Project

Ballyoulster SHD - Phase 1 Residential Development
Celbridge, Co. Kildare

Report Title

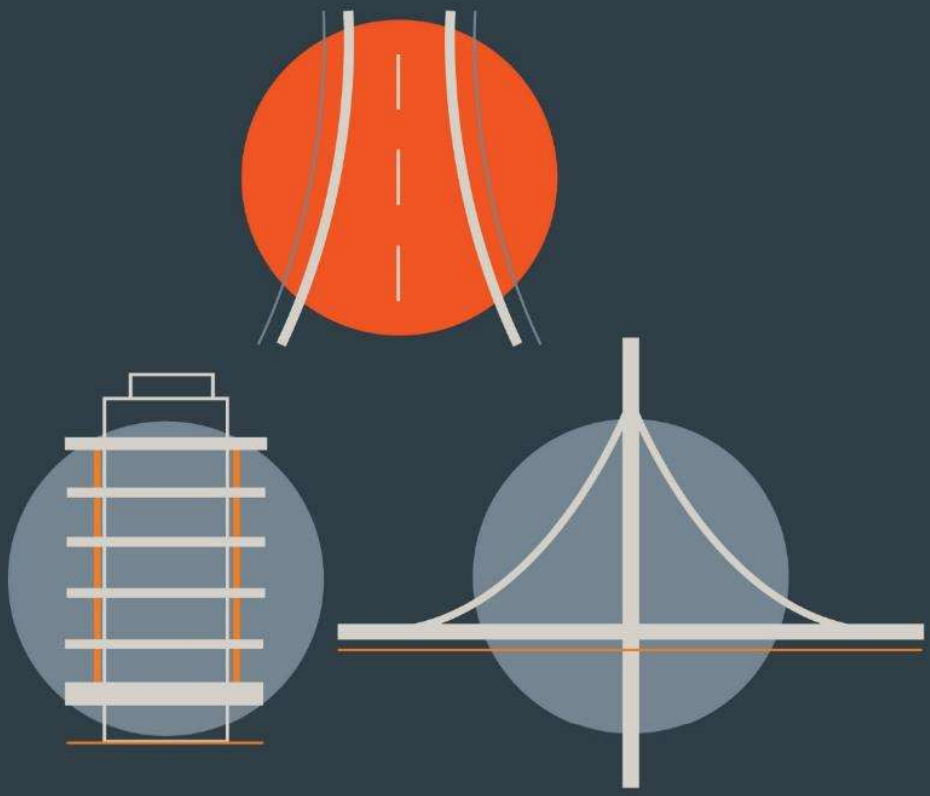
TRAFFIC AND TRANSPORT ASSESSMENT

Client

Kieran Curtin, Receiver over certain assets

of Maplewood Developments Unlimited Company (in liquidation and in receivership)

TRANSPORTATION



DBFL CONSULTING ENGINEERS

June 2022

Document Control

Job Title: Ballyoulster Phase 1 Residential Development Celbridge, Co. Kildare

Job Number: p180221

Report Ref: 180221-DBFL-TR-XX-RP-0003

Author: Daniel Gill

Reviewed by: Mark McKenna

Date: June 2022

Distribution: Clients Design Team
DBFL Consulting Engineers
Ab Bord Pleanála

Revision	Issue Date	Description	Prepared	Reviewed	Approved
-	13/10/2021	Design Team Review	DG	MMK	-
1	26/10/2021	Stage 2 Planning Draft	DG	MMK	-
2	29/10/2021	Stage 2 Planning Review	DG	MMK	TJ
3	11/11/2021	Stage 2 Planning	DG	MMK	TJ
4	26/05/2022	Stage 3 Draft	DG	MMK	-
5	09/06/2022	Stage 3 Planning Draft	DG	MMK	TJ
6	13/06/2022	Stage 3 Final	DG	MMK	TJ

DBFL Consulting Engineers

Dublin Office
Ormond House
Ormond Quay
Dublin 7 D07 W704
Tel: 01 4004000
Email: info@dbfl.ie
Web: www.dbfl.ie

Waterford Office
Suite 8b The Atrium
Maritana Gate
Canada Street X91 W028
Tel: 051 309500
Email: info@dbfl.ie
Web: www.dbfl.ie

Cork Office
14 South Mall
Cork
T12 CT91
Tel: 021 2024538
Email: info@dbfl.ie
Web: www.dbfl.ie

CONTENTS

APPENDICES

1.0 INTRODUCTION

1.1 BACKGROUND

1.1.1 The proposed development will consist of the construction of 344 no. residential units (comprising 214 no. apartments / duplex units and 130 no. houses), a childcare facility, communal and public open space, landscaping, car and cycle parking spaces, a local distributor road from Dublin Road and Shinkeen Road, including provision of vehicular accesses, associated internal roads, pedestrian and cycle paths, bin storage, public lighting, ESB substations, pumping station and all associated site and infrastructural works.

1.1.2 The subject lands are located on lands at Dublin Road and the Shinkeen Road, within the townlands of Donaghcumper and Ballyoulster, Celbridge, Co. Kildare. The application site is bound by a greenfield site, Donaghcumper Cemetery and the Dublin Road to the north, the Rye River Brewing Company and the Ballyoulster Park housing estate to the north east, the Primrose Gate housing estate to the south, agricultural lands to the east and Shinkeen Road to the west.

1.2 SCOPE

1.2.1 The purpose of this TTA is to quantify the existing transport environment and to detail the results of assessment work undertaken to identify the potential level of transport impact generated as a result of the proposed residential development.

1.2.2 The scope of the assessment covers transport and sustainability issues including access, pedestrian, cyclist and public transport connections. Recommendations contained within this report are based on existing and proposed road layout plans, site visits, on site traffic observations and junction vehicle turning count data.

1.2.3 This TTA has been prepared in reference to the requirements of the TII "*Traffic and Transportation Assessment Guidelines*". Reference has also been made to the "*Celbridge Local Area Plan (LAP) (2017-2023)*" and the "*Kildare County Development Plan 2017 – 2023*".

1.3 METHODOLOGY

1.3.1 DBFL's 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) Transport Infrastructure Ireland;
- *'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 (1994);
- TII Project Appraisal Guidelines (PAG) (2016);
- *Sustainable Urban Housing: Design Standards for New Apartments Guidelines For Planning Authorities*, as published by the Department of Housing, Planning and Local Government (DHPLG – December 2020)
- *Kildare County Council Development Plan 2017 – 2023; and*
- *Celbridge Local Area Plan (LAP) (2017-2023).*

1.3.2 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.

- **Traffic Counts**: Junction traffic counts were undertaken and analysed with the objective of establishing local traffic characteristics in the immediate area of the proposed development.

- **Trip Generation**: A trip generation exercise has been carried out to establish the potential level of vehicle trips generated by the proposed residential development.

- **Trip Distribution:** Based upon both the existing traffic characteristics and the network layout in addition to the spatial / land use configuration

and density of the urban structure across the catchments area of the development, a distribution exercise has been undertaken to assign site generated vehicle trips across the local road network.

- **Network Impact:** The impact as a result of the predicted traffic generated by the subject development proposals has been quantified at key off-site junctions across the local road network.

- **Network Analysis:** Further to quantifying the predicted impact of vehicle movements across the local road network for the adopted optimum site access strategy, more detailed computer simulations have been undertaken to assess the operational performance of key junctions in the post development 2024, 2029 and 2039 development scenarios.

- **Sensitivity Analysis:** Detailed computer simulations have been undertaken to assess the operational performance of key junctions for 2 no. Sensitivity Analysis scenarios which incorporate future development on the wider KDA2 lands.

1.4 REPORT STRUCTURE

1.4.1 As introduced above, this TTA seeks to clarify the potential level of influence generated by the proposed development upon the local road network and subsequently ascertain the existing and future operational performance of the local transport system. The structure of the report responds to the various stages of this exercise including the key tasks summarised below.

1.4.2 **Section 2** of this report describes the existing conditions at the proposed development location and surrounding area.

1.4.3 The relevant transportation policies that influence the design and appraisal of the subject development proposals are highlighted within **Section 3.**

1.4.4 **Section 4** provides a summary of the development's proposals, describing the nature of the development, future transport proposals and their impacts on the development.

1.4.5 **Section 5** outlines the trip generation and distribution exercises carried out and the adopted methodology for applying growth factors to establish a baseline for the design year network traffic flows.

1.4.6 The potential traffic and public transport impact of the proposals assessed and summarised within **Section 6**.

1.4.7 **Section 7** provides a summary of the junction assessment undertaken in the 2024 Opening Year, and 2029 & 2039 Future Design Year scenarios.

1.4.8 Two sensitivity analyses have been undertaken and summarised in **Section 8**. The sensitivity analysis considers the potential traffic impact in the scenario that the entire KDA2 lands are developed.

1.4.9 **Section 9** provides a summary of consultations between the design team and KCC Roads and Sustainable Transport departments.

1.4.10 The main conclusions and recommendations derived from the analysis are summarised in **Section 10**.

2.0 RECEIVING ENVIRONMENT

2.1 LAND USE AND LOCATION

2.1.1 The subject Phase 1 site is located on a greenfield site that has an approximate application site area of c.13.4 hectares. The development site is located in the Ballyoulster area of Celbridge and is approx. 1.3km east of Celbridge Town Centre. The subject KDA2 lands are zoned "C: New Residential plus part of the secondary link street and creche is on lands zoned "*E: Community and Educational".* The subject site is bounded to the north by, development lands zoned "*E: Community and Educational"*, Donaghcumper Cemetery and Dublin Road (R403), residential units in Primrose Gate to the south, Rye River Brewing Co. and Ballyoulster Park to the east and Shinkeen Road to the west.

2.1.2 The site is located approx. 5.5km west of Lucan, approx. 14.8km north-west of Citywest and 20km away from Dublin City Centre. Nearby towns such as Leixlip is located to the north-east (approx. 5.2km), Maynooth to the north-west (approx. 8km) and Naas to the south-west (approx. 21km). The majority of suburbs in west Dublin (Ballyfermot, Blanchardstown, Citywest and Lucan) can be accessed within 20 minutes by a car. The general location of the subject site in relation to the surrounding towns is illustrated in **Figure 2.1** below whilst **Figure 2.2** indicatively shows the extent of the subject site boundary and neighbouring lands.

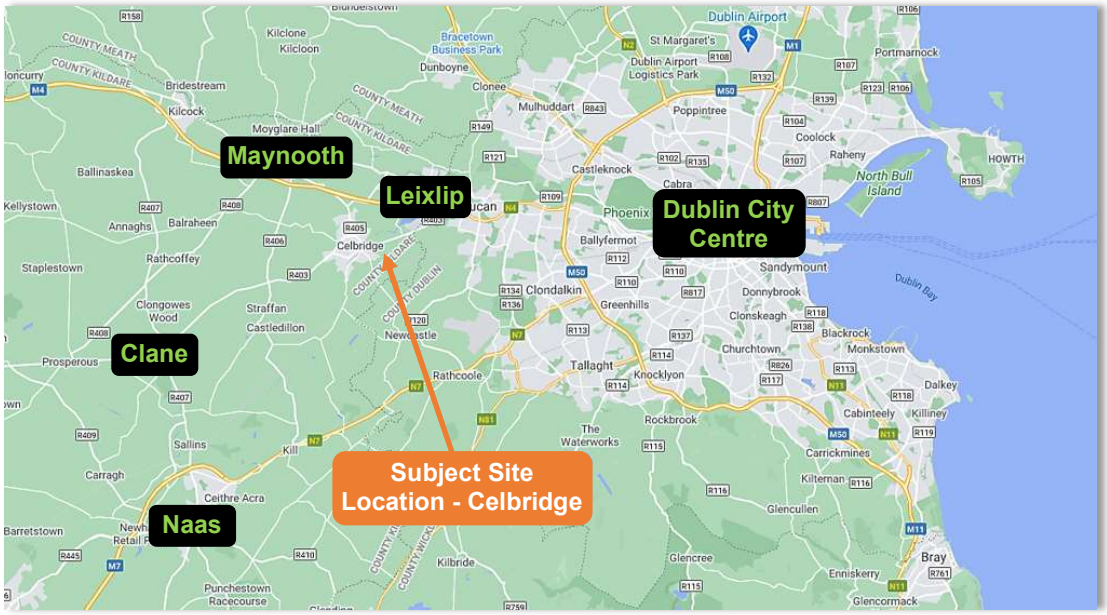


Figure 2.1: Site Location

Figure 2.2: Subject Site Indicative Boundary

2.2 EXISTING TRANSPORTATION INFRASTRUCTURE

Road Network

2.2.1 The subject site is located to the south of Dublin Road (R403) and east of Shinkeen Road. Travelling eastwards on the R403, provides links to Leixlip via the R404. The R403 terminates at the R148 / M4 (Junction 5) approx. 4.1km to north-east. The M4 Junction 5 Interchange located close by provides convenient access to the strategic M4/N4 road network which subsequently provides vehicular connectivity to locations including Dublin to the east and Maynooth, Kilcock and Enfield in the west.

2.2.2 Travelling westward from the subject site on the R403, leads to Celbridge Town Centre joining the R405 at the Liffey Bridge which leads to Celbridge Main Street. At Main Street, the road separates into the R403 which provides access towards Clane to the west and the R405 which gives access to the M4 Business Park to the North and Maynooth to the northeast.

2.2.3 Travelling in a southwards direction on Shinkeen Road, provides access to the R405 corridor which provides further connections to Hazelhatch and Celbridge Train Station, Newcastle and Rathcoole (via the R120).

2.2.4 **Figure 2.3** below illustrates the existing road network in the vicinity of the subject site.

Figure 2.3: Existing Road Network

Existing Cycling and Pedestrian Facilities

2.2.5 Pedestrians can benefit from a continuous footway on the northern side of Dublin Road (R403) along the frontage of the subject site. Footways are intermittent on the southern side of this road with facilities being provided on approach to the Dublin Road / Shinkeen Road signalised junction and along the frontage of Rye River Brewing Company. The Dublin Road / Shinkeen Road junction benefits from controlled pedestrian crossings on all arms with appropriate tactile paving. Street lighting is provided on the southern side of the road and a signal controlled pedestrian crossing is available in the vicinity of Ballyoulster Park to the north east providing a controlled crossing point for access to / from bus stops located here. Vehicular traffic travelling along the section of the R403 Dublin Road in the vicinity of the subject site is restricted to 50kph speed limit.

2.2.6 Shinkeen Road currently benefits from good quality pedestrian and cyclists facilities. Segregated footways which are separated from vehicular traffic by grass verges and on-road mandatory cycle lanes are provided on both sides of the corridor (Ref. **Figure 2.4**). Public lighting is provided on western side and a dedicated signal controlled pedestrian crossing is in place in the vicinity of the Primrose Gate entrance.

2.2.7 The southern section of the R405 (from the Shinkeen Road junction) provides a cycle track and footway (segregated by way of surface and road markings) on the

western side of the R405 road corridor for approximately 800m to Celbridge & District Tennis Club. From this location, a shared cycle / pedestrian facility is available as far south as the non-vehicular access to Hazelhatch and Celbridge Train Station.

Figure 2.4: Pedestrian / Cyclist Facilities on Shinkeen Road

2.2.8 The R403 / R405 / Newtown Road junction (the eastern side of Liffey Bridge) provides footways and benefits from zebra crossings accompanied by Belisha beacons on three of the four arms. Liffey Bridge contains a narrow footway which is provided on the northern side of the bridge. Nevertheless, a pedestrian bridge over the River Liffey (approx. 46m in length) connects Newtown Rd and English Row (R403). This crossing is located adjacent Liffey Bridge and benefits from public lighting.

Figure 2.5: R403 / R405 / Newtown Road Junction (Source: Google Maps)

2.2.9 Pedestrian facilities continue on Main Street (R405) and English Row (R403) with

footways being provided on both sides. A zebra crossing is provided on English Row and benefits from tactile paving and Belisha beacons. Main Street also benefits from footways and street lighting on both sides of the street.

2.2.10 A summary of the extents of the existing cycle and pedestrian infrastructure on the local road network is summarised in **Figure 2.6** below. This figure reveals that continuous pedestrian facilities are available between the subject site access locations and Celbridge Town Centre. Cycle facilities are available along the full extents of Shinkeen Road and along the Dublin Road corridor between the Shinkeen Road junction and the Supervalu access. In addition pedestrian and cycle facilities are available between the subject site access and Hazelhatch & Celbridge Train Station.

Figure 2.6: Existing Pedestrian & Cycle Facilities

Public Transport - Bus

2.2.11 The first two phases of the Bus Connects Network Redesign have commenced. Included within Phase two are Dublin Bus Services C4, C6, X27, X28, L58 and L59 which operate within Celbridge replacing the previous Dublin Bus Services 67, 67x and 67n with two additional 'Local' Routes L58 and L58 which provide convenient bus connections to Rail services available at the Hazelhatch & Celbridge Train

Station.

2.2.12 The C4 bus service operates between Ringsend and Maynooth with a 30 minute frequency whilst the X27 and X28 offer express services between Celbridge and UCD (Belfield) every 15-20 minutes during peak times.

2.2.13 The C6 Route provides a nightly service between Maynooth and Ringsend operating between midnight and approx. 05:00.

2.2.14 The Go-Ahead Commuter Route 120 is accessible on English Row in Celbridge Town Centre and operates between Connolly Station and Edenderry.

2.2.15 **Table 2.1** below summarises the number of aforementioned services which are available within the local area and **Figure 2.7** illustrates the bus stops around the subject site.

Bus Service	Route No.	Route (Two-Way)	Mon - Fri	Sat	Sun
Dublin Bus	C4	Ringsend to Maynooth	36	35	34
		Maynooth to Ringsend	37	36	34
	L58	Louisa Valley to Hazelhatch Station (via Castletown)	37	32	29
		Hazelhatch Station to Louisa Valley (via Castletown)	36	32	29
	L59	Louisa Valley to Hazelhatch Station (via Glen Easton)	36	32	29
		Hazelhatch Station to Louisa Valley (via Glen Easton)	35	32	29
	X27	UCD (Belfield) to Celbridge (Salesian College)	5[2]	-	-
		Celbridge (Salesian College) to UCD (Belfield)	6[1]	-	-
	X28	UCD (Belfield) to Celbridge (Salesian College)	5[2]	-	-
		Celbridge (Salesian College) to UCD (Belfield)	5[1]	-	-
Go-Ahead	120	Connolly Station to Edenderry	31	24	13
		Edenderry to Connolly Station	31	25	13

[1] Operates in the AM period only
[2] Operates in the PM period only

Table 2.1: Bus Services – Number of Services (Source: Transport for Ireland)

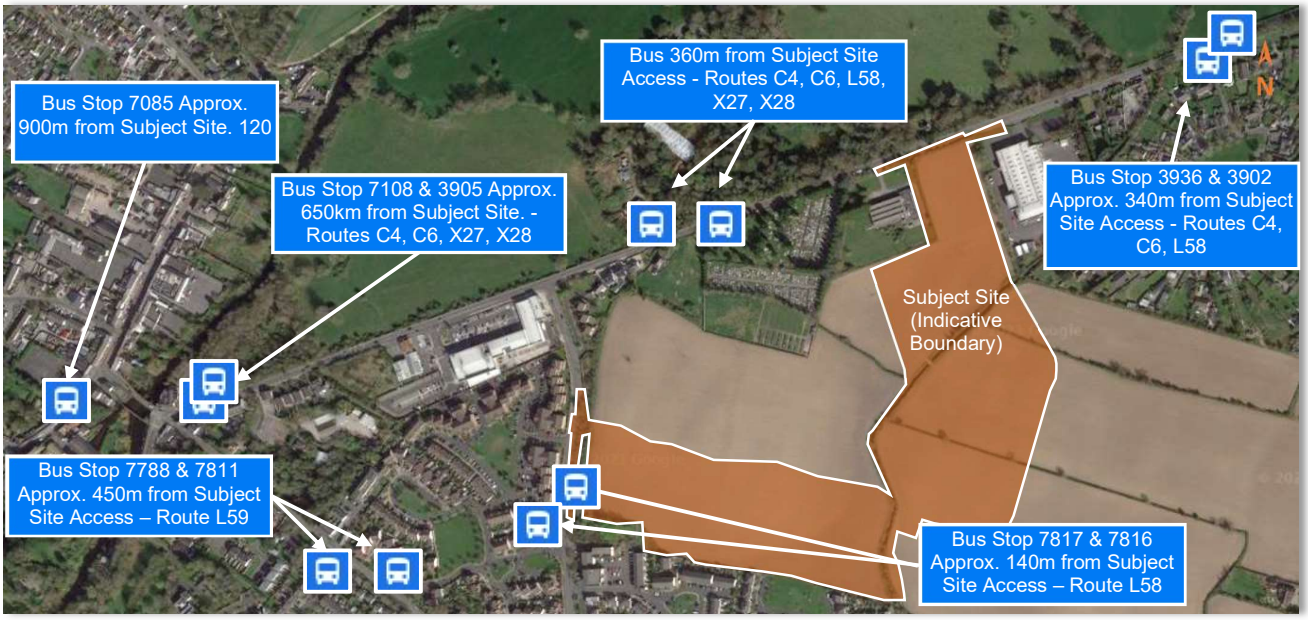


Figure 2.7: Existing Bus Stops in Vicinity of the Subject Site (Source: Google Maps)

Public Transport – Heavy Rail Network

2.2.16 The Hazelhatch and Celbridge Train Station is located approximately 1.9km from subject site's access on Shinkeen Road. This station can accommodate up to 228 no. cars on-site providing a conveniently located Park & Ride facility in close proximity to the subject site. In addition newly implemented Bus Connect 'Local' Routes L58 and L59 (which are easily accessible from the subject site location as discussed in the previous section) provide bus access to this station. The established rail infrastructure operated by Iarnród Éireann provides linkages to key destinations such as Dublin (Connolly / Heuston Station), Galway and Cork via number of other regional locations. **Table 2.2** below presents a summary of the main rail services available at the Hazelhatch and Celbridge Station.

Route	Mon – Fri	Sat	Sun
Dublin to Cork / Celbridge	45	19	5
Cork / Celbridge to Dublin	32	18	5
Dublin to Portlaoise	12	8	5
Portlaoise to Dublin	14	7	5
Dublin to Galway	-	-	-
Galway to Dublin	1	-	-
Celbridge to Waterford	2	1	-
Waterford to Celbridge	2	-	-

Table 2.2: No. of Rail Services available at Hazelhatch and Celbridge
(Source: Iarnród Éireann)

2.3 EXISTING PUBLIC TRANSPORT CAPACITY

2.3.1 It is widely accepted in the industry that the periods of maximum demand generated upon the public transport networks on a typical weekday are focused upon the AM (06:00-10:00) and PM (16:00-20:00) periods as predominantly influenced by travel to work, school, and college patterns at any given location.

2.3.2 The existing capacity on the local public transport network has been determined based on (i) frequency of services (i.e. timetabled services) and (ii) type / size of vehicle. The existing public transport services accessible from the subject development site include the bus services accessible on the Dublin Road, Shinkeen Road, the R405 and Celbridge Town Centre as discussed previously and rail services available at Hazelhatch & Celbridge accessible by car (Park & Ride facilities available), bus (L58 & L59) and by active travel modes.

2.3.3 **Table 2.3** below provides a summary of the bus capacity during the identified peak public transport patronage times (i.e. AM 06:00-10:00 & PM 16:00-20:00 in the PM). The existing bus capacity analysis reveals that, during peak travel periods, the existing bus services have the capacity to accommodate up to 6244 no. passengers in the AM peak period and 6356 no. passengers in the PM peak period.

Bus Service	Route No.	Route	AM (06:00-10:00)		PM (1600-20:00)	
			Services	Capacity	Services	Capacity
Dublin Bus	C4	To Maynooth	7	672	8	768
		To Dublin	8	768	8	768
	L58	To H&C Station	8	768	8	768
		From H&C Station	8	768	8	768
	L59	To H&C Station	8	768	8	768
		From H&C Station	8	768	8	768
	X27	To Celbridge	0	0	4	384
		To Dublin	6	576	0	0
	X28	To Celbridge	0	0	5	480
		To Dublin	5	480	0	0
Go-Ahead	120	To Edenderry	4	208	10	520
		To Dublin	9	468	7	364
Total Bus Capacity			71	6244	74	6356

Table 2.3: Calculated Existing Bus Capacity

2.3.4 **Table 2.4** below provides a summary of the rail capacity during the identified peak

public transport patronage times (i.e. 06:00-10:00 in the AM & 16:00-20:00 in the PM).

2.3.5 The existing rail capacity analysis reveals that, during peak travel periods, the existing rail services have the capacity to accommodate up to 6812 no. passengers in the AM peak period and 6288 no. passengers in the PM peak period.

Direction	AM (06:00-10:00)		PM (1600-20:00)	
	Services	Capacity*	Services	Capacity*
From Dublin	9	2358	14	3668
To Dublin	17	4454	10	2620
Total	**26**	**6812**	**24**	**6288**

* Assumed 4 no. carriages

Table 2.4: Calculated Existing Rail Capacity

2.3.6 It is noted that this capacity analysis considers only existing bus / rail services and does not take cognisance of future bus network improvements being proposed as part of the Bus Connects proposals or DART+ proposals (as outlined later in this chapter) some / or all of which could be implemented by the subject development's adopted Opening Year of 2024.

2.3.7 An assessment of the projected demand and associated impact on the current bus transport capacity as a result of the subject residential development is outlined in **Section 6** of this TTA report.

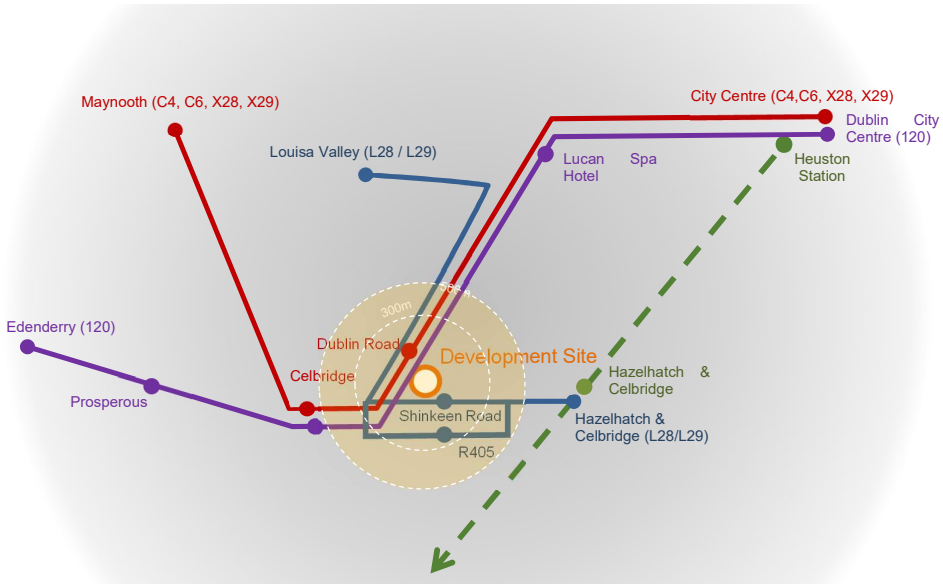


Figure 2.8: Existing Public Transport Services Catchment Schematic

2.4 LOCAL AMENITIES

2.4.1 The proposed development site is ideally located to benefit from local amenities in the area, as presented in **Figure 2.9**. There are a number of schools within 3.0km of the subject site including St. Wolstan's Community School, St. Wolstan's Community School, St Brigid's Girls National School, Primrose Hill National School and St. Patrick's Primary School. Furthermore, third level education opportunities are also available with NUI Maynooth located just less than 8km from the subject site.

2.4.2 Furthermore, the subject site benefits from nearby leisure facilities such as O'Hanlon Park and the Celbridge & District Tennis Club. The subject site also has good access to St. Wolstan's Shopping Centre and businesses like Rye River Brewing Co. and Veolia Water Technologies in the in the vicinity of the subject site.

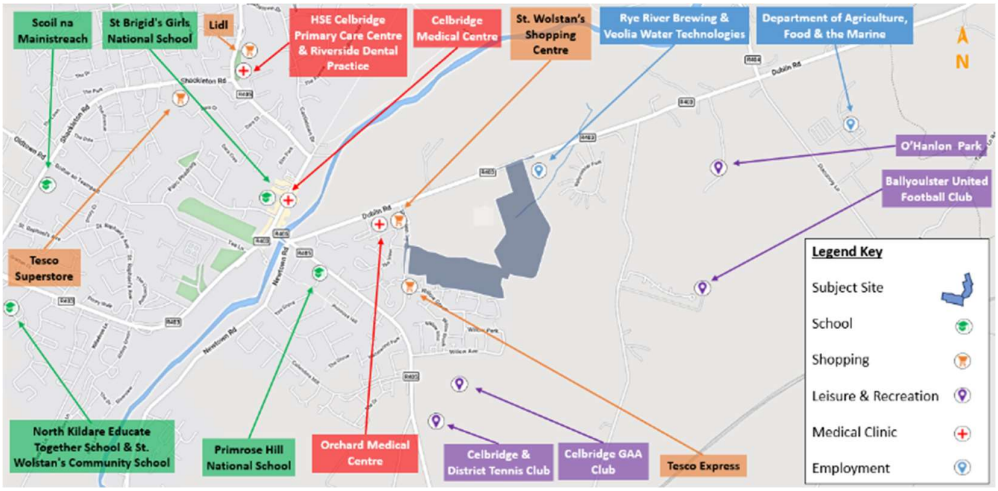


Figure 2.9: Local Amenities Surrounding Subject Development Site

2.5 RSA COLLISION HISTORY

2.5.1 The collision statistics on the Road Safety Authority (RSA) website has been reviewed in order to ascertain the safety record of the local road network over the most recent twelve-year period. This includes information for the years 2005 to 2016 inclusive and indicates basic information on all reported incidents.

2.5.2 The RSA records detail only those occasions where the incident was officially recorded such as the Garda being present to formally record details of the incident. According to the RSA website, there were 20 no. reported incidents within the

immediate vicinity of the subject scheme proposals. The locations include Liffey Bridge to the west and the Dublin Road (R403) / Stacumny Lane / R404 junction to the east.

2.5.3 Of the 20 no. recorded collisions, one collision was considered a serious severity whilst the remaining 19 resulted in minor severity casualties as shown in **Figure 2.10**, with specific RSA information relating to each recorded incident summarised in **Table 2.5**.

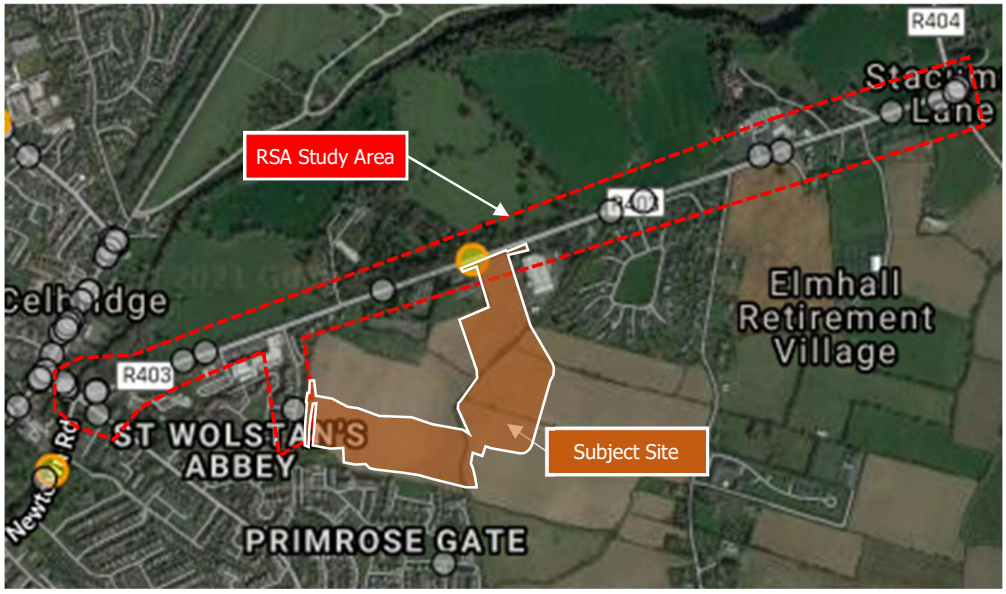


Figure 2.10: Collision Map (Source: RSA)

2.5.4 According to the RSA Collision Statistic Map, the majority of collisions recorded were 'minor' in severity. The vehicle type recorded in the majority incidents was a car with 11 no. incidents recorded. After cars, the next highest vehicle category involved was bicycles with 4 no. incidents recorded.

2.5.5 Incident no. 9, a 'serious' collision, occurred in 2013 on the R403 near the subject site's Dublin Road access location. The incident involved a bicycle and occurred between the hours of 07:00 and 10:00.

2.5.6 The review of the RSA collision data available revealed that the existing surrounding road network exhibits a relatively good safety record considering the level of traffic travelling along it. Furthermore, there are no apparent trends in collisions on the road network in the immediate vicinity of the site or existing road safety issues which could be exacerbated by the proposed residential development.

