.70	90	99.09	10.37

Table 4- 13: Stillorgan Park Road / Carysfort Avenue / Fleurville DS 2028 TRANSYT Analysis

As presented above, it is shown that under the Do Minimum 2028 Scenario the junction will exceed capacity during the AM and PM peak hour. Under the Do Something 2028 scenario delays increase significantly with the junction continuing to operate over capacity during the AM and PM peaks, though the maximum recorded degree of saturation for the PM peak hour is lower in the Do Something scenario.

Figure 4-16 below shows the extracted 2028 ERM traffic flows for the Do Minimum and Do Something scenarios for the Stillorgan Park Road / Carysfort Avenue / Fleurville signalised junction. It can be observed that the junction has a large throughput of vehicle flows particularly from the Stillorgan Park Road arm. The Do Something scenarios show a reduction in the number of vehicles

navigating the junction, as well as a reduction in the degree of saturations, but it remains a busy intersection. Chapter 5 of this report assesses the junction's improvements in its capacity to convey various road users, not limited to motorists.

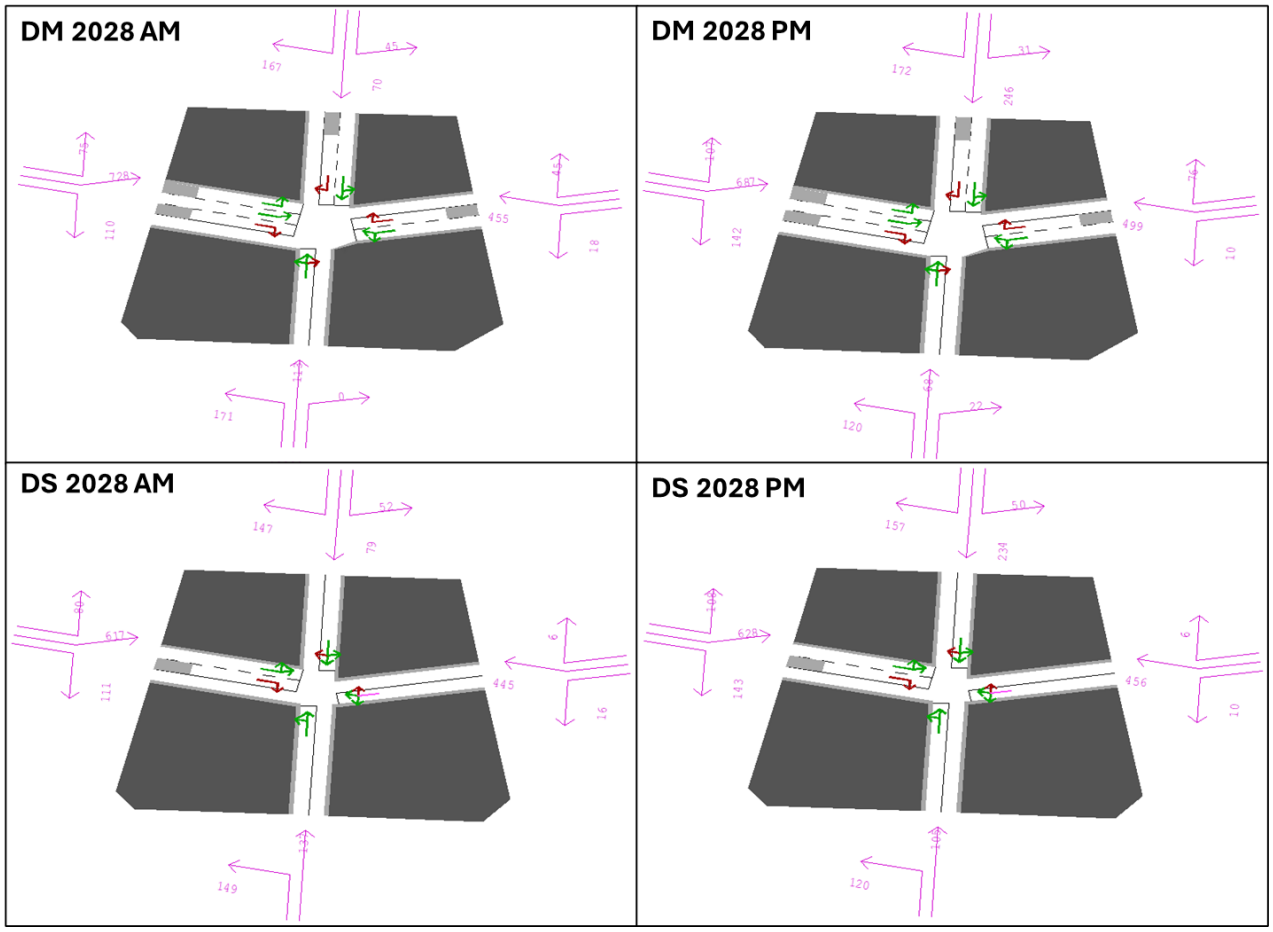

Figure 4-16: 2028 ERM Traffic Flows for Stillorgan Park Road / Carysfort Avenue / Fleurville

4.9 Annaville Terrace / Newtownpark Avenue / Rowanbyrn Junction Signalised Junction

This four-arm signalised junction has been analysed in TRANSYT for the Year 2028 scenario. The arms were labelled as follows within TRANSYT as:

A. Annaville Terrace
B. Newtownpark Avenue (N)
C. Rowanbyrn
D. Newtownpark Avenue (N)

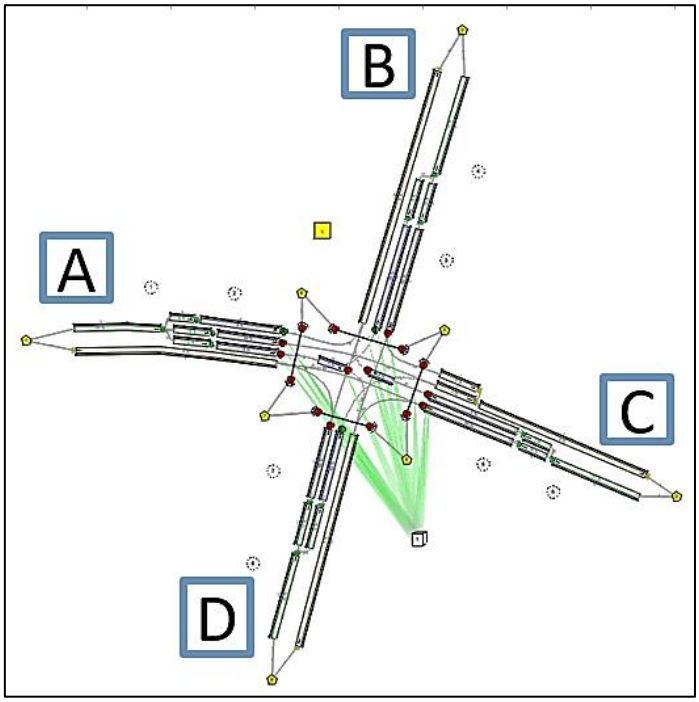

Figure 4-17: Annaville Terrace / Newtownpark Ave / Rowanbyrn DM 2028 TRANSYT Model

4.9.1 Do Something Proposals

The Annaville Terrace / Newtownpark Avenue / Rowanbyrn junction has been redesigned as a CYCLOPS junction for the Do Something proposals as shown in **Figure 4-18** below. The Advanced Cyclist Stop Lines have been removed for each of the approach arms, as well as the long pedestrian crossings. The carriageway width was reduced by removing the separate right turning lanes from the Newtownpark approaches and instead having one combined turning lane. Consequently, shorter pedestrian crossings can be provided over all arms of the junction.

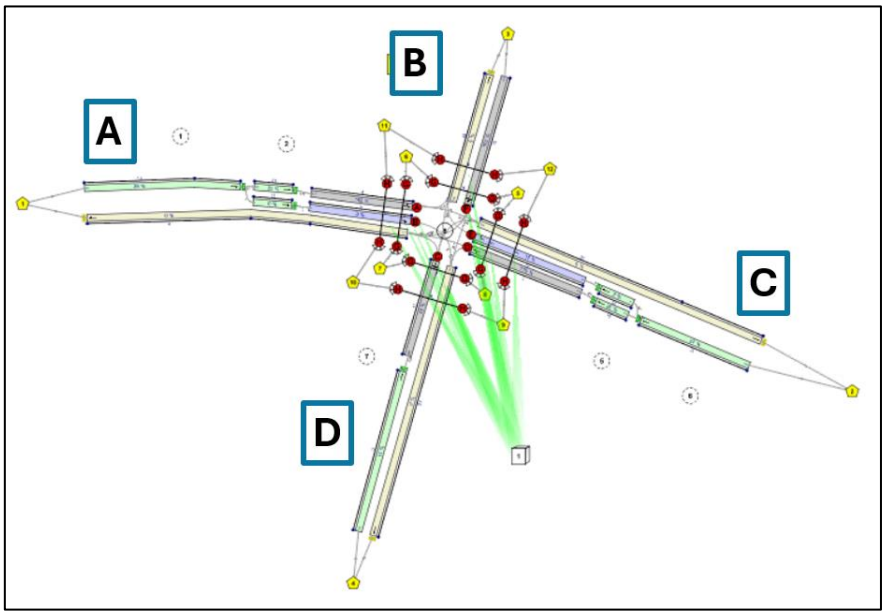

Figure 4-18: Annaville Terrace / Newtownpark Avenue / Rowanbyrn DS 2028 TRANSYT Model

4.9.2 Modelling Results

The TRANSYT results indicates that this junction, during the DM 2028 Scenario, operates over capacity. The junction experiences a maximum DoS of 100% on Rowanbyrn (straight-ahead / turning left movements on the eastern arm) with a corresponding queue of 27.17 PCUs and a delay of 108.09 seconds during the AM peak hour. During the PM peak hour, Newtownpark Avenue (straight-ahead / turning left movements on the northern arm) experiences a maximum DoS of 125%, a delay of 415.80 seconds and a queue of 47.79 PCUs.

The TRANSYT results indicates that this junction, during the DS 2028 Scenario, operates over capacity. The junction experiences a maximum DoS of 134% on Annaville Terrace (straight-ahead / turning left movements on the western arm) with a corresponding queue of 102.36 PCUs and a delay of 499.06 seconds during the AM peak hour. During the PM peak hour, the same arm experiences a maximum DoS of 135%, a delay of 504.18 seconds and a queue of 104.35 PCUs.

Arm			AM Peak Hour			PM Peak Hour		
			DoS (%)	Delay (s)	Queue (PCUs)	DoS (%)	Delay (s)	Queue (PCUs)
A	Annaville Terrace	Straight	94	71.44	20.91	67	25.49	14.03
		Left	20	18.36	3.01	7	5.82	0.83
		Right-Turn Bay	0	0.00	0.00	0	0.00	0.00
B	Newtownpark Ave (N)	Straight and Left	37	31.65	4.27	125	415.80	47.79
		Right	7	11.00	0.41	5	15.96	0.46
C	Rowanbyrn	Straight and Left	100	108.09	27.17	75	28.72	16.14
		Right-Turn Bay	11	25.68	1.31	0	0.00	0.00
D	Newtownpark Ave (S)	Straight and Left	65	38.86	8.54	55	45.85	4.46
		Right	30	13.75	1.82	13	18.42	0.71

Table 4- 14: Annaville Terrace / Newtownpark Avenue / Rowanbyrn DM 2028 TRANSYT Analysis

Arm			AM Peak Hour			PM Peak Hour		
			DoS (%)	Delay (s)	Queue (PCUs)	DoS (%)	Delay (s)	Queue (PCUs)
A	Annaville Terrace	Straight and Left	134	499.06	102.36	135	504.18	104.35
		Right-Turn Bay	0	0.00	0.00	0	0.00	0.00
B	Newtownpark Ave (N)	All	68	48.60	8.55	111	240.37	41.21
C	Rowanbyrn	Straight and Left	90	65.51	16.56	96	87.47	20.70
		Right-Turn Bay	17	31.60	1.31	14	31.18	1.10
D	Newtownpark Ave (S)	All	93	78.13	18.29	49	40.02	5.97

Table 4-15: Annaville Terrace / Newtownpark Avenue / Rowanbyrn DS 2028 TRANSYT Analysis

As presented above, it is shown that under the Do Minimum 2028 Scenario the junction will operate over capacity during the AM and PM peak hour. Under the Do Something 2028 scenario both the delays and junction capacity are comparable to the Do Minimum scenario. However, the junction continues to operate over capacity during the AM and PM peaks.

Figure 4-19 below shows the extracted 2028 ERM traffic flows for the Do Minimum and Do Something scenarios for the Annaville Terrace / Newtownpark Avenue / Rowanbyrn signalised junction. In the Do Minimum scenarios, the junction shows high flows for the mainline flows as well as the right-turn movement from Newtonpark Avenue and the left-turn movement from Annaville Terrace. These flows represent a large demand, whilst also being conflicting traffic movements, as such balancing these to assign sufficient green time to all movements has resulted in a junction that operates well over capacity in the Do Minimum scenarios.

For the Do Something scenarios, it can be seen that the traffic flows have been redistributed within the Eastern Regional Model, as well as reduced to improve the junction's operation. This is reflected in the Do Something TRANSYT results which show significant improvements for all the mainline movements' degrees of saturation.

Chapter 5 of this report assesses the junction's improvements in its capacity to convey various road users, not limited to motorists.

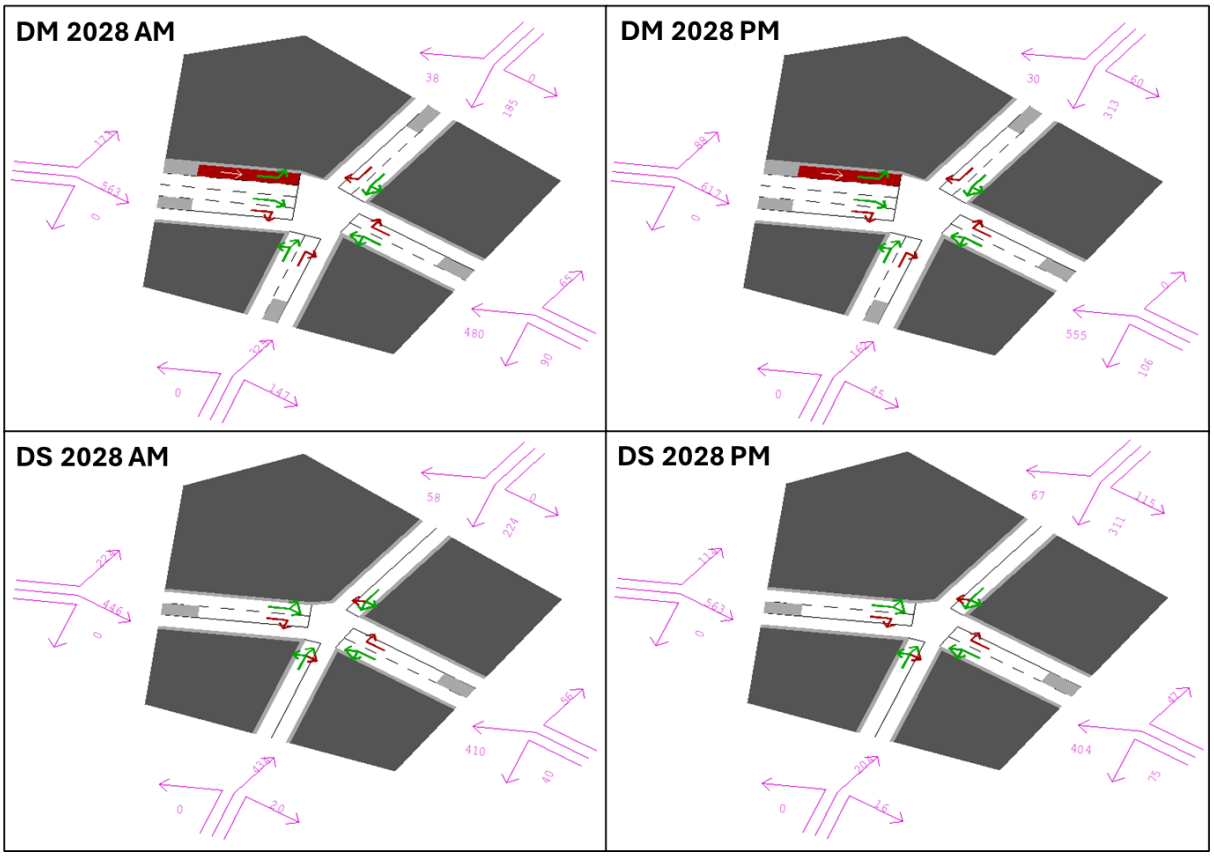

Figure 4-19: 2028 ERM Traffic Flows for Annaville Terrace / Newtownpark Avenue / Rowanbyrn

4.10 Brookville Park / Deansgrange Road / Monkstown Link Road Signalised Junction

This four-arm signalised junction has been analysed in TRANSYT for the Opening Year (2028) scenario. The arms were labelled as follows within TRANSYT as:

A. Brookville Park
B. Deansgrange Road (N)
C. L1024 New Road
D. Deansgrange Road (S)

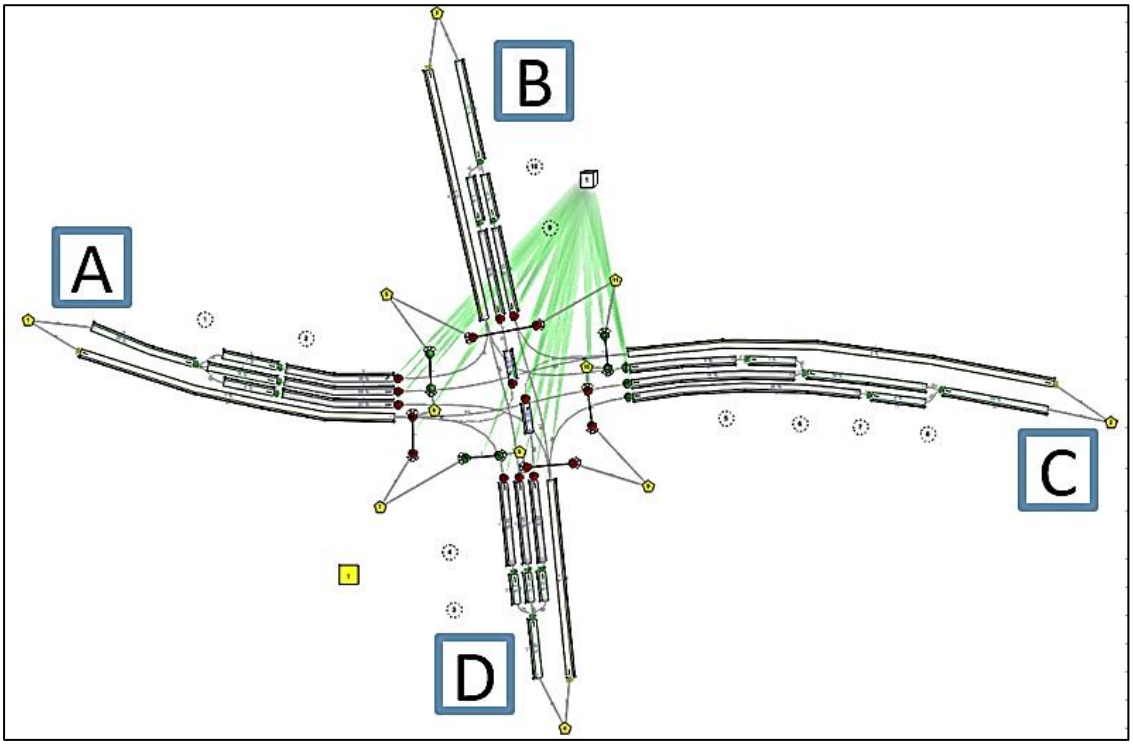

Figure 4-20: Brookville Park / Deansgrange Road / Monkstown Link Road DM 2028 TRANSYT Model

4.10.1 Do Something Proposals

The existing Brookville Park / Deansgrange Road junction has been redesigned as a CYCLOPS junction as shown in **Figure 4-21** below. The existing junction arrangement is exceedingly vehicle-dominated with three vehicle lanes on three of the arms requiring staggered and two-stage pedestrian crossings of large spans across all arms. The proposals have limited each approach to two vehicle lanes, providing full segregation between vehicles and cyclist facilities at each arm. Four large corner islands enable pedestrians to make shorter, direct crossings throughout the junction, with no pedestrian crossing exceeding 9.5m.