Ref.	Severity	Year	Vehicle	Circumstances	Day	Time	Speed Limit	Casualty
1	Minor	2016	Bicycle	Other	Tuesday	0700-1000	50 KPH	1
2	Minor	2016	Bicycle	Other	Wednesday	1600-1900	80 KPH	1
3	Minor	2016	Bicycle	Other	Wednesday	1600-1900	80 KPH	1
4	Minor	2015	Car	Rear end, straight	Tuesday	1600-1900	50 KPH	1
5	Minor	2014	undefined	Pedestrian	Monday	1000-1600	50 KPH	1
6	Minor	2014	Bus	Pedestrian	Saturday	2300-0300	50 KPH	1
7	Minor	2014	Car	Rear end, straight	Saturday	1000-1600	80 KPH	1
8	Minor	2013	Car	Other	Thursday	1000-1600	50 KPH	1
9	Serious	2013	Bicycle	Single vehicle only	Saturday	0700-1000	80 KPH	1
10	Minor	2012	Car	Rear end, straight	Saturday	1600-1900	50 KPH	1
11	Minor	2012	Car	Rear end, straight	Thursday	1600-1900	80 KPH	1
12	Minor	2012	Car	Rear end, straight	Wednesday	1900-2300	60 KPH	2
13	Minor	2011	undefined	Other	Wednesday	0700-1000	80 KPH	1
14	Minor	2011	Motorcycle	Other	Wednesday	1900-2300	80 KPH	2
15	Minor	2011	Car	Single vehicle only	Friday	1900-2300	60 KPH	1
16	Minor	2010	Car	Rear end, right turn	Sunday	1600-1900	80 KPH	1
17	Minor	2009	Car	Head-on conflict	Tuesday	1000-1600	50 KPH	3
18	Minor	2006	Car	Angle, right turn	Tuesday	0700-1000	80 KPH	2
19	Minor	2006	Car	Single vehicle only	Tuesday	0300-0700	50 KPH	1
20	Minor	2005	Goods vehicle	Angle, right turn	Wednesday	0700-1000	50 KPH	1

Table 2.5: Collision Records (Source: RSA)

2.6 PROPOSED TRANSPORTATION INFRASTRUCTURE

Cycle Network Proposals - GDA Cycle Network Plan

2.6.1 The subject site lies within the "*North Kildare*" area as outlined within the Greater Dublin Area Cycle Network Plan (2013). The sector covers Leixlip, Celbridge and Maynooth. These proposals are yet to be constructed in the vicinity of the development site and include the formation of the following key routes:

- **C1**: R405 Newcastle Road to Hazelhatch and Celbridge railway station and the Grand Canal Greenway.
- **C2**: Clane Road to Main Street.
- **C3**: Oldtown (Ring) Road to Church Road.
- **C4**: R403 Clane Road & Oldtown Road to Maynooth Road.
- **C5**: Willowbrook Road.
- **C6**: R405 Maynooth Road.
- **C7**: R449 Celbridge to Leixlip Link Road (across M4 Junction 6).

- **C8 / C8a / C8b**: Castletown Demesne Greenways to Barnhall Road, Leixlip and links to C6 & C7.

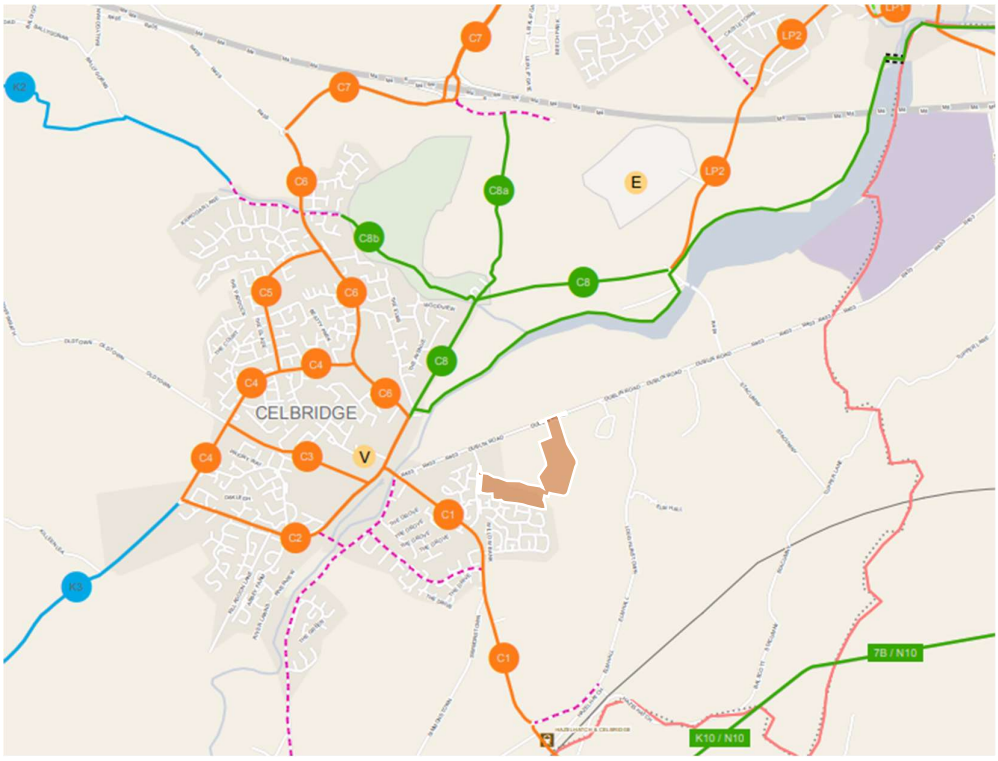


Figure 2.11: Proposed Cycle Facilities (Source: Sheet N16 GDA Cycle Network Plan)

Public Transport Proposals - BusConnects

2.6.2 *BusConnects* is an initiative launched by the NTA with the aim of overhauling the bus system in the Dublin Region. This initiative includes review of bus services, the core bus network which comprises radial, orbital and regional core bus corridors. It also includes enhancements to ticketing and fare systems as well as a transition to a new low emission vehicle fleet.

2.6.3 This initiative in the long-term proposes to implement a redesign of the existing bus network. The fundamental changes to the network expected would be as follows:

- Increasing the overall amount of bus services. Providing new and frequent orbital services connecting more outer parts of the city together;
- Simplifying the bus services on the key radial into "Spines" where all buses will operate under a common letter system and buses will run very

frequently and be more evenly spaced;

- Increasing the number of routes where buses will operate every 15 minutes or less all day;
- The frequent network would become a web-shaped grid, with many interchange opportunities to reach more destinations. Everywhere that two frequent routes cross, a fast interchange is possible; and
- Additional service would be provided at peak hours to limit overcrowding.

2.6.4 As introduced previously, Phase 2 of the Bus Connects Network redesign is being implemented and includes bus Routes **C4**, **L58**, **L59**, **X27**, **X28** and the **C6** night service. The subject site will benefit from an additional orbital Route **W6** which will provide a connection towards Maynooth to the north-west and Tallaght to the south-east. The route will travel via Citywest and will have a frequency of 30 minutes on both weekdays and weekends. **Figure 2.12** below illustrates the Bus Connects proposals in the local area, some of which, as discussed, have already been implemented.

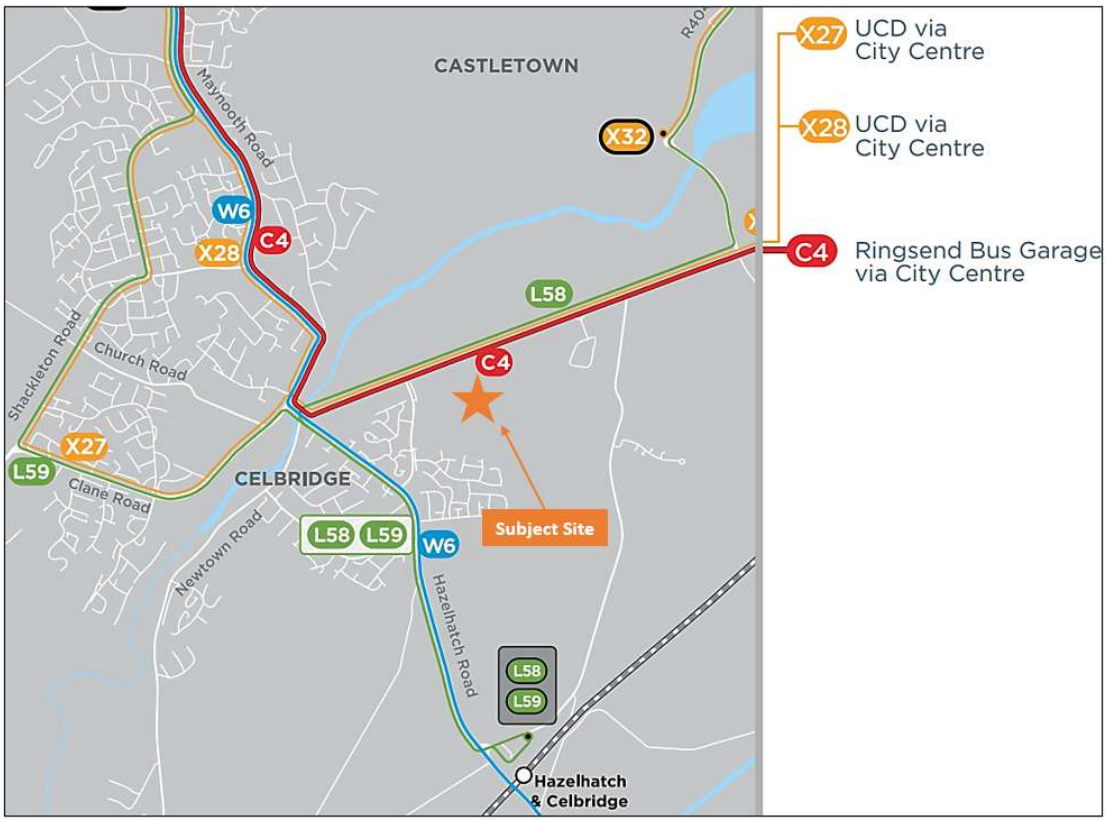


Figure 2.12: Proposed Bus Network (Source: *BusConnects* – Revised Network 2020)

Public Transport Proposals – DART+

2.6.5 The DART+ Programme aims to modernise and improve the existing rail network, which radiates from Dublin City Centre. It will provide a sustainable, electrified, faster, reliable and user-friendly rail system, which increases train frequencies and customer carrying capacity. It intends to increase the length of DART network from the currently 50km to 150km railway corridor through the electrification and upgrade of existing lines transforming commuter train travel in the Greater Dublin Area (GDA). The DART+ Programme also includes the purchase of new train fleet.

2.6.6 The DART+ Programme will deliver frequent, modern, electrified services within the GDA and improve connectivity to regional routes as part of the following projects:

- DART+ West - Maynooth and M3 Parkway to the City Centre
- **DART+ South West - Hazelhatch & Celbridge to the City Centre**
- DART+ Coastal North - Drogheda to the City Centre Greystones
- DART+ Coastal South - Greystones to the City Centre

2.6.7 This proposed DART+ South West project (for which 2nd round of a non-statutory public consultation on the preferred option has concluded) will further increase the accessibility of Celbridge and its environs. The project aims to;

- Increase train capacity from the current 12 trains per hour per direction to 23 trains per hour per direction (i.e., maintain the existing 12 services, with an additional 11 train services provided by DART+ South West). This will increase passenger capacity from the current peak capacity of approximately 5,000 passengers per hour per direction to approximately 20,000 passengers per hour per direction.
- Reduce carbon emissions through the deployment of new electric trains.
- Support growing communities, businesses, and future development by providing high-quality integrated public transport services in line with Government policy including the National Planning Framework and Climate Action Plan.

2.6.8 The project aims to cover approx. 20km from Hazelhatch & Celbridge Station to Glasnevin via the Phoenix Park Tunnel Branch Line as illustrated in **Figure 2.13**.

Figure 2.13: DART+ South West Route Map (Source National Transport Authority and Irish Rail)

Road Infrastructure

2.6.9 Kildare County Council have appointed consultants to progress the Celbridge to Hazelhatch Link Road Scheme which incorporates a second bridge crossing across the River Liffey. A preferred route for the scheme has been identified and a non-statutory public consultation has been undertaken which ran between 28th March and 6th May 2022.

2.6.10 The identified preferred route is presented in **Figure 2.14** below. The future implementation of this scheme is expected to significantly relieve the existing peak hour congestion at the existing bridge crossing.

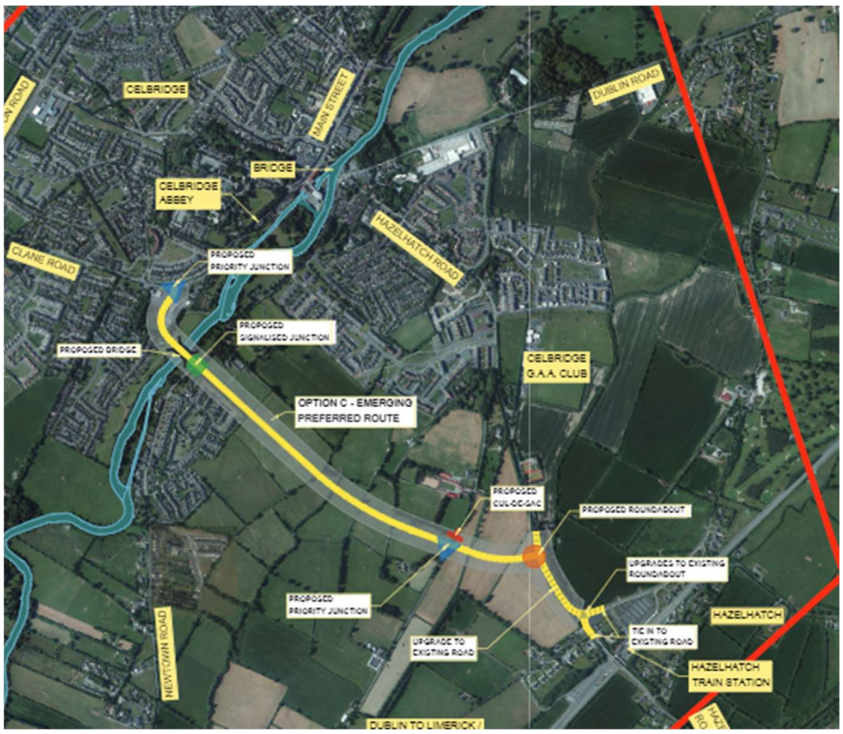


Figure 2.14: Celbridge to Hazelhatch Link Road Preferred Route

3.0 POLICY FRAMEWORK

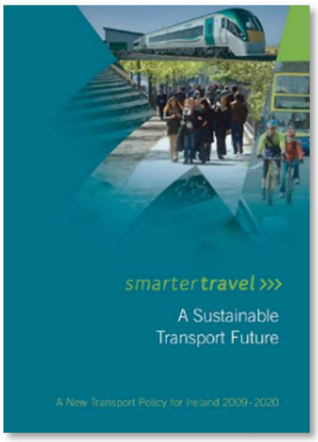
3.1 DEVELOPMENT POLICY

3.1.1 In the context of transportation, the subject site policy framework is influenced by the following key documentations. A common theme through each of these key documents is the emphasis placed upon the importance of travel demand management, with many identifying the need to implement mobility management plans and promoting sustainable travel patterns.

- *Smarter Travel – A Sustainable Transport Future* (2009)
- *Transport Strategy for the Greater Dublin Area 2016-2035*
- *Sustainable Urban Housing: Design Standards for New Apartments* (March 2018)
- *Kildare County Development Plan 2017-2023*
- *Celbridge Local Area Plan 2017-2023*

3.2 SMARTER TRAVEL – A SUSTAINABLE TRANSPORT FUTURE

3.2.1 Smarter Travel - *A Sustainable Transport Future*, was published in February 2009, and represents a new transport policy for Ireland for the period 2009-2020. The policy recognises the vital importance of continued investment in transport to ensure an efficient economy and continued social development, but it also sets out the necessary steps to ensure that people choose more sustainable transport modes such as walking, cycling and public transport.



3.2.2 The policy is a direct response to the fact that the continued growth in demand for road transport is not sustainable due to the resulting adverse impacts of increasing congestion levels, local air pollution, contribution to global warming, and the additional negative impacts to health through promoting increasingly sedentary lifestyles.

3.2.3 Although this document outlines objectives and targets from 2009 to 2020, the goals set out will continue to play active role from 2021 onwards in order to address

the unsustainable nature of current travel behaviour. The following five key goals form the basis of the Smarter Travel policy document.

- Improve economic competitiveness through maximising the efficiency of the transport system and alleviating congestion and infrastructural bottlenecks.
- Minimise the negative impacts of transport on the local and global environment through reducing localised air pollutants and greenhouse gas emissions.
- Reduce overall travel demand and commuting distances travelled by the private car.
- Improve security of energy supply by reducing dependency on imported fossil fuels.

3.2.4 The document recognises that these are ambitious targets, and outlines a suite of 49 actions required to achieve these targets – summarised under the following four main headings:

- Actions aimed at reducing distances travelled by car and the use of fiscal measures to discourage use of the car;
- Actions aimed at ensuring that alternatives to the car are more widely available;
- Actions aimed at improving fuel efficiency of motorised travel; and
- Actions aimed at strengthening institutional arrangements to deliver the targets.

3.2.5 The opportunities and potential benefits that could be achieved by the implementation of a MMP are considered under the policy goal of encouraging Smarter Travel.

3.2.6 The Smarter Travel policy also includes for a comprehensive range of supporting 'actions' including mode specific (e.g., walking, cycling and public transport etc.) and behaviour change initiatives which both encourage and provide for sustainable travel practices for all journeys.

3.3 TRANSPORT STRATEGY FOR THE GREATER DUBLIN AREA 2016-2035

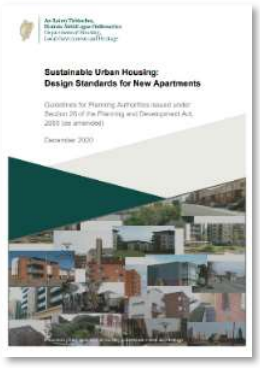
3.3.1 The Transport Strategy for the Greater Dublin Area 2016 – 2035 is a document compiled by the National Transport Authority which sets out the Strategic Transport Plan for the Greater Dublin Area for the period up to 2035.

3.3.2 This document will influence transport planning across the region until 2035 and replaces 'A Platform for Change – An Integrated Transportation Strategy for the Greater Dublin Area 2000 to 2016'. It thereby underpins all transportation strategies, traffic management schemes and development plans prepared by Dublin City Council during this timeframe.

3.3.3 The Strategy sets out a clear hierarchy of transport users, commencing with the sustainable modes of travel such as walking, cycling and public transport users at the very top of the hierarchy. The Strategy adopts the general principle that these users should have their safety and convenience needs considered first and that the hierarchy is applied where a large share of travel is (or could be) made by walking, cycling and public transport.

3.3.4 In addition to guiding the development of specific Strategy measures, the NTA encourages that the "transport user hierarchy should guide engineers, planners and urban designers on the order in which the needs of transport users should be considered in designing new developments or traffic schemes in the Greater Dublin Area."

3.4 SUSTAINABLE URBAN HOUSING: DESIGN STANDARDS FOR NEW APARTMENTS (DECEMBER 2020)



3.4.1 This guideline document was produced by the Department of Housing, Planning and Local Government in March 2018 and was updated in December 2020. The purpose of this document is to set out standards for apartment development, mainly in response to circumstances that had arisen whereby some local authority standards were at odds with national guidance.

3.4.2 With the demand for housing increasing, this means that there is a need for an absolute minimum of 275,000 new homes in Ireland's cities by 2040. It is therefore critical to ensure that apartment living is an increasingly attractive and desirable housing option for a range of household types and tenures.

3.4.3 These Guidelines apply to all housing developments that include apartments that may be made available for sale, whether for owner occupation or for individual lease. They also apply to housing developments that include apartments that are built specifically for rental purposes, whether as a 'build to rent' or as a 'shared accommodation'.

3.4.4 Cycling provides a flexible, efficient and attractive transport option for urban living and these guidelines require that this transport mode is fully integrated into the design and operation of all new apartment development schemes.

3.4.5 The quantum of car parking or the requirement for any such provision for apartment developments will vary, having regard to the types of location in cities and towns that may be suitable for apartment development, broadly based on proximity and accessibility criteria. For all types of location, where it is sought to eliminate or reduce car parking provision, it is necessary to ensure, where possible, the provision of an appropriate number of drop off, service, visitor parking spaces and parking for the mobility impaired. Provision is also to be made for alternative mobility solutions including facilities for car sharing club vehicles and cycle parking and secure storage.

3.5 KILDARE COUNTY DEVELOPMENT PLAN 2017 - 2023

3.5.1 The Kildare County Development Plan (2017 – 2023) sets out the authority's policies and objectives for the development of the County for the period 2017 to 2023. The Plan seeks to develop and improve in a sustainable manner the social, economic, cultural and environmental assets of the county. In the context of the subject development site, the most relevant transport policies include;

Movement and Transport

*"**MT 1**: Promote the sustainable development of the county through the creation of an appropriately phased integrated transport network that services the needs of communities and businesses."*

*"**MT 2**: Support sustainable modes of transport by spatially arranging activities around existing and planned high quality public transport systems."*

*"**MT 3**: Influence people's travel behaviour and choices towards more sustainable options by working closely with relevant organisations in improving and accessing public transport facilities."*

*"**MT 4**: Develop sustainable transport solutions within and around the major towns in the county that encourage a transition towards more sustainable modes of transport, whilst also ensuring sufficient road capacity for trips which continue to be taken by private vehicles."*

"***MT 7**: Focus on improvements to the national, regional and local network that provide additional capacity in order to reduce congestion and provide for current and future demand."*

*"**MT 8**: Seek to address urban congestion with particular emphasis on facilitating improved bus transport movement and reliability and improved links to bus and railway stations."*

*"**MT 11**: Focus on improvements to the local road and street network that better utilise existing road space and encourage a transition toward more sustainable modes of transport…"*

Public Transport

*"**PT 1**: Promote the sustainable development of the county by supporting and guiding national agencies including the National Transport Authority in delivering major improvements to the public transport network and to encourage public transport providers to provide an attractive and convenient alternative to the car."*

*"**PT 2**: Generate additional demand for public transport services by strengthening development around existing and planned high capacity transport routes and interchanges throughout the county."*

"***PT 4**: Support sustainable transport initiatives in Kildare that are consistent with the goals of Smarter Travel – A Sustainable Transport Future, A New Transport Policy for Ireland 2009 – 2020 and other government investment programmes."*

"***PT 7**: Improve access to public transport as part of road improvement projects where possible."*

"***PT 11**: Promote access to bus and rail services for people with disabilities."*

"***PT 12**: Liaise with and encourage transport providers and other agencies (e.g., NTA, developers etc) to provide appropriate bus shelters and real time information panels at bus stops."*

Walking and Cycling

"***WC 1**: Prioritise sustainable modes of travel by the development of high quality walking and cycling facilities within a safe street environment."*

"***WC 2**: Promote the development of safe and convenient walking and cycling routes."*

"***WC 3**: Ensure that connectivity for pedestrians and cyclists is maximised in new communities and improved within the existing areas in order to maximise access to town centres, local shops, schools, public transport services and other amenities."*

"***WC 4**: Ensure that all new roads and cycle routes implement the National Cycle Manual, with a focus on a high level of service for cyclists and encouraging a modal shift from car to cycling."*

"***WC 5**: Identify new walking and cycling routes and linkages on all sites where new development is proposed and to ensure that all streets and street networks are designed to prioritise the movement of pedestrians and cyclists."*

"***WC 6**: Ensure that all roads in existing and new developments are designed in accordance with the principles, approaches and standards contained in the Design Manual for Urban Roads and Streets 2013, the NTA National Cycle Manual and other appropriate standards."*

"***WC 7**: Provide for safer routes to schools within the county and promote walking and cycling as suitable modes of transport as part of the Green Schools Programme and other local traffic management improvements."*

*"**WC 8**: Require the provision of secure cycle parking facilities in towns, at public service destinations and in all new residential and commercial developments."*

*"**WC 10**: Support the implementation of the Greater Dublin Area Cycle Network Plan, NTA (2015), in a balanced way in County Kildare."*

Road and Street Network

*"**RS 2**: Improve safety on the road and street network and manage congestion."*

"***RS 3**: Ensure that all new developments in proximity to Motorway Routes, National Routes and Regional Routes provide suitable noise protection measures to protect sensitive noise receptors from traffic noise."*

"***RS 8**: Ensure that the planning, design and implementation of all road and street networks within urban areas across the county accord with the principles set out in the Design Manual for Urban Roads and Streets (2013), the National Cycle Manual (2010) and other relevant standards where appropriate."*

Local Roads

*"**LR 4**: Ensure that all new streets in housing and mixed use schemes are designed, in accordance with: – Design Manual for Urban Roads and Streets (2013)"*

*"**LR 5**: Ensure that all streets and street networks within urban areas are designed to passively calm traffic through the creation of a self-regulating street environment."*

*"**LR 6**: Ensure that all developments can provide full connectivity to the adjacent road network (pedestrian, cycle and vehicular)."*

*"**LR 7**: Ensure that all developments allow for and ensure full connectivity (pedestrian, cycle and vehicular) to the adjacent lands which are zoned for development and lands which may be zoned for development in the future."*

Parking

*"**PK 2**: Design car parking layouts in accordance with the Design Manual for Urban Roads and Streets (2013)."*

*"**PK 3**: Carefully consider the number of parking spaces provided to service the needs of new development"*

*"**PK 5**: Seek to ensure that all new private car parking facilities are provided to an appropriate standard, proximate to the development which it serves."*

"***PK 7**: Ensure that car parking does not detract from the comfort and safety of pedestrians and cyclists or the attractiveness of the landscape."*

Road and Street Design

*"**RS 2**: Ensure that all streets and street networks are designed to passively calm traffic through the creation of a self-regulating street environment, through a multi-disciplinary team approach (e.g., engineers, planners, architects, landscape architects, urban designers)."*

*"**RS 3**: Ensure that all new roads and streets within urban areas are designed in accordance with the principles, approaches and standards contained within the Design Manual for Urban Roads and Streets (2013) and other appropriate standards."*

*"**RS 5**: Ensure that the design and speed limits of street networks and associated junctions in new residential estates facilitate the implementation of: (i) Speed limits in accordance with the Guidelines for Setting and Managing Speed Limits in Ireland DTTS (2015); (ii) Design Manual for Urban Roads and Streets, DTTS and DECLG (2013)."*

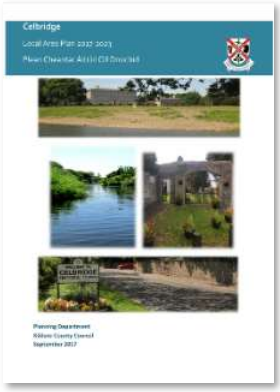
Traffic and Transportation Management

*"**TM 1**: Manage traffic in urban areas and prioritise the movement of pedestrians, cyclists and public transport particularly at key junctions."*

*"**TM 4**: Minimise the impact of new developments on the county road and street network by implementing mobility management initiatives."*

*"**TM 6**: Require all major developments to submit Traffic Impact Assessments and Mobility Management Plans."*

3.6 CELBRIDGE LOCAL AREA PLAN (2017-2023)



3.6.1 The subject site is part zoned "C: New Residential" which seeks "*to provide for new residential development*" and part zoned "E: Community and Educational" which seeks "*to provide for education, recreation, community and health*".

3.6.2 The Celbridge LAP includes a number of Key Development Areas "*to ensure development proposals conform with best practice urban design principles on the basis that well planned and integrated development will enhance the town and its environs and improve the quality of life of its residents*".

3.6.3 The subject site is located within one of the 5 Key Development Areas (KDA's), KDA2 Ballyoulster, identified within the LAP. A review of the Celbridge LAP has established that a number of transport infrastructure scheme objectives proposed in the immediate area of the KDA2 site which will have an influence upon the site's accessibility levels.

3.6.4 The Celbridge LAP outlines several roads objectives and improvements for the town area which will ultimately benefit the subject Ballyoulster KDA2 lands.

"Policy MT1: *Pedestrian and Cycle Movement It is the policy of the Council to provide an enhanced pedestrian and cycle network in Celbridge including the provision of an additional crossing of the River Liffey, to ensure ease of access to public transport, the town centre, heritage sites and other recreational facilities."*

"Policy MT3: *Roads It is the policy of the Council to support improvements to the road and street network in Celbridge in order to provide connectivity and permeability throughout the town, enable access to and from new communities and to reduce through-traffic in the town centre."*

"MTO1.2: *To facilitate and encourage cycle as a more convenient and safe method of transport through the development of new or improved cycle facilities in Celbridge with a particular focus on the routes identified in the National Transport Authority (NTA) Greater Dublin Area Cycle Network Plan to link population, commercial, community facilities, schools and transport nodes. Any new development to facilitate routes identified in the Greater Dublin Area Cycle Network Plan shall be subject to the mitigation detailed in the environmental assessments for that plan."*

*"**MTO1.4:** To provide footpaths and public lighting at the following locations":*

- *"Resurface footpaths on the Dublin Road, where required."*
- *"Full provision for pedestrians and cyclists, including public lighting, on Loughlinstown Road as part of road objectives for KDA3."*

*"**MTO1.6**: To facilitate a new pedestrian/cycling bridge across the Liffey linking to Celbridge Town Centre, in conjunction with any new development at Donaghcumper and new residential areas to the south."*

"MTO1.8: *To require new housing developments to deliver filtered or full permeability to adjoining development in so far as is possible and, in the case of adjoining greenfield sites, to ensure the potential for such provision is addressed."*

*"**MTO1.9**: To upgrade existing pedestrian and cycle facilities across the River Liffey."*

"MTO3.2: *To require all road development to be undertaken in accordance with 'Principles of Road Development' as set out in Section 5.8.3 of the Transport Strategy for the Greater Dublin Area 2016-2035".*

"MTO3.5: *To secure the provision of the strategic road objectives identified on Map 8.1, which provides access to new communities and Key Development Areas within the town".*

"MTO3.6: *To ensure that all significant development proposals for the KDAs are subject to a Traffic Impact Assessment (TIA), to be carried out in accordance with the Traffic and Transport Assessment Guidelines, NRA (2014). The requirement for TIA will be determined, by the Planning Authority, on a case-by-case basis".*

"MTO3.8: *To require all new developments to comply with the recommendations of the Design Manual for Urban Roads and Streets (DMURS) and National Cycle Manual, or any subsequent relevant publication."*

*"**MTO3.9**: To facilitate the construction of a road from Hazelhatch Park to Newtown Road in tandem with development of KDA 5 and in the interim to protect this route from development."*

*"**MTO3.10**: To facilitate the construction of a road from Primrose Hill to Loughlinstown Road in tandem with the development of KDA 2 and in the interim to protect this route from development."*

*"**MTO3.14**: To carry out the following road improvements":*

- *"Improve the existing Liffey Bridge to better accommodate pedestrians and cyclists."*
- *"Upgrade the Loughlinstown Road in conjunction with road objectives for KDA 2."* (Note: error in the text of the LAP as it refers to KDA 3)

3.6.1 As presented in **Figure 3.1** below, cycle and pedestrian objectives are proposed between the Dublin Road corridor and Celbridge Main Street via green field lands (zoned "Strategic open Space") and a future new pedestrian / cycle bridge crossing over the River Liffey.

3.6.2 The subject proposals include for the delivery of 2 no. LAP cycle and pedestrian objectives including both the north / south link between Dublin Road and Shinkeen Road and the east-east connection between the subject Phase 1 lands up to the boundary with the wider KDA2 development lands.

3.6.3 We refer to the Urban Design Strategy chapter, and associated appendix, of the Architectural Design Statement prepared by OMP provides an overview of the development strategy for the subject site and the wider KDA 2 lands. The urban design strategy illustrates how the proposed Phase 1 development adheres to all the key objectives for the lands as set out in the Celbridge Local Area Plan 2017-2023 and how it relates to the potential future development of the overall KDA 2 lands. As part of this it provides a coherent strategy for future planning applications expected to come forward on a phased basis, and includes proposals in relation to the public realm, built form, green infrastructure, movement hierarchy with supporting civils infrastructure. In summary it is envisaged that the wider KDA 2 lands could be delivered over 3 no. residential phases with associated physical and social infrastructure. The delivery of the lands reserved for the schools will be delivered separately by the Department of Education and is incorporated into the phased approach for the overall lands. The strategy has been developed following consultation with the Planning Authority since 2020 (period 2020-2021) in respect to the overall landholding, and has been informed by the pre-application consultations with the Planning Authority and An Bord Pleanala, and ongoing engagement with the Department of Education.

3.6.4 Phase 1 has regard to this overall urban design strategy and has evolved to ensure the proposed development addresses potential flood risk and identified archaeological features which are to be retained in situ within the site, whilst ensuring it continues to meet the overall key objectives for the KDA 2 lands set out in the Celbridge LAP 2017-2023.

3.6.5 With respect to the LAP requirements, it is noted that the wider Ballyoulster KDA2 development will be delivered on a phased basis to ensure the required

infrastructure is provided together with the new residential development. Accordingly, each phase of development will have its own Traffic and Transportation Assessment to demonstrate capacity of the existing transport network to support the proposed development.