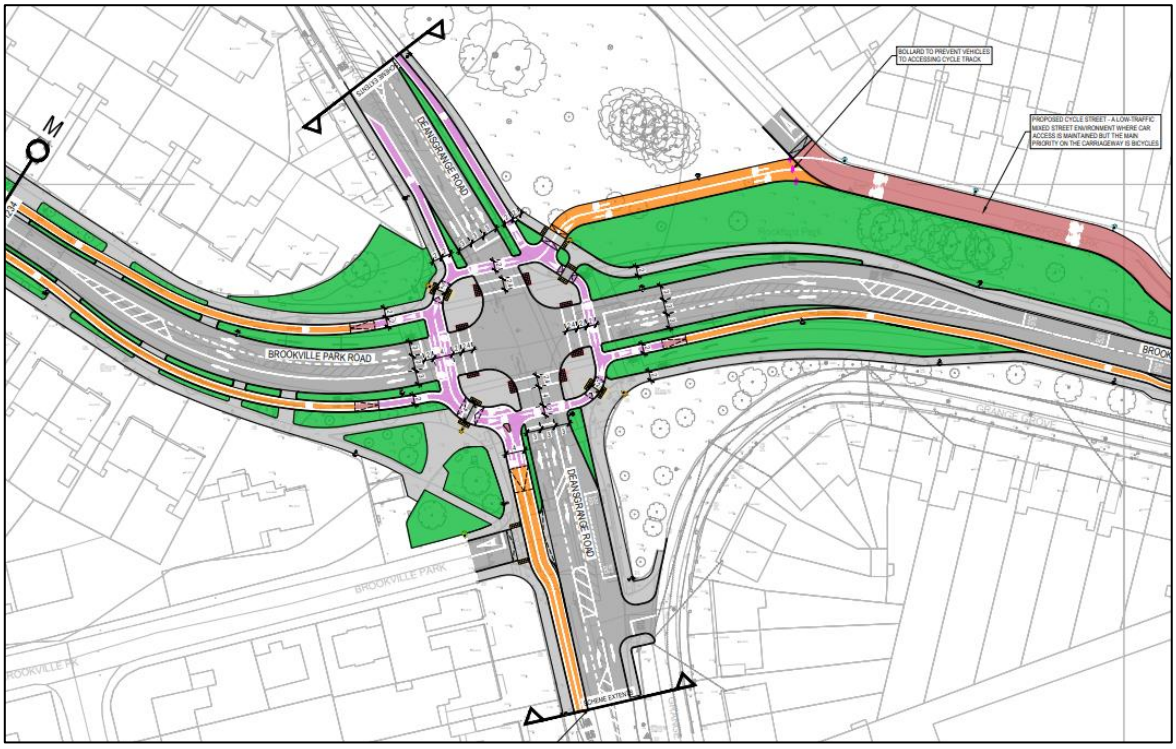

Figure 4-21: Brookville Park / Deansgrange Road / Monkstown Link Road DS 2028 Layout

4.10.2 Modelling Results

The TRANSYT results indicates that this junction, during the DM 2028 Scenario, operates over capacity during both the AM peak and PM peak hours. The junction experiences a maximum DoS of 213% on Brookville Park (straight-ahead movement on the western arm) with a corresponding queue of 201.96 PCUs and a delay of 977.94 seconds during the AM peak hour. During the PM peak hour, the same straight-ahead movement on Brookville Park experiences a maximum DoS of 208%, a delay of 958.25 seconds and a queue of 193.48 PCUs.

The TRANSYT results indicates that this junction, during the DS 2028 Scenario, operates within capacity during both the AM peak and PM peak hours. The junction experiences a maximum DoS of 76% on Deansgrange Road (S) (straight-ahead and left turn movement on the southern arm) with a corresponding queue of 13.97 PCUs and a delay of 43.14 seconds during the AM peak hour. During the PM peak hour, the straight-ahead and left turn movement on Brookville Park experiences a maximum DoS of 76%, a delay of 31.20 seconds and a queue of 16.41 PCUs.

Arm			AM Peak Hour			PM Peak Hour		
			DoS (%)	Delay (s)	Queue (PCUs)	DoS (%)	Delay (s)	Queue (PCUs)
A	Brookville Park	Straight	213	977.94	201.96	208	958.25	193.48
		Left	0	0.00	0.00	0	0.00	0.00
		Right	12	27.29	1.55	18	27.97	2.33
B	Deansgrange Rd (N)	Straight and Left	23	32.41	2.54	33	33.99	3.79
		Right-Turn Bay	0	0.00	0.00	0	0.00	0.00
C	L1024 New Road	Straight	170	767.95	131.34	190	879.49	167.18
		Left	5	38.34	0.32	11	39.06	0.75
		Right	11	46.70	0.41	11	46.70	0.41
D	Deansgrange Rd (S)	Straight	43	29.66	6.62	19	25.96	2.59
		Left	38	39.74	3.69	21	37.00	1.99
		Right-Turn Bay	3	0.94	0.01	2	0.91	0.00

Table 4- 16: Brookville Park / Deansgrange Road / Monkstown Link Road DM 2028 TRANSYT Analysis

Arm			AM Peak Hour			PM Peak Hour		
			DoS (%)	Delay (s)	Queue (PCUs)	DoS (%)	Delay (s)	Queue (PCUs)
A	Brookville Park	Straight and Left	63	30.30	12.07	76	31.20	16.41
		Right	15	21.75	1.43	20	18.21	1.92
B	Deansgrange Rd (N)	Straight and Left	24	28.61	3.30	47	31.41	6.69
		Right	1	23.95	0.12	28	27.92	2.35
C	L1024 New Road	Straight and Left	69	32.62	14.01	52	23.57	9.33
		Right	17	21.44	1.69	4	16.28	0.39
D	Deansgrange Rd (S)	Straight and Left	76	43.14	13.97	43	30.46	5.83
		Right	0	0.00	0.00	0	0.00	0.00

Table 4- 17: Brookville Park / Deansgrange Road / Monkstown Link Road DS 2028 TRANSYT Analysis

As presented above, it is shown that under the Do Minimum 2028 Scenario the junction will exceed capacity during both the AM and PM peak hour. Under the Do Something 2028 scenario delays decrease significantly with all arms operating within capacity during the AM and PM peaks.

Figure 4-22 below shows the extracted 2028 ERM traffic flows for the Do Minimum and Do Something scenarios for the Brookville Park / Deansgrange Road / Monkstown Link Road signalised junction.

In the Do Minimum scenarios, the junction shows high flows for the mainline flows, particularly along Annaville Terrace and Rowanbyrn. This large demand in vehicle flows naturally shows an over capacity junction on TRANSYT as the size of the junction cannot accommodate flows of this size without additional vehicle lanes being added.

For the Do Something scenarios, the traffic flows have been both redistributed and reduced, with a reduction from 723 pcus to 437 pcus for the straight-ahead movement on Annaville Terrace in the AM peak hour. These changes have resulted in a junction that operates within capacity for all the junction arms, as shown by the Do Something TRANSYT results.

Chapter 5 of this report assesses the junction's improvements in its capacity to convey various road users, not limited to motorists.

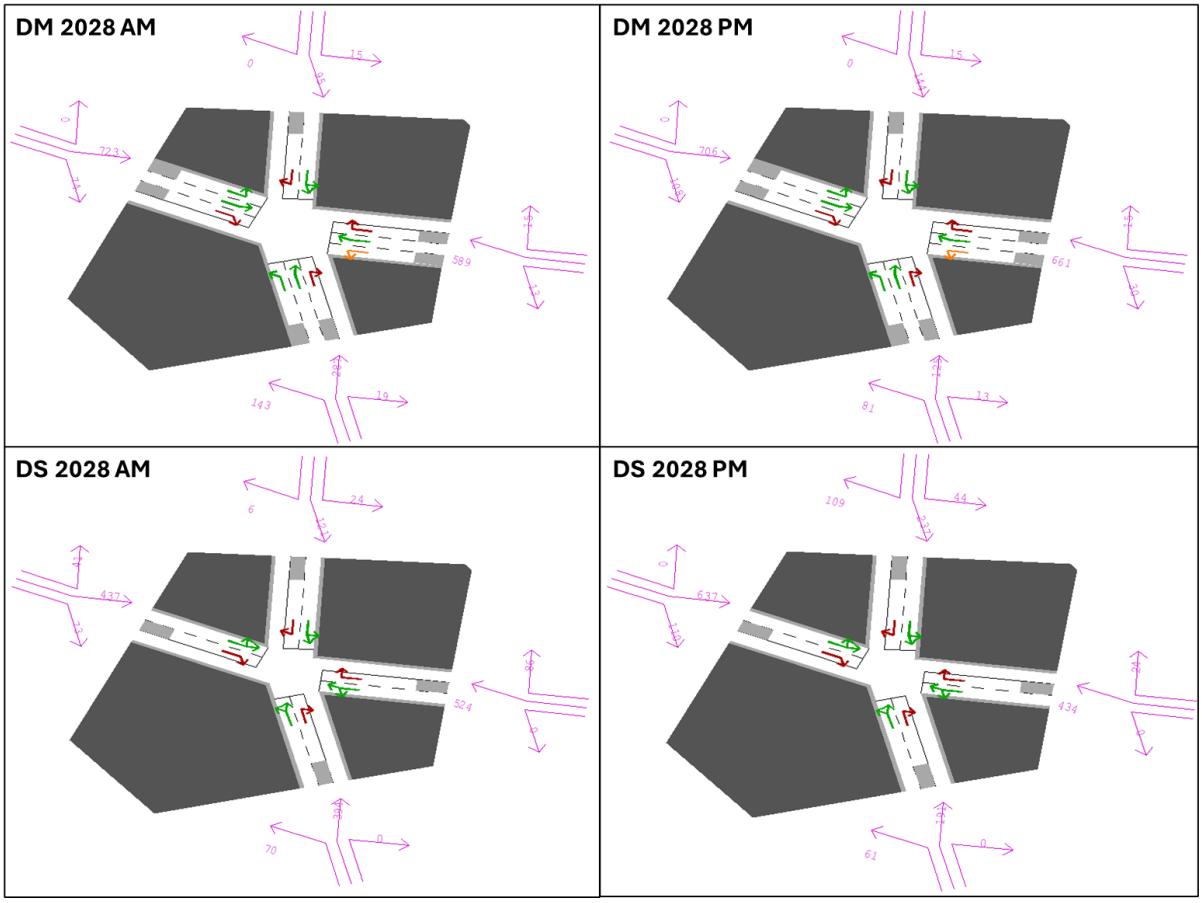

Figure 4-22: 2028 ERM Traffic Flows for Brookville Park / Deansgrange Road / Monkstown Link Road

4.11 Stradbrook Road / Monkstown Avenue / Abbey Road / Monkstown Link Road Roundabout

This existing four-arm roundabout has been analysed in ARCADY for the Opening Year (2028) scenario. The arms were labelled as follows within the ARCADY model as:

1. Monkstown Avenue
2. Abbey Road
3. New Road (L1024)
4. Stradbrook Road

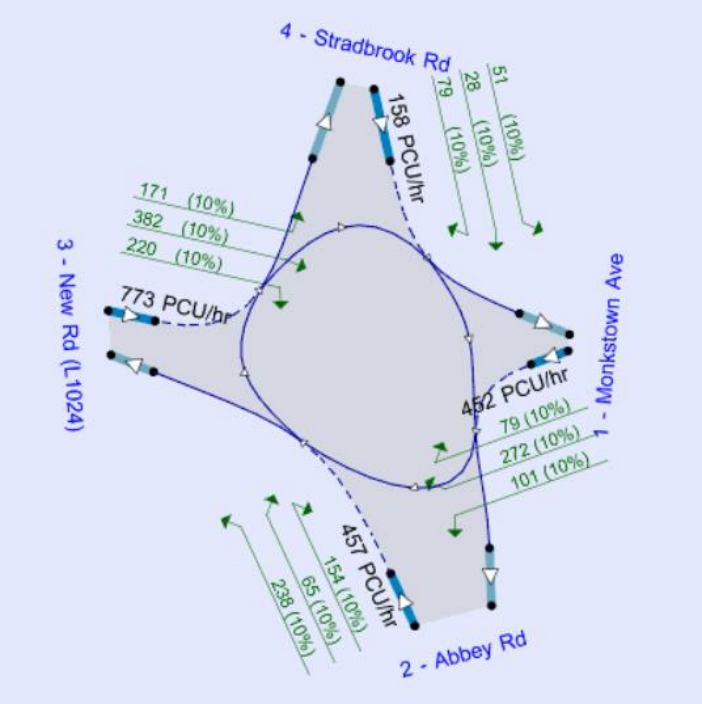

Figure 4-23: Stradbrook Road / Monkstown Ave-Link Road / Abbey Road DM 2028 ARCADY Model

4.11.1 Stradbrook Roundabout Optioneering

A modelling assessment was undertaken as part of the options development and assessment at the Stradbrook Roundabout. The following four options were considered, and are shown in **Figure 4-24** below:

- **Option 1:** Four Arm Dutch Style / Protected Roundabout
- **Option 2:** Three Arm Dutch Style / Protected Roundabout - The Stradbrook Road arm would be closed to general traffic and replaced with a filtered permeability connection for pedestrians / cyclists.