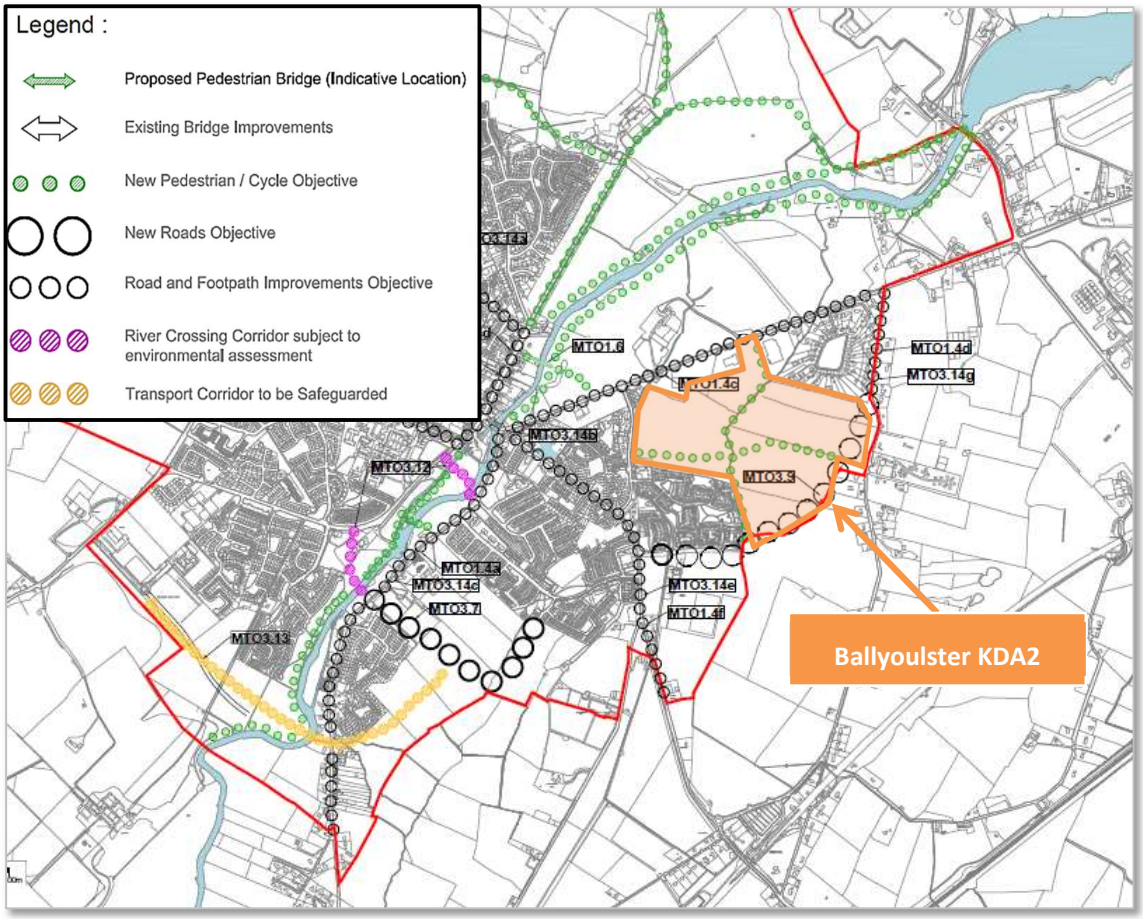


Figure 3.1: Transport & Movement Objectives Map (Source: Celbridge LAP 2017-2023 Map 8.1)

3.6.6 Section 13.5.1 of the LAP provides a table regarding infrastructure and associated phasing of the KDA2 development and also within Table 1 of the Development Strategy on the Phasing of Development of the Ballyoulster KDA. With respect to the provision of a new town centre pedestrian/cycle link from Celbridge Main Street to Dublin Road crossing the River Liffey or improved facilities on the existing bridge, it states that this is "*To be completed prior to the occupation of dwelling units 351 in this KDA*". It is noted that the delivery of this new/upgraded pedestrian and cyclist link from Celbridge Main Street is not required to be constructed or in place for the proposed Phase 1 development. Under the requirements of the LAP

and Table 1 of the Development Strategy, the completion and opening of the pedestrian/cyclist link is required in advance of the occupation of the 351st residential unit associated with Phase 2.

3.6.7 In accordance with objectives MT01.6 and MT03.14 KCC will facilitate a new pedestrian / cycle bridge crossing of the River Liffey in conjunction with any new development at Donaghcumper and new residential areas to the south. The delivery of this bridge or upgrade of the existing bridge will benefit the wider area as well as the subject lands. Consequently, the Planning Authority may consider it necessary to apply a Special Development Contribution Levy under S.48 of the Planning and Development Act 200, as amended, to forthcoming planning applications to assist in funding of this infrastructure.

3.6.8 Accordingly, the developer shall pay a development contribution to KCC towards the new pedestrian / cycle bridge crossing of the River Liffey linking Celbridge Main Street to Dublin Road or improved facilities on the existing bridge, with the bridge being completed within 2 years of receipt of said development contribution.

3.6.9 In accordance with objective MT03.10 KCC will facilitate the construction of a road from Primrose Hill to Loughlinstown Road in tandem with the development of KDA 2 and in the interim to protect this route from development . It is noted that the delivery of this new road is not deemed necessary for the modest increase in traffic predicted to be generated at this location as a result of the implementation of the subject Phase 1 development.

3.6.10 The LAP states that The Council will work with the National Transport Authority and other statutory agencies to provide for walking and cycling infrastructure including cycle parking, subject to relevant environmental assessments.

3.7 DEVELOPMENT CONTROL

Car Parking Standards

3.7.1 Reference has been made to both Table 17.9 of the Kildare County Development Plan (2017 - 2023) which sets out the car parking standards for new developments and Chapter 4 of the Sustainable Urban Housing: Design Standards for New Apartments Guidelines For Planning Authorities (December 2020), as published by the Department of Housing, Planning and Local Government (DHPLG).

3.7.2 Within the DHPLG standards, the location of the subject residential development can be classified as an '*Peripheral and/or Less Accessible Urban Locations'*. Peripheral and/or Less Accessible Urban Locations, according to the DHPLG standards, are defined as:-

- Sites in suburban development areas that do not meet proximity or accessibility criteria;
- Sites in small towns or villages.

3.7.3 The DHPLG document states that for sites located in an 'Peripheral and/or Less Accessible Urban Locations', these sites:

"As a benchmark guideline for apartments in relatively peripheral or less accessible urban locations, one car parking space per unit, together with an element of visitor parking, such as one space for every 3-4 apartments, should generally be required."

3.7.4 With regard to the proposed development schedule the associated car parking requirements are outlined in **Table 3.1** below. In response to the development management standards the scheme is required to provide 660 on-site car parking spaces based on the development plan requirements and a reduced 268-2850 on-site car parking spaces for the apartment / duplex units based on the DHPLG guidelines (inclusive of an element of visitor parking at a rate of 1 space for every 3-4 units).

Unit Type	No. of Units	KCC Standards		KCC Requirements		DHPLG Standard		DHPLG Requirement	
		Visitor	Residents	Visitor	Residents	Visitor	Residents	Visitor	Residents
House	130	2 / unit		260		-	-	-	-
Duplex / Apartment	214	1 / 4 units	1.5 / unit	54	321	1 / 3-4 units	1 / unit	54-71	214
Creche[1]	497m[2]	1 / 4 children	0.5 / staff	18	7	-	-	-	-
Total				**660**				**268-285** (*553-570*[3])	

1 70 children, 14 staff; 2 Includes KCC parking requirement for houses and creche

Table 3.1: Car Parking Standards

Disabled Car Parking

3.7.5 The development management standards require that 5% on non-residential spaces should be dedicated disabled parking bays but it does not specify a rate of disabled car parking provision for residential development. Section 17.2.9 "Universal Access" states that *"The Council will require that proposed*

developments, in their layout and design, are accessible, understandable and usable to the greatest extent possible by all people, regardless of their age, size, ability or disability. All developments must make provision for the disabled in accordance with the recommendations of 'Buildings for Everyone' 2002 published by the National Disability Authority". Accordingly, a minimum of 1 disabled space per 25 standard spaces up to the first 100 spaces and 1 disabled space for every 100 spaces thereafter are to be provided.

Electric Vehicle Parking

3.7.6 The development management standards require that up to 10% on non-residential spaces should be dedicated electric vehicle parking bays but it does not specify a rate of electric vehicle parking for car parking provision for residential developments. Nevertheless, national policy, as set out in the "Low Emission Vehicle Taskforce" Phase 2 Report dictates that EV charging facilities should be provided for residential developments with more than 10 car parking spaces. Accordingly, EV charger facilities will be provided at a rate of 10% of car parking spaces for apartments / duplexes and houses which do not benefit from on-curtilage parking.

Cycle Parking

3.7.1 Reference has been made to Table 17.10 of the KCC County Development Plan (2017-2023) which sets out the 'minimum' bicycle parking provision required for new developments and Section 4.17 of the Department of Housing, planning and Local Government (DHPLG) "Sustainable Urban Housing: Design Standards for New Apartments".

3.7.2 In reference to these development management standards **Table 3.2** below outlines the subject development schedules subsequent bicycle parking requirements.

3.7.3 In response to the Development Plan requirements the scheme is required to provide at least 331 on-site cycle parking spaces comprising at minimum 114 short stay and 217 long stay bicycle parking spaces as part of the proposed residential development. With reference to the DHPLG guidelines, the subject scheme is required to provide 611 cycle parking spaces comprising 107 short stay spaces and 504 long stay spaces for the apartment / duplex units.

3.7.4 The Kildare County Development Plan does not specify standards for bicycle parking in relation to residential houses; however, it states that "Terraced/townhouse schemes shall include appropriate design measures for bicycle storage, details of which should be clearly shown at planning application stage." Accordingly, to provide appropriate provision for the terraced units dedicated external bike storage areas will be provided which will be covered and secure for the use of residents. This will be provided at a rate of 2 bike parking space per terraced unit.

Description	No. of Units / Area	KCC Standards		KCC Requirements		DHPLG Standards		DHPLG Requirements	
		Short Stay	Long Stay	Short Stay	Long Stay	Short Stay	Long Stay	Short Stay	Long Stay
Houses	130	-	-	-	-	-	-	-	-
Apartment /Duplex	54 No. 1-Bed	1 / 2 Units	1 / Unit	107	214	1 / 2 units	1 / Bed	107	504
	30 No. 2-Bed								
	130 No. 3-bed								
Creche[1]	497m²	1 / 10 children	1 / 5 staff	7	3	-	-	-	-
Totals				**114**	**217**			**107**	**504**
				331				**611**	

1 70 children, 14 staff

Table 3.2: Cycle Parking Standards

4.0 CHARACTERISTICS OF PROPOSALS

4.1 PROPOSED DEVELOPMENT

4.1.1 The proposals presented in **Figure 4.1**, seek planning permission to construct KDA2 Phase 1 residential development comprising 344 no. residential units comprising 130 no. houses and 214 no. apartment / duplex units in addition to a creche facility and public open space. With reference to O'Mahony Pike Architects' drawings, as submitted with this planning application, the proposed development schedule is summarised in **Table 4.1** below.

Unit Type		Number of Units
House	3-Bed	80
	4-Bed	50
Apartment / Duplex	1-Bed	54
	2-Bed	30
	3-Bed	130
Total Residential Units		**344**

Table 4.1: Subject Phase 1 Residential Unit Schedule

Figure 4.1: Proposed Phase 1 Site Layout

4.2 SITE ACCESS ARRANGEMENTS

Pedestrian & Cycle Access Arrangements

4.2.1 The proposed site layout has been designed to maximise permeability and connectivity to, through and from the site by foot and by bicycle, as indicated in **Figure 4.2** below. Dedicated cycle and pedestrian facilities are proposed at the two vehicular access junctions on Dublin Road and Shinkeen Road.

4.2.2 It is acknowledged that the Celbridge Local Area Plan 2017-2023 identifies an objective for road and footpath improvements along the Dublin Road. To allow for this, the building line along the Dublin Road corridor has been set back to ensure appropriate cycle and pedestrian facilities can be introduced in the future by the Planning Authority. Whilst no scheme has been developed to date by the Planning Authority, this allows for sufficient space that will be compatible with numerous potential future cycle schemes on the Dublin Road corridor. As will be discussed later in this TTA report, a meeting took place between DBFL and KCC Roads / Sustainable Transport departments with the aim of determining the likely future cycle infrastructure along the Dublin Road corridor. The subject site layout incorporates a 2m wide footpath and 2m wide cycle track within the site boundary on the southern side of the Dublin Road corridor. Should an alternative arrangement be preferred, this can be easily incorporated into the subject scheme due to the significant set back proposed at this location. In the interim (before a cycle scheme along the Dublin Road corridor is developed), the proposed cycle and pedestrian link through the subject lands offers a safe and attractive connection between the Dublin Road corridor and existing cycle facilities on Shinkeen Road which in turn link with the Dublin Road corridor.

4.2.3 The proposed cycle facilities on the Shinkeen Road corridor within the subject sites red line boundary will take the form of cycle tracks with dedicated TOUCAN crossings on all arms of the proposed signal controlled junction. The proposed cycle tracks offer additional protection and Quality of Service (as per the National Cycle Manual) to cyclists along this corridor over and above the existing cycle lanes. At the extents of the red line boundary, the proposed cycle tracks will tie-into the existing cycle lane arrangement to the north and south.

4.2.4 For the majority of residents of the proposed development (Sites A & C equating to 80% of units), the most direct and convenient route to Celbridge Town Centre

is via the Shinkeen Road corridor as presented in **Figure 4.2** below. This figure compares the distances between a point within Site C and the Shinkeen Road / Dublin Road junction and illustrated that the route via Shinkeen Road is approx. 106m shorter than the alternative route via the Dublin Road corridor. Accordingly, the subject development is not dependent on the provision of dedicated cycle facilities along the Dublin Road corridor in order to facilitate travel to / from the development site by bicycle.

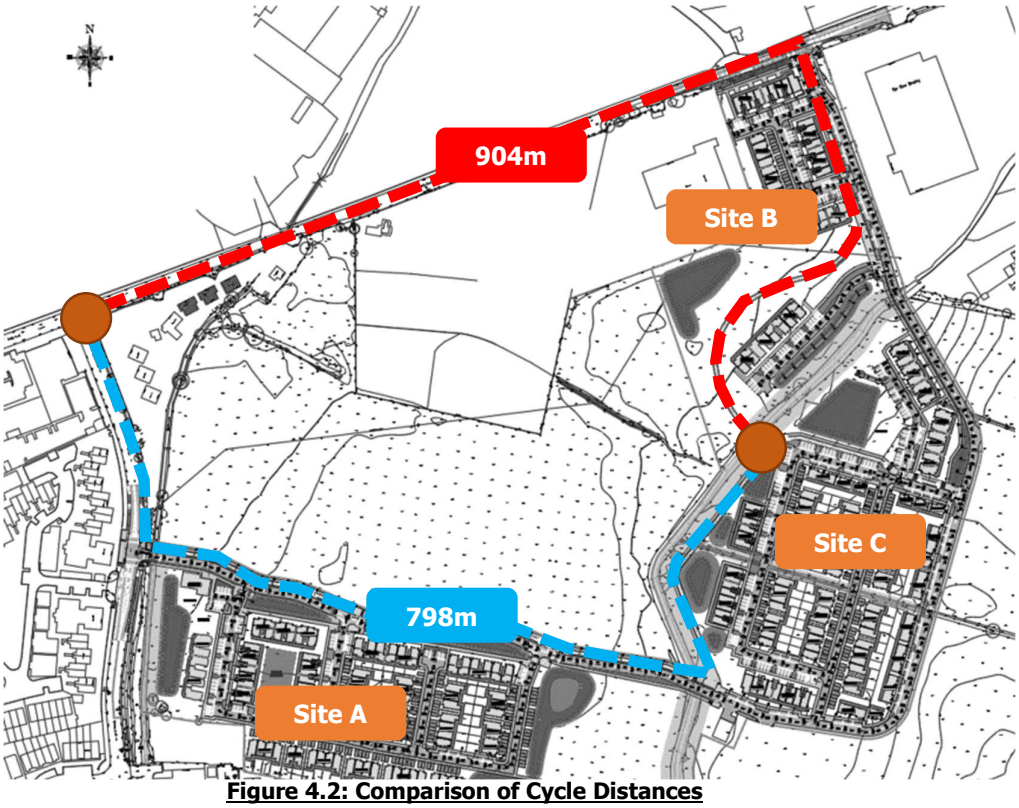


Figure 4.2: Comparison of Cycle Distances

4.2.5 In addition, the proposed development includes pedestrian infrastructure up to the application site boundary to facilitate potential future filtered permeable links with the existing residential settlement of Willow Crescent by way of 2 no. non-vehicular connections, subject to agreement.

4.2.6 The subject proposals also provide for the implementation of cycle / pedestrian facilities to the south and east for future connectivity with future development within the KDA2 lands.

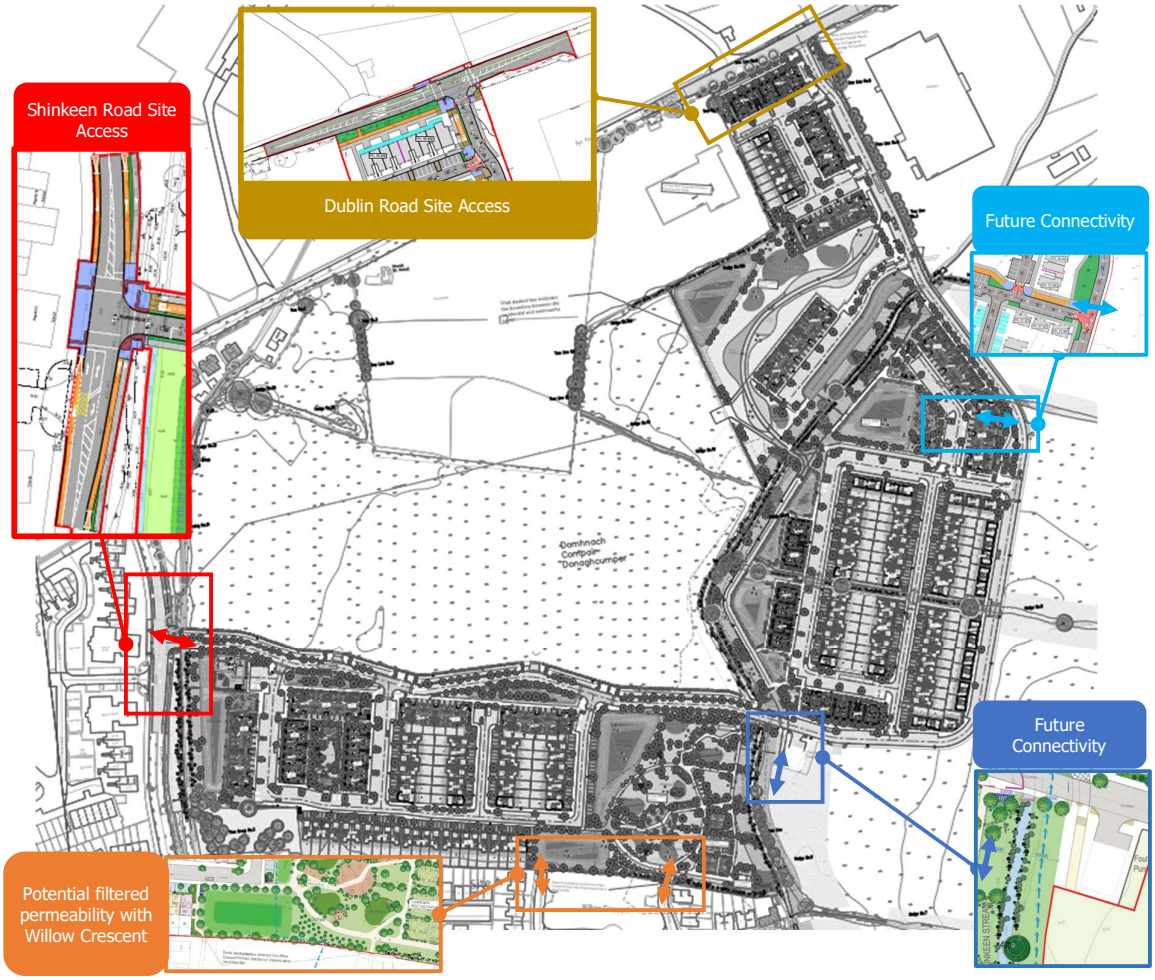


Figure 4.3: Proposed Phase 1 Pedestrian/Cyclist Access Points

Vehicular Access Arrangements

4.2.7 The main site access / egress will be via 2 no. new junctions including one on the Shinkeen Road and another on the R403 Dublin Road. Both junctions will take the form of signal controlled junctions as presented in **Figure 4.4** below. These accesses will also accommodate future vehicular access to the schools site and future residential development on the wider KDA 2 lands.

4.2.8 These site access junctions at SHD Planning Stage 2 were designed as priority controlled junctions based on the junction assessment revealing that a priority arrangement had sufficient capacity to cater for the subject development (and future schools traffic). Nevertheless, following a review of the KCC Opinion which recommended upgrading these junctions to be signal controlled, this approach has been incorporated into the scheme proposals.

4.2.9 The proposed new junctions include the provision of right turn lanes to ensure vehicles waiting to access the subject site do not delay traffic continuing straight.

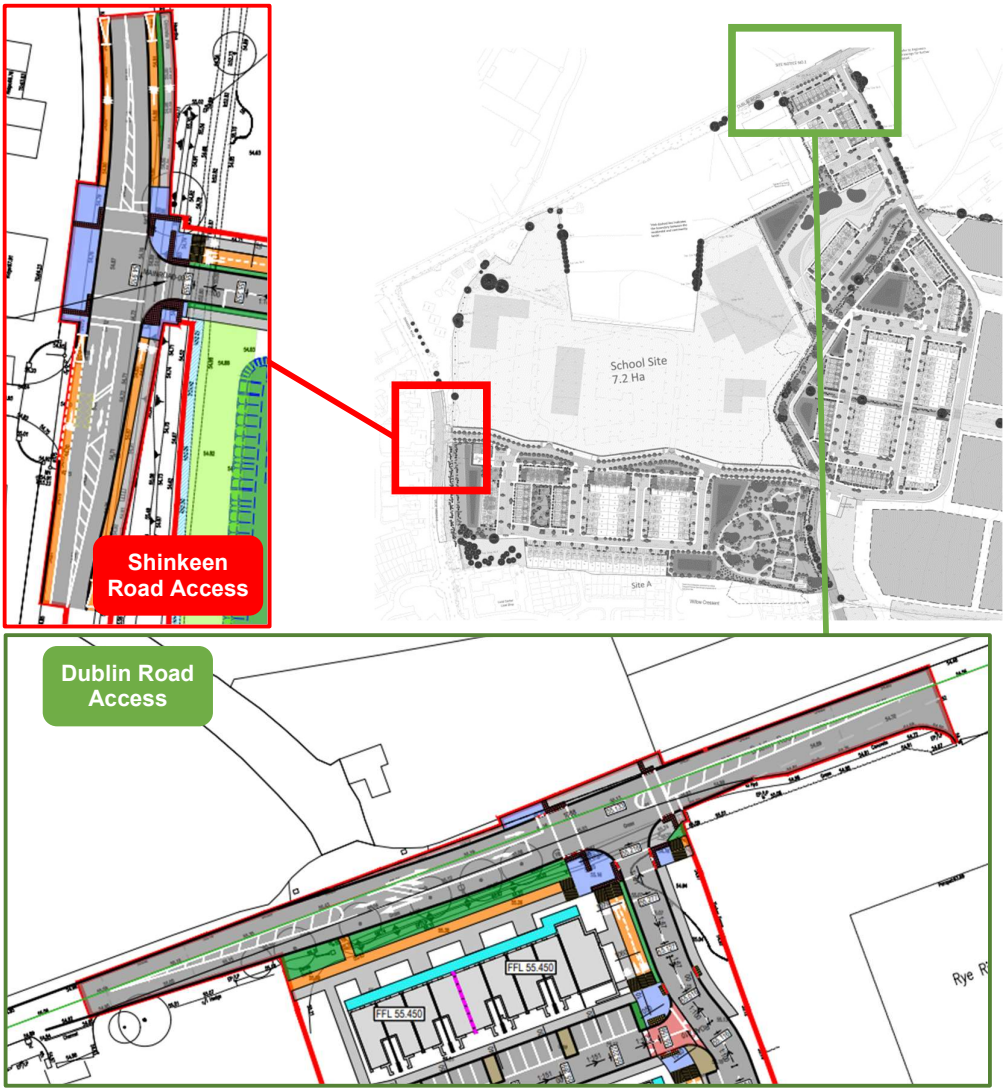


Figure 4.4: Proposed Site Access Junctions

4.2.10 The proposed location of the Shinkeen Road access junction has been positioned taking cognisance of maximising right turn lane length to allow vehicles turning right into the subject site from Shinkeen Road the ability to store within a dedicated right turn facility thereby maximising capacity for through traffic. The proposed layout has the added benefit of providing a right turn pocket for vehicle drivers wishing to turn right into The View development located on the western side of Shinkeen Road.

4.3 PROPOSED ROAD INFRASTRUCTURE

4.3.1 The subject proposals include for the provision of a new 6.5m wide "Local Distributor Road" between the aforementioned site access junctions located on Shinkeen Road and Dublin Road. In addition, provision has been made for 2 no. access locations to the aforementioned schools site to the north as well as links to future phases of the KDA2 lands to the east and south.

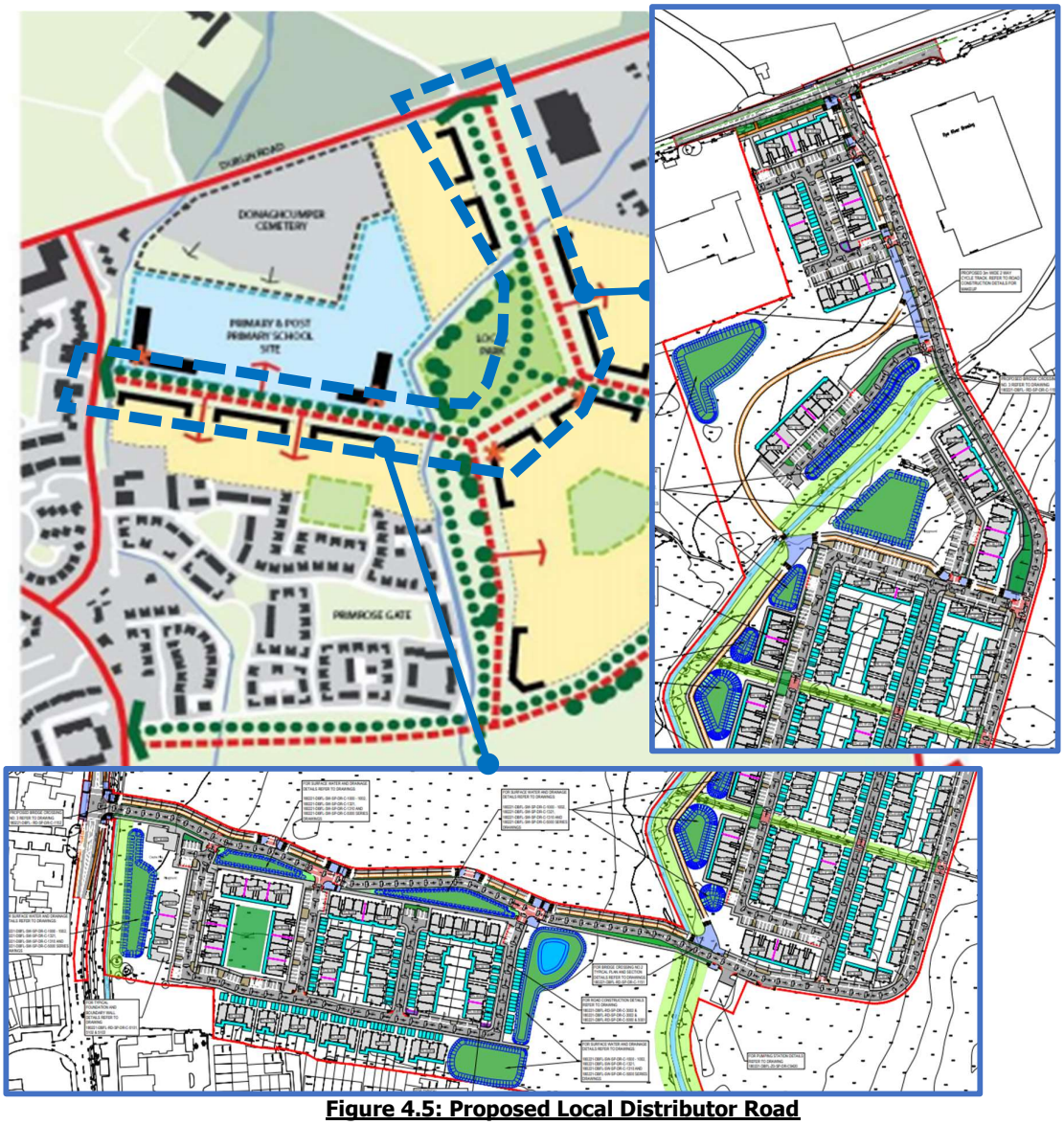


Figure 4.5: Proposed Local Distributor Road

4.3.2 Dedicated pedestrian footways are proposed along both sides of the corridor with a 2-way cycle track proposed on the northern / western side.

4.3.3 The proposed alignment has been designed to comply with the road / pedestrian / cycle objective indicatively illustrated in the Celbridge LAP (**Figure 4.5**).

4.3.4 The internal roads layout is consistent with the principles as set out in DMURS as discussed in more detail within the **DBFL Report 180221-DBFL-TR-XX-RP-0005**. Speed reduction has been achieved through the introduction of horizontal deflection and supplementary raised tables at crossing points and junctions. Along straight sections, on-street parallel parking with associates buildouts incorporating planting has been provided in order to reduce the perceived width of the carriageway through the impact of a sense of enclosure.

4.4 PROPOSED CYCLE INFRASTRUCTURE

4.4.1 As introduced in the previous paragraphs, the subject scheme proposes the provision of a two-way off-road cycle track between the access junctions on the Shinkeen Road and Dublin Road corridors.

4.4.2 Between the Shinkeen Road (where cycle infrastructure is proposed by way of Toucan crossings and cycle tracks which will tie into existing cycle infrastructure on Shinkeen Road) and Site C (Section 1 in **Figure 4.6**), the proposed cycle track will operate to the north of and parallel to the road carriageway segregated by way of a grass verge. This is considered the preferred arrangement for the cycle track as it provides a safer option for future school children who will be using the facility allowing for direct access to / from the school grounds negating the need to cross the proposed new road link.

4.4.3 At Site C, the proposed cycle track travels in a northbound direction between the western site boundary and Site C (Section 2 in **Figure 4.6**) until it reaches a proposed east-west cycle facility which will operate through Site C (Section 3 in **Figure 4.6**) allowing for a future connection to cycle infrastructure implemented as part of the wider KDA2 lands to the east.

4.4.4 Continuing northward from Site C, the proposed two-way cycle track will loop around the proposed duplex apartments as located at the southern section of Site B (Section 4 in **Figure 4.6**) before again travelling parallel along the proposed new road carriageway towards the Dublin Road (Section 5 in **Figure 4.6**) access. Finally, a cycle track is proposed on the southern side of Dublin Road which could tie into any future scheme implemented in the future.

4.4.5 The proposed cycle infrastructure through the subject KDA2 lands will implement two cycle / pedestrian infrastructure objectives identified within the Celbridge LAP.

The north-south link provides a safe and attractive cycle / pedestrian route between the Dublin Road site access and the existing cycle / pedestrian infrastructure on Shinkeen Road. This will significantly enhance the local cycle / pedestrian network creating a shorter safer cycle / pedestrian route between the Dublin Road corridor (for residents residing here) and Hazelhatch & Celbridge Train Station. This north-south pedestrian / cycle link will be further extended southwards as part of the Phase 2 development on the wider KDA 2 lands as far as the future Roads Objective MTO3.9 as introduced in **Chapter 3** of this TTA report.

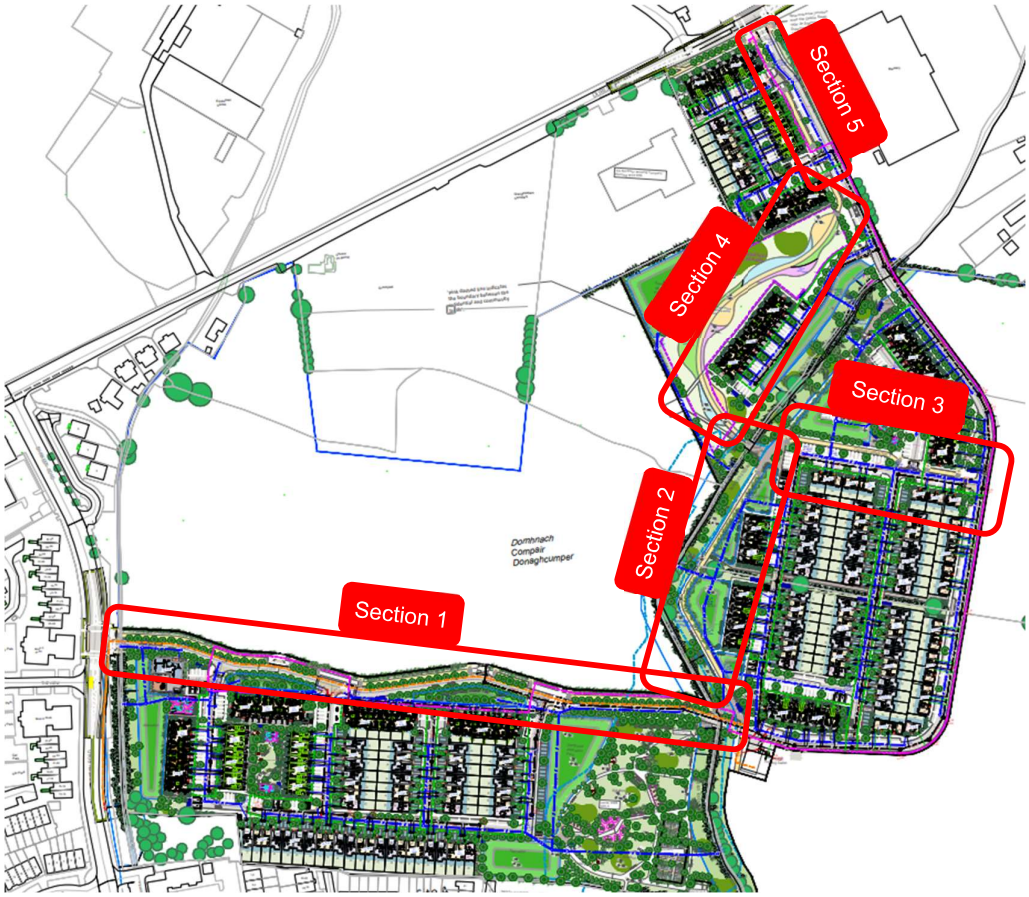


Figure 4.6: Proposed Cycle Infrastructure

4.4.6 Whilst it is noted that there is a gap in the cycle infrastructure provision between Supervalu and the Town Centre, and this was raised by KCC as part of the pre-application process, this TTA demonstrates that additional dedicated cycle facilities to the town centre are not required to support the Phase 1 development as the proposals will not generate a high level of cycle trips to / from the Town Centre to justify such a requirement. As discussed in more detail in **Chapter 5** of this TTA

report, the 2016 Census modal split data reveals that only 2% of local residents cycle to work, school or college equating. Applying this to the subject developments projected peak hour person trips amounts to only 5 no. and 6 no. two-way cycle trips in the AM and PM peak hours respectively. The proposed development incorporates pedestrian and cycle connections in accordance with the relevant objectives set out in the LAP. The introduction of a continuous route should be progressed separately by an Active Travel Scheme implemented by the local authority funded by the NTA and would not form part of the development. However, as noted above, sufficient set back has been incorporated along the frontage of the Dublin Road to allow for future provision.

4.5 CAR PARKING PROVISION

4.5.1 As indicated in **Table 4.2** below (and presented in **Appendix D**), a total of 585 (excluding loading bays) no. car parking spaces are proposed as part of the subject scheme comprising 479 no. resident (inclusive of 5 no. creche staff spaces) and 106 no. visitor car parking spaces (inclusive of 4 no. creche set down spaces). The proposed 106 no. visitor parking spaces equates to 18% of the overall car parking provision.

4.5.2 The proposed 585 no. car parking spaces is lower than the development plan requirement of 660 no. spaces (75 no. lower) however the provision of 260 car parking for residents of the houses is fully compliant with the KCC development plan requirement. The provision of 279 no. apartment / duplex car parking spaces, whilst lower than the development plan requirement, is fully compliant with the DHPLG requirement which requires between 268-285 no. car apartment / duplex car parking spaces.

4.5.3 Whilst the development plan does not require visitor parking for house units, a total of 37 no. visitor spaces have been provided comprising 5 no. at site A, 4 no. at Site B and 28 no. at Site C. The 28 no. at Site C are expected to perform a dual purpose for both the houses and visitors to the playground proposed within this area of the site.

Unit Type	No. of Units	KCC Requirements		DHPLG Requirement		Proposed	
		Visitor	Residents	Visitor	Residents	Visitor	Residents
House	130	260		-	-	37	260
Duplex / Apartment	214	54	321	54-71	214	65	214
Creche[1]	497m²	18	7	-	-	4	5
Total		**660**		**268-285 (553-570)[2]**		**585**	

Table 4.2: Comparison between Proposed and Required Car Parking Provision

4.5.4 A breakdown of proposed car parking provision per site is outlined in **Table 4.3** below. This table reveals that, on average, 1.30 car parking spaces are proposed for the apartment / duplex units (inclusive of visitor parking) whilst an average of 2.28 no. car parking spaces per house unit (inclusive of visitor parking) is proposed.

Site	Units Type	Unit Number	Residents Parking	Visitor Parking	Ratio
A	Apartment / Duplex	80	80	20	1.25 / unit
	House	51	102	5	2.10 / unit
B	Apartment / Duplex	63	63	21	1.33 / unit
	House	8	16	4	2.50 / unit
C	Apartment / Duplex	71	71	24	1.33 / unit
	House	71	142	*28**	2.39 / unit
Total-Apartment / Duplex		**214**	**214**	**65**	**1.30 / unit**
Total-Houses		**130**	**260**	**37**	**2.28 / unit**

* These can be used by visitors to the playground also

Table 4.3: Proposed Residential Car Parking Provision per Site

4.5.5 A car parking management regime will be implemented by the development's management company to control access to the on-site duplex / apartment car parking bays thereby actively managing the availability of on-site car parking for residents / visitors.

4.5.6 The residents within one of the proposed duplex / apartment units will NOT include the ownership of a designated parking space. Nevertheless, all residents of the proposed duplex / apartment units will have the opportunity to apply to the management company for both (i) a residents car parking permit (updated annually or upon return of same permit) to the management company to gain access to a dedicated (assigned) on-site car parking space or (ii) a visitor's car parking permit (which will be issued electronically and subject to time restrictions).

A nominal charge will be applied to obtain a permit with the objective of covering the associated management and enforcement costs.

4.5.7 Each permit will enable the resident (or visitor) to park a vehicle within a specific assigned parking bay for a defined period of time. This management regime will enhance the availability of on-site car parking, ensuring that every resident who needs car parking can avail of an on-site car parking space whilst residents that actually don't own a car are not unnecessarily assigned a car parking space.

4.5.8 A lower rate of dedicated crèche car parking is proposed compared to the maximum development plan requirement (16 fewer spaces). This neighbourhood focussed crèche is expected to predominantly cater for future residents of the subject Phase 1 development, adjacent residential settlements and potentially residents of future Phases within the wider KDA2 lands within a convenient walking / cycle catchment. Accordingly, it is predicted that the number of children being dropped off / collected by car will be significantly lower than it would be for a standalone crèche facility and therefore the maximum provision of car parking for the proposed crèche facility would likely be underutilised if provided.

4.5.9 In addition to the car parking provision summarised above, a total of 4 no. dedicated loading bay facilities are proposed including 2 no. within Site A, 1 no. within Site B and 1 no. within Site C. Loading bays have been incorporated into the design in response to the KCC Opinion.

Electrically Operated Vehicles

4.5.10 Whilst the current development plan does not specify a quantum of electric vehicle charging facilities that should be provided for residential schemes, the subject proposals include for the provision of 10% of apartments / duplexes and houses without on-curtilage parking spaces as per national policy. This equates to a total of 36 no. EV car parking spaces. The location of EV car parking spaces is presented in Appendix D of this TTA report. It is expected that residents of the house units which benefit from in-curtilage parking can utilise their private power source for the charging of electric vehicles.

4.5.11 In terms of individual dwelling house which benefit from on-curtilage parking (as presented in **Appendix D**), whilst it is not proposed as part of scheme proposals to provide an EV charge point, the design of the house units will be specified to allow the easy future installation of an EV Charging Point as and when individual

residents require. A dedicated circuit will be provided on the dwelling houses Consumer Unit with wiring / ducting to an external junction box on front/side of the dwelling house. This approach will allow purchasers to easily install an EV Charging Point with minimal disruptive works to the dwelling property and adjoining streetscape.

4.5.12 As introduced previously, the scheme proposals include for the implementation of 36 no. dedicated EV Charging Points for the apartment units, houses with in-street parking and visitor spaces. These will be available for residents from initial occupation of these units. In addition, as part of the scheme proposals ducting will be provided throughout the on-street car parking areas with the objective of ensuring that additional EV charge point units can be easily retrofitted in the future when demand may arise.

Disabled Parking

4.5.13 The subject development proposals include for a total of 22 no. disabled car parking spaces. A minimum of 1 disabled space per 25 standard spaces up to the first 100 spaces and 1 disabled space for every 100 spaces thereafter are to be provided. This equates to a minimum of 4 no. disabled car parking spaces (excluding the in-curtilage car parking spaces) within each of the sites plus 1 at the creche. The proposals include for the following disabled car parking provision per site: -

- Site A – 8 no. for the residential units and 2 no. for the creche
- Site B – 4 no. for the residential units and
- Site C – 8 no. for the residential units.

4.5.14 Accordingly, the proposed provision of 22 no. disabled car parking spaces complies with the local development management standards.

4.6 BICYCLE PARKING PROVISION

4.6.1 The proposals include the provision of a total of 770 no. bicycle parking spaces / opportunities on-site comprising 272 no. short stay spaces and 498 no. long stay spaces / opportunities.

4.6.2 The proposed 272 no. short stay cycle parking spaces is significantly higher than the development plan and DHPLG requirements (both require 114 no. short stay

spaces).

4.6.3 The long stay apartment / duplex cycle parking provision of 238 no. spaces is also higher than the development plan requirement but lower than the DHPLG requirement which require at least 217 no. and 504 no. long stay cycle parking spaces respectively.

4.6.4 It is noted that the development plan does not specify a rate of cycle parking for residential house units, nevertheless, the subject proposals include for 2 dedicated spaces within cycle stores per terrace house whilst semi-detached and detached houses with a side access to rear gardens can benefit from cycle parking opportunities on curtilage. In addition, short stay cycle parking has been provided for housing units, by way of Sheffield stands, throughout the subject site at a rate of approx. 1 / 3 houses. **Table 4.3** below provides a summary of the quantum of cycle parking proposed in comparison to the Development Plan and DHPLG requirements. Cycle parking for the apartment / duplex units are facilitated by way of one long stay and one short stay space per unit provided on-curtilage with an additional 24 no. long stay apartment spaces within secure bike stores.

4.6.5 It is acknowledged that the long stay cycle parking for the apartment / duplex units does not fully align with the Apartment Guidelines 2020 requirements, however the proposed cycle provision of 452 no. secure bicycle spaces is considered to represent a compromise between the Development Plan requirements (which equates to a requirement of 321 no. spaces) and the Apartment Guidelines 2020 requirements (which equate to a recommendation for 611 no. spaces to be provided). The level of cycle parking provision is considered appropriate and justified in the context of the site location, public transport accessibility, the quantum of car parking proposed, and is supported by the Guidelines which states that *"any deviation from these standards shall be at the discretion of the planning authority and shall be justified with respect to factors such as location, quality of facilities proposed, flexibility for future enhancement/enlargement, etc."*

4.6.6 A total of 13 no. cycle parking spaces are proposed for the creche which is compliant with the 13 no. required as per the KCC development plan standard.

Description	KCC Requirements		DHPLG Requirements		Proposed		
	Short Stay	Long Stay	Short Stay	Long Stay	Short Stay	Long Stay	
						On Curtilage	Store
Houses	-	-	-	-	45	164	96
Apartment /Duplex	107	214	107	504	214	214	24
Creche[1]	7	3	-	-	13		-
Totals	**114**	**217**	**107**(114)[2]	**504**(507)[2]	**272**	**498**	
	331		**611**(621)[2]		**770**		

1 70 children, 14 staff; 2 Includes KCC parking requirement for houses and creche

Table 4.3: Proposed Cycle Parking Provision

5.0 TRIP GENERATION AND DISTRIBUTION

5.1 INTRODUCTION

5.1.1 The following paragraphs present the process by which the potential level of person and vehicle trips associated with the future residential development have been generated.

5.2 CURRENT TRANSPORT MODAL SPLIT

5.2.1 The Central Statistics Office's SAPMAP (Small Areas Population Map) data has been investigated to determine the travel trends within the local vicinity of the subject residential development. SAPMAP is an interactive mapping tool that allows users to pinpoint a location on the map and access 2016 census data related to that area.

5.2.2 A number of residential developments close to the subject site were analysed to establish current commuter trends in the local area. This analysis will form the basis of the initial travel characteristics that could be generated by the proposed residential development.

5.2.3 **Figure 5.1** below illustrates the areas selected for this analysis. These residential sites were selected due to their proximity to the subject site and as such best represents the development's future travel trends (at least in the short term).

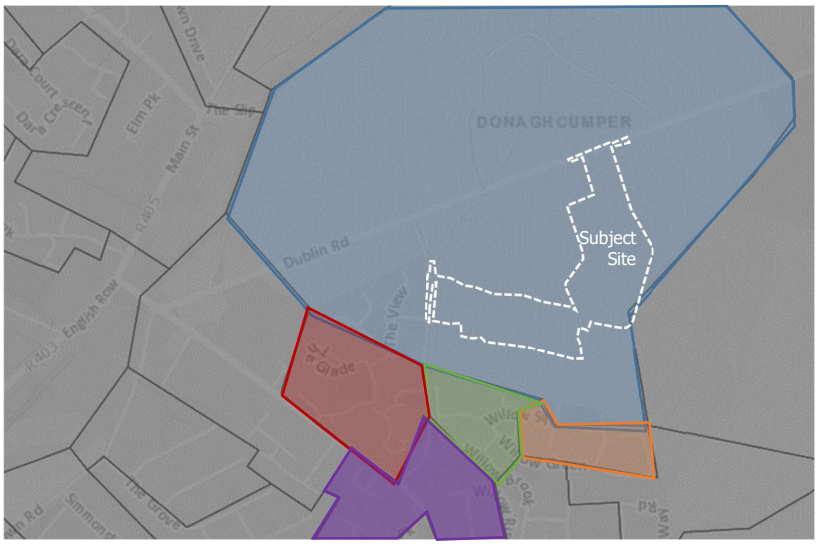


Figure 5.1: Residential Areas of Interest for Trend Analysis
(Source : http://census.cso.ie/sapmap/)

5.2.4 The analysis highlights the existing trend in modes used by the residents when travelling to work, school / college from their homes. The summary of the 2016 data for the aforementioned 5 selected areas are illustrated in **Figure 5.2** below.

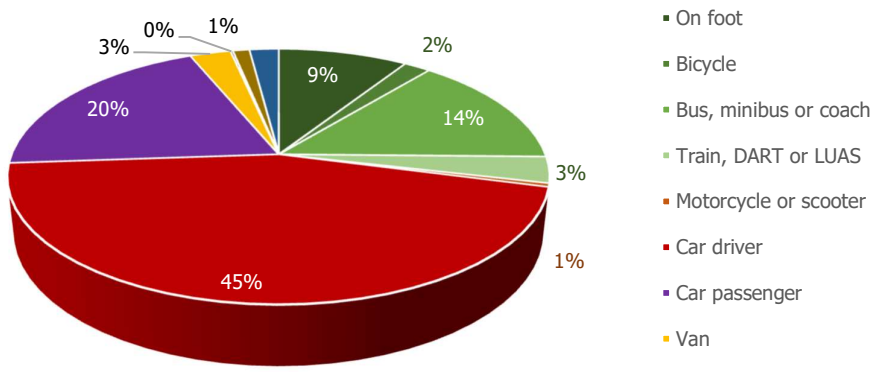


Figure 5.2: 2016 Modal Split for Existing Residential Developments

5.2.5 The above graph indicates that travel by car is the primary mode of transportation in the study area with 65% of residents travelling to work / school / college by car comprising 45% as a car driver and 20% as car passenger.

5.2.6 17% of residents travelling to work / school / college use public transport (14% by bus, 3% by rail).

5.2.7 The analysis reveals that 11% of trips are undertaken using active modes of travel whilst active travel comprising 9% on foot and 2% by bicycle.

5.3 TRAFFIC SURVEYS

5.3.1 With the objective of establishing the existing up to date local road networks traffic characteristics and subsequently enable the identification of the potential impact by the residential development, traffic surveys were undertaken by the independent specialist survey firm Nationwide Data Collection.

5.3.2 JTCs (Junction Turning Count) were conducted over a 12-hour period from 07:00 to 19:00 on Tuesday 21st September 2021 at the following key junctions;

- **JTC 1**: R405 (E) / Main St. R405 (N) / R403 (S) Priority Junction
- **JTC 2**: Dublin Rd (R403) (NE) / R405 (SE) / Newtown Rd (S) /R405 (NW) Priority Junction
- **JTC 3**: Newtown Rd / Simmonstown Manor Priority Junction.

- **JTC 4**: R405 / Hazelhatch Park Access Priority Junction.
- **JTC 5**: R405 / Shinkeen Rd Priority Junction.
- **JTC 6**: Dublin Rd (R403) / Shinkeen Rd Signalised Junction.
- **JTC 7**: Dublin Rd (R403) / Loughlinstown Rd Priority Junction.
- **JTC 8**: Dublin Rd (R403) / Stacumny Lane / R404 Signalised Junction.

5.3.3 In addition , Queue Length surveys have been undertaken at JTC locations 1 to 7.

5.3.4 Two automatic turning count (ATC) surveys were also conducted on the Dublin Road and Shinkeen Road corridors in the vicinity of the proposed site access locations.

5.3.5 The surveys undertaken by Nationwide Data Collection established that the local network's AM and PM peak hours occur between 08:00 – 09:00 and 17:00 – 18:00 respectively.

5.3.6 In order to analyse and assess the impact of the proposed development on the surrounding road network, a traffic generation and distribution model (MS Excel based) of the following key junctions was created (as agreed with KCC) as illustrated in **Figure 5.3**:

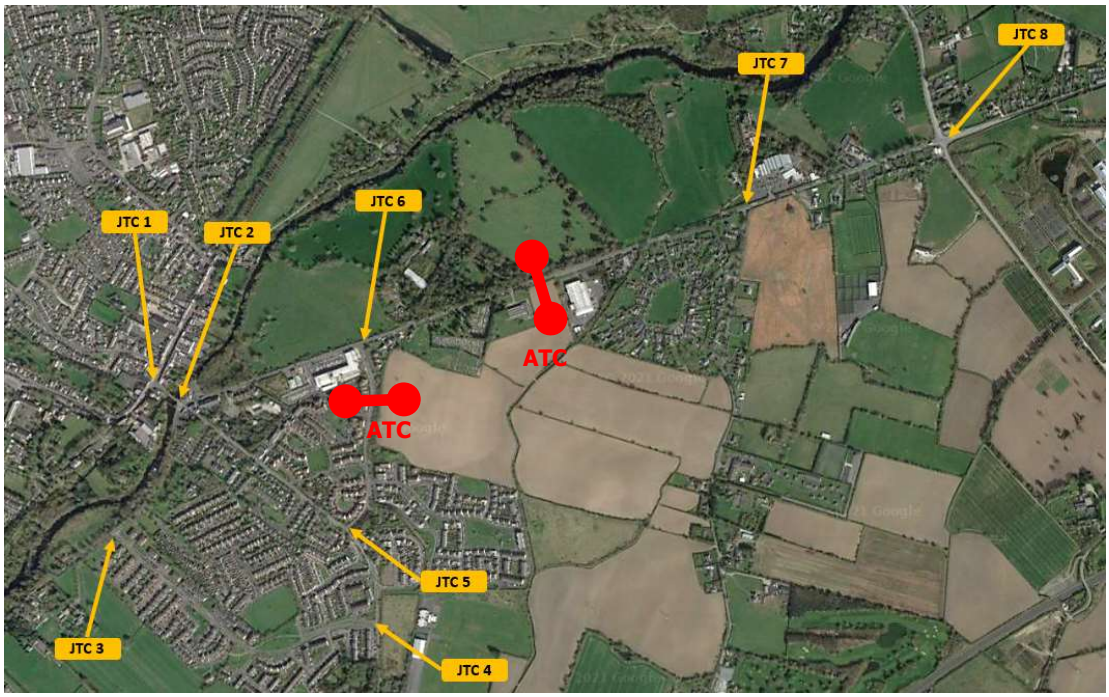


Figure 5.3: Junctions Included Within the Network Analysis

5.4 TRIP GENERATION – PROPOSED DEVELOPMENT

5.4.1 It is predicted, particularly in the 2024 Opening Year, that the residents travel mode share will be similar to that illustrated in **Figure 5.2** (local area 2016 Census data). Nevertheless, with the objective of investigating the long term vehicle trip demand that could potentially be generated by the proposed development, trip rates have been derived from the TRICS database for residential developments with similar characteristics to the subject development site. These vehicle trip rates as predicted by TRICS are presented in **Table 5.3** and **5.4** below.

Person Trips

5.4.2 Based on the mode share proportions derived from the Census 2016 data in **Section 5.1** above, the total person trips can be estimated.

5.4.3 It has been assumed that the predicted vehicle trips generated by the subject residential development correspond to the proportion of vehicle trips derived within the Census mode share data. **Table 5.1** below presents the predicted person trips generated by the subject residential development during the AM and PM peak hours.

Mode of Travel	Average Mode Share (%)	AM Peak Hour		PM Peak Hour	
		Arr	Dep	Arr	Dep
On Foot	9.1%	6	20	20	11
Bicycle	1.9%	1	4	4	2
Bus, minibus or coach	14.3 %	10	31	31	18
Train	3.3%	2	7	7	4
Motorcycle or scooter	0.4%	0	1	1	1
Car driver	44.8%	31	97	96	56
Car Passenger	19.8%	14	43	43	25
Van	2.9%	2	6	6	4
Total Person Trips		**69**	**216**	**215**	**125**

Table 5.1: Proposed Residential Predicted Person Trips

Sustainable Travel Based Trips

5.4.4 In reference to the baseline modal split data presented in **Table 5.1** (Census Data) for the local area, it has been possible to estimate the number of trips undertaken by sustainable modes of travel that the proposed development could generate in the peak travel periods i.e. (0600-1000 in the AM and 1600-2000 in the PM). The predicted AM and PM peak period trips are presented in **Table 5.2** below.

Peak Period	PT Rail Trips	PT Bus Trips	Cycling	Walking
AM (06:00-10:00)	23	98	14	63
PM (16:00-20:00)	35	146	21	94

Table 5.2: Potential Two-Way Development Trips by Sustainable Modes of Travel

Proposed Development Vehicle Trips

5.4.5 To estimate the potential level of vehicle trips that could be generated by the proposed residential development, reference has been made to the TRICS database. TRICS provides trip rate information for a variety of different land uses and development types, which can be applied to the subject development.

5.4.6 A review of trip generation factors contained within the TRICS database was carried out. TRICS data is primarily UK based, although a number of Irish sites have recently been included and the number of Irish sites continues to expand. Nevertheless, we consider that TRICS will provide a reasonable indication of traffic generation from the proposed development.

5.4.7 Notwithstanding the above, internal research undertaken by TRICS has shown that there is no direct evidence of trip rate variation by country or region. The use of English, Scottish or Welsh data can be equally applicable to Ireland if users take into account important site selection filtering factors such as levels of population, location type, local public transport provision, and development size and car ownership level, amongst others.

5.4.8 Data supplied for inclusion in TRICS undergoes a procedure of validation testing, and there is no evidence from this procedure suggesting that data from Ireland bears any significant fundamental differences to that from the other countries included. Consequently, we consider that TRICS will provide a reasonable indication of traffic generation from the proposed development.

5.4.9 **Table 5.3** below includes the predicted trip rates for the proposed development during the morning and evening peak hour periods using data from TRICS.

5.4.10 Based on these trip rates, potential peak hour vehicle traffic flow has been calculated for the proposed development. For the purposes of the subject traffic assessment it has been assumed that, by the end of the adopted 2024 Opening Year, Phase 1 of the proposed development will be complete which includes all units within Site A (i.e. 80 no. apartments / duplexes, 51 no. houses and creche). However in reality, this could roll into 2025 allowing for unforeseen circumstances.

Land Use	No. Units / GFA	AM Peak Hour (07:45-08:45)			PM Peak Hour (17:00 - 18:00)		
		Arr	Dep	Two-Way	Arr	Dep	Two-Way
House	**130**	0.172	0.510	0.682	0.423	0.266	0.689
Apartments / Duplex	**214**	0.041	0.142	0.183	0.193	0.101	0.294
Creche	**497 sq.m**	4.78	3.46	8.24	3.26	4.25	7.51

Table 5.3: Proposed Development Trip Rates (TRICS)

5.4.11 It has been assumed that the vast majority of creche trips would be internal (i.e., trips generated by the residents themselves) whilst a small proportion of the trips would be external or 'new' (i.e., creche trips from outside the development). Accordingly, the creche TRICS derived trips rates have been discounted by a factor of 40% to account for this.

5.4.12 **Table 5.4** below summarises the predicted AM and PM peak hour traffic generated by the proposed development.

Land Use	No. Units / GFA	AM Peak Hour (07:45-08:45)			PM Peak Hour (17:00 - 18:00)		
		Arr	Dep	Two-Way	Arr	Dep	Two-Way
Apartments / Duplexes	80	3	11	15	15	8	24
Houses	51	9	26	35	22	14	36
Creche	497 sq.m	14*	10*	25*	104*	13*	22*
Total		**23**	**36**	**60**	**31**	**26**	**58**

*Creche Trips discounted by 40%

Table 5.4: Proposed Development Potential Vehicle Trips – 2024 Opening Year

5.4.13 By the 2029 Future Design Year, it has been assumed that the remaining residential units within Phase 1 could be complete and occupied. The total Phase 1 potential vehicle trip generation is summarised in **Table 5.5** below.

Land Use	No. Units / GFA	AM Peak Hour (07:45-08:45)			PM Peak Hour (17:00 - 18:00)		
		Arr	Dep	Two-Way	Arr	Dep	Two-Way
Apartment / Duplex /	220	9	31	40	42	22	65
Houses	130	21	63	84	52	33	85
Creche	497 sq.m	14*	10*	25*	104*	13*	22*
Total		**45**	**107**	**152**	**106**	**69**	**175**

Table 5.5: Proposed Development Potential Vehicle Trips – 2029 Future Design Year Onwards

5.5 TRIP GENERATION - COMMITTED DEVELOPMENTS

Introduction

5.5.1 Following a review of the KCC online planning portal, DBFL have established the extent of existing third party development, as located within the area of influence of the subject KDA residential development, which currently benefit from a planning permission but have yet to be constructed/occupied and could generate a significant level of traffic on the local road network. DBFL have subsequently included the following 3 no. third-party development proposals as 'committed development' within the network assessment.

Oldtown Residential Development (Ref: ABP-303295-18)

5.5.2 The Oldtown residential development (ABP Ref. No. ABP-303295-18) is located at the western end of Celbridge. It is bounded to the north by Oldtown Road and to the east by Shackleton Road. The development consists of 251 no. residential units comprising 167 no. houses, 84 no. apartments and a creche.

5.5.3 Also included is the upgrading of the existing junction at the corner of Shackleton Road and Oldtown Road to accommodate a new filter lane and crossing point; and the provision of new vehicular entrance onto Shackleton Road and two new vehicular entrances onto Oldtown Road. Planning was granted, with conditions, in April of 2019 and as of October 2021, several houses have been occupied.

5.5.4 The vehicle trips associated with this committed development were retrieved from the Traffic and Transport Assessment submitted as part of the development's planning application. These vehicle trips were included in the subject development's Traffic Model in order to assess the impact of the Ballyoulster development on the surrounding network in addition to the subject development's impact. **Table 5.6** below summarises the peak hour AM and PM traffic generated by the committed residential development.

No. Units	AM Peak Hour (07:45-08:45)			PM Peak Hour (17:00 - 18:00)		
	Arr	Dep	Two-Way	Arr	Dep	Two-Way
251	17	67	84	49	27	76

Table 5.6: Committed Development (Ref: ABP-303295-18) Traffic Generation

Residential Development at Crodaun, Celbridge (Ref: ABP-306504-20 & 309361-21)

5.5.5 The committed residential development at Crodaun (ABP Ref. No. ABP-306504-20 & 309361-21) is located to the north of Celbridge Town Centre. The development consists of 372 (reduced to 352 as part of amendment) no. residential units.

5.5.6 The vehicle trips associated with this committed development were retrieved from the Traffic and Transport Assessment submitted as part of the development's planning application. These vehicle trips were included in the subject development's Traffic Model in order to assess the impact of the Ballyoulster development on the surrounding network in addition to the subject development's impact. **Table 5.7** below summarises the peak hour AM and PM traffic generated by this committed residential development.

No. Units	AM Peak Hour (07:45-08:45)			PM Peak Hour (17:00 - 18:00)		
	Arr	Dep	Two-Way	Arr	Dep	Two-Way
272	39	125	163	84	51	135

Table 5.7: Committed Development (Ref: ABP-306504-20 & 309361-21) Traffic Generation

Residential Development at Crodaun, Celbridge (Ref: ABP-307100-20)

5.5.7 The committed residential development at Crodaun (ABP Ref. No. ABP-307100-20) is located to the north of Celbridge Town Centre. The development consists of 467 no. residential units.

5.5.8 The vehicle trips associated with this committed development were retrieved from the Traffic and Transport Assessment submitted as part of the development's planning application. These vehicle trips were included in the subject development's Traffic Model in order to assess the impact of the Ballyoulster development on the surrounding network in addition to the subject development's impact. **Table 5.8** below summarises the peak hour AM and PM traffic generated by this committed residential development.

No. Units	AM Peak Hour (07:45-08:45)			PM Peak Hour (17:00 - 18:00)		
	Arr	Dep	Two-Way	Arr	Dep	Two-Way
467	73	174	247	165	92	257

Table 5.8: Committed Development (Ref: ABP-307100-20) Traffic Generation

5.6 POTENTIAL FUTURE DEVELOPMENT

5.6.1 As introduced previously, the subject scheme represents Phase 1 of the overall development on the subject KDA2 lands. Lands to the north are zoned for educational land uses whilst the wider KDA2 lands to the east and south are zoned for residential land uses. In the interest of assessing the potential cumulative impact of the entire development on the KDA2 lands at the proposed access junctions on Shinkeen Road and Dublin Road, 2 no. sensitivity analyses have been undertaken. Sensitivity Analysis 1 considers the impact of including the traffic generated by the future schools site whilst Sensitivity Analysis 2 considers Sensitivity Analysis 1 plus future residential development on the wider KDA2 lands. A description of the potential future developments within the KDA2 lands is described in the following paragraphs.

Primary, Post Primary and Special Needs Schools

5.6.2 Further to the committed development outlined above, a parcel lands within the subject KDA2 lands is zoned E: Community and Education. Correspondence from the DOES confirmed that the proposals for the schools on this parcel of lands are at a preliminary stage and an indicative layout only has been produced. However, a preliminary school travel plan has been provided which has allowed for the estimation of travel by car for each of the proposed schools based on number of pupils / staff and the predicted modal split for each of the three schools which is considered a standard approach for determining trip generation for educational development proposals. A summary of the predicted school vehicle trips is summarised in **Table 5.9** below.

School	Number		Vehicle Mode Share	Vehicle Trips	
	Pupils	Staff		Pupils	Staff
Post Primary	1000	67	33%	330	22
Primary	448	30		148	10
Special	120	30	50%	60	15
Total	**1568**	**127**	-	**538**	**56**

Table 5.9: Future Schools Vehicle Trips

5.6.3 It is noted that not all the pupils will arrive during the local road network's AM peak hour and that they will depart sooner that the local road network's PM peak hour. Accordingly, the following assumptions have been incorporated in the interest of determining AM and PM peak hour traffic: -

- 90% of pupils arrive during the AM peak hour
- 10% of pupils depart during the PM peak hour
- Average of 2 pupils per vehicle
- All staff arrive during the AM peak hour
- 30% of staff depart during the PM peak hour

Description	AM Peak Hour (08:00-09:00)			PM Peak Hour (17:00 - 18:00)		
	Arr	Dep	Two-Way	Arr	Dep	Two-Way
Staff	47	0	47	0	14	14
Pupils	242	242	484	27	27	54
Total	**289**	**242**	**531**	**27**	**41**	**68**

Table 5.10: Future Schools Predicted Peak Hour Vehicle Trips

5.6.4 The 'cumulative' assessment incorporating the potential school traffic has been undertaken as part of Sensitivity Analysis 1 as summarised in **Chapter 8** of this TTA report.

Potential Future Residential Development

5.6.5 Further to the committed development outlined above, an assessment of the potential impact of 3rd party development on the remaining KDA2 development lands has been undertaken. For the purposes of this assessment, it has been assumed that the remaining lands could accommodate somewhere in the region of 850 no residential units (as informed by the development strategy for the KDA2 lands) comprising 65% apartment / duplex units and 35% houses. The 'cumulative' assessment has been undertaken as part of Sensitivity Analysis 2 as summarised in **Chapter 8** of this TTA report.

5.6.6 The location of the abovementioned committed developments and potential future developments included within the assessment relative to the subject Ballyoulster Phase 1 residential development is presented in **Figure 5.4**.