- **Option 3:** Three Arm CYCLOPS Junction – The Stradbrook Road arm would be closed to general traffic and replaced with a filtered permeability connection for pedestrians / cyclists.
- **Option 4:** Four Arm CYCLOPS Junction

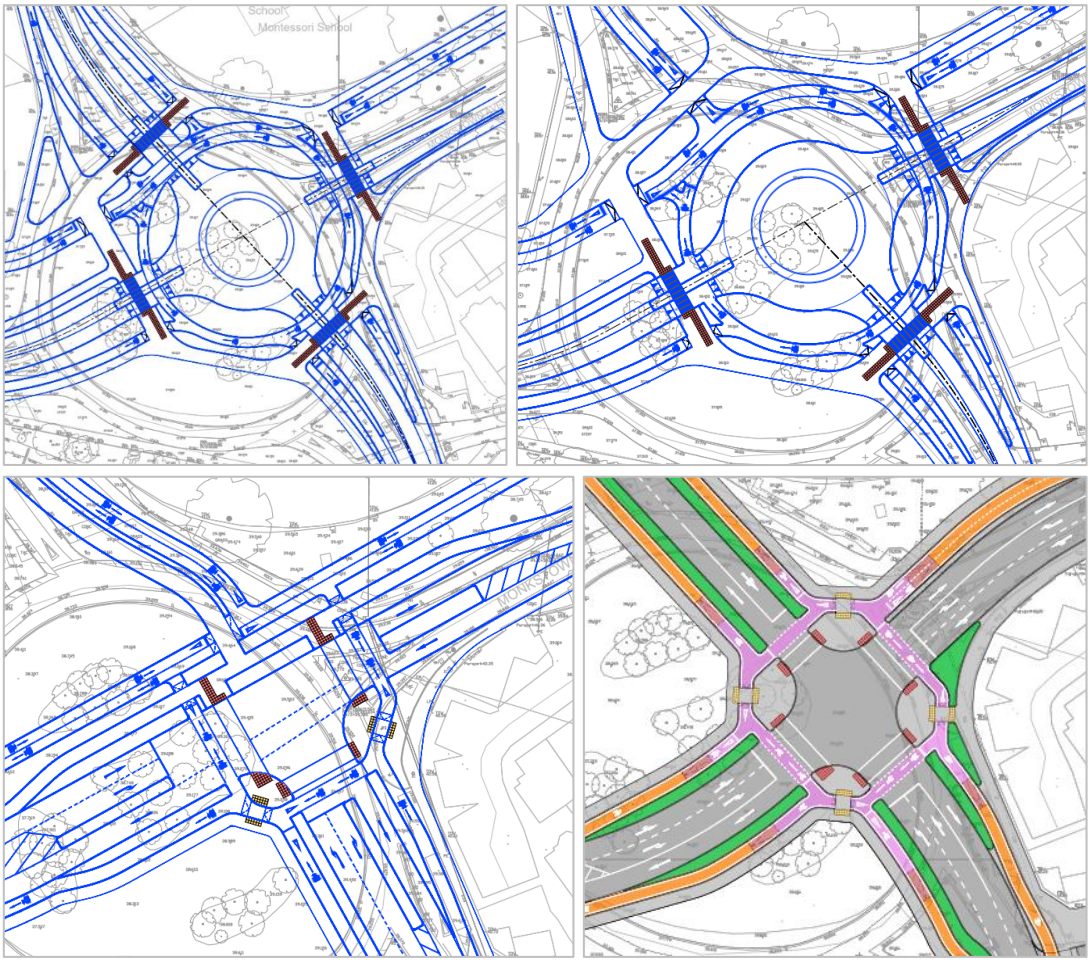

Figure 4-24: Stradbrook Roundabout Optioneering Assessment [Top to Bottom, Left to Right: Option 1 – Four Arm Dutch Style Roundabout; Option 2 - Three Arm Dutch Style Roundabout; Option 3 - Three Arm CYCLOPS Junction; Option 4 - Four Arm CYCLOPS Junction]

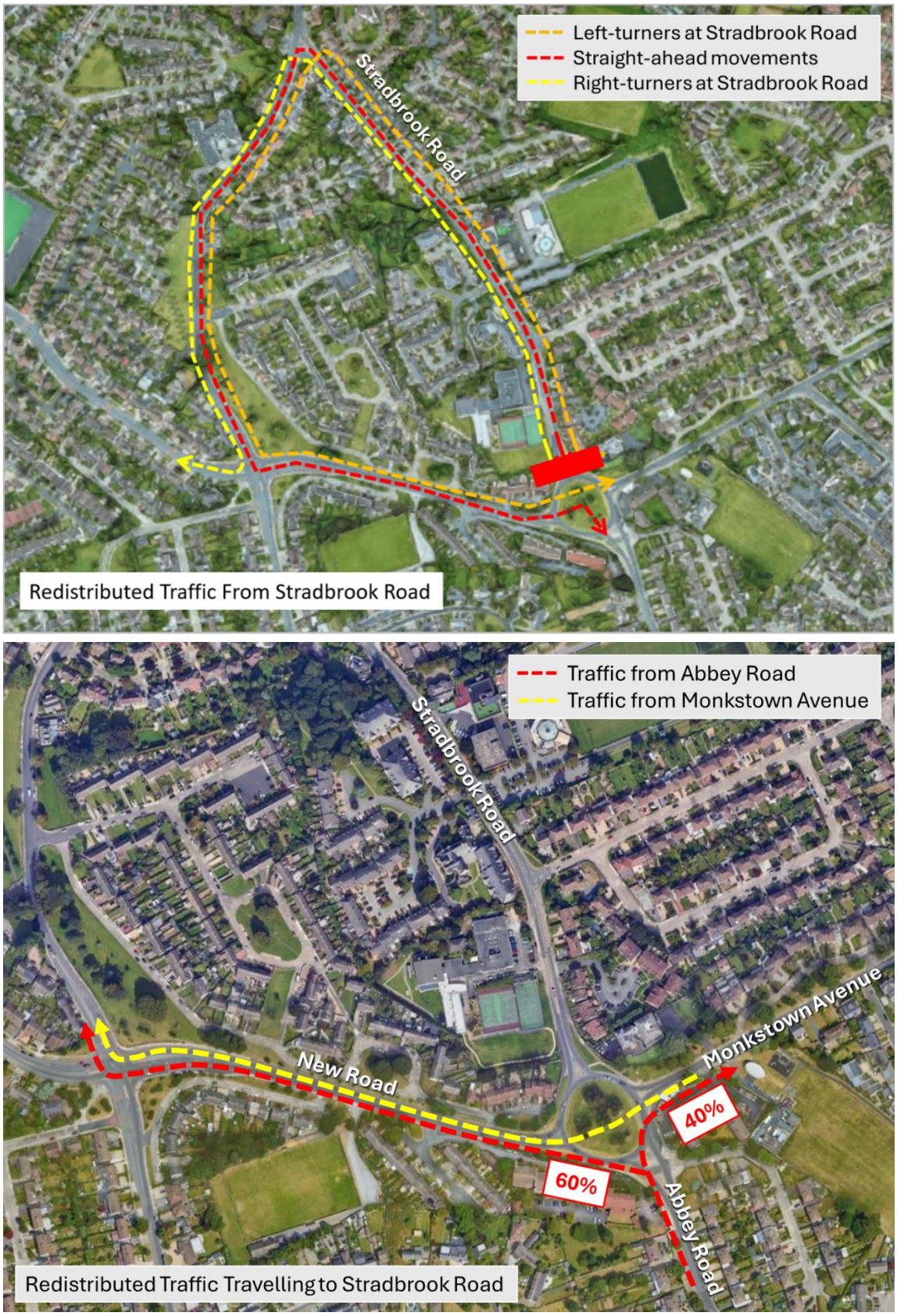

Figure 4-25: Redistributed Traffic Flows Travelling To / From Stradbrook Road

For Options 2 and 3, considering three-armed junctions with the closure of the Stradbrook Road arm, the redistribution of vehicular traffic has been modelled as per **Figure 4-25** above. These redistributed flows and their resulting impact on the operational performance of the junction are considered conservative. In reality, following the closure of the Stradbrook Road arm, strategic traffic may take alternative routes on the wider network and consequently, may not reroute as assumed above, thereby reducing the predicted impact.

Furthermore, the provision of the filtered permeability link seeks to encourage a greater uptake in active modes, particularly in relation to the Rockford Manor Secondary School. Therefore, it is anticipated that a proportion of the local trips including school drop-off/pick-up trips currently made by car using Stradbrook Road would shift to active modes, thereby reducing predicted impact as outlined below.

Table 4- 18 below shows a comparison of the queues, delays and junction capacity across the four junction layout options considered for the Stradbrook Roundabout for the AM peak hour.

For all the parameters and options considered, the worst operating arm is the New Road for Option 2 representing a three-arm Dutch Style / Protected Roundabout with a maximum RFC of 168% being recorded. The second worst operating arm and option would be the Abbey Road arm for Option 1 for a four-arm Dutch Style / Protected Roundabout with a maximum RFC of 141%.

Across the parameters assessed, Options 1 and 2, show a much greater deterioration in the junction performance compared to Options 3 and 4. Between Options 3 and 4, Option 3 shows less queues, delays and lower degrees of saturation for more movements than Option 4 indicating that the junction arrangement benefits from more reserve capacity overall.

			Queue (PCUs)				Delay (s)				RFC		DOS	
		Option	1	2	3	4	1	2	3	4	1	2	3	4
A	Monkstown Avenue	Straight & Left	7.0	3.0	19.7	15.7	45.3	18.8	67.3	63.2	0.90	0.76	0.94	0.86
		Right			-	3.2			-	35.7			-	0.32
B	Abbey Road	Left	122.7	94.7	8.0	5.6	757.9	560.3	22.3	41.9	1.41	1.31	0.50	0.44
		Right			9.2	19.7			76.0	85.1			0.87	0.94
		Straight			-				-				-	
C	New Rd (L1024)	Left	82.5	305.7	-	19.5	596.9	2027.5	-	80.9	1.27	1.68	-	0.93
		Straight			6.4				11.7				0.40	
		Right			14.6	2.9			77.9	35.1			0.93	0.29

D	Stradbrook Road	Straight & Right	2.5	-	-	14.1	20.2	-	-	87.9	0.72	-	-	0.91
		Left				2.7				40.5				0.25

Table 4- 18: Do Something AM Modelling Results for Stradbrook Roundabout Options

Table 4- 19 below shows a comparison of the queues, delays and junction capacity across the four junction layout options considered for the Stradbrook Roundabout for the PM peak hour. For the PM peak hour, Option 2 is shown to be the worst operating option with the highest queues, delays and ratios of flow to capacity for the New Road and Abbey Road approach arms with a maximum recorded delay of 286.78 seconds at the New Road.