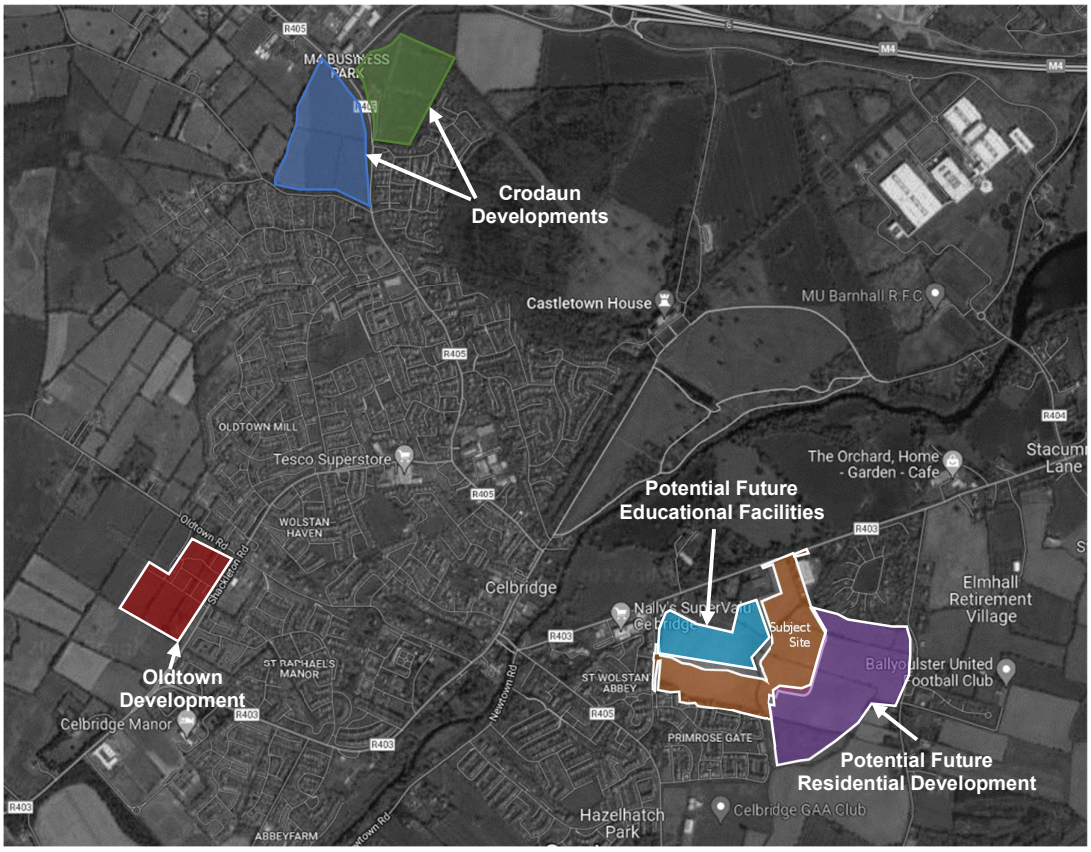


Figure 5.4: Committed Development and Potential Future Development Locations

5.7 TRIP REDISTRIBUTION

5.7.1 The proposed local distributor road through the subject KDA2 lands has been designed to reduce vehicle speeds through frequent accesses and changes to horizontal and vertical alignment and therefore reduce its attractiveness for use by non-development traffic. Nevertheless, the potential exists for a proportion of existing network traffic travelling between the Shinkeen Road and Dublin Road corridors to utilise the proposed new road infrastructure through the subject lands as an alternative route. Accordingly, a redistribution exercise has been undertaken to account for this where a redistribution factor of 25% has been applied to the base network traffic that currently travels southwards along the Dublin Road corridor turning left into Shinkeen Road and traffic currently travelling westwards along Shinkeen Road turning right onto the Dublin Road corridor.

5.8 TRIP DISTRIBUTION & ASSIGNMENT

5.8.1 The associated development vehicle trips have been assigned to the surrounding road network based on the following key Origin-Destination assumptions;

- Dublin / Lucan / Leixlip – 50%
- Northwest via Celbridge Town Centre – 27%
- West / Southwest via Newtown Road – 3%
- South via R405 – 20%

5.8.2 The distribution of proposed development traffic as proposed by DBFL is presented in **Figure 6** as included in **Appendix A** of this report. The subject development trips have been distributed to the surrounding road network based on the existing observed traffic movements.

5.9 TRAFFIC GROWTH

5.9.1 The TTA adopts an Opening Design Year of 2024, Interim Year of 2029 (+5 years) and Future Horizon Year of 2039 (+15 years) as per TII guidelines. Although traffic growth may not increase at the rates once predicted, to ensure a robust analysis of the impact of traffic upon the local road network we have adopted growth rates using the Transport Infrastructure Ireland (TII) "Travel Demand Projections".

5.9.2 Table 6.1 (Unit 5.3 – Travel Demand Projections) within the TII Project Appraisal Guidelines provides Link-Based Annual Traffic Growth Factors for the different regions within Ireland. The subject site lies within 'Kildare' with the growth factors as outlined within **Table 5.11** below.

County	Low Sensitivity Growth				Central Growth				High Sensitivity Growth			
	2016-2030		2030-2040		2016-2030		2030-2040		2016-2030		2030-2040	
	LV	HV	LV	HV	LV	HV	LV	HV	LV	HV	LV	HV
Kildare	1.0180	1.0363	1.0044	1.0135	1.0197	1.0378	1.0062	1.0155	1.0229	1.0413	1.0098	1.0191

Table 5.11: Link-Based Growth Rates: Annual Growth Factors
(Extract from Table 6.1 PAG Unit 5.3)

5.9.3 Applying the annual factors (Central Growth) as outlined above for the adopted Opening Year of 2024, Interim Year 2029 (+5 years) and Future Horizon Year of 2039 (+15 years), the following growth rates have been adopted to establish corresponding baseline network flows: -

- 2021 to 2024 – 1.0494 (or 4.9%);
- 2021 to 2029 – 1.1372 (or 13.7%); and
- 2021 to 2039 – 1.2366 (or 23.7%).

6.0 TRIP GENERATION AND DISTRIBUTION

6.1 ASSESSMENT SCOPE

Assessment Scenarios

6.1.1 Two different traffic scenarios have been assessed, namely (a) the 'Do-Nothing' traffic characteristics and (b) the 'Post Development' (Do-Something) traffic characteristics.

6.1.2 The 'Base' traffic scenario takes into account the potential level of traffic that could be generated by the 'committed developments' in addition to the existing flows (with TII growth rates applied) travelling across the network. The proposed development traffic flows are then added to the network's 'Do Nothing' (Base + Committed Development) traffic flows to establish the new 'Post Development' traffic flows. In summary, the following scenarios have been investigated:

Do-Nothing

- A1 – 2024 Opening Year Base Flows + Committed Developments
- A2 – 2029 Interim Year Base Flows + Committed Developments
- A3 – 2039 Future Year Base Flows + Committed Developments

Do-Something

- B1 – 2024 Do-Nothing (A1) redistributed + Proposed Development Flows
- B2 – 2029 Do-Nothing (A2) redistributed + Proposed Development Flows
- B3 – 2039 Do-Nothing (A3) redistributed + Proposed Development Flows

Assessment Periods

6.1.3 The network's AM and PM peak hour flows have been identified as occurring between 08:00 to 09:00 and 17:00 to 18:00 respectively. The following figures as included in **Appendix A** present the vehicle flows across the local road network for each of the adopted development scenarios: -

- Figure 11 – 2024 Do-Nothing (A1)
- Figure 12 – 2029 Do-Nothing (A2)
- Figure 13 – 2039 Do-Nothing (A3)
- Figure 20 – 2024 Do-Something (B1)
- Figure 21 – 2029 Do-Something (B2)
- Figure 22 – 2039 Do-Something (B3)

6.2 ROAD NETWORK IMPACT

6.2.1 The Transport Infrastructure Ireland (TII) document 'Transport Assessment Guidelines (2014)' states that the impact of a proposed development upon the local road network is considered material when the level of traffic it generates surpasses 10% and 5% on normal and congested networks respectively. When such levels of impact are generated, a more detailed assessment should be undertaken to ascertain the specific impact upon the network's operational performance.

6.2.2 **Table 6.1** details the specific scale of network impact predicted at each of the key local junctions during the 2024, 2029 and 2039 design years as a result of the subject Phase 1 development proposals. For the all key off-site junctions, it can be seen that the proposed development would have sub-threshold impacts (i.e. <5% or 10%). Due to the redistribution of base traffic, slight improvements in the operation of the Dublin Road / Shinkeen Road signal controlled junction are predicted. However, as expected, significant impacts are predicted at the 2 no. site access locations and therefore, these junction will be subject to more detailed assessment in **Chapter 7** of this TTA.

Junction No.	Junction	Design Year	Percentage Impact	
			AM	PM
1	Proposed Access 1 (Shinkeen Rd)	2024	4.64%	4.42%
		2029	10.98%	12.40%
		2039	10.10%	11.41%
2	Proposed Access 2 (Dublin Rd)	2024	3.26%	3.00%
		2029	7.72%	8.43%
		2039	7.11%	7.76%
3	R405/Shinkeen Rd Junction	2024	1.15%	1.09%
		2029	2.73%	3.06%
		2039	2.53%	2.83%
4	Dublin Rd (R403)/Shinkeen Rd Junction	2024	-5.49%	-1.83%
		2029	-3.18%	1.08%
		2039	-3.51%	0.71%
5	Dublin Rd (R403)/Stacumny Lane/R404 Signalised Junction	2024	1.80%	1.63%
		2029	3.87%	4.53%
		2039	3.59%	4.18%
6	Dublin Rd (R403)/Loughlinstown Rd Junction	2024	2.23%	1.93%
		2029	5.30%	5.43%
		2039	4.88%	4.99%
7	R405/Willow Avenue Junction	2024	1.21%	1.11%
		2029	2.88%	3.12%
		2039	2.66%	2.88%
8	R405/Hazelhatch Park Access	2024	1.05%	1.00%
		2029	2.51%	2.80%
		2039	2.32%	2.59%

Junction No.	Junction	Design Year	Percentage Impact	
			AM	PM
9	Newtown Rd/Simmonstown Manor	2024	0.41%	0.37%
		2029	0.97%	1.05%
		2039	0.89%	0.96%
10	Dublin Rd (R403)/R405 (E)/Newtown Rd/R405 (W)	2024	1.00%	0.95%
		2029	2.39%	2.68%
		2039	2.21%	2.48%
11	R405 (E)/Main St. R405 (N)/R403 (S)	2024	0.90%	0.83%
		2029	2.15%	2.35%
		2039	1.99%	2.17%

Table 6.1: Network Impact Through Key Off Site Junctions

6.2.3 In **Table 6.2** (AM Peak Hour) and **Table 6.3** (PM Peak Hour) the predicted impacts have been categorised for the 2039 future design year.

6.2.4 **Table 6.2** reveals that, during the AM peak hour, the impact significance of the subject proposals are categorised as ***Imperceptible*** to ***Not Significant*** at all key off-site junctions. At the future site access locations, the impacts are classified as ***Slight*** to ***Moderate***.

Junction - Nature of Impact (Additional Vehicular Traffic on key Junctions)		Impact Scale	Impact Significance	Impact Effect
1	Proposed Access 1 (Shinkeen Rd)	10.10%	Moderate	Negative
2	Proposed Access 2 (Dublin Rd)	7.11%	Slight	Negative
3	R405/Shinkeen Rd Junction	2.53%	Not Significant	Negative
4	Dublin Rd (R403)/Shinkeen Rd Junction	-3.51%	Not Significant	Positive
5	Dublin Rd (R403)/Stacumny Lane/R404 Signalised Junction	3.59%	Not Significant	Negative
6	Dublin Rd (R403)/Loughlinstown Rd Junction	4.88%	Not Significant	Negative
7	R405/Willow Avenue Junction	2.66%	Not Significant	Negative
8	R405/Hazelhatch Park Access	2.32%	Imperceptible	Negative
9	Newtown Rd/Simmonstown Manor	0.89%	Imperceptible	Negative
10	Dublin Rd (R403)/R405 (E)/Newtown Rd/R405 (W)	2.21%	Imperceptible	Negative
11	R405 (E)/Main St. R405 (N)/R403 (S)	1.99%	Imperceptible	Negative

Table 6.2: Network Impact Categorisation 2039 AM Peak Hour

6.2.5 Similarly, during the PM peak hour, the impact significance of the subject proposals are categorised as ***Imperceptible*** to ***Not Significant*** at all key off-site junctions. At the future site access locations, the impacts are again classified as ***Slight*** to ***Moderate***.

	Junction - Nature of Impact (Additional Vehicular Traffic on key Junctions)	**Impact Scale**	**Impact Significance**	**Impact Effect**
1	Proposed Access 1 (Shinkeen Rd)	11.41%	Moderate	Negative
2	Proposed Access 2 (Dublin Rd)	7.76%	Slight	Negative
3	R405/Shinkeen Rd Junction	2.83%	Not Significant	Negative
4	Dublin Rd (R403)/Shinkeen Rd Junction	0.71%	Imperceptible	Negative
5	Dublin Rd (R403)/Stacumny Lane/R404 Signalised Junction	4.18%	Not Significant	Negative
6	Dublin Rd (R403)/Loughlinstown Rd Junction	4.99%	Not Significant	Negative
7	R405/Willow Avenue Junction	2.88%	Not Significant	Negative
8	R405/Hazelhatch Park Access	2.59%	Not Significant	Negative
9	Newtown Rd/Simmonstown Manor	0.96%	Imperceptible	Negative
10	Dublin Rd (R403)/R405 (E)/Newtown Rd/R405 (W)	2.48%	Not Significant	Negative
11	R405 (E)/Main St. R405 (N)/R403 (S)	2.17%	Imperceptible	Negative

Table 6.3: Network Impact Categorisation 2039 PM Peak Hour

6.2.6 **Figure 6.1** below details the total amount of two-way vehicle trips that will pass through the key off-site and proposed access junctions in the 2039 Future Design Year and the resulting percentage increase in traffic flows as a result of the traffic generated by the proposed residential development.

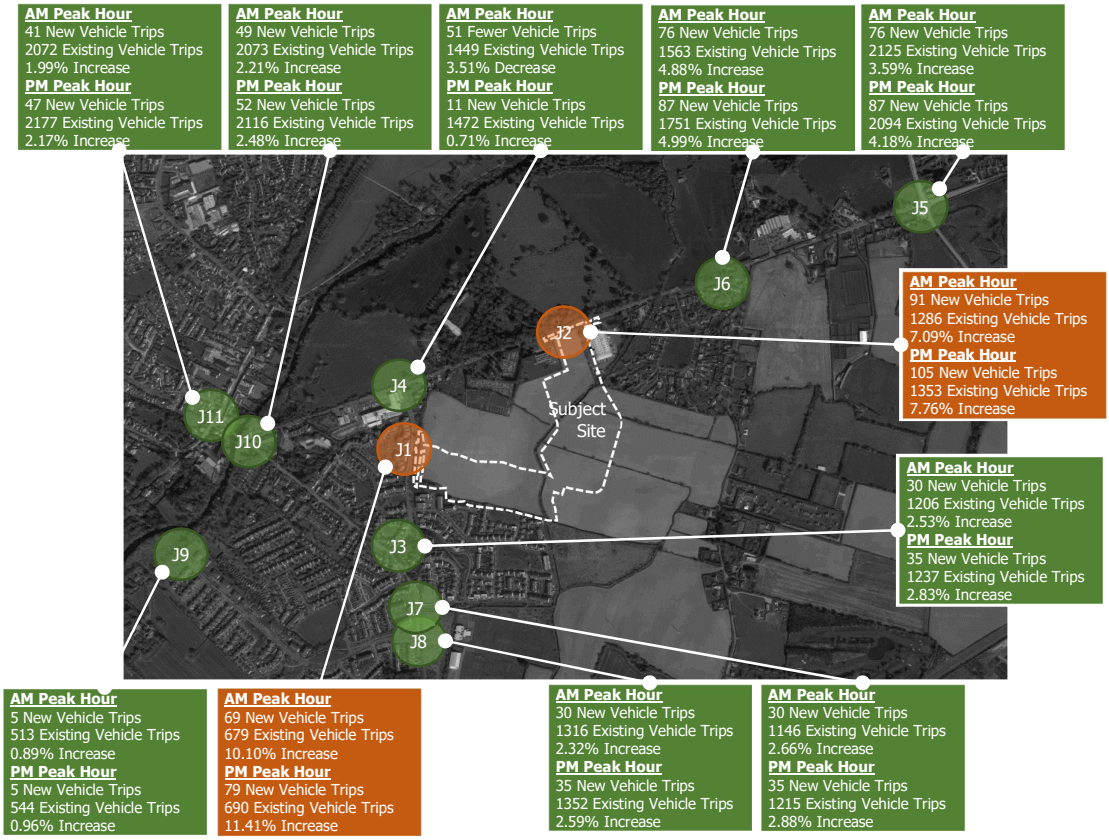


Figure 6.1: Increase in Vehicle (2039 Do-Something)

6.3 MITIGATION STRATEGY

6.3.1 A package of integrated mitigation measures has been identified to off-set the additional local demand that the proposed residential development on the subject zoned lands could potentially generate as a result of the forecast increase in vehicle movements by residents of the scheme. The strategy includes specific measures for both the construction and operational stages of the proposed development.

Construction Stage

6.3.2 The Construction & Environmental Management Plan (an outline CEMP accompanies the application) and the associated Construction Traffic Management Plan (CTMP) in addition to the applications accompanying Construction and Waste Management Plan will incorporate a range of integrated control measures and associated management initiatives with the objective of mitigating the impact of the proposed developments on-site construction activities.

Operational Stage

6.3.3 With the objective of mitigating the potential impact of the proposed development as predicted in **Section 6.1** above during its operational stage, the following initiatives and associated timescale for their implementation have been identified and subsequently form an integral part of the subject development proposals.

- Management – A Mobility Management (MMP) is to be compiled with the aim of guiding the delivery and management of coordinated initiatives by the scheme promotor. The MMP ultimately seeks to encourage sustainable travel practices for all journeys to and from the proposed development.
- Infrastructure - The proposed scheme design incorporates the LAP objectives of 'Green Links' through the site for the benefit of pedestrians and cyclists. The implementation of dedicated infrastructure along an integrated area wide catchment provides an attractive, convenient, seamless 'green' corridor providing a permeable, safe connection between existing (and future) residential neighbouring's.
- Infrastructure (by others) - Kildare County Council have appointed consultants to progress the Celbridge to Hazelhatch Link Road Scheme which incorporates a second bridge crossing across the River Liffey. A preferred route for the scheme has been identified and a non-statutory public consultation has been undertaken which ran between 28th March and 6th May 2022. The future implementation of this scheme is expected to significantly relieve the existing peak hour congestion at the existing bridge crossing.

6.4 PUBLIC TRANSPORT NETWORK IMPACT

6.4.1 The capacity of the existing 2022 public transport network serving Celbridge has been quantified previously in **Section 2.3** whilst the demand that the proposed development is predicted to generate is presented in **Section 5.4**.

6.4.2 The following section establishes the scale of impact that the proposed development is predicted to generate upon the public transport networks and quantifies the capacity of the public transport network to accommodate the proposed development.

Scale of Public Transport Impact

6.4.3 In reference to **Table 5.2, Table 6.4** below establishes that the additional bus trips that the proposed development is predicted to generate amounts to only 1.6% and 2.3% of the total bus transport network capacity available during the morning (0600-1000) and evening (1600-2000) peak periods respectively. The additional rail trips that the proposed development is predicted to generate amounts to only 0.3% and 0.6% of the total rail transport network capacity (serving Hazelhatch & Celbridge) available during the morning (0600-1000) and evening (1600-2000) peak periods respectively.

Period	Mode	Existing Two-Way Capacity	Additional Trips	Scale of Impact (%)
AM	Bus	6244	98	1.6%
	Train	6812	23	0.3%
	Total	**12600**	**121**	**0.9%**
PM	Bus	6356	146	2.3%
	Train	6288	35	0.6%
	Total	**13100**	**181**	**1.4%**

Table 6.4: Predicted Phase 1 Residential Developments Public Transport Network Impact

7.0 NETWORK ANALYSIS

7.1 INTRODUCTION

7.1.1 The operational assessment of the local road network has been undertaken using the Transport Research Laboratory (TRL) computer package TRANSYT for the proposed signal controlled junctions.

7.1.2 When considering signal controlled junctions, a Degree of Saturation (DoS) of greater than 90% would indicate a junction to be approaching capacity, as operation above this RFC value is poor and deteriorates quickly.

7.1.3 For the TRANSYT analyses a 60-minute AM and PM period has been simulated, from 08:00 to 09:00 and 17:00 to 18:00, respectively. For the TRANSYT analyses traffic flows were entered using an Origin-Destination table for the peak hours.

7.1.4 As the proposed signal controlled site access junctions will not be in place without the introduction of the subject development, only Do-Something assessments have been undertaken.

7.1.5 In summary, the following key junctions have been further analysed:

- **Junction 1** – Shinkeen Road / Site Access Signal Controlled Junction
- **Junction 2** – R403 Dublin Road / Site Access Signal Controlled Junction

7.2 JUNCTION 1: SHINKEEN ROAD / SITE ACCESS SIGNAL CONTROLLED JUNCTION

7.2.1 The results of the operational assessment of the proposed access on Shinkeen Road during the weekday morning and evening peaks "Do-Something" scenarios has been summarised in **Table 7.1** below. The three arms were labelled as follows within the TRANSYT model:

Arm A: Shinkeen Road (N)
Arm B: Site Access (E)
Arm C: Shinkeen Road (S)

7.2.2 The TRANSYT results (**Table 7.1**) indicate that the new signal controlled junction on Shinkeen Road will operate with significant reserve capacity during the AM peak hour with a maximum DoS (Degree of Saturation) of 43% and a maximum MMQ

(Mean Max Queue) of 6.43 pcu being recorded during the 2039 Future Design Year scenario.

7.2.3 For the corresponding PM peak hour, a maximum DoS of 39% and a maximum MMQ of 5.75 pcu is recorded during the 2039 Future Design Year scenario implying significant reserve capacity.

Scenario	Period	Arm	DoS	Delay (s)	MMQ
DS 2024	AM Peak	A	16	8.29	2.04
		B	28	48.28	1.13
		C	33	4.22	4.73
	PM Peak	A	20	9.09	2.73
		B	35	50.38	1.43
		C	29	4.26	4.12
DS 2029	AM Peak	A	18	9.79	2.43
		B	42	49.34	2.08
		C	37	5.29	5.66
	PM Peak	A	24	10.36	3.41
		B	41	48.98	2.02
		C	34	5.36	5.09
DS 2039	AM Peak	A	20	9.93	2.69
		B	43	49.70	2.17
		C	41	6.22	6.43
	PM Peak	A	27	11.06	3.83
		B	39	47.11	2.09
		C	37	6.22	5.75

Table 7.1: TRANSYT "Do-Something" Analysis for Shinkeen Road Access

7.3 JUNCTION 2: R403 DUBLIN ROAD / SITE ACCESS SIGNAL JUNCTION

7.3.1 The results of the operational assessment of the proposed access on Dublin Road (R403) during the weekday morning and evening peaks "Do-Something" scenarios have been summarised in **Table 7.2** below. The three arms were labelled as follows within the TRANSYT model:

Arm A: Dublin Road (E)
Arm B: Access (S)
Arm C: Dublin Road (W)

7.3.2 The TRANSYT results (**Table 7.2**) indicate that the Dublin Road access junction will operate with significant reserve capacity during the AM peak hour with a maximum DoS of 67% and a maximum MMQ of 13.96 pcu being recorded during the 2039 Future Design Year scenario.

7.3.3 For the corresponding PM peak hour, a maximum DoS of 68% and a maximum MMQ of 14.46 pcu being recorded during the 2039 Future Design Year scenario implying significant reserve capacity.

Scenario	Period	Arm	DoS	Delay (s)	MMQ
DS 2024	AM Peak	A	36	9.70	5.36
		B	47	51.14	2.39
		C	53	7.43	9.21
	PM Peak	A	56	10.56	10.06
		B	13	44.68	0.50
		C	40	4.70	5.89
DS 2029	AM Peak	A	41	11.24	6.47
		B	55	50.07	3.67
		C	60	10.12	11.75
	PM Peak	A	63	12.03	12.64
		B	30	48.68	1.19
		C	44	5.23	6.68
DS 2039	AM Peak	A	44	5.23	6.68
		B	54	48.11	3.75
		C	67	12.21	13.96
	PM Peak	A	68	13.24	14.46
		B	30	48.68	1.19
		C	47	5.80	7.60

Table 7.2: TRANSYT "Do-Something" Analysis for Dublin Road Access

8.0 SENSITIVITY ANALYSIS

8.1 INTRODUCTION

8.1.1 Two Sensitivity Analyses (SA) have been incorporated into the subject assessment including: -

- SA1 – Three schools constructed & operational within the KDA2 lands; and
- SA2 – The remaining residentially zoned lands are constructed and occupied.

8.1.2 As per the junction assessment above, the following 3 no. junctions have been incorporated into the subject Sensitivity Assessment.

- **Junction 1** – Shinkeen Road / Site Access Signal Controlled Junction
- **Junction 2** – R403 Dublin Road / Site Access Signal Controlled Junction

8.1.3 The sensitivity assessment scenario below assumes that no future new road infrastructure (MTO3.9) will be in place by the 2039 Future Design Year and therefore represents a worst case assessment where all traffic from development on the entire KDA2 lands will continue to access / enter via the proposed site access junctions on the Dublin Road corridor and Shinkeen Road corridor. In reality, the Roads Objective to the east of the KDA2 could be developed as part of future phases of the KDA2 and therefore offer alternative route options other than the proposed site access junctions.

8.2 SENSITIVITY ANALYSIS 1 – FUTURE SCHOOLS

8.2.1 The results of the operational assessment of the 2 no. junctions assessed in **Section 7** above for the scenario that potential future schools are constructed and operational are as follows.

Shinkeen Road / Site Access Signal Controlled Junction

8.2.2 In the 2039 SA1 scenario at the proposed Shinkeen Road access, a maximum DoS of 65% and a maximum MMQ of 9.69 pcu is recorded. For the corresponding PM peak hour, a maximum DoS of 43% and a maximum MMQ of 6.92 pcu is recorded. These results indicate that this proposed signal controlled junction is predicted to continue to operate within capacity with the introduction of the potential future schools traffic.

Scenario		Arm	DoS	Delay (s)	MMQ
Sensitivity Analysis 1	AM Peak Hour	A	40	17.56	6.33
		B	65	44.99	6.85
		C	54	12.16	9.69
	PM Peak Hour	A	32	15.24	4.76
		B	33	38.42	2.64
		C	43	9.29	6.92

Table 8.1: Shinkeen Road / Site Access Signal Controlled Junction SA 1

Dublin Road / Site Access Signal Controlled Junction

8.2.3 In the 2039 SA1 scenario at the proposed Dublin Road access, a maximum DoS of 72% and a maximum MMQ of 15.67 pcu is recorded. For the corresponding PM peak hour, a maximum DoS of 70% and a maximum MMQ of 15.39 pcu is recorded. These results indicate that this proposed signal controlled junction is predicted to continue to operate within capacity with the introduction of the potential future schools traffic.

Scenario		Arm	DoS	Delay (s)	MMQ
Sensitivity Analysis 1	AM Peak Hour	A	55	14.98	9.99
		B	72	55.23	6.29
		C	71	14.56	15.67
	PM Peak Hour	A	70	14.29	15.39
		B	38	51.31	1.55
		C	47	5.82	7.63

Table 8.2: Dublin Road / Site Access Signal Controlled Junction SA1

8.3 SENSITIVITY ANALYSIS 2 – RESIDENTIAL LANDS WITHIN KDA2

8.3.1 The results of the operational assessment of the 2 no. junctions assessed in **Section 7** above, for the scenario that the potential future schools traffic plus all potential future residential units within the remaining KDA2 land (circa. 850 units) are in place, are as follows.

Shinkeen Road / Site Access Signal Controlled Junction

8.3.2 In the 2039 SA2 scenario at the proposed Shinkeen Road access, a maximum DoS of 93% and a maximum MMQ of 13.76 pcu is recorded. For the corresponding PM

peak hour, a maximum DoS of 49% and a maximum MMQ of 8.12 pcu is recorded. These results indicate that this proposed signal controlled junction is predicted to continue to operate within capacity but approaching capacity in the AM peak hour with the introduction of the future schools traffic plus the additional 850 residential units within the KDA2 lands.

Scenario		Arm	DoS	Delay (s)	MMQ
Sensitivity Analysis 2	AM Peak Hour	A	42	17.88	6.77
		B	93	82.26	13.76
		C	56	12.54	10.14
	PM Peak Hour	A	39	16.77	6.13
		B	49	41.07	4.33
		C	48	10.52	8.12

Table 8.3: Shinkeen Road / Site Access Signal Controlled Junction SA 2

Dublin Road / Site Access Signal Controlled Junction

8.3.3 In the 2039 SA2 scenario at the proposed Dublin Road access, a maximum DoS of 84% and a maximum MMQ of 19.47 pcu is recorded. For the corresponding PM peak hour, a maximum DoS of 88% and a maximum MMQ of 25.15 pcu is recorded. These results indicate that this proposed signal controlled junction is predicted to continue to operate within capacity with the introduction of the future schools traffic plus the additional 850 residential units within the KDA2 lands.

Scenario		Arm	DoS	Delay (s)	MMQ
Sensitivity Analysis 2	AM Peak Hour	A	64	19.94	12.36
		B	84	59.74	10.89
		C	81	22.21	19.47
	PM Peak Hour	A	88	28.32	25.15
		B	51	47.25	3.56
		C	54	8.93	9.82

Table 8.4: Dublin Road / Site Access Signal Controlled Junction SA 2

8.4 JUNCTION ANALYSIS SUMMARY

8.4.1 A comparison of the operational performance the proposed Shinkeen Road and Dublin Road junctions for each scenario in the 2039 Future Design Year is presented in **Figures 8.1** and **8.2** respectively.

8.4.2 This comparison reveals that the impact of the introduction of the future schools traffic is most significant at the Shinkeen Road in the AM peak hour which is to be expected. Nevertheless, this junction is still predicted to operate with significant reserve capacity with the introduction of the schools traffic.

8.4.3 The assessment incorporating the introduction of the potential future development on the wider KDA2 lands reveals that both junctions are predicted to continue to operate within capacity albeit the Shinkeen Road junction is predicted to be approaching capacity over a period of approx. 30minutes in the AM Peak hour.

8.4.4 These results are representative of the scenario that only 2 no. access junctions are available at the time when all development on the wider KDA2 lands is complete and operational. In reality, it is expected that, as part of the planning / implementation of the wider KDA2 lands to the east, a third vehicular access to the external road network will be made available on the eastern KDA 2 boundary onto Loughlinstown Road. Whilst the subject assessment reveals that the provision of 2 no. vehicular access locations has the capacity to accommodate the projected future development traffic, a potential third access point would reduce the demand of the proposed Shinkeen Road and Dublin Road junctions allowing them to operate with additional reserve capacity.

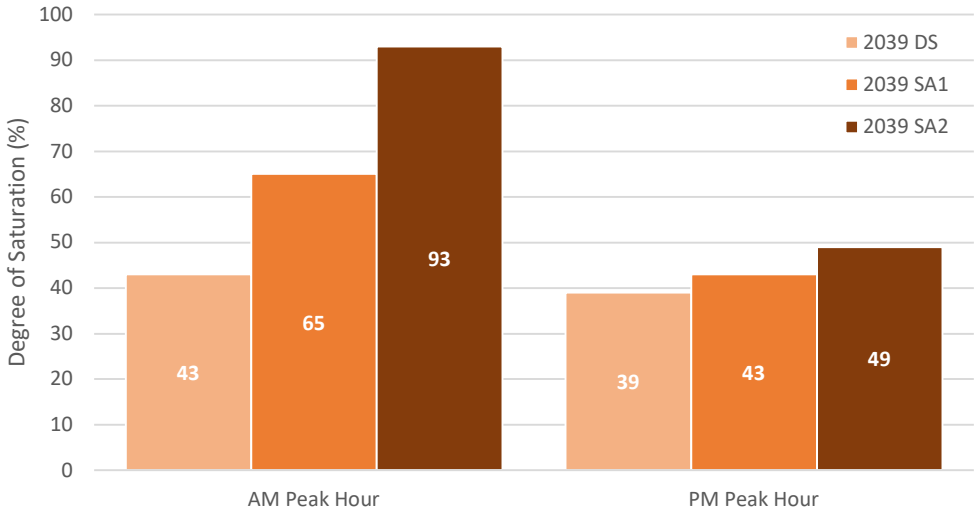


Figure 8.1: AM Peak Hour Junction Performance Comparison

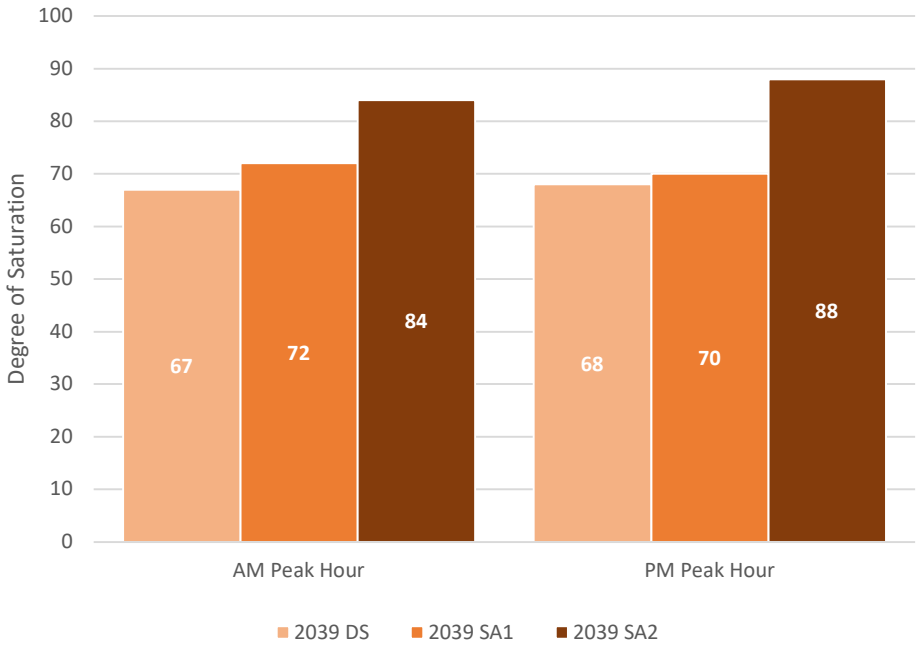


Figure 8.2: PM Peak Hour Junction Performance Comparison

9.0 CONSULTATION WITH KILDARE COUNTY COUNCIL

9.1 OVERVIEW

9.1.1 In addition to 2 no. pre-planning meetings and a tri-partite meeting, DBFL Consulting Engineers met with local authority officers within KCC's Roads and Sustainable Transport departments on Wednesday 1st June 2022 with the aim of discussing the proposed site access arrangements and cycle infrastructure on the surrounding road network.

9.1.2 In addition, DBFL have liaised directly with KCC Roads department on the methodology employed in the road network assessment providing details of trip generation, trip distribution, rationale analysing the relevant junctions and a summary of site access junction performance for the Do-Something and 2 no. Sensitivity Assessments.

9.2 SUMMARY OUTCOME

9.2.1 KCC highlighted the provision of facilities for vulnerable road users along the Dublin Road corridor is a key issue for KCC and recommended the following measures to be carried out by the applicant;

- A complete topographical survey from the proposed development to Celbridge Town to outline the dimensions and location of existing road , footpath, junction and signalised works infrastructure.
- Cross sections to be provided of the dimensions and location of existing road , footpath, junction and signalised works infrastructure.
- Options to be examined and submitted for improved VRU facilities on plan and cross sections which should also highlight the extent and area of third party lands that may have to be acquired by CPO.
- Ideally the improved VRU facilities should be carried out within the existing road corridor and may require the reduction of the c/w width to 6m.
- Options should include upgrading of existing junctions and signalised junctions, segregated VRU facilities, shared VRU facilities, on road cycle tracks.

9.2.2 KCC also noted that the Active Travel Section currently have no plans for the installation of improved VRU facilities on the Dublin Road but would approach the NTA for funding if required to assist the Developer in carrying out these works and that a Part 8 is being prepared by the KCC Active Travel Section for the installation of a new VRU footbridge beside the existing bridge at Celbridge.

9.2.3 DBFL have put forward the case that the subject development is providing an attractive link for VRU's between the Dublin Road corridor and the existing cycle facilities on the Shinkeen Road corridor.

9.2.4 The building line on the Dublin Road boundary has been generously set back to allow for the implementation of a variety of potential quality cycle and pedestrian facilities which would be constructed to tie in with a future scheme on the Dublin Road corridor. The subject site layout incorporates a 2m wide footpath and 2m wide cycle track within the site boundary on the southern side of the Dublin Road corridor. Should an alternative arrangement be preferred, this can be easily incorporated into the subject scheme due to the significant set back proposed at this location. In the interim (before a cycle scheme along the Dublin Road corridor is developed), the proposed cycle and pedestrian link through the subject lands offers a safe and attractive connection between the Dublin Road corridor and existing cycle facilities on Shinkeen Road which in turn link with the Dublin Road corridor.

9.2.5 As outlined in **Chapter 4** of this report, the level of cycle trips generated by the subject development is not expected generate a significant demand on the local cycle network. For the majority of residents of the proposed development (Sites A & C equating to 80% of units), the most direct and convenient route to Celbridge Town Centre is via the Shinkeen Road corridor as presented. Accordingly, the subject development is not dependent on the provision of dedicated cycle facilities along the Dublin Road corridor in order to facilitate travel to / from the development site by bicycle.

9.2.6 DBFL have liaised with KCC outlining the constraints along the Dublin Road and potential high level cycle scheme options. DBFL recommended that an Active Travel scheme is pursued with NTA funding to ensure high quality cycle facilities compliant with latest NTA design guidance are implemented.

10.0 SUMMARY AND CONCLUSION

10.1 OVERVIEW

10.1.1 The proposed development will consist of the construction of 344 no. residential units (comprising 214 no. apartments / duplex units and 130 no. houses), a childcare facility, communal and public open space, landscaping, car and cycle parking spaces, a local distributor road from Dublin Road and Shinkeen Road, including provision of vehicular accesses, associated internal roads, pedestrian and cycle paths, bin storage, public lighting, ESB substations, pumping station and all associated site and infrastructural works.

10.1.2 The purpose of this TTA is to quantify the existing transport environment and to detail the results of assessment work undertaken to identify the potential level of transport impact generated as a result of the proposed development. Our methodology incorporated a number of key inter-related stages, including;

- Site Audit,
- Planning File Review,
- Policy Review,
- Commissioning and Analysis of Traffic Surveys,
- Trip Generation, Distribution and Assignment,
- Road & Public Transport Network Impact
- Network Analysis
- Sensitivity Analysis.

10.1.3 This TTA has carried out a range of assessments for an Opening Year of 2024, Interim Year of 2029 and a Future Horizon Year of 2039. This assessment assumed and accounted for complete development and occupation of all units proposed to occur by Opening Year, as this provided a conservative design assessment of network operations.

10.1.4 Based upon the information and analysis detailed within this TTA, it has been demonstrated that:

- The site of the proposed residential development is ideally located to maximise access to / from the site by sustainable forms of travel including walking and cycling to local amenities located at Celbridge Town Centre located just 1.3km to the west.

- The proposals are in accordance with the land use zoned for the subject development site, which is described within the Celbridge LAP 2017-2023 as "*New Residential*".

- The subject site proposals being promoted will deliver a number of benefits for pedestrians and cyclists with a network of pedestrian and cycle linkages to provide attractive, safe and convenient connections between Dublin Road and Shinkeen Road in addition to permeable links with existing residential settlements to the south.

- The site benefits from good accessibility to DublinBus services with interchanges being located within a convenient walking distance of the subject development site (less than 350m walking distance).

- The subject development will benefit from the enhanced accessibility levels afforded by the emerging BusConnects proposals by the NTA.

- A total of 585 (excluding loading bays) no. car parking spaces are proposed as part of the subject scheme comprising 479 no. resident (inclusive of 5 no. creche staff spaces) and 106 no. visitor car parking spaces (inclusive of 4 no. creche set down spaces). The proposed 106 no. visitor parking spaces equates to 18% of the overall car parking provision. The proposed 585 no. car parking spaces is lower than the development plan requirement of 660 no. spaces (75 no. lower) however the provision of 260 car parking for residents of the houses is fully compliant with the KCC development plan requirement. The provision of 279 no. apartment / duplex car parking spaces, whilst lower than the development plan requirement, is fully compliant with the DHPLG requirement which requires between 268-285 no. car apartment / duplex car parking spaces.

- The proposals include the provision of a total of 770 no. bicycle parking spaces / opportunities on-site comprising 272 no. short stay spaces and 498 no. long stay spaces / opportunities. The proposed 272 no. short stay cycle parking spaces is significantly higher than the development plan and DHPLG requirements (both require 114 no. short stay spaces). The long stay apartment / duplex cycle parking provision of 238 no. spaces is also higher than the development plan requirement but lower than the DHPLG

requirement which require at least 217 no. and 504 no. long stay cycle parking spaces respectively. It is noted that the development plan does not specify a rate of cycle parking for residential house units, nevertheless, the subject proposals include for 2 dedicated spaces within cycle stores per terrace house whilst semi-detached and detached houses with a side access to rear gardens can benefit from cycle parking opportunities on curtilage. In addition, short stay cycle parking has been provided for housing units, by way of Sheffield stands, throughout the subject site at a rate of approx. 1 / 3 houses.

- The subject proposals include for the provision of a new 6.5m wide "Local Distributor Road" between the site access junctions located on Shinkeen Road and Dublin Road which will benefit from dedicated pedestrian and cycle facilities.
- The subject scheme proposes the provision of a two-way off-road cycle track between the access junctions on the Shinkeen Road and Dublin Road corridors. The north-south link provides a safe and attractive cycle / pedestrian route between the Dublin Road site access and the existing cycle / pedestrian infrastructure on Shinkeen Road. This will significantly enhance the local cycle / pedestrian network creating a shorter safer cycle / pedestrian route between the Dublin Road corridor (for residents residing here) and Hazelhatch & Celbridge Train Station. This north-south pedestrian / cycle link will be further extended southwards as part of the Phase 2 development on the wider KDA 2 lands as far as the future Roads Objective MTO3.9

- A junction impact assessment was undertaken and has demonstrated that the impact of the proposed Phase 1 development will have a sub-threshold impact at all key off-site junctions. Accordingly, the proposed 2 no. site access junctions have been subject to more detailed assessment.

- The evaluation of the operational performance of both site access junctions following the implementation of the proposed Phase 1 residential scheme established that both junctions are predicted to operate with significant reserve capacity in all design year scenarios.

- Two Sensitivity Analyses have been incorporated into the subject assessment including: -

- SA1 – Three schools constructed & operational within the KDA2 lands; and
- SA2 – The remaining residentially zoned lands are constructed and occupied.

- The sensitivity assessment scenarios assumes that no future new road infrastructure (MTO3.9) will be in place by the 2039 Future Design Year and therefore represents a worst case assessment where all traffic from development on the entire KDA2 lands will continue to access / enter via the proposed site access junctions on the Dublin Road corridor and Shinkeen Road corridor. In reality, the Roads Objective to the east of the KDA2 (MTO3.9) could be developed as part of future phases of the KDA2 and therefore offer alternative route options other than the proposed site access junctions. The results of the sensitivity analyses reveal that the impact of the introduction of the future schools traffic is most significant at the Shinkeen Road in the AM peak hour which is to be expected. Nevertheless, this junction is still predicted to operate with significant reserve capacity with the introduction of the schools traffic. The introduction of the potential future development on the wider KDA2 lands reveals that both junctions are predicted to continue to operate within capacity albeit the Shinkeen Road is predicted to be approaching capacity over a period of approx. 30minutes in the AM Peak hour.

10.2 CONCLUSIONS

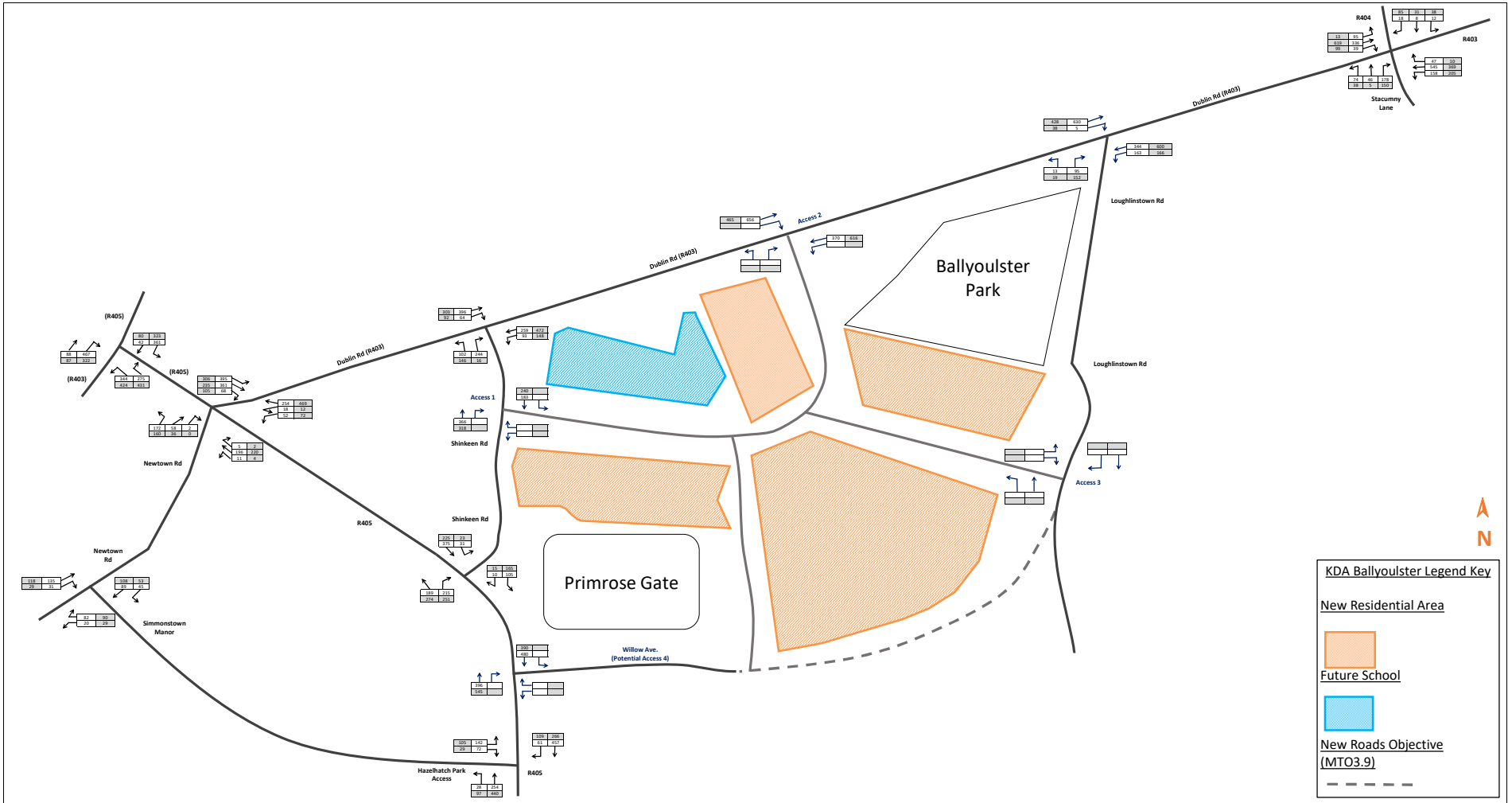
10.2.1 In conclusion, DBFL believes that the opportunity is available, in terms of transport and traffic, for An Bord Pleanála to consider favourably the proposed residential development on the subject site. This TTA demonstrates that the existing traffic and transport infrastructure is appropriate to cater for the predicted additional demand generated by the proposed development.

10.2.2 It is concluded that there are no traffic or transportation related reasons that should prevent the granting of planning permission for the subject Phase 1 residential development.

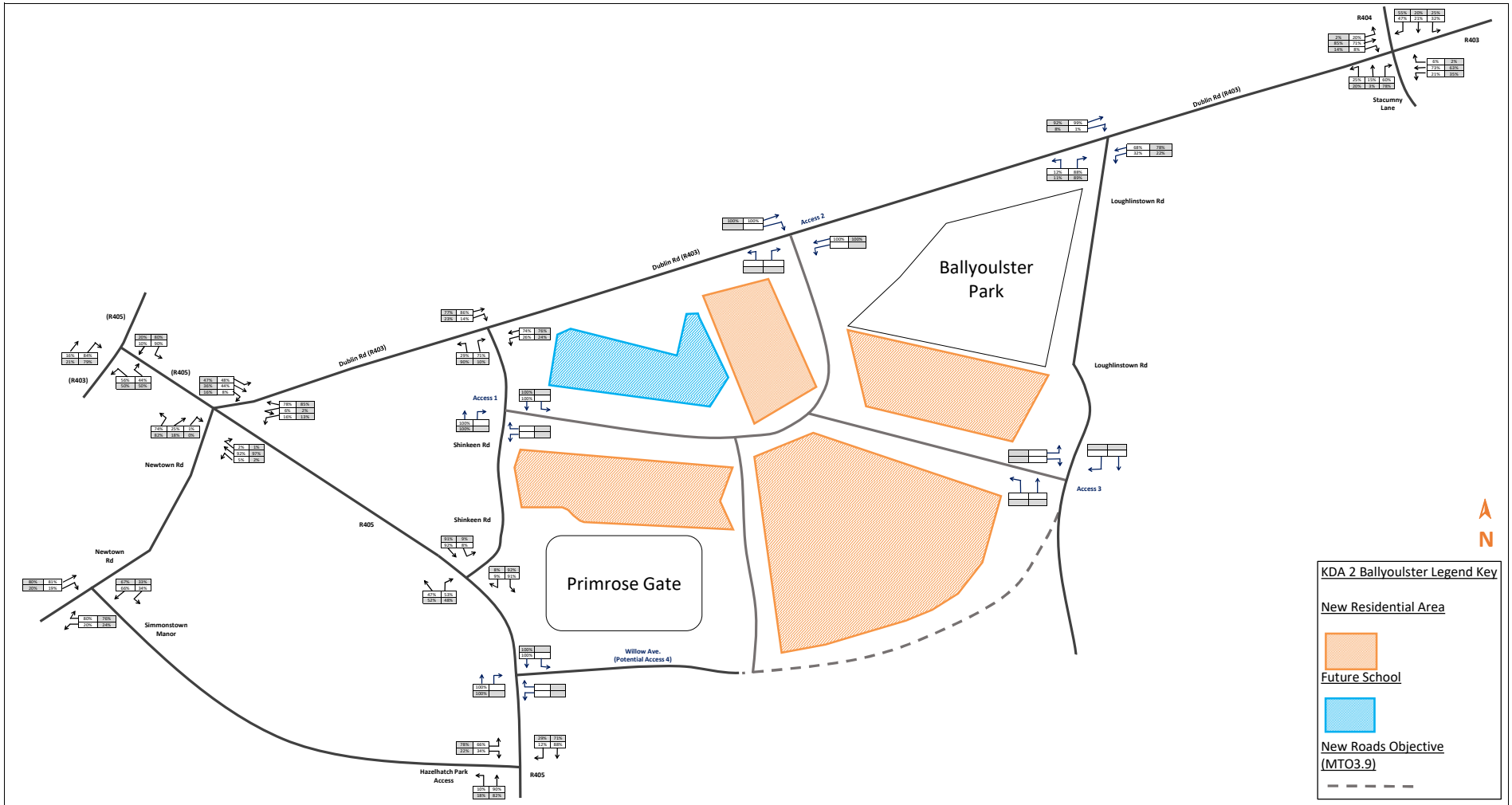
APPENDICES

APPENDIX A

Traffic Flow Diagrams



DBFL Consulting Engineers	**Dublin Office :** Ormond House, Upper Ormond Quay, Dublin 7 D07 W704 **phone:** +353 (0) 1 400 4000 **Waterford Office :** Maritana Gate, Suite 8b The Atrium, Canada St, Waterford X91 W028 **phone:** +353 (0) 51 309 500 **Cork Office :** 14 South Mall, Cork T12 CT91 **phone:** +353 (0) 21 2024538 **email :** info@dbfl.ie **website :** www.dbfl.ie	**Project:** Ballyouster KDA SHD - Phase 1 Residential Development **Drawing Title :** Base Traffic Flows (2021)	**Key :** AM Peak Hour (08:00 - 09:00) PM Peak Hour (17:00 - 18:00)	**Drawn by:** DG **Approved by:** MMK **Date :** 08/10/2021 **Reference :** G:\2018\p180221\calcs\excel\Traffic\2021 **Figure :** 1 **Rev :** -	



DBFL Consulting Engineers

Dublin Office :
Ormond House, Upper Ormond Quay, Dublin 7 D07 W704
phone: +353 (0) 1 400 4000

Waterford Office :
Maritana Gate, Suite 8b The Atrium, Canada St, Waterford X91 W028
phone: +353 (0) 51 309 500

Cork Office :
14 South Mall, Cork T12 CT91
phone: +353 (0) 21 2024538

email : info@dbfl.ie
website : www.dbfl.ie

Project: Ballyouster KDA SHD - Phase 1 Residential Development

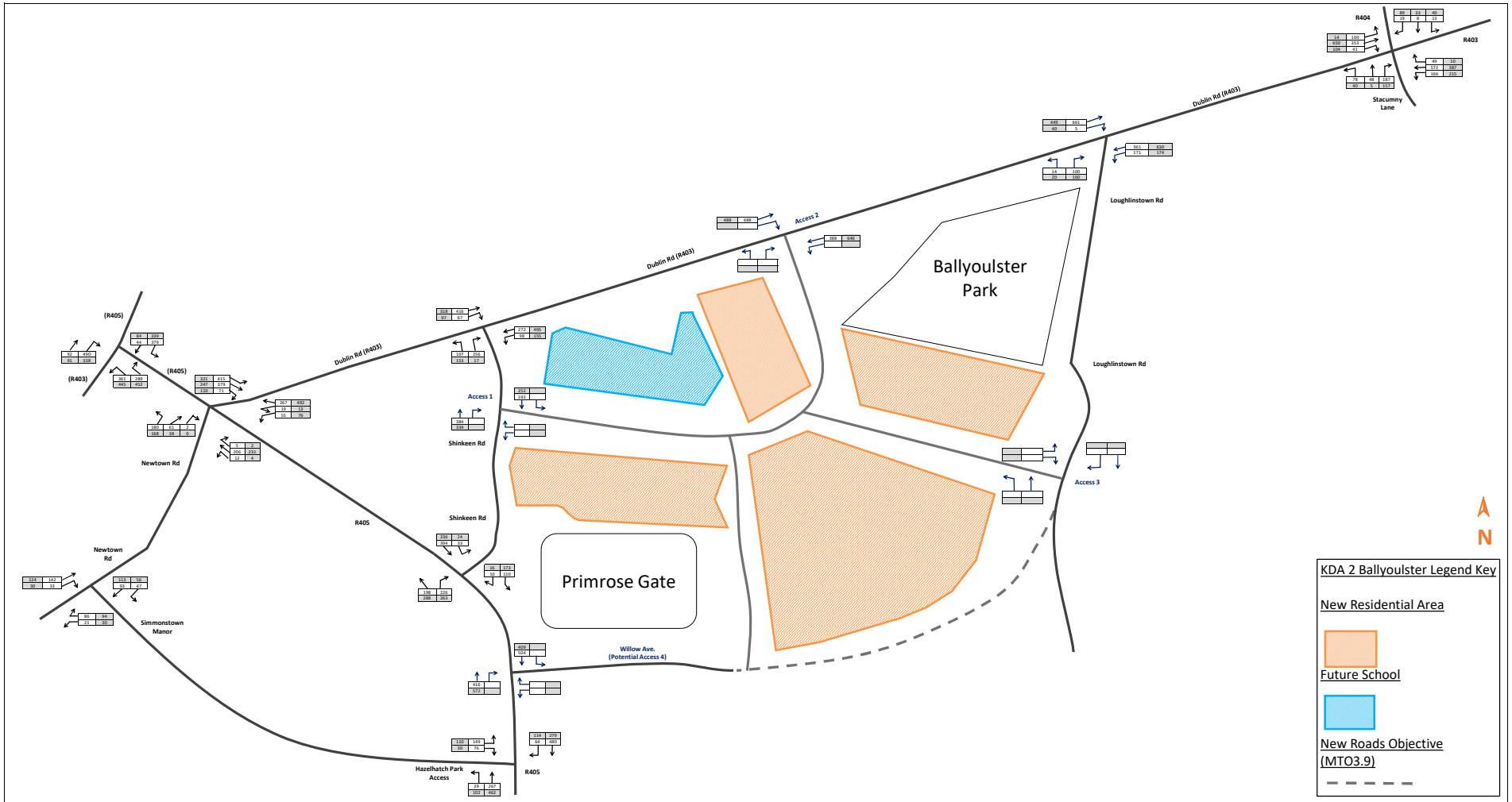
Drawing Title : Base Flow Turning (%)

Key :
AM Peak Hour (08:00 - 09:00)
PM Peak Hour (17:00 - 18:00)

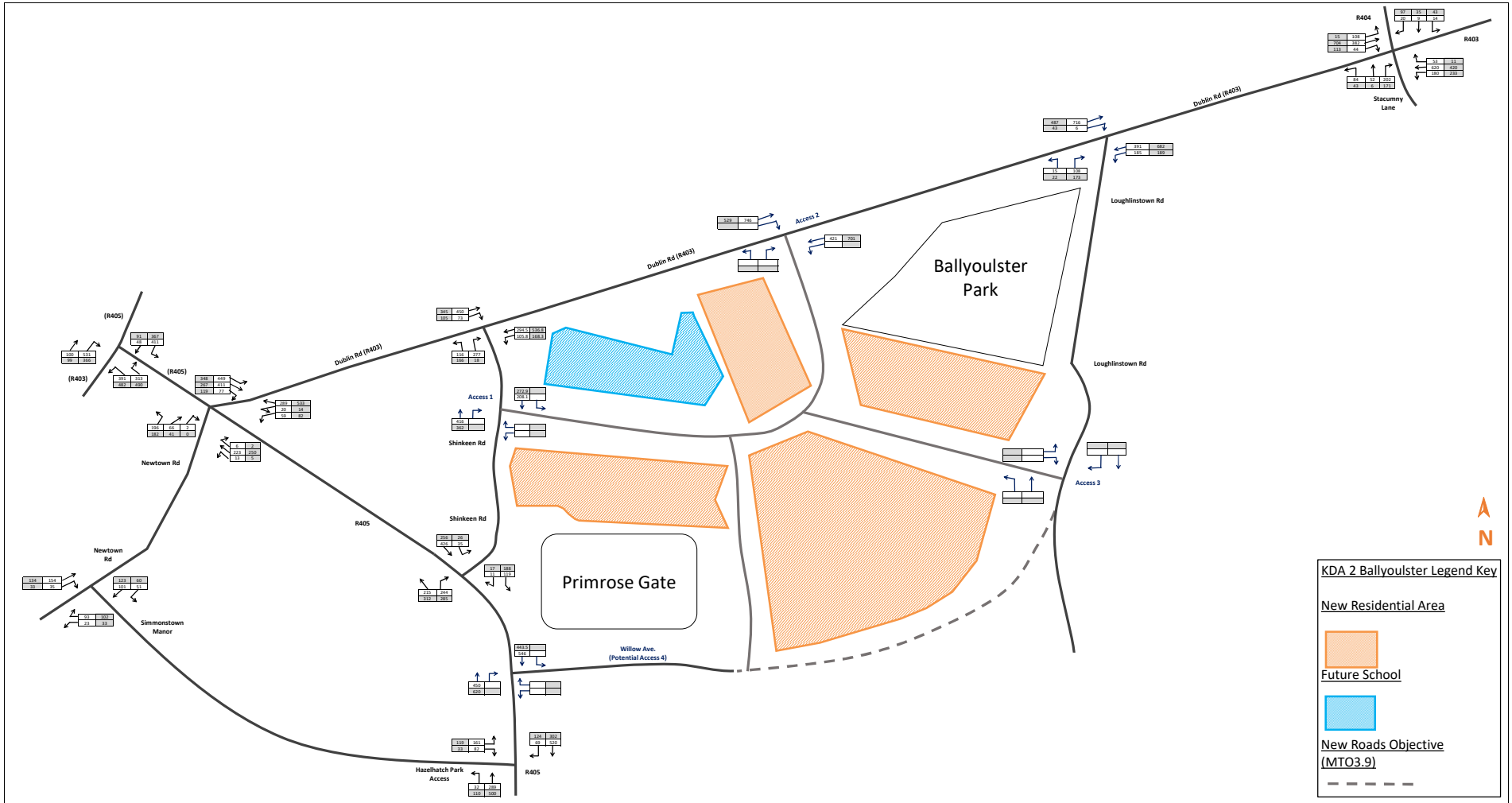
Drawn by:	Approved by:	Date :
DG	MMK	16/07/2020

Reference : G:\2018\p180221\calcs\excel\Traffic\2021

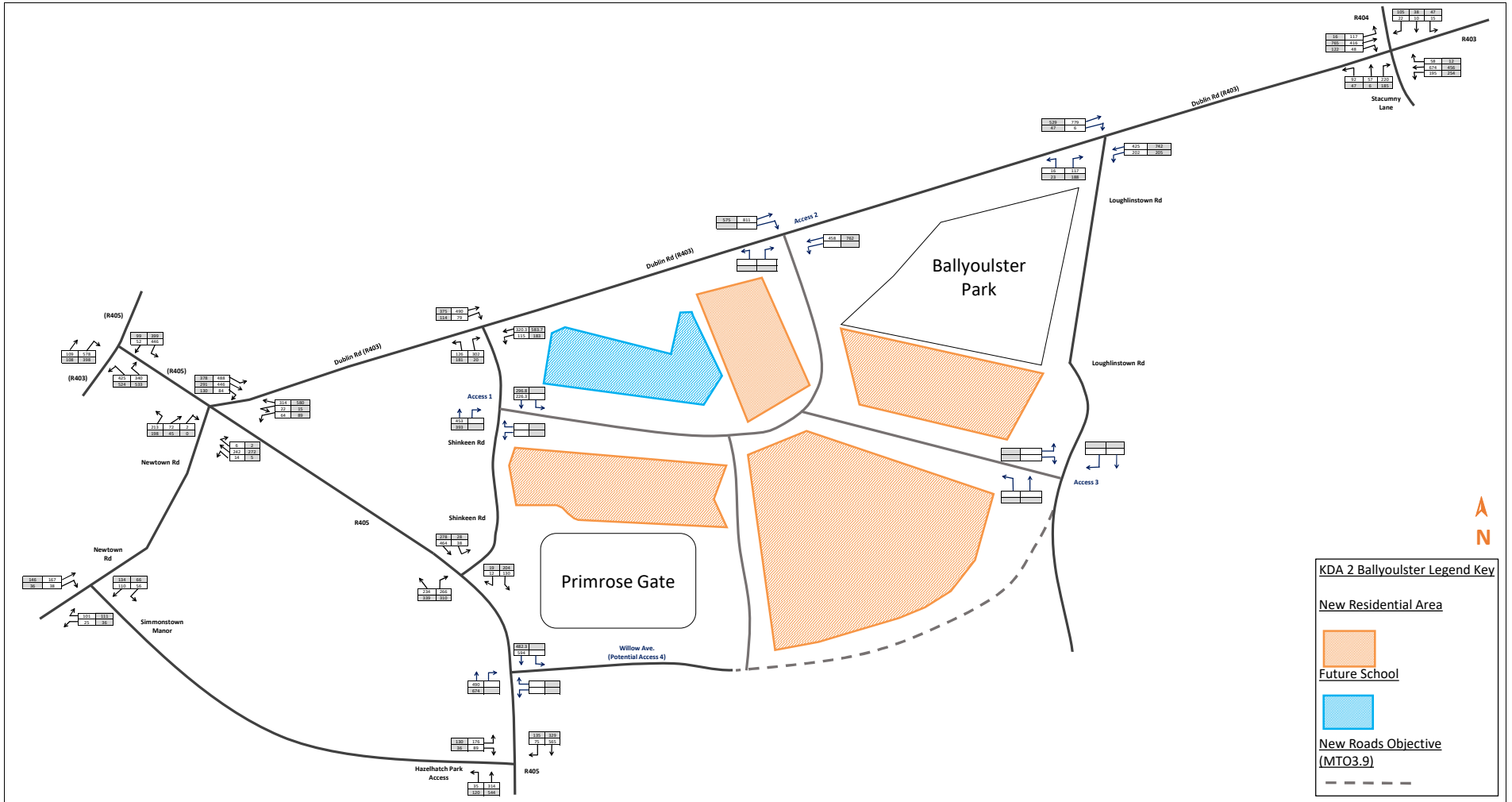
Figure :	Rev :
2	-



DBFL Consulting Engineers	**Dublin Office:** Ormond House, Upper Ormond Quay, Dublin 7 D07 W704 **phone:** +353 (0) 1 400 4000 **Waterford Office:** Maritana Gate, Suite 8b The Atrium, Canada St, Waterford X91 W028 **phone:** +353 (0) 51 309 500 **Cork Office:** 14 South Mall, Cork T12 CT91 **phone:** +353 (0) 21 2024538 **email:** info@dbfl.ie **website:** www.dbfl.ie	**Project:** Ballyouster KDA SHD - Phase 1 Residential Development **Drawing Title :** 2024 Traffic Flows	**Key :** AM Peak Hour (08:00 - 09:00) PM Peak Hour (17:00 - 18:00) 2024 Growth Factor: 1.049	**Drawn by:** DG **Approved by:** MMK **Date :** 08/10/2021 **Reference :** G:\2018\p180221\calcs\excel\Traffic\2021 **Figure :** 3 **Rev :** -	



DBFL Consulting Engineers	**Dublin Office:** Ormond House, Upper Ormond Quay, Dublin 7 D07 W704 **phone:** +353 (0) 1 400 4000 **Waterford Office:** Maritana Gate, Suite 8b The Atrium, Canada St, Waterford X91 W028 **phone:** +353 (0) 51 309 500 **Cork Office:** 14 South Mall, Cork T12 CT91 **phone:** +353 (0) 21 2024538 **email:** info@dbfl.ie **website:** www.dbfl.ie	**Project:** Ballyouster KDA SHD - Phase 1 Residential Development **Drawing Title :** 2029 Traffic Flows	**Key :** AM Peak Hour (08:00 - 09:00); PM Peak Hour (17:00 - 18:00) 2029 Growth Factor: 1.137	**Drawn by:** DG; **Approved by:** MMK; **Date :** 08/10/2021 **Reference :** G:\2018\p180221\calcs\excel\Traffic\2021 **Figure :** 4; **Rev :** -	