Option 1 is also shown to be operating above capacity with maximum RFC values of 106% and 102% for the New Road and Abbey Road arms respectively. Similarly to the AM peak hour, Options 3 and 4 indicate that the performance of the junction will be significantly better under the signalised junction layouts compared to the roundabout layouts across the parameters assessed.

			Queue (PCUs)				Delay (s)				RFC		DOS	
		Option	1	2	3	4	1	2	3	4	1	2	3	4
A	Monkstown Avenue	Straight & Left	5.0	3.6	16.8	15.1	34.3	24.7	58.4	58.1	0.85	0.80	0.90	0.83
		Right			-	2.1			-	32.9			-	0.21
B	Abbey Road	Left	18.8	42.4	5.5	3.9	119.5	256.4	19.4	41.3	1.02	1.15	0.37	0.34
		Right			7.7	13.4			75.2	59.7			0.84	0.81
		Straight			-				-				-	
C	New Rd (L1024)	Left	26.6	67.1	-	13.3	157.4	286.8	-	52.6	1.06	1.14	-	0.78
		Straight			5.8				10.4				0.38	
		Right			13.7	3.7			60.1	35.8			0.88	0.35
D	Stradbrook Road	Straight & Right	2.5	-	-	11.6	21.3	-	-	67.5	0.73	-	-	0.82
		Left				2.6				39.5				0.24

Table 4- 19: Do Something PM Modelling Results for Stradbrook Roundabout Options

4.11.1.1 Conclusions

Based on the assessment outlined above, on balance it is considered that Option 3, a three arm CYCLOPS junction is the preferred option for the following key reasons:

- The junction arrangement offers a good level of operational efficiency compared to the Dutch-Style roundabout layouts of Option 1 or Option 2. It is noted that Arm A (Monkstown Avenue) and Arm C (New Road) are shown to be approaching capacity in the AM peak hour. However, as noted the redistributed traffic flows assumed for this assessment are considered to be conservative and represent a worst-case scenario.
- Further modelling using the National Transport Authority's (NTAs) Eastern Regional Model (ERM) will be undertaken (discussed in following section) which provides a more accurate assessment of the redistributed traffic flows on the wider network with consideration also, of additional changes on the wider network.
- The three arm CYCLOPS arrangement offers significant benefits in terms of providing high quality pedestrian and cyclist facilities, particularly due to the inclusion of the filtered permeability link to Stradbrook Road. This would provide a safe, attractive, segregated connection for people travelling either on foot or by bike to key destinations including Rockford Manor Secondary School, Links Childcare, WeeCare Day Nursery and Blackrock College RFC and Stradbrook Rugby Club grounds.
- The layout of the 3-arm CYCLOPS junction is also more compact than the other options considered, freeing up more space for public realm and landscaping enhancements.

4.11.2 Do Nothing / Do Something Assessment

This existing four-arm roundabout has been analysed in ARCADY for the Opening Year 2028 scenario. The arms were labelled as follows within the ARCADY model as:

1. Monkstown Avenue
2. Abbey Road
3. New Road (L1024)
4. Stradbrook Road

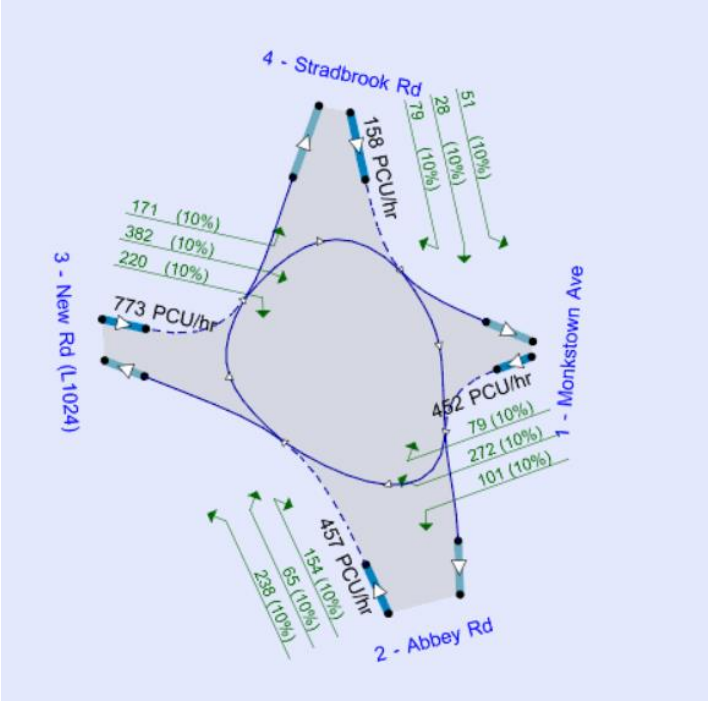

Figure 4-26: Stradbrook Road / Monkstown Ave-Link Road / Abbey Road DM 2028 ARCADY Model

It is proposed to alter this junction to a signalised three-arm junction with segregated cycle lanes through the junction as illustrated in **Figure 4-27**.

Figure 4-27: Stradbrook Road / Monkstown Ave-Link Road / Abbey Road DS 2028 Layout

The ARCADY results indicates that this junction operates within capacity during both the DM 2028 Scenario AM and PM peak hours. The junction during the AM peak hour experiences a maximum RFC of 0.63 on New Road (L1024) (western arm) with a corresponding queue of 1.9 PCUs and a delay of 8.03 seconds. During the PM peak hour, the same approach arm experiences a maximum RFC of 0.52, a delay of 5.86 seconds and a queue of 1.2 PCUs.

The TRANSYT results indicates that this junction operates within capacity during both the DS 2028 Scenario AM and PM peak hours. The junction during the AM peak hour experiences a maximum DoS of 54% on Monkstown Avenue (eastern arm) with a corresponding queue of 6.80 PCUs and a delay of 36.18 seconds. During the PM peak hour, the New Rd (L1024) (western arm) experiences a maximum DoS of 46%, a delay of 28.72 seconds and a queue of 6.96 PCUs.

Arm		AM Peak Hour			PM Peak Hour		
		Queue (PCUs)	Delay (s)	RFC	Queue (PCUs)	Delay (s)	RFC
1	Monkstown Ave	0.6	4.06	0.34	0.8	5.13	0.43
2	Abbey Rd	0.6	3.96	0.34	0.5	3.94	0.29
3	New Rd (L1024)	1.9	8.03	0.63	1.2	5.86	0.52
4	Stradbrook Rd	0.2	4.35	0.16	0.3	4.16	0.23

Table 4- 20: Stradbrook Road / Monkstown Ave-Link Road / Abbey Road DM 2028 ARCADY Analysis

Arm			AM Peak Hour			PM Peak Hour		
			DoS (%)	Delay (s)	Queue (PCUs)	DoS (%)	Delay (s)	Queue (PCUs)
A	Monkstown Ave	Straight and Left	54	36.18	6.80	43	33.55	5.10
B	Abbey Rd	Left	31	17.92	4.77	28	17.55	4.33
		Right	4	43.19	0.15	4	43.19	0.15
C	New Rd (L1024)	Straight	20	7.78	2.78	23	8.01	3.26
		Right	31	26.24	4.43	46	28.72	6.96

Table 4- 21: Monkstown Ave-Link Road / Abbey Road / New Road (L1024) DS 2028 TRANSYT Analysis

As presented above, it is shown that under the Do Minimum 2028 Scenario the junction will operate within capacity during the AM and PM peak hour. Under the Do Something 2028 scenario the junction continues to operate within capacity during the AM and PM peaks and shows lower values for degrees of saturation as compared with the corresponding ratios of flow to capacity in the Do Minimum scenario.

Figure 4-28 below shows the extracted 2028 ERM traffic flows for the Do Minimum and Do Something scenarios for the Stradbrook Road / Monkstown Ave-Link Road / Abbey Road roundabout junction in the DM and signalised junction in the DS. Chapter 5 of this report assesses the junction's improvements in its capacity to convey various road users, not limited to motorists.

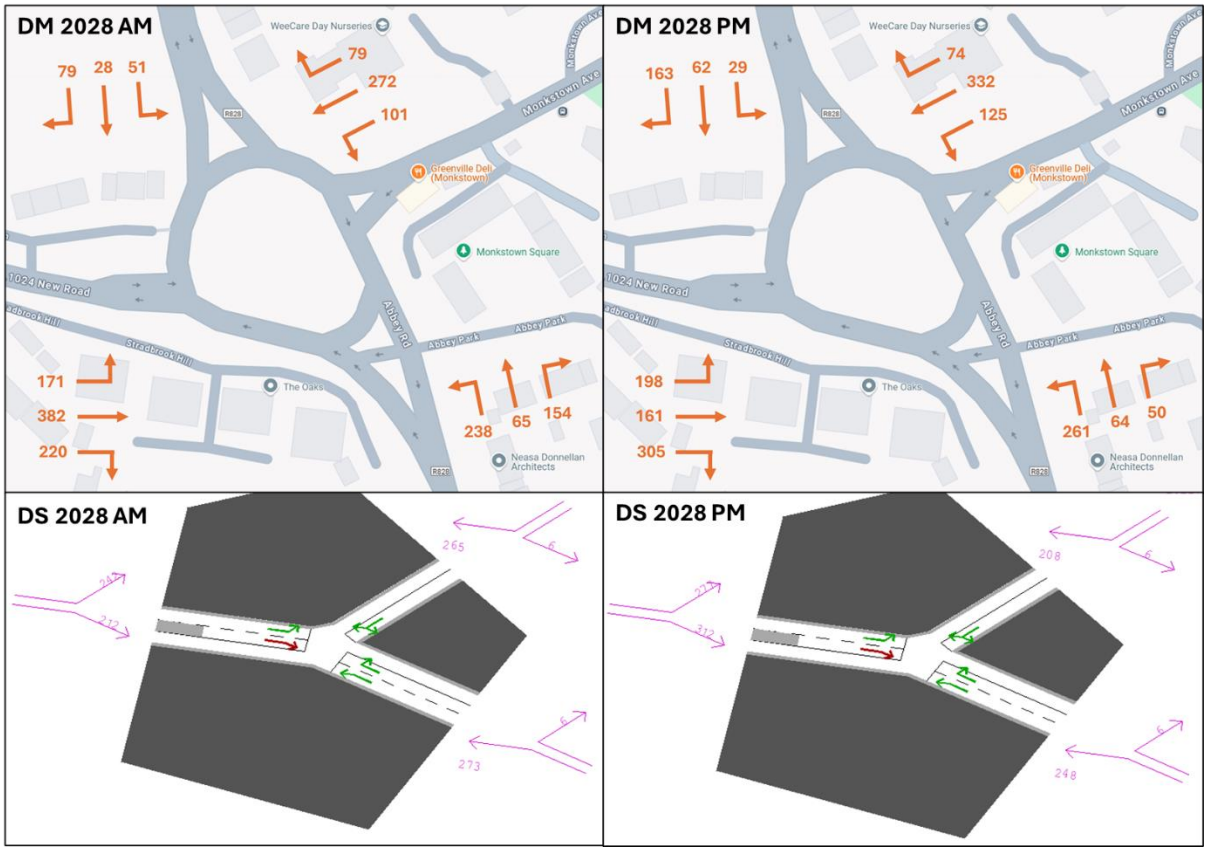

Figure 4-28: 2028 ERM Traffic Flows for Stradbrook Road / Monkstown Ave-Link Road / Abbey Road

4.12 Monkstown Avenue / Monkstown Farm / Monkstown Grove Junction

Due to its close proximity, Monkstown Farm and Monkstown Grove, both of which form a three-arm junction with Monkstown Avenue has been combined and assessed together on TRANSYT for the Year 2028 scenario. The arms were labelled as follows within TRANSYT as:

A. Monkstown Avenue (W)
B. Monkstown Farm
C. Monkstown Avenue
D. Monkstown Avenue
E. Monkstown Grove
F. Monkstown Avenue (E)

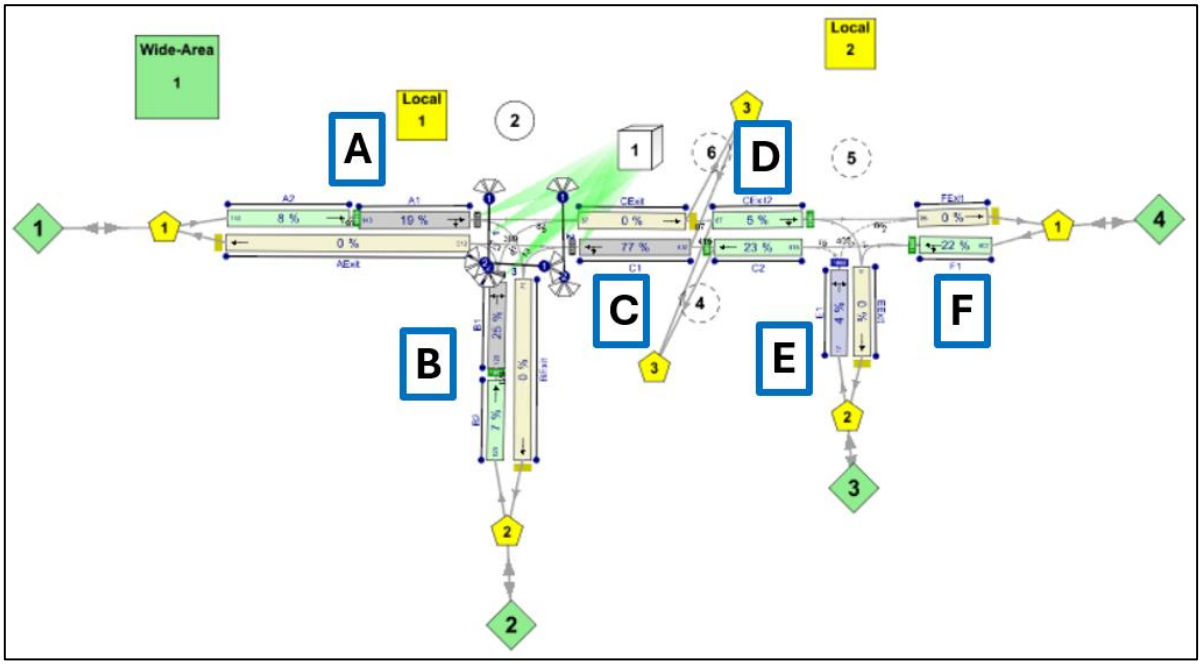

Figure 4-29: Monkstown Avenue / Monkstown Farm / Monkstown Grove DM 2028 TRANSYT Model

4.12.1 Do Something Proposals

It is proposed to alter these junctions so that the section of Monkstown Avenue between Monkstown Farm and Monkstown Grove operates as a one-lane two-way shuttle system as illustrated in **Figure 4-30** and **Figure 4-31**.

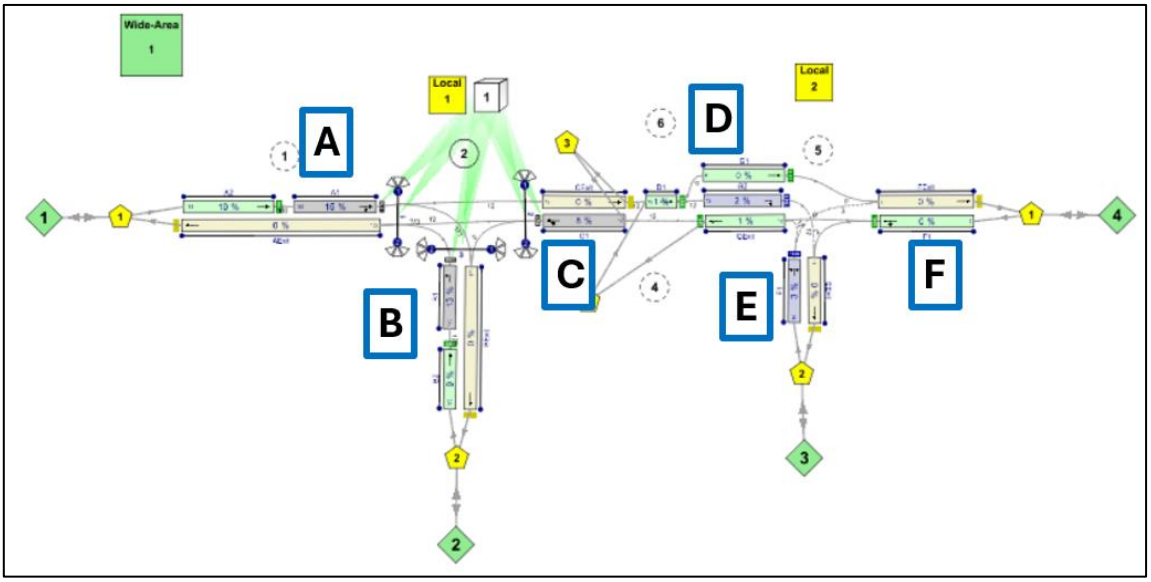

Figure 4-30: Monkstown Avenue / Monkstown Farm / Monkstown Grove DS 2028 TRANSYT Model

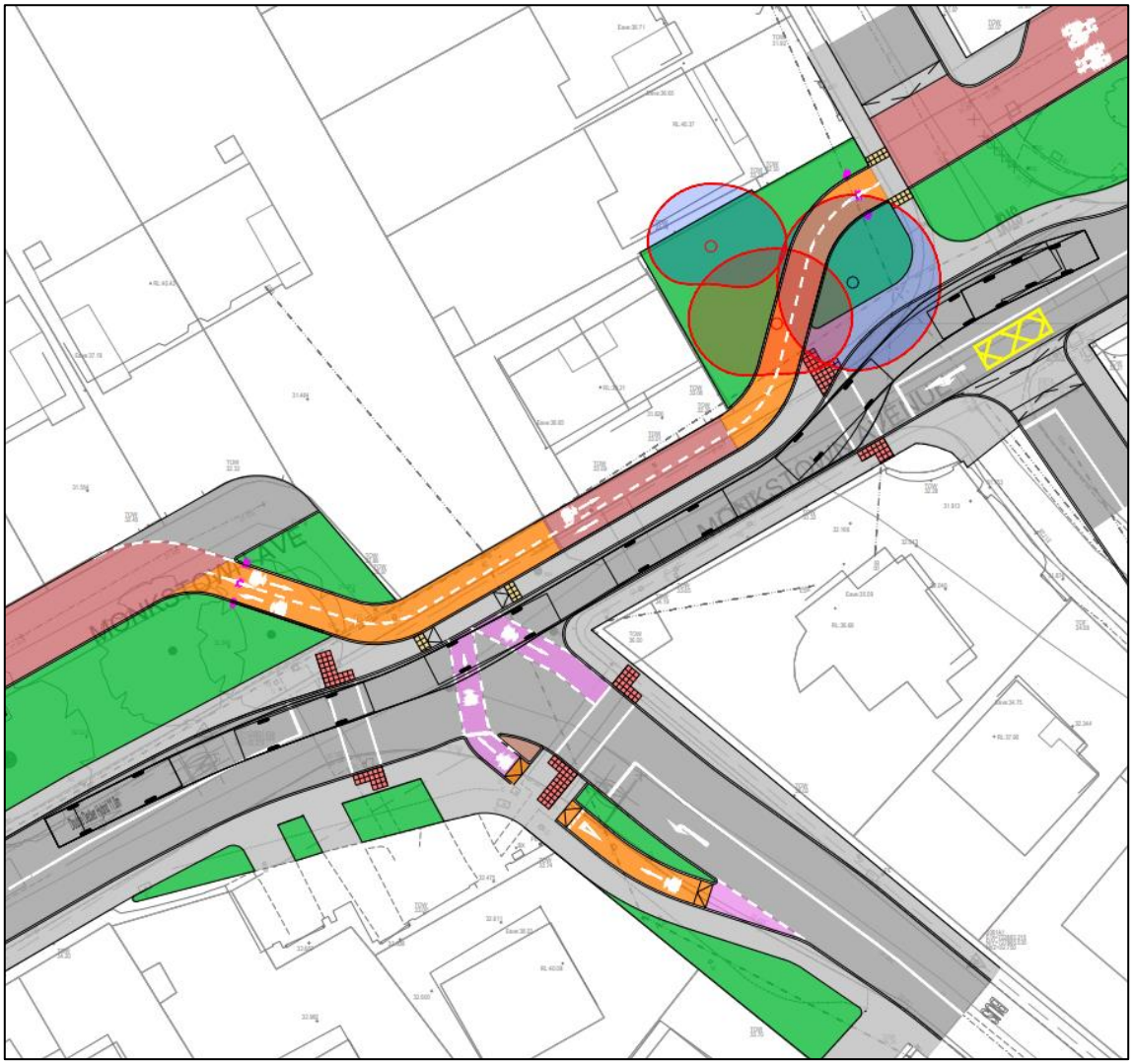

Figure 4-31: Monkstown Avenue / Monkstown Farm / Monkstown Grove DS Layout

4.12.2 Modelling Results

The TRANSYT results indicates that this junction, during the DM 2028 Scenario, operates within capacity during both the AM peak and PM peak hours. The junction experiences a maximum DoS of 54% on Monkstown Farm arm with a corresponding queue of 5.39 PCUs and a delay of 40.81 seconds during the AM peak hour. During the PM peak hour, the Monkstown Avenue arm experiences a maximum DoS of 77%, a delay of 43.63 seconds and a queue of 11.41 PCUs.

The TRANSYT results indicates that this junction, during the DS 2028 Scenario, operates within capacity during both the AM peak and PM peak hours. The junction experiences a maximum DoS of 16% on Monkstown Avenue arm with a corresponding queue of 2.43 PCUs and a delay of 6.72 seconds during the AM peak hour. During the PM peak hour, the Monkstown Avenue arm experiences a maximum DoS of 14%, a delay of 6.01 seconds and a queue of 1.84 PCUs.