DBFL Consulting Engineers

Dublin Office:
Ormond House, Upper Ormond Quay, Dublin 7 D07 W704
phone: +353 (0) 1 400 4000

Waterford Office:
Maritana Gate, Suite 8b The Atrium, Canada St, Waterford X91 W028
phone: +353 (0) 51 309 500

Cork Office:
14 South Mall, Cork T12 CT91
phone: +353 (0) 21 2024538

email: info@dbfl.ie
website: www.dbfl.ie

Project:
Ballyouster KDA SHD - Phase 1 Residential Development

Drawing Title :
2039 Traffic Flows

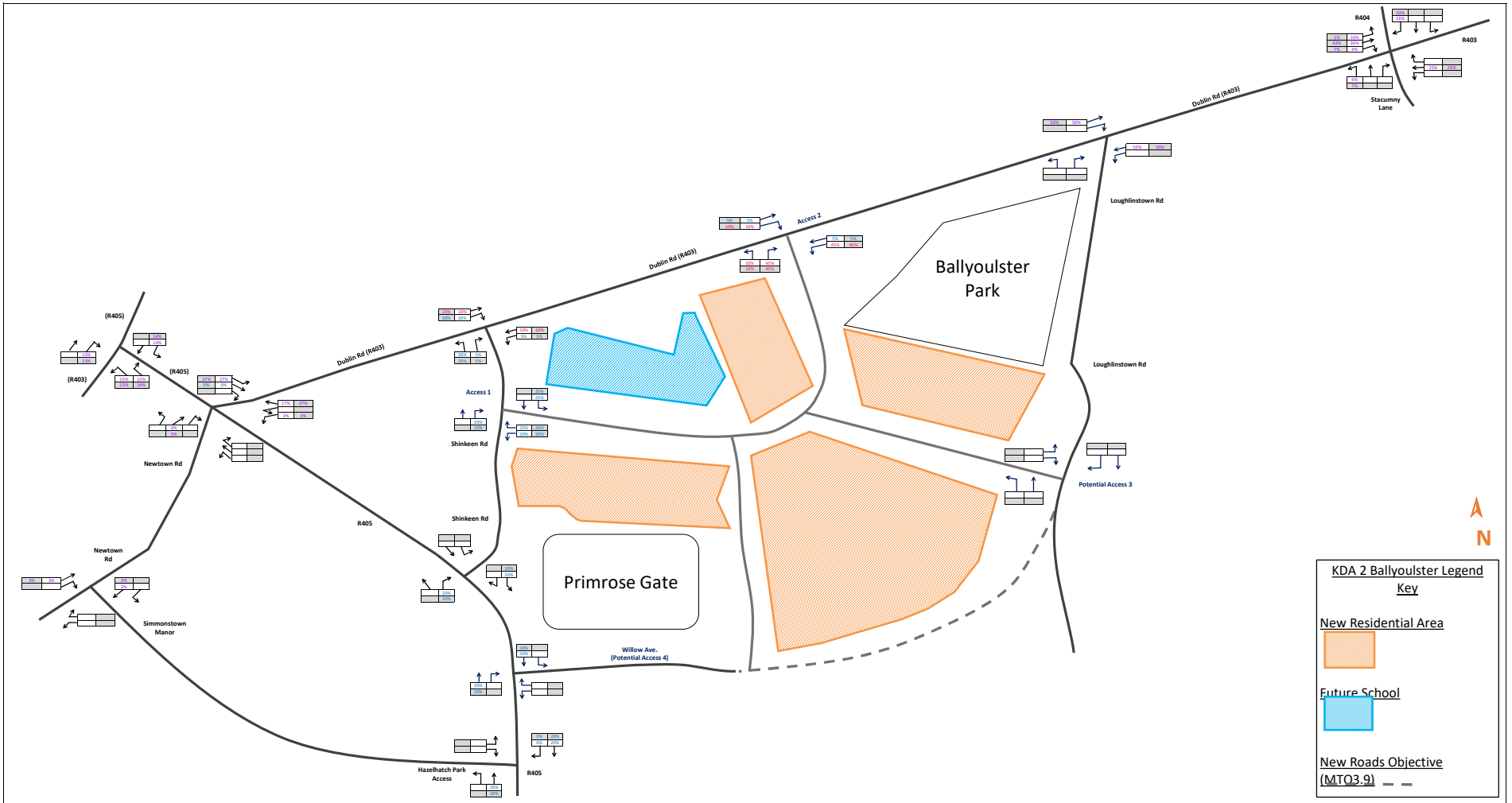
Key :
AM Peak Hour (08:00 - 09:00)
PM Peak Hour (17:00 - 18:00)

2039 Growth Factor: 1.237

Drawn by:	Approved by:	Date :
DG	MMK	08/10/2021

Reference : G:\2018\p180221\calcs\excel\Traffic\2021

Figure :	Rev :
5	-



DBFL Consulting Engineers

Dublin Office:
Ormond House, Upper Ormond Quay, Dublin 7 D07 W704
phone: +353 (0) 1 400 4000
Waterford Office:
Maritana Gate, Suite 8b The Atrium, Canada St, Waterford X91 W028
phone: +353 (0) 51 309 500
Cork Office:
14 South Mall, Cork T12 CT91
phone: +353 (0) 21 2024538
email: info@dbfl.ie
website: www.dbfl.ie

Project: Ballyouster KDA SHD - Phase 1 Residential Development

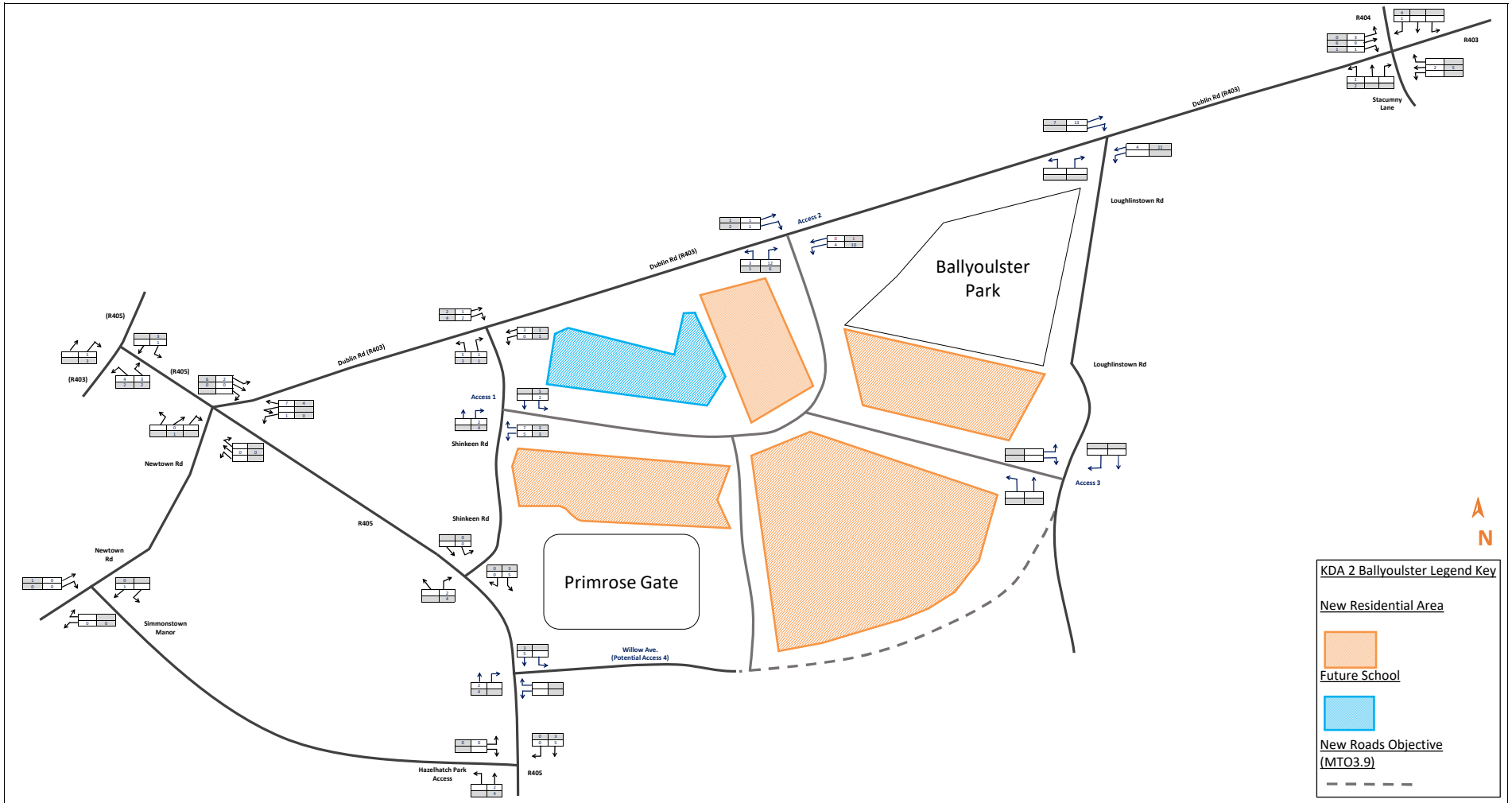
Drawing Title : Proposed Residential Development Trip Distribution

Key :
AM Peak Hour (08:00 - 09:00)
PM Peak Hour (17:00 - 18:00)

Drawn by:	Approved by:	Date :
DG	MMK	08/10/2021

Reference : G:\2018\p180221\calcs\excel\Traffic\2021

Figure :	Rev :
6	-



DBFL Consulting Engineers

Dublin Office:
Ormond House, Upper Ormond Quay, Dublin 7 D07 W704
phone: +353 (0) 1 400 4000
Waterford Office:
Maritana Gate, Suite 8b The Atrium, Canada St, Waterford X91 W028
phone: +353 (0) 51 309 500
Cork Office:
14 South Mall, Cork T12 CT91
phone: +353 (0) 21 2024538
email: info@dbfl.ie
website: www.dbfl.ie

Project:
Ballyouster KDA SHD - Phase 1 Residential Development

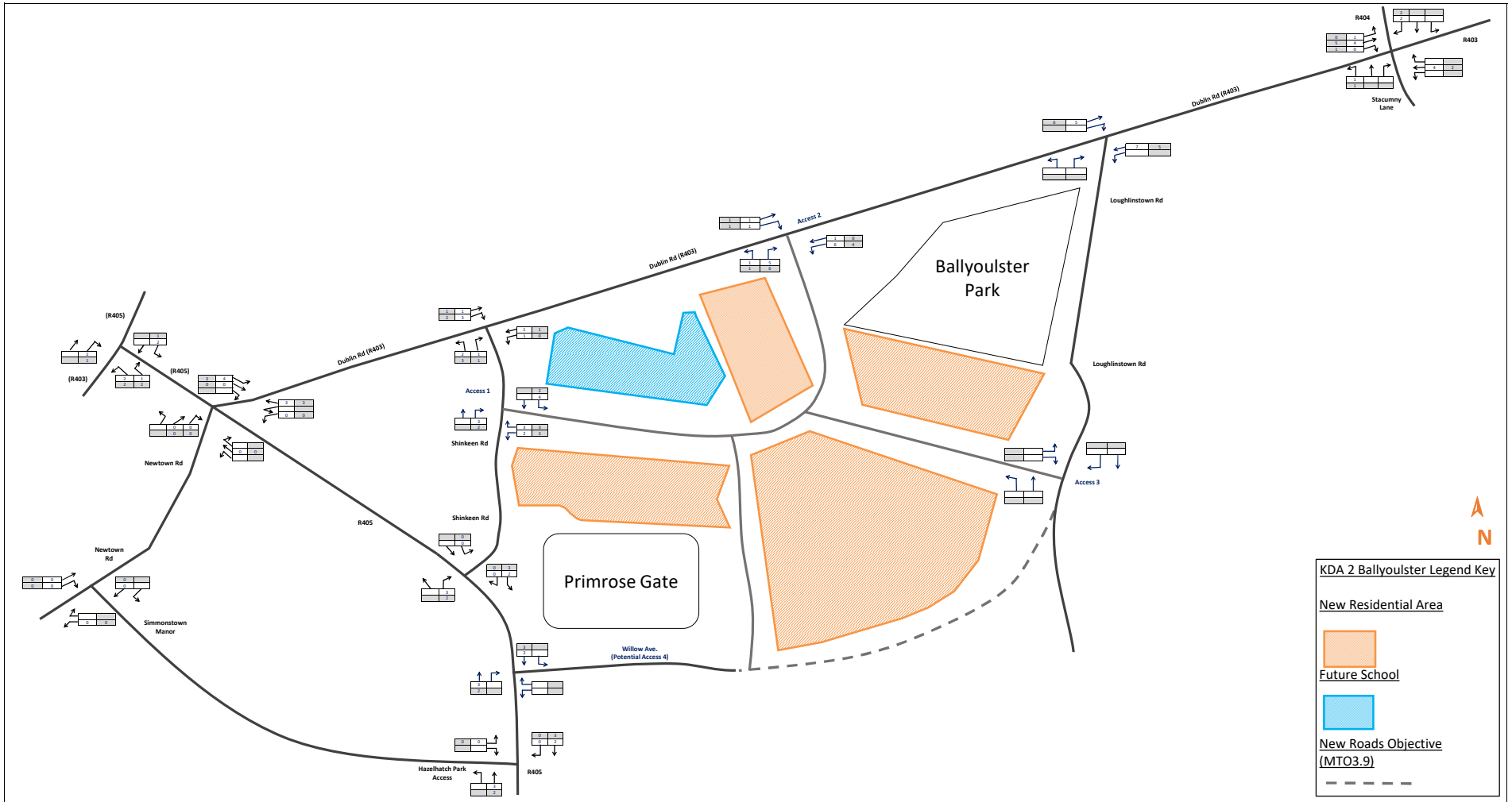
Drawing Title :
Proposed Residential Development Trips at Opening Year 2024 (Phase 1)

Key :
AM Peak Hour (08:00 - 09:00)
PM Peak Hour (17:00 - 18:00)

Drawn by:	Approved by:	Date :
DG	MMK	08/10/2021

Reference :
G:\2018\p180221\calcs\excel\Traffic\2021

Figure :	Rev :
7	-



DBFL Consulting Engineers

Dublin Office:
Ormond House, Upper Ormond Quay, Dublin 7 D07 W704
phone: +353 (0) 1 400 4000

Waterford Office:
Maritana Gate, Suite 8b The Atrium, Canada St, Waterford X91 W028
phone: +353 (0) 51 309 500

Cork Office:
14 South Mall, Cork T12 CT91
phone: +353 (0) 21 2024538

email: info@dbfl.ie
website: www.dbfl.ie

Project: Ballyouster KDA SHD - Phase 1 Residential Development

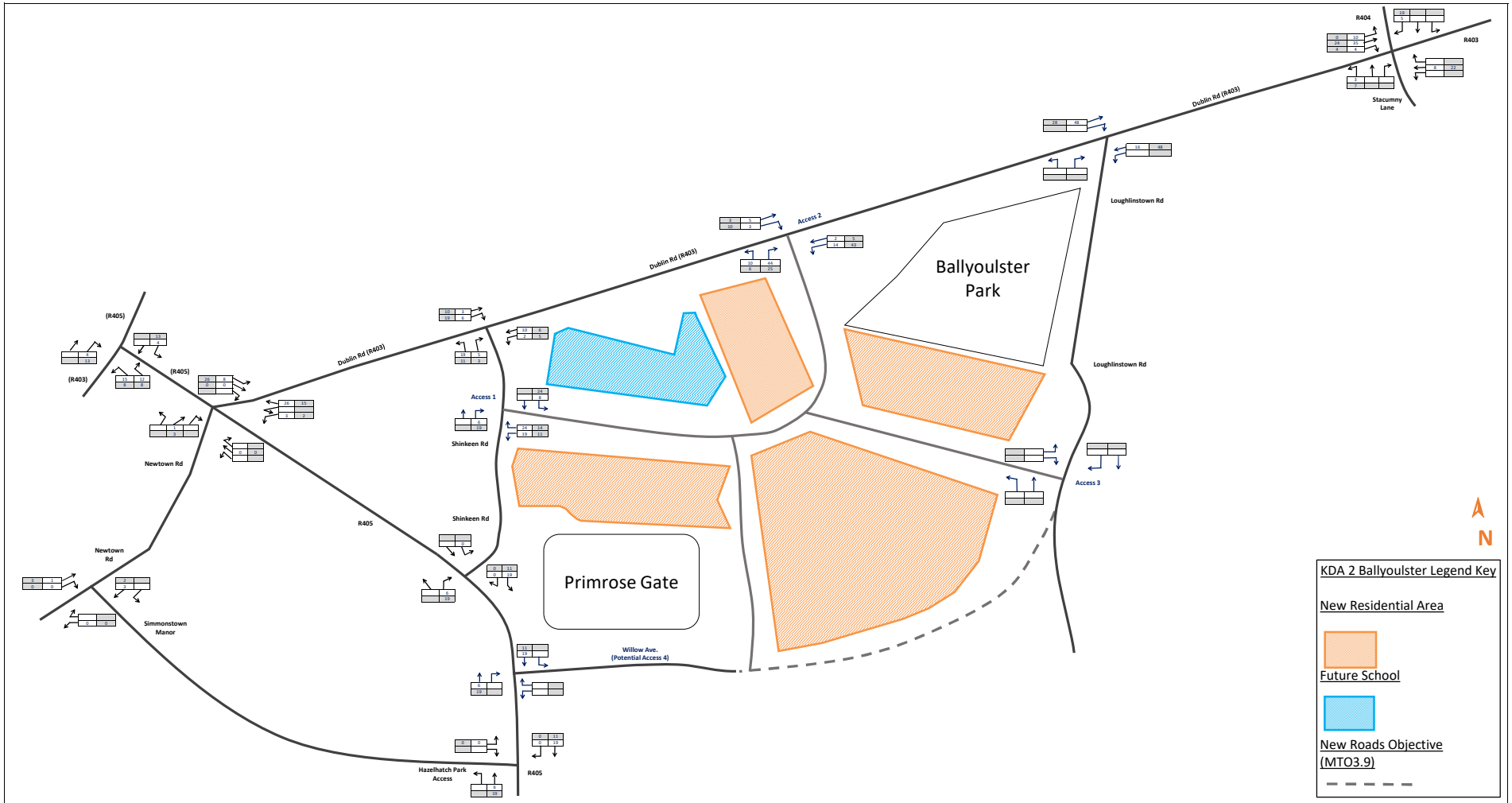
Drawing Title : Proposed Creche Trips (Opening Year 2024)

Key :
AM Peak Hour (08:00 - 09:00)
PM Peak Hour (17:00 - 18:00)

Drawn by:	Approved by:	Date :
DG	MMK	08/10/2021

Reference : G:\2018\p180221\calcs\excel\Traffic\2021

Figure :	Rev :
8	-



DBFL Consulting Engineers

Dublin Office:
Ormond House, Upper Ormond Quay, Dublin 7 D07 W704
phone: +353 (0) 1 400 4000

Waterford Office:
Maritana Gate, Suite 8b The Atrium, Canada St, Waterford X91 W028
phone: +353 (0) 51 309 500

Cork Office:
14 South Mall, Cork T12 CT91
phone: +353 (0) 21 2024538

email: info@dbfl.ie
website: www.dbfl.ie

Project: Ballyouster KDA SHD - Phase 1 Residential Development

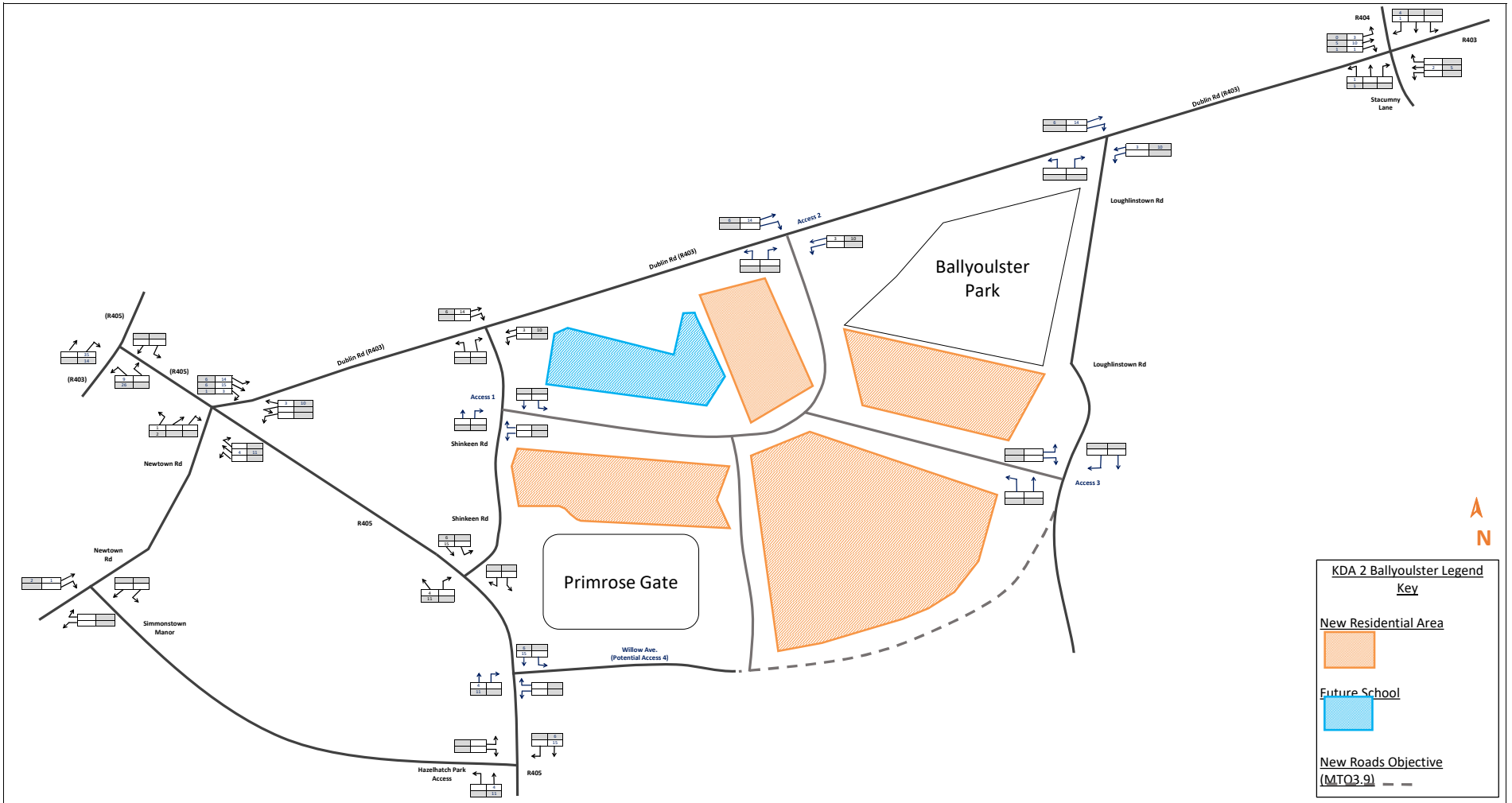
Drawing Title : Proposed Residential Development Trips at Interim 2029 and Horizon Year 2039 - Full Development

Key :
AM Peak Hour (08:00 - 09:00)
PM Peak Hour (17:00 - 18:00)

Drawn by:	Approved by:	Date :
DG	MMK	08/10/2021

Reference : G:\2018\p180221\calcs\excel\Traffic\2021

Figure :	Rev :
9	-



DBFL Consulting Engineers

Dublin Office:
Ormond House, Upper Ormond Quay, Dublin 7 D07 W704
phone: +353 (0) 1 400 4000
Waterford Office:
Maritana Gate, Suite 8b The Atrium, Canada St, Waterford X91 W028
phone: +353 (0) 51 309 500
Cork Office:
14 South Mall, Cork T12 CT91
phone: +353 (0) 21 2024538
email: info@dbfl.ie
website: www.dbfl.ie

Project:
Ballyouster KDA SHD - Phase 1 Residential Development

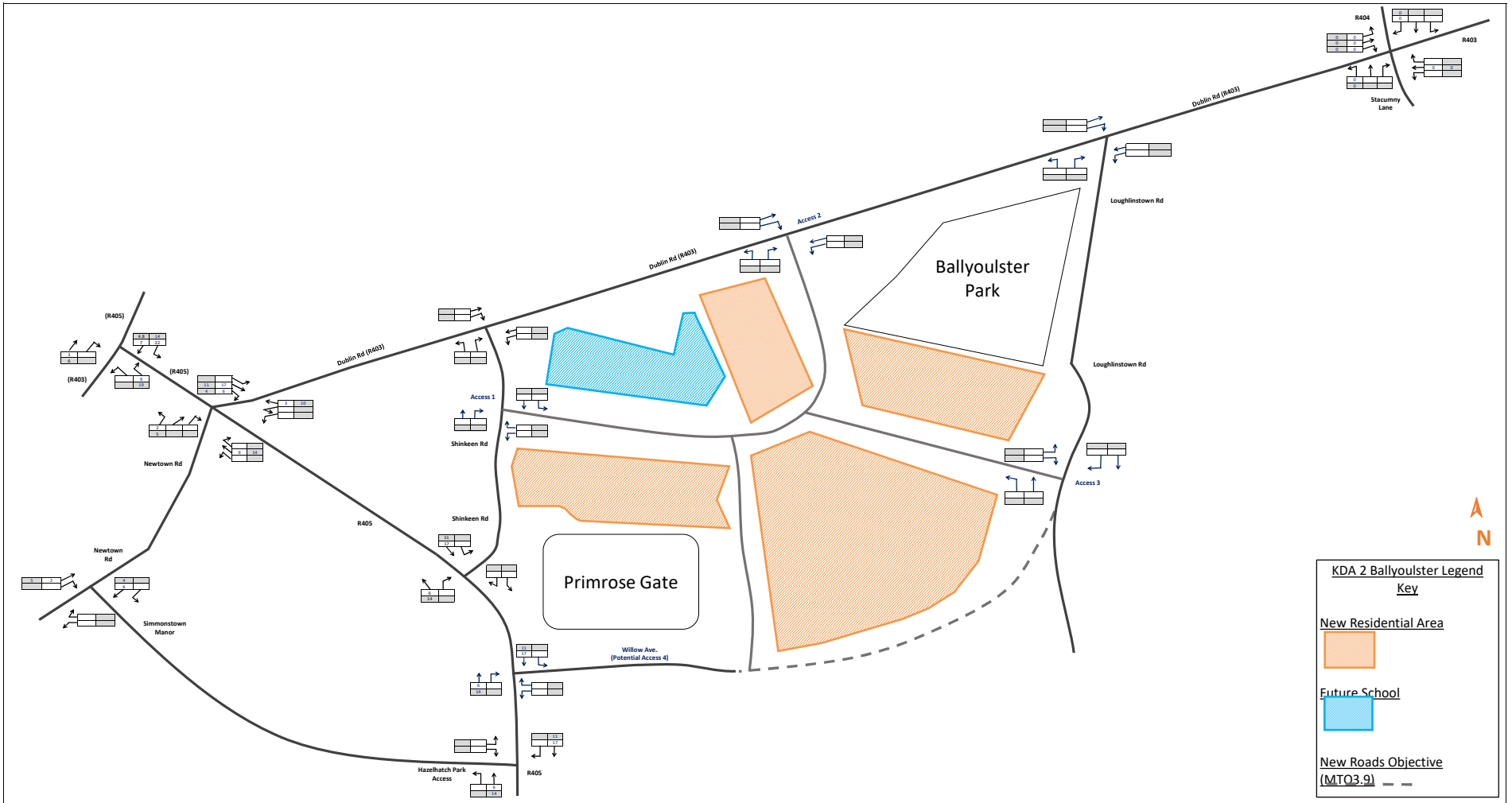
Drawing Title :
Oldtown Residential Development, Shackleton Road, Celbridge (ABP-303295-18) - Committed Development Trips

Key :
AM Peak Hour (08:00 - 09:00)
PM Peak Hour (17:00 - 18:00)

Drawn by:	Approved by:	Date :
DG	MMK	16/07/2020

Reference : G:\2018\p180221\calcs\excel\Traffic\2021

Figure :	Rev :
10	-



DBFL Consulting Engineers

Dublin Office:
Ormond House, Upper Ormond Quay, Dublin 7 D07 W704
phone: +353 (0) 1 400 4000
Waterford Office:
Maritana Gate, Suite 8b The Atrium, Canada St, Waterford X91 W028
phone: +353 (0) 51 309 500
Cork Office:
14 South Mall, Cork T12 CT91
phone: +353 (0) 21 2024538
email: info@dbfl.ie
website: www.dbfl.ie

Project:
Ballyouster KDA SHD - Phase 1 Residential Development

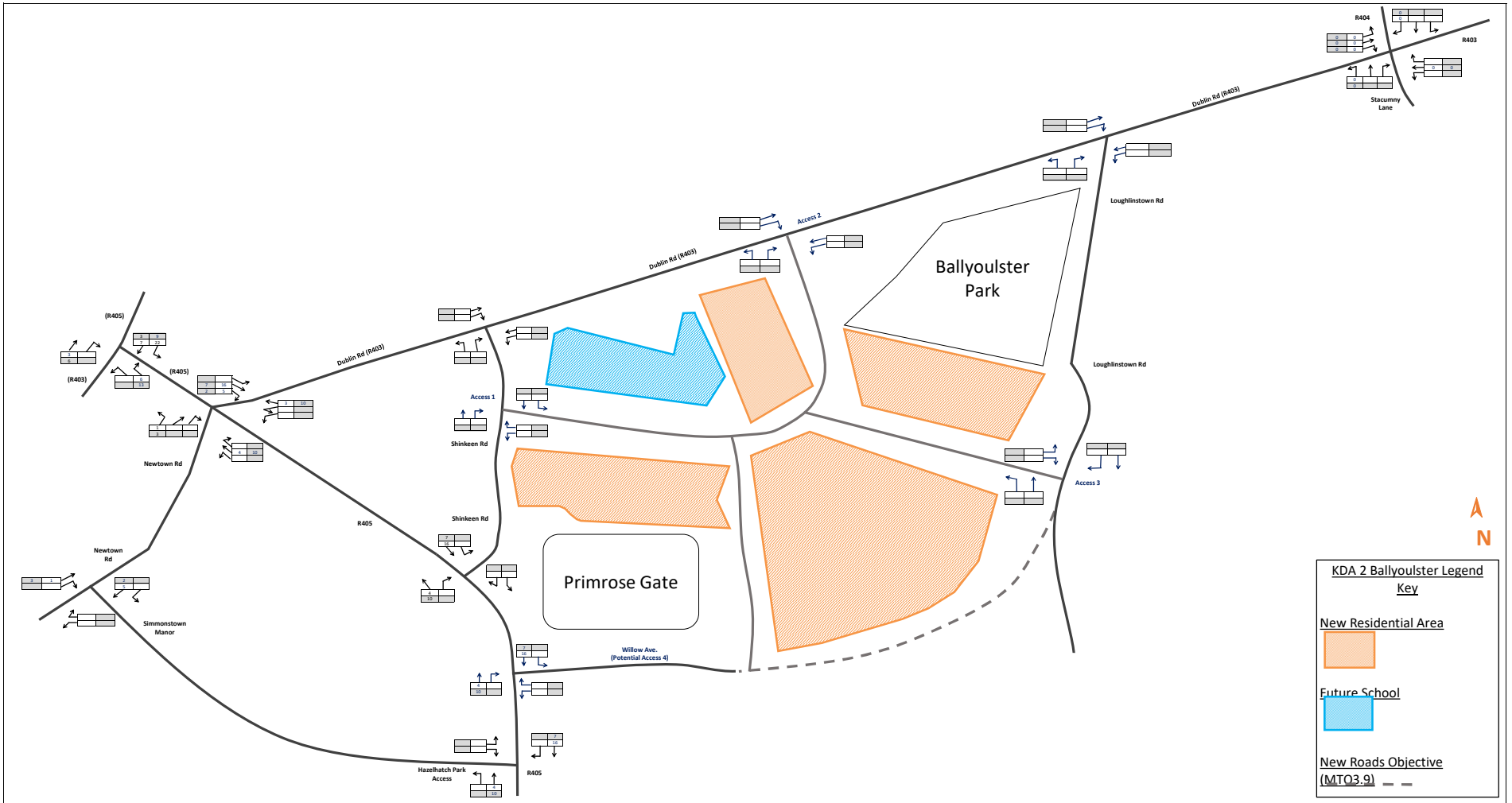
Drawing Title :
Townland of Crodaun, Celbridge (ABP-309361-21) - Committed Development Trips

Key :
AM Peak Hour (08:00 - 09:00)
PM Peak Hour (17:00 - 18:00)