Arm			AM Peak Hour			PM Peak Hour		
			DoS (%)	Delay (s)	Queue (PCUs)	DoS (%)	Delay (s)	Queue (PCUs)
A	Monkstown Avenue (W)	All	52	14.02	9.40	19	20.12	2.55
B	Monkstown Farm	All	54	40.81	5.39	25	28.27	2.74
C	Monkstown Avenue	All	39	30.56	4.55	77	43.63	11.41
D	Monkstown Avenue	All	31	0.44	0.07	5	0.05	0.00
E	Monkstown Grove	All	16	0.71	0.02	4	0.14	0.00
F	Monkstown Avenue (E)	All	22	0.27	0.03	22	0.29	0.03

Table 4- 22: Monkstown Ave / Monkstown Farm / Monkstown Grove DN 2028 TRANSYT Analysis

Arm			AM Peak Hour			PM Peak Hour		
			DoS (%)	Delay (s)	Queue (PCUs)	DoS (%)	Delay (s)	Queue (PCUs)
A	Monkstown Avenue (W)	All	16	6.72	2.43	14	6.01	1.84
B	Monkstown Farm	All	14	5.90	1.78	13	5.84	1.66
C	Monkstown Avenue	All	8	45.58	0.41	8	44.44	0.38
D	Monkstown Avenue	Straight	0	0.00	0.00	0	0.00	0.00
		Right	2	0.07	0.02	2	0.07	0.02
E	Monkstown Grove	All	7	0.28	0.00	3	0.10	0.00
F	Monkstown Avenue (E)	All	1	0.01	0.00	0	0.00	0.00

Table 4- 23: Monkstown Ave / Monkstown Farm / Monkstown Grove DS 2028 TRANSYT Analysis

As presented above, it is shown that under the Do Minimum 2028 Scenario the junction will operate within capacity during the AM and PM peak hour. Under the Do Something 2028 scenario the junction performance improves with reduced delays and queues and therefore operates well within capacity during both the AM and PM peaks.

4.13 Monkstown Avenue / Carrickbrennan Road / Mounttown Road Upper / Castle Park Roundabout

This existing four-arm roundabout has been analysed in ARCADY for the Opening Year (2028) scenario. The arms were labelled as follows within the ARCADY model as:

1. Mounttown Road Upper
2. Castle Park
3. Monkstown Avenue
4. Carrickbrennan Road

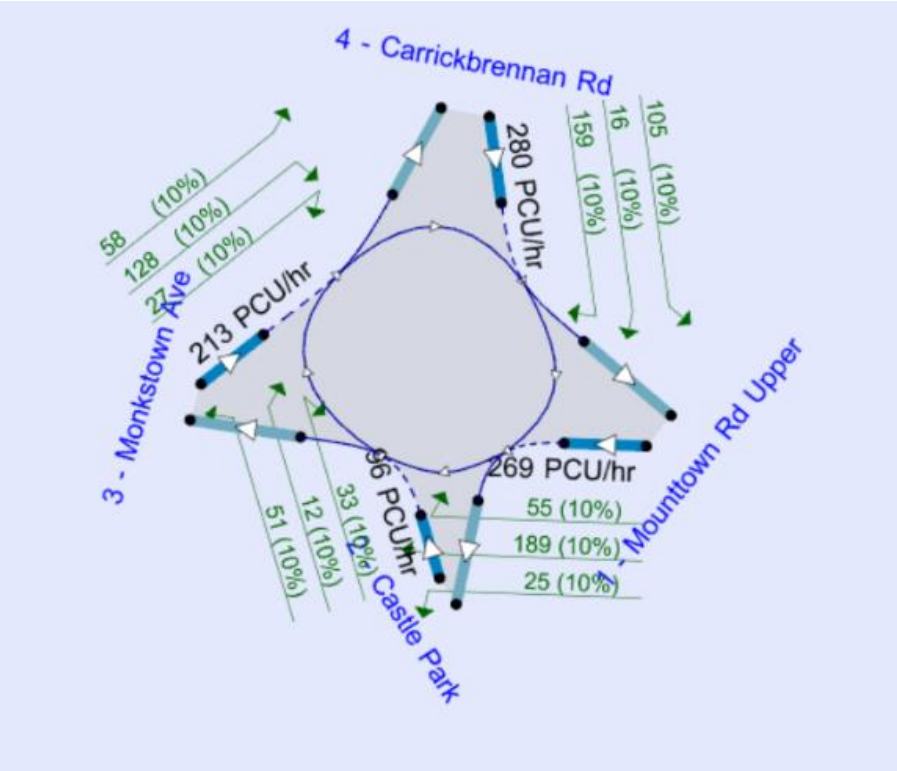

Figure 4-32: Monkstown Avenue / Mounttown Road Upper DM 2028 ARCADY Model

It is proposed to alter this junction to a three arm signalised junction with segregated cycle lanes through the junction and controlled pedestrian crossings. Therefore, the proposed junction layout was labelled as follows in TRANSYT:

1. Mounttown Road Upper
2. Monkstown Avenue
3. Carrickbrennan Road

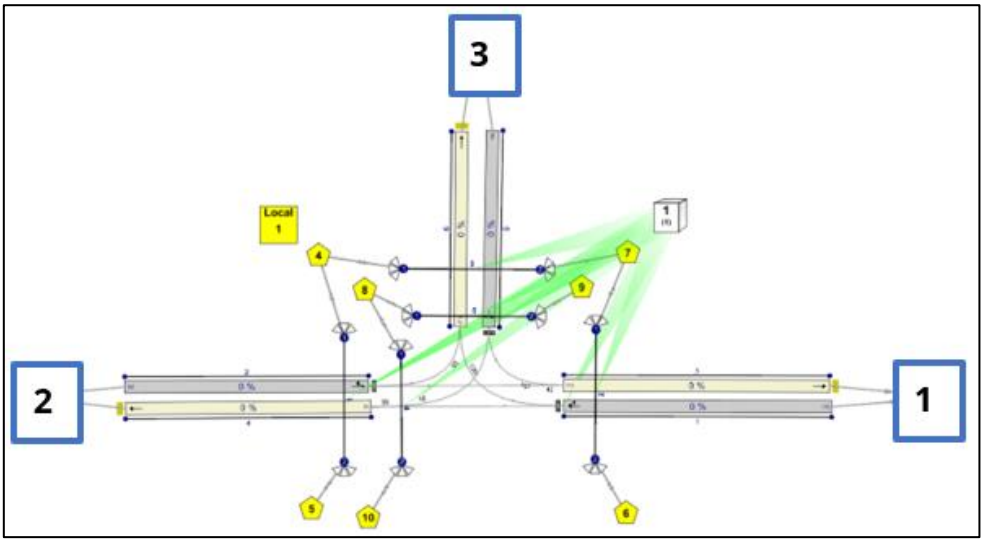

Figure 4-33: Monkstown Avenue / Mounttown Road Upper DS 2028 TRANSYT Model

4.13.1 Do Something Proposals

The existing Monkstown Avenue roundabout has been redesigned for the Do Something scenario as a three-arm protected signalised junction with the existing Castle Park arm realigned to join the access road which then directly connects to Monkstown Avenue. Controlled pedestrian crossings will be provided over each arm, all of which are 6m in length. There are cycle crossings across two of the three junction arms, with the remainder of the cyclist movements protected by a number of traffic islands.

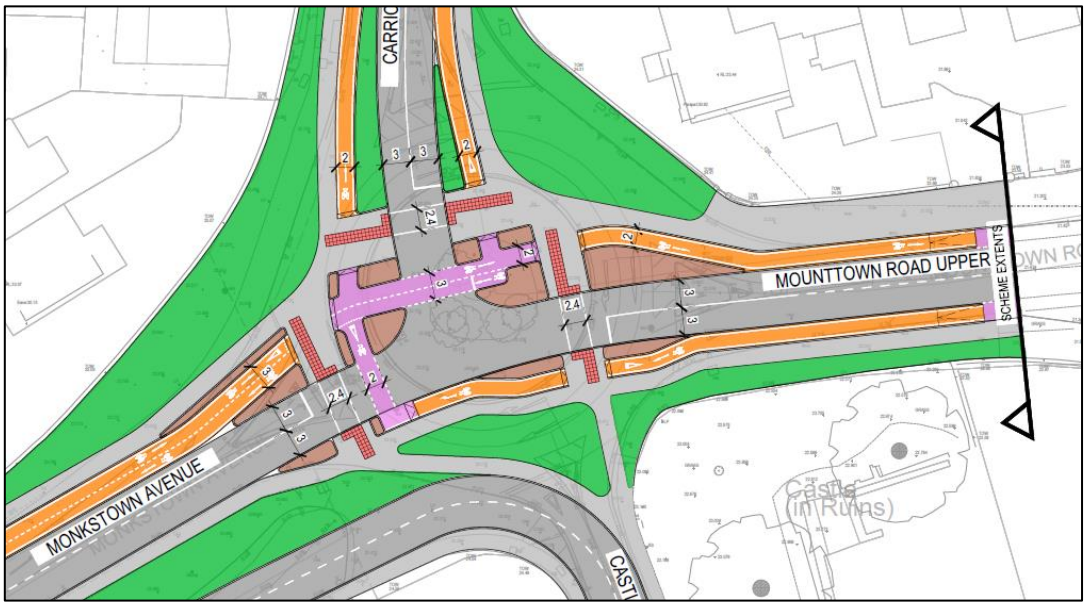

Figure 4-34: Monkstown Avenue / Mounttown Road Upper DS Layout

4.13.2 Modelling Results

The ARCADY results indicates that this junction operates within capacity during the DM 2028 Scenario. The junction experiences a maximum RFC value of 0.47 on Monkstown Avenue (western arm) with a corresponding queue of 1.0 PCUs and a delay of 6.26 seconds during the AM peak hour. During the PM peak hour, Mounttown Road Upper experiences a maximum RFC of 0.23 with a delay of 4.11 seconds and a queue of 0.3 PCUs.

The TRANSYT results indicates that this junction, during the DS 2028 Scenario, operates within capacity during both the AM peak and PM peak hours. The junction experiences a maximum DoS of 35% on Monkstown Avenue arm with a corresponding queue of 3.21 PCUs and a delay of 36.94 seconds during the AM peak hour. During the PM peak hour, the Carrickbrennan Road arm experiences a maximum DoS of 36%, a delay of 31.54 seconds and a queue of 4.17 PCUs.

Arm		AM Peak Hour			PM Peak Hour		
		Queue (PCUs)	Delay (s)	RFC	Queue (PCUs)	Delay (s)	RFC
1	Mounttown Rd Upper	0.2	3.59	0.17	0.3	4.11	0.23
2	Castle Park	0.2	6.27	0.17	0.2	6.88	0.16
3	Monkstown Ave	1.0	6.26	0.47	0.3	3.98	0.19
4	Carrickbrennan Rd	0.2	3.69	0.14	0.3	3.62	0.22

Table 4- 24: Monkstown Avenue / Mounttown Road Upper DM 2028 ARCADY Analysis

Arm			AM Peak Hour			PM Peak Hour		
			DoS (%)	Delay (s)	Queue (PCUs)	DoS (%)	Delay (s)	Queue (PCUs)
1	Mounttown Rd Upper	Straight and Right	33	31.77	3.70	17	23.09	2.24
2	Monkstown Ave	Straight and Left	35	36.94	3.21	29	48.26	1.24
3	Carrickbrennan Rd	Left and Right	32	33.22	3.38	36	31.54	4.17

Table 4- 25: Monkstown Avenue / Mounttown Road Upper DS 2028 TRANSYT Analysis

As presented above, it is shown that under the Do Minimum 2028 Scenario the junction will operate within capacity during the AM and PM peak hour. Under the Do Something 2028 scenario the junction continues to operate within capacity during the AM and PM peaks.

5 People Movement

The preceding chapter presents an assessment of the scheme's junctions in the Do Nothing and Do Something scenarios relating to capacity parameters for vehicle flow. In order to present a robust assessment with consideration to pedestrians and cyclists at the top of the modal hierarchy, as informed by the Department of Transports National Investment Framework for Transport in Ireland (NIFTI), an assessment of the movement of people has been undertaken for the junctions which have the most significant impacts.

The following junctions have been assessed:

- Stillorgan Park Road / Carysfort Avenue / Fleurville Signalised Junction
- Annaville Terrace / Newtownpark Avenue / Rowanbyrn Signalised Junction
- Stradbrook Road / Monkstown Avenue / Abbey Road / Monkstown Link Road Roundabout

5.1 Methodology

Two scenarios were considered within this assessment:

- **2021 Do Nothing**: Data for the baseline scenario was retrieved from pedestrian and traffic count surveys including cyclist numbers and junction turning count surveys conducted in 2021;
- **2028 Do Something**: Data for the future year scenario was retrieved from the NTA's ERM for pedestrians, cyclists, public transport users and the vehicle flows.

Data assessed for both scenarios was the total throughput of the junction for each user type, as such only flows entering the junction through each approach arm were considered. For the pedestrians (**PED**), cyclists (**CYC**) and public transport (**PT**) users the throughput is shown as individual users. For the vehicle flows (**VEH**), the throughput is shown as passenger car units (PCUs).

The number of public transport users in the 2021 Do Nothing scenario has not been represented as this data was not collected for the 2021 surveys.

The AM peak hour was considered to be 08:00 – 09:00 and the PM peak hour as 17:00 – 18:00 in accordance with the ERM.

5.2 Results

Table 5-1 and **Table 5-2** below show the comparison of the movement of people for the AM and PM peak hour for each of the junctions assessed.

Junction	2021 Surveys			2028 ERM			
	PED	CYC	VEH	PED	CYC	PT	VEH
Stillorgan Park / Carysfort	232	84	1198	438	242	652	1839
Annaville Terrace / Newtownpark	324	186	1505	241	211	812	1912
Stradbrook Road / Monkstown Avenue	444	201	1904	306	165	740	1004

Table 5-1: AM Peak Hour – Throughput per Junction

Junction	2021 Surveys			2028 ERM			
	PED	CYC	VEH	PED	CYC	PT	VEH
Stillorgan Park / Carysfort	109	40	1023	284	254	528	2017
Annaville Terrace / Newtownpark	140	86	1502	160	188	618	1916
Stradbrook Road / Monkstown Avenue	120	84	1762	229	182	541	1057

Table 5-2: PM Peak Hour – Throughput per Junction

It may be worthwhile to note that the 2021 traffic surveys were conducted on September 8th 2021. The after effects of the covid-19 pandemic on travel trends as well as the time period the surveys were undertaken may be indicative of the low number of cyclists recorded in the baseline scenario.

For both the AM and PM peak hours, the Stradbrook Road / Monkstown Avenue junction, transformed into a 3-arm junction in the 2028 DS, sees vehicle flow reductions of over 40%, facilitating necessary active travel infrastructure whilst reducing congestion along the route. This allows the increase in the active travel mode share in the PM peak hour with a 91% increase in pedestrian flows through the junction and 117% increase in cyclist flows.

Reductions in pedestrian flows observed in the tables above may be attributable to a modal shift to cycling as a result of the large step change between the infrastructure in the 2021 DN scenario and the 2028 DS scenario, leading to a greater uptake of cycling in the local area as a result of both the subject scheme and the development of the surrounding network facilitating the mode as a more attractive and faster mode choice than walking.

Table 5-3 below shows the proportions of those travelling sustainably (on foot, cycling and via public transport) and via private vehicle in the AM and PM scenarios for both the 2021 and 2028 scenarios. It can be observed that an increase in the proportions of those travelling sustainably occurs for the 2028 DS scenarios. This is attributable to the improvements in the active travel infrastructure leading more users to choose sustainable modes in lieu of travelling by car.

Junction	2021 Modal Split				2028 Modal Split			
	Sustainable		Motorists		Sustainable		Motorists	
	AM	PM	AM	PM	AM	PM	AM	PM
Stillorgan Park / Carysfort	21%	13%	79%	87%	42%	35%	58%	65%
Annaville Terrace / Newtownpark	25%	13%	75%	87%	40%	34%	60%	66%
Stradbrook Road / Monkstown Avenue	25%	10%	75%	90%	55%	47%	45%	53%

Table 5-3: Sustainable Modes to Private Vehicle Proportions for 2021 DN and 2028 DS

5.3 Conclusion

As showcased by the results within this chapter, between the 2021 DN and 2028 DS, a significant increase is observed in the number of active travel users at each of the junctions assessed. The improvements in the active travel infrastructure can be seen to affect a modal shift towards sustainable modes, lessening the vehicular demand at each of the junctions.

As such the modelling results presented in Chapter 4 of this report can be reframed in this context, the DLR scheme's proposals will result in improved vehicular capacity for most junctions whilst also providing pedestrians and cyclists with attractive, direct and accessible infrastructure capable of influencing more users to adopt alternative mode choices to private vehicles.

6 Conclusions

A comprehensive traffic modelling assessment has been undertaken for the key junctions proposed to be altered and upgraded as part of the DLR Connector Active Travel Scheme. The assessment has been undertaken for the future year 2028, which will be the Opening Year of the scheme. The results have compared the Do Minimum and Do Something scenarios for the AM and PM peak hours in the Opening Year (2028) for the assessed junctions along the route.

A summary of the results for each of the junctions is as follows:

1. **Barton Road East / Nutgrove Way / Broadford Road Roundabout**
   With the implementation of the proposed scheme changes, the delays increase during the AM peak hour, specifically on the southern arm (Stonemasons Way) which operated above capacity during the AM peak. All other arms operate within capacity in the AM and PM peak hours.

2. **Barton Road East / Beaumont Avenue Signalised Junction**
   With the implementation of the proposed scheme changes, whilst the delays increase slightly compared to the existing DM 2028 scenario, the junction still continues to operate within capacity.

3. **Barton Road East / Ballinteer Road Roundabout**
   With the implementation of the proposed scheme changes, delays on some of the arms increase slightly but overall the junction continues to operate well within capacity during booth the AM and PM peak hours.

4. **Main Street / Kilmacud Road Upper / Sandyford Road / Ballinteer Road Junction**
   Under the DM Scenario, the junction is shown to operate over capacity in both the AM and PM peak hours. With the implementation of the changes as per the Interim Option, the junction operates well within capacity and similarly for the Preferred Option, the junction will operate well within capacity for both the AM and PM peak hours.

5. **Kilmacud Road Upper / Overend Avenue / Birches Lane Signalised Junction**
   Under the DM scenario the junction is shown to be approaching capacity during the PM peak hour. However, with the implementation of the proposed scheme changes the junction operates well within capacity for both the AM and PM peak hours.

6. **Stillorgan Park Road / Carysfort Avenue / Fleurville Signalised Junction**

Under the DM scenario the junction is shown to exceed capacity during both the AM and PM peak hours. With the implementation of the proposed scheme changes the junction will deteriorate and continue to operate over capacity for both the AM and PM peak hours, although the maximum recorded Degree of Saturation (DoS) for the PM is lower in the Do Something scenario compared to the Do Minimum.

7. **Annaville Terrace / Newtownpark Avenue / Rowanbyrn Signalised Junction**
   Under the DM 2028 Scenario, the junction will significantly exceed capacity during the AM and PM peak hours. With the implementation of the proposed scheme changes delays decrease significantly and overall performance of the junction improves compared to the Do Minimum scenario. However, the junction will continue to operate over capacity during the AM and PM peaks.

8. **Brookville Park / Deansgrange Road / Monkstown Link Road Signalised Junction**
   Under the DM 2028 scenario the junction will exceed capacity during both the AM and PM peak hours. However, with the implementation of the proposed scheme changes, the junction performance improves with all arms operating within capacity during both the AM and PM peak hours.

9. **Stradbrook Road / Monkstown Avenue / Abbey Road / Monkstown Link Road Rdbt**
   With the implementation of the proposed scheme changes, the junction will operate within capacity during the AM and PM peak hours with lower Degrees of Saturation (DoS) compared to the corresponding Ratios of Flow to Capacity (RFC) under the Do Minimum scenario.

10. **Monkstown Avenue / Monkstown Farm / Monkstown Grove Signalised Junction**
    With the implementation of the proposed scheme changes the junction performance improves compared to the Do Minimum scenario, with reduced delays and queues and operates well within capacity during both the AM and PM peaks.

11. **Monkstown Ave / Carrickbrennan Road / Mounttown Road Upper / Castle Park Rdbt**
    With the implementation of the proposed scheme changes, the junction will continue to operate well within capacity during both the AM and PM peak hours.

Consequently, the results indicate that the vast majority of the junctions (8 out of 11junctions) will operate within capacity and / or see delays and queues reduced as a result of the proposed changes compared to the Do Minimum Scenarios.

The Barton Road East / Nutgrove Way / Broadford Road roundabout will experience delays on the southern arm as a result of the scheme during the AM peak, but this will be for a short period and all other arms will operate within capacity.

The remaining two junctions, Stillorgan Park Road / Carysfort Avenue / Fleurville and the Annaville Terrace / Newtownpark Avenue / Rowanbyrn signalised junctions will operate over capacity, however it is noted that even without the proposed scheme changes these junctions would be operating over capacity in the Do Minimum 2028 scenario.

Considering both capacity performance and queuing, though for some junctions the DN scenarios present acceptable values for capacity and queuing, they lack pedestrian and cyclist facilities which poses safety and accessibility concerns. The proposed junction upgrades will provide comparable and in most cases better performance in terms of traffic capacity but will greatly enhance facilities for pedestrians and cyclists at the junctions whilst the proposed traffic signal form of control will offer significantly improved traffic management capabilities to adapt and control any congestion that may arise at particular peak periods.

With the implementation of the DLR Connector Scheme, the traffic capacity along the route will be reallocated for the active modes, and this will be followed by a reduction of traffic demand. This scheme also offers more adaptability of signals in terms of traffic management at the junctions and also at a network level. This will be of significant benefit as traffic patterns change with future development and travel behaviour shifts in the future.

To present a robust assessment, the results only outline peak hour time conditions in the AM and PM periods as worse-case scenarios for a balanced and functional multi-modal operation which will cater for traffic, active mode and bus movements. During off-peak times the junctions are anticipated to operate with improved capacity to that presented within the report and will cater for all traffic movements comfortably and with reserve capacity.

Therefore, the results suggest that the proposed interventions offer a number of benefits to the network over both the existing conditions and the Do Minimum baseline which will benefit motorists as well as the pedestrians and cyclists for whom the active travel enhancements as a result of the DLR Connector will affect significant change.

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