Drawn by:	Approved by:	Date :
DG	MMK	16/07/2020

Reference : G:\2018\p180221\calcs\excel\Traffic\2021

Figure :	Rev :
10b	-



DBFL Consulting Engineers

Dublin Office:
Ormond House, Upper Ormond Quay, Dublin 7 D07 W704
phone: +353 (0) 1 400 4000
Waterford Office:
Maritana Gate, Suite 8b The Atrium, Canada St, Waterford X91 W028
phone: +353 (0) 51 309 500
Cork Office:
14 South Mall, Cork T12 CT91
phone: +353 (0) 21 2024538
email: info@dbfl.ie
website: www.dbfl.ie

Project: Ballyouster KDA SHD - Phase 1 Residential Development

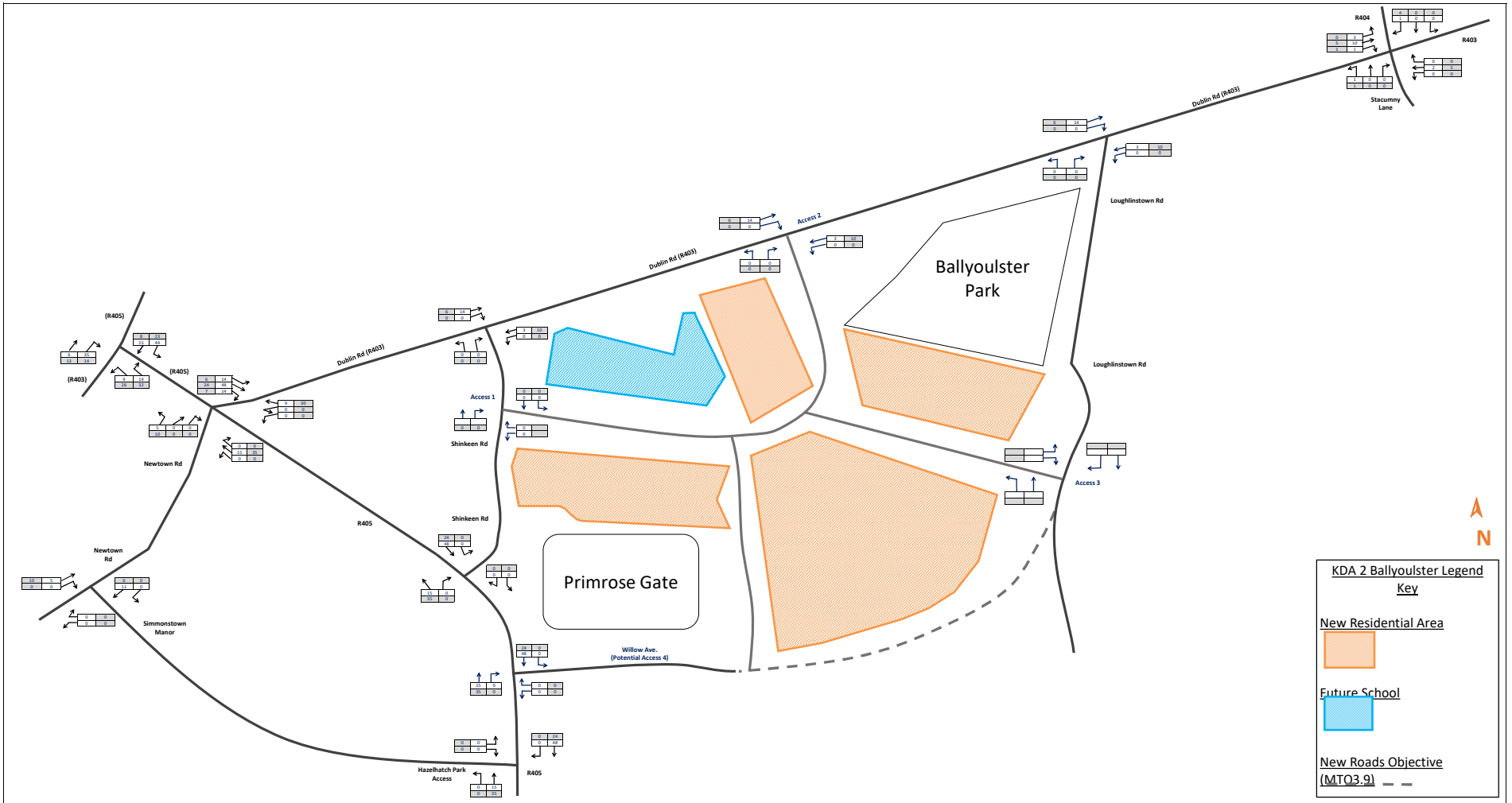
Drawing Title : Crodaun, Celbridge (ABP-303295-19) - Committed Development Trips

Key :
AM Peak Hour (08:00 - 09:00)
PM Peak Hour (17:00 - 18:00)

Drawn by:	Approved by:	Date :
DG	MMK	16/07/2020

Reference : G:\2018\p180221\calcs\excel\Traffic\2021

Figure :	Rev :
10c	-



DBFL Consulting Engineers

Dublin Office:
Ormond House, Upper Ormond Quay, Dublin 7 D07 W704
phone: +353 (0) 1 400 4000
Waterford Office:
Maritana Gate, Suite 8b The Atrium, Canada St, Waterford X91 W028
phone: +353 (0) 51 309 500
Cork Office:
14 South Mall, Cork T12 CT91
phone: +353 (0) 21 2024538
email: info@dbfl.ie
website: www.dbfl.ie

Project: Ballyouster KDA SHD - Phase 1 Residential Development

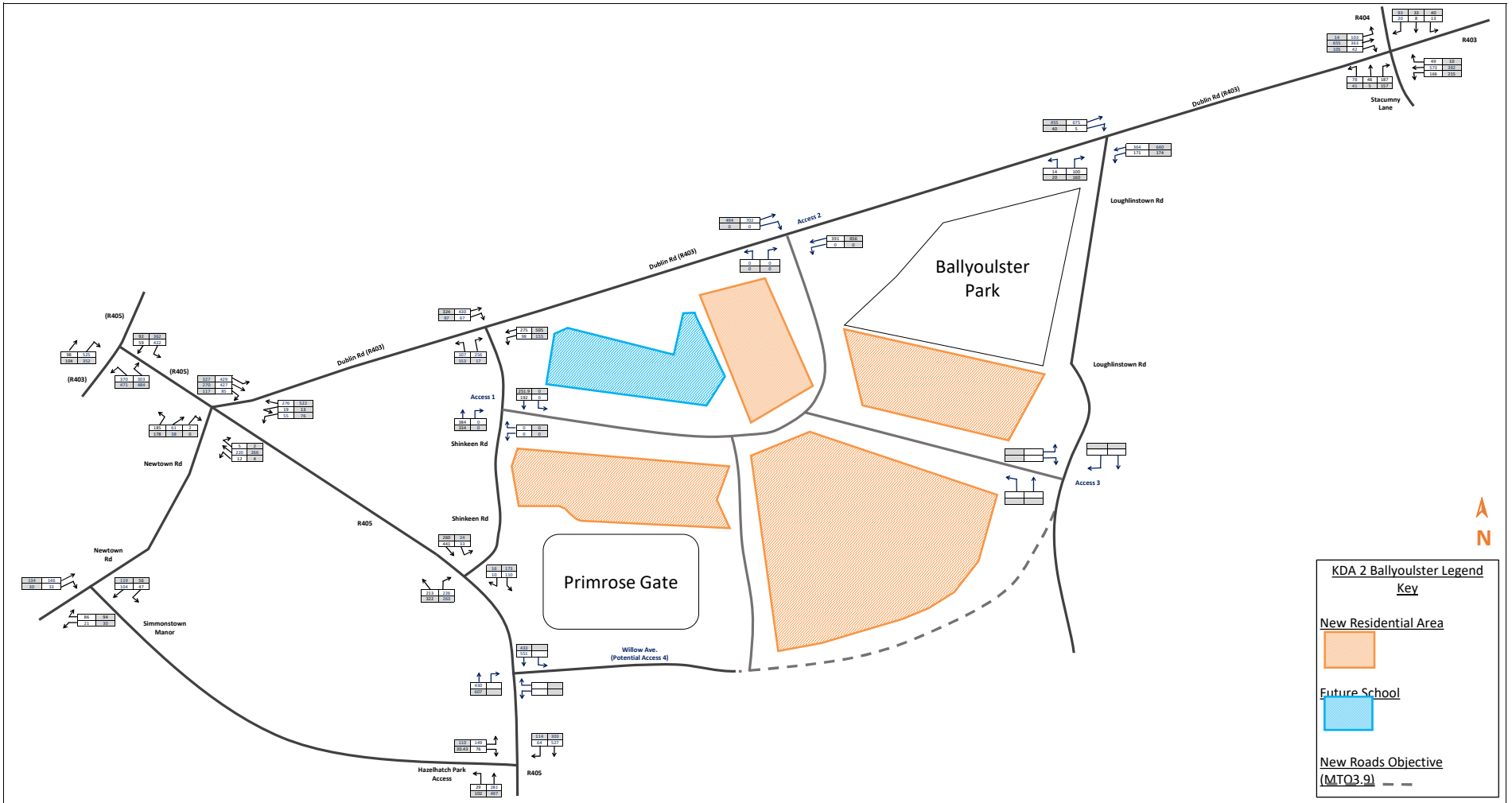
Drawing Title : Total Committed Development Trips

Key :
AM Peak Hour (08:00 - 09:00)
PM Peak Hour (17:00 - 18:00)

Drawn by:	Approved by:	Date :
DG	MMK	16/07/2020

Reference : G:\2018\p180221\calcs\excel\Traffic\2021

Figure :	Rev :
10d	-



DBFL Consulting Engineers

Dublin Office:
Ormond House, Upper Ormond Quay, Dublin 7 D07 W704
phone: +353 (0) 1 400 4000
Waterford Office:
Maritana Gate, Suite 8b The Atrium, Canada St, Waterford X91 W028
phone: +353 (0) 51 309 500
Cork Office:
14 South Mall, Cork T12 CT91
phone: +353 (0) 21 2024538
email: info@dbfl.ie
website: www.dbfl.ie

Project: Ballyouster KDA SHD - Phase 1 Residential Development

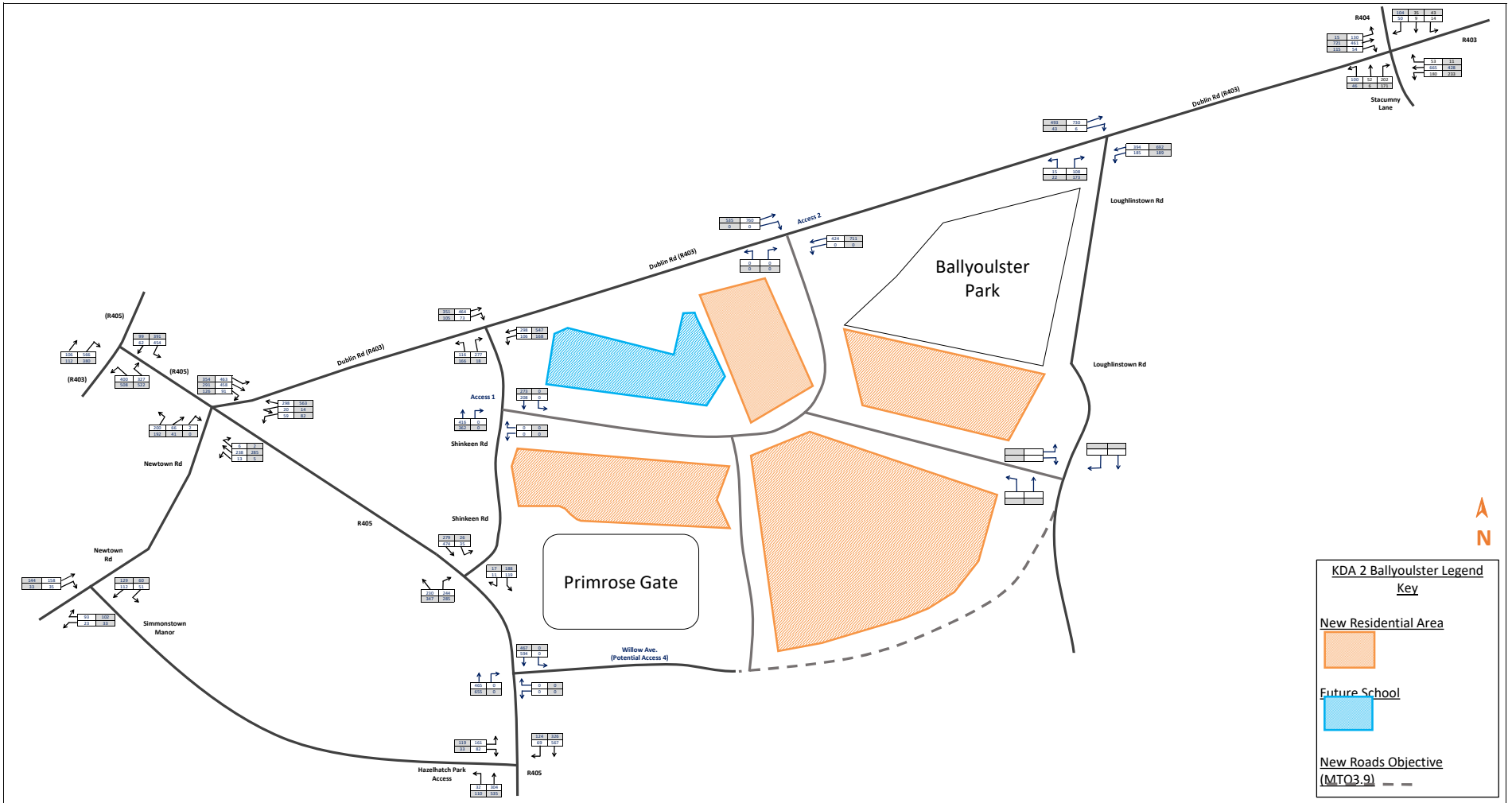
Drawing Title : Do Nothing 2024

Key :
AM Peak Hour (08:00 - 09:00)
PM Peak Hour (17:00 - 18:00)

Drawn by:	Approved by:	Date :
DG	MMK	11/10/2021

Reference : G:\2018\p180221\calcs\excel\Traffic\2021

Figure :	Rev :
11	-



DBFL Consulting Engineers

Dublin Office:
Ormond House, Upper Ormond Quay, Dublin 7 D07 W704
phone: +353 (0) 1 400 4000
Waterford Office:
Maritana Gate, Suite 8b The Atrium, Canada St, Waterford X91 W028
phone: +353 (0) 51 309 500
Cork Office:
14 South Mall, Cork T12 CT91
phone: +353 (0) 21 2024538
email: info@dbfl.ie
website: www.dbfl.ie

Project: Ballyouster KDA SHD - Phase 1 Residential Development

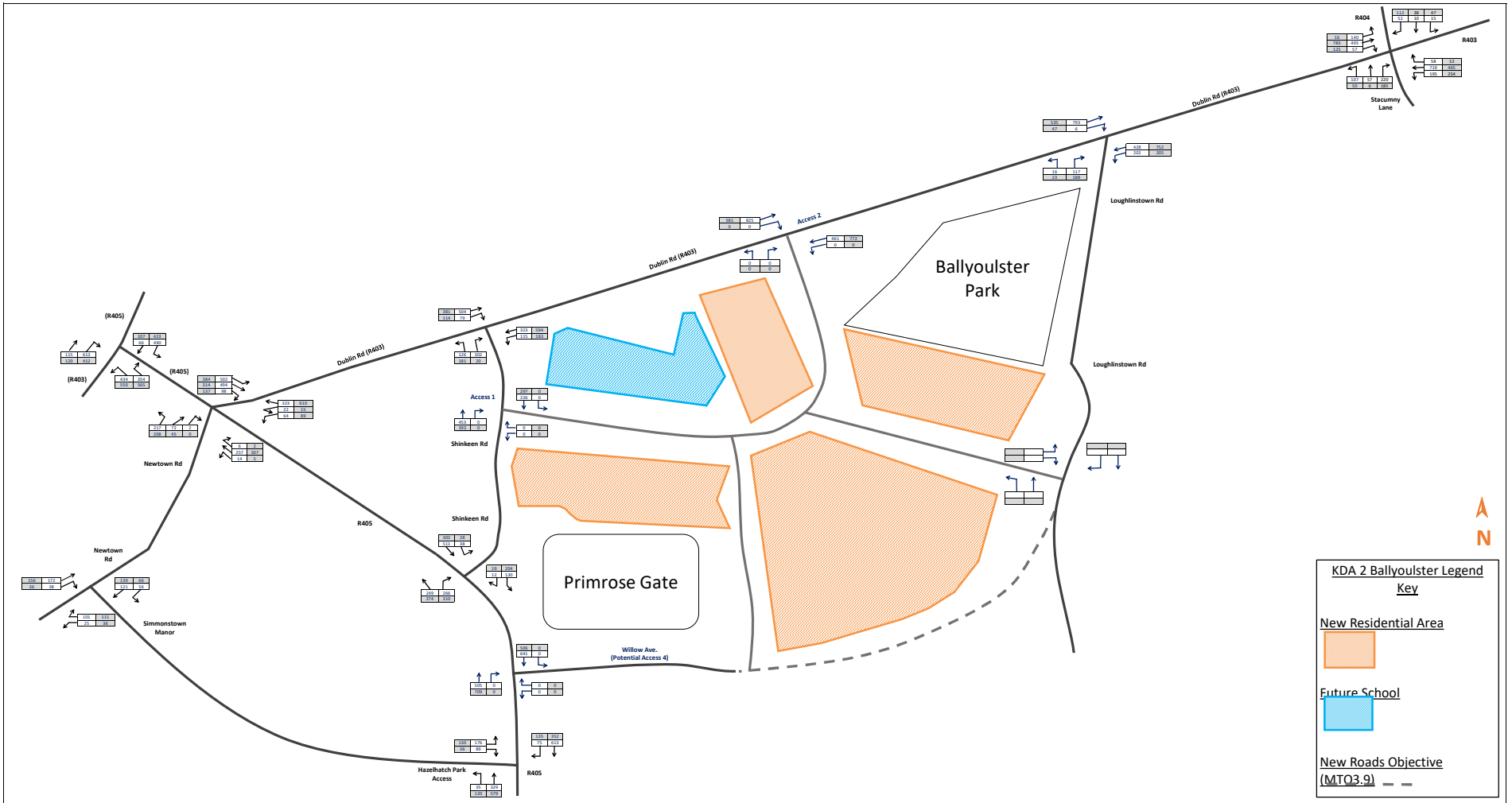
Drawing Title : Do Nothing 2029 - No School

Key :
AM Peak Hour (08:00 - 09:00)
PM Peak Hour (17:00 - 18:00)

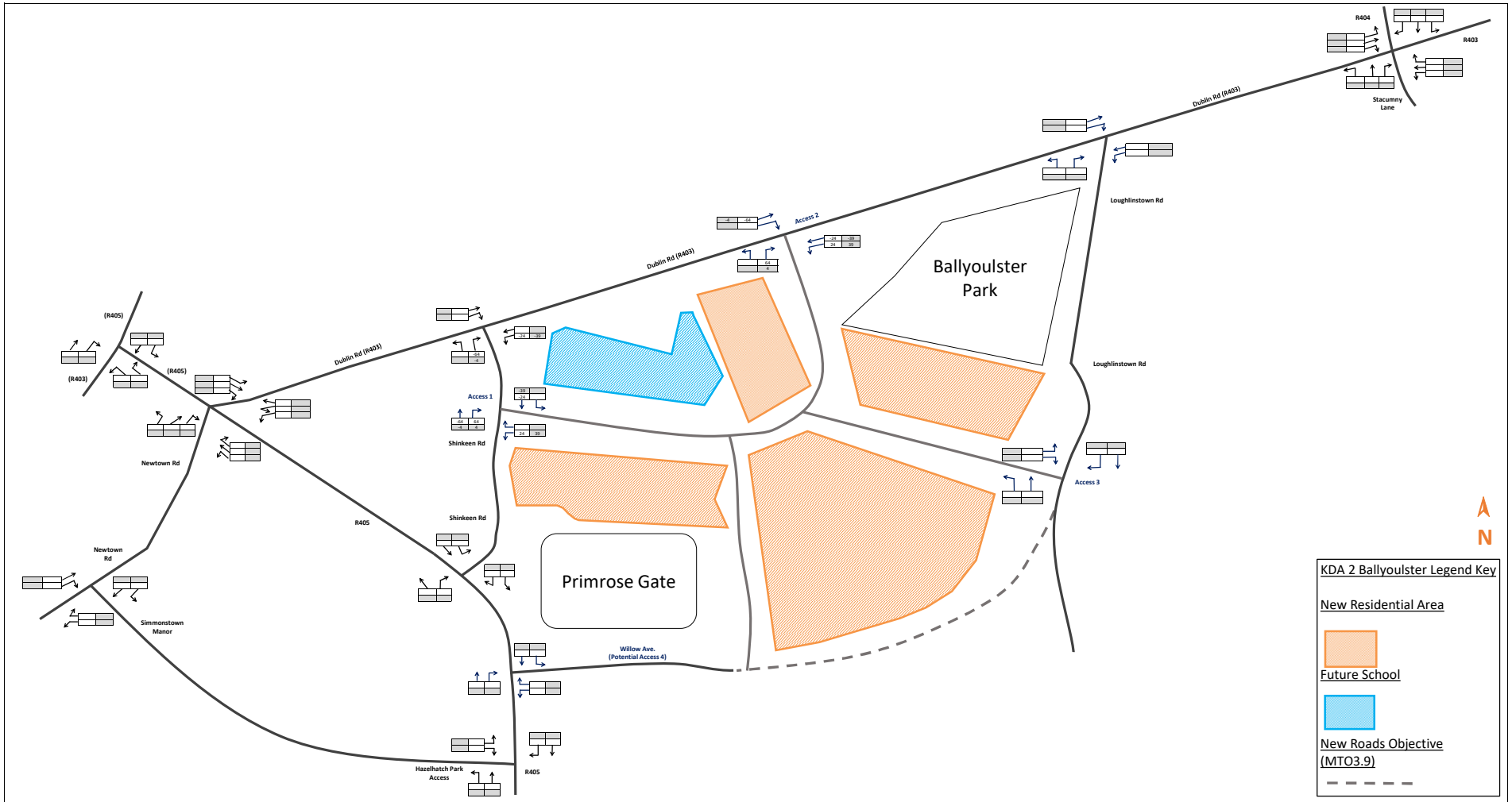
Drawn by:	Approved by:	Date :
DG	MMK	11/10/2021

Reference : G:\2018\p180221\calcs\excel\Traffic\2021

Figure :	Rev :
12	-



DBFL Consulting Engineers	**Dublin Office:** Ormond House, Upper Ormond Quay, Dublin 7 D07 W704 **phone:** +353 (0) 1 400 4000 **Waterford Office:** Maritana Gate, Suite 8b The Atrium, Canada St, Waterford X91 W028 **phone:** +353 (0) 51 309 500 **Cork Office:** 14 South Mall, Cork T12 CT91 **phone:** +353 (0) 21 2024538 **email:** info@dbfl.ie **website:** www.dbfl.ie	**Project:** Ballyouster KDA SHD - Phase 1 Residential Development **Drawing Title :** Do Nothing 2039 - No School	**Key :** AM Peak Hour (08:00 - 09:00) PM Peak Hour (17:00 - 18:00)	**Drawn by:** DG **Approved by:** MMK **Date :** 11/10/2021 **Reference :** G:\2018\p180221\calcs\excel\Traffic\2021 **Figure :** 13 **Rev :** -	



DBFL Consulting Engineers

Dublin Office:
Ormond House, Upper Ormond Quay, Dublin 7 D07 W704
phone: +353 (0) 1 400 4000

Waterford Office:
Maritana Gate, Suite 8b The Atrium, Canada St, Waterford X91 W028
phone: +353 (0) 51 309 500

Cork Office:
14 South Mall, Cork T12 CT91
phone: +353 (0) 21 2024538

email: info@dbfl.ie
website: www.dbfl.ie

Project: Ballyouster KDA SHD - Phase 1 Residential Development

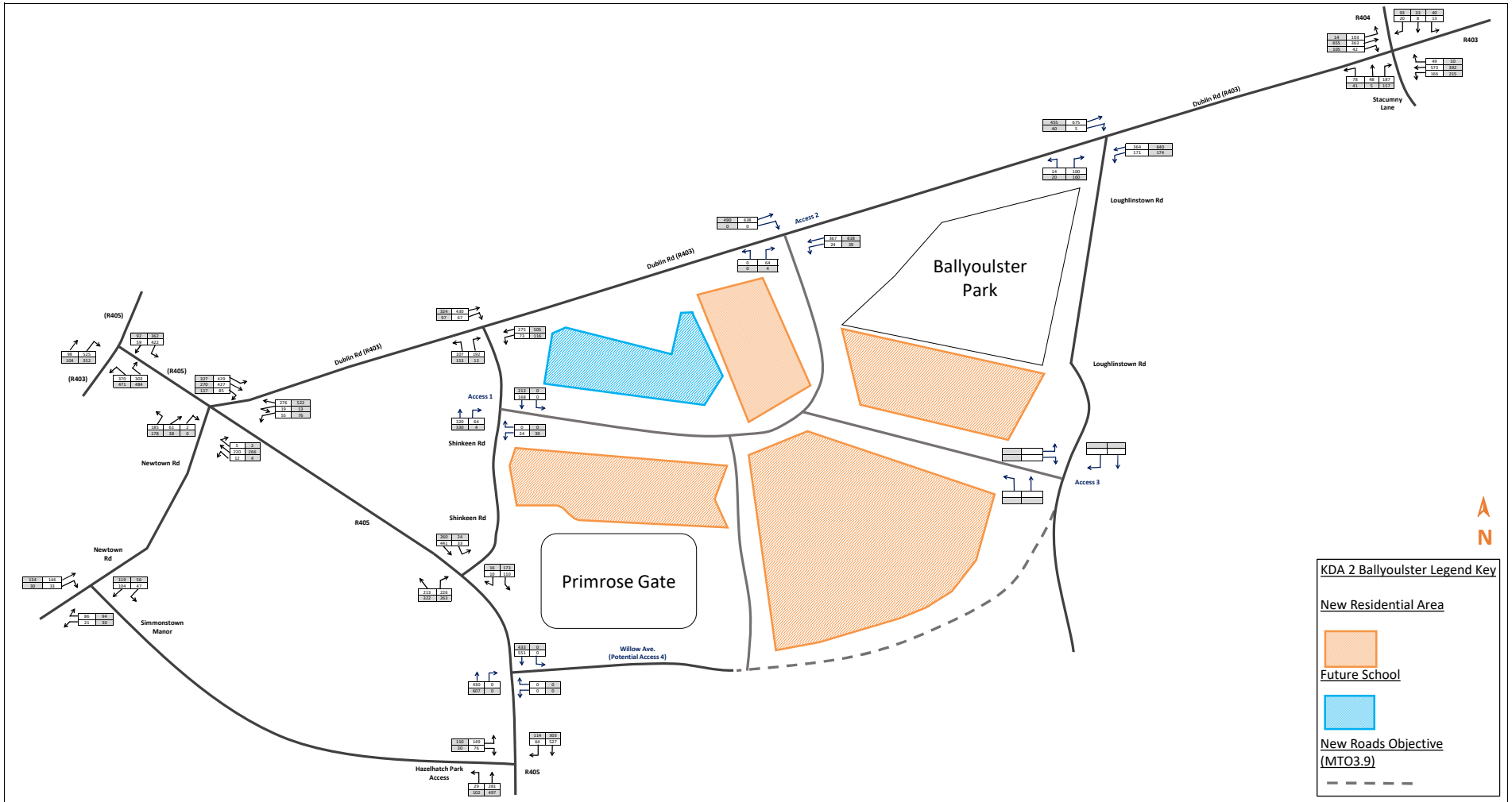
Drawing Title : 2024 Distributed Flows

Key :
AM Peak Hour (08:00 - 09:00)
PM Peak Hour (17:00 - 18:00)
Redistribution Factor 0.25

Drawn by:	Approved by:	Date :
DG	MMK	08/10/2021

Reference : G:\2018\p180221\calcs\excel\Traffic\2021

Figure :	Rev :
14	-



DBFL Consulting Engineers

Dublin Office:
Ormond House, Upper Ormond Quay, Dublin 7 D07 W704
phone: +353 (0) 1 400 4000

Waterford Office:
Maritana Gate, Suite 8b The Atrium, Canada St, Waterford X91 W028
phone: +353 (0) 51 309 500

Cork Office:
14 South Mall, Cork T12 CT91
phone: +353 (0) 21 2024538

email: info@dbfl.ie
website: www.dbfl.ie

Project: Ballyouster KDA SHD - Phase 1 Residential Development

Drawing Title : 2024 DN Redistributed

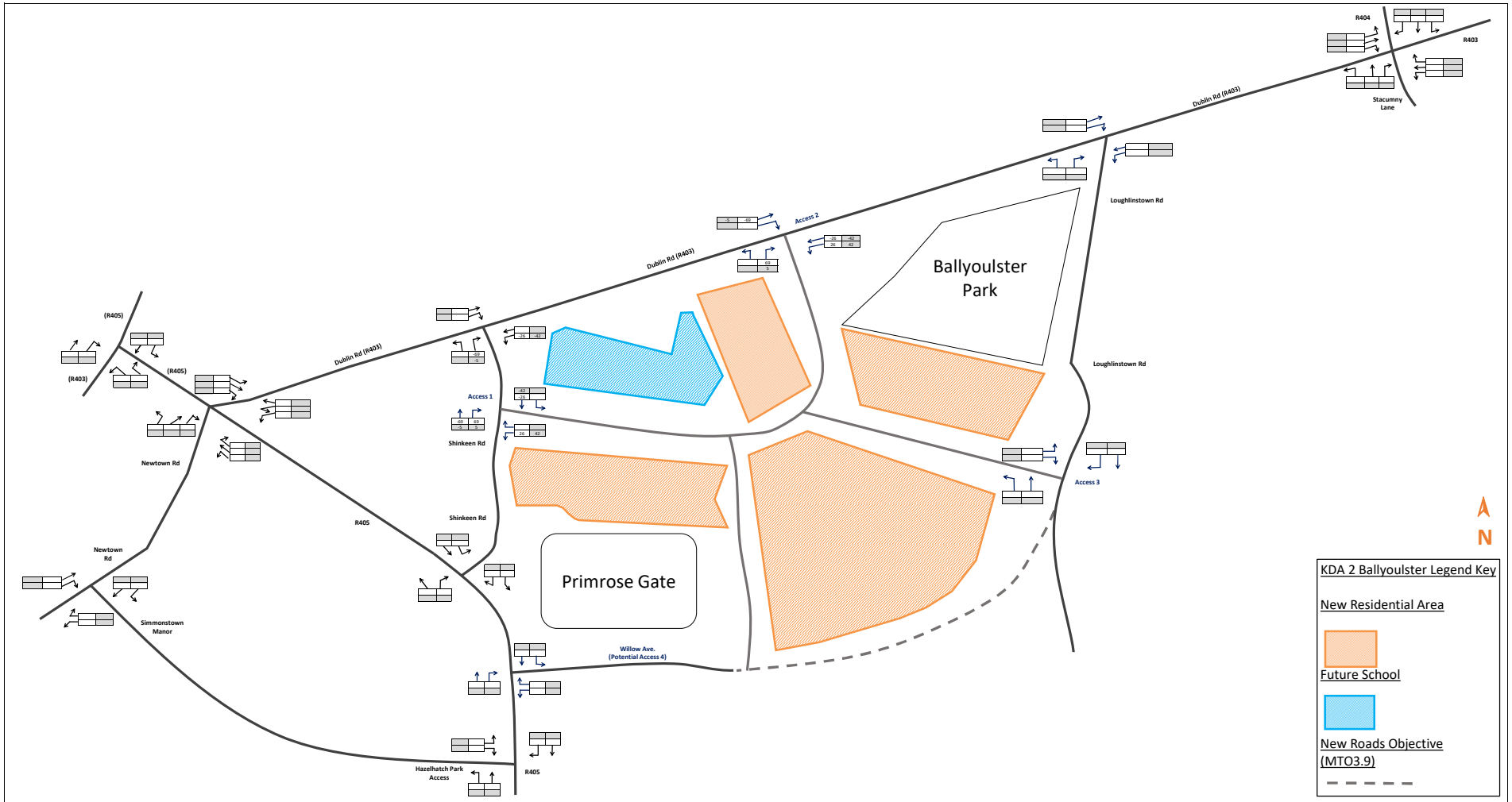
Key :
AM Peak Hour (08:00 - 09:00)
PM Peak Hour (17:00 - 18:00)

2024 Growth Factor: 1.033

Drawn by:	Approved by:	Date :
DG	MMK	08/10/2021

Reference : G:\2018\p180221\calcs\excel\Traffic\2021

Figure :	Rev :
15	-



DBFL Consulting Engineers

Dublin Office:
Ormond House, Upper Ormond Quay, Dublin 7 D07 W704
phone: +353 (0) 1 400 4000

Waterford Office:
Maritana Gate, Suite 8b The Atrium, Canada St, Waterford X91 W028
phone: +353 (0) 51 309 500

Cork Office:
14 South Mall, Cork T12 CT91
phone: +353 (0) 21 2024538

email: info@dbfl.ie
website: www.dbfl.ie

Project: Ballyouster KDA SHD - Phase 1 Residential Development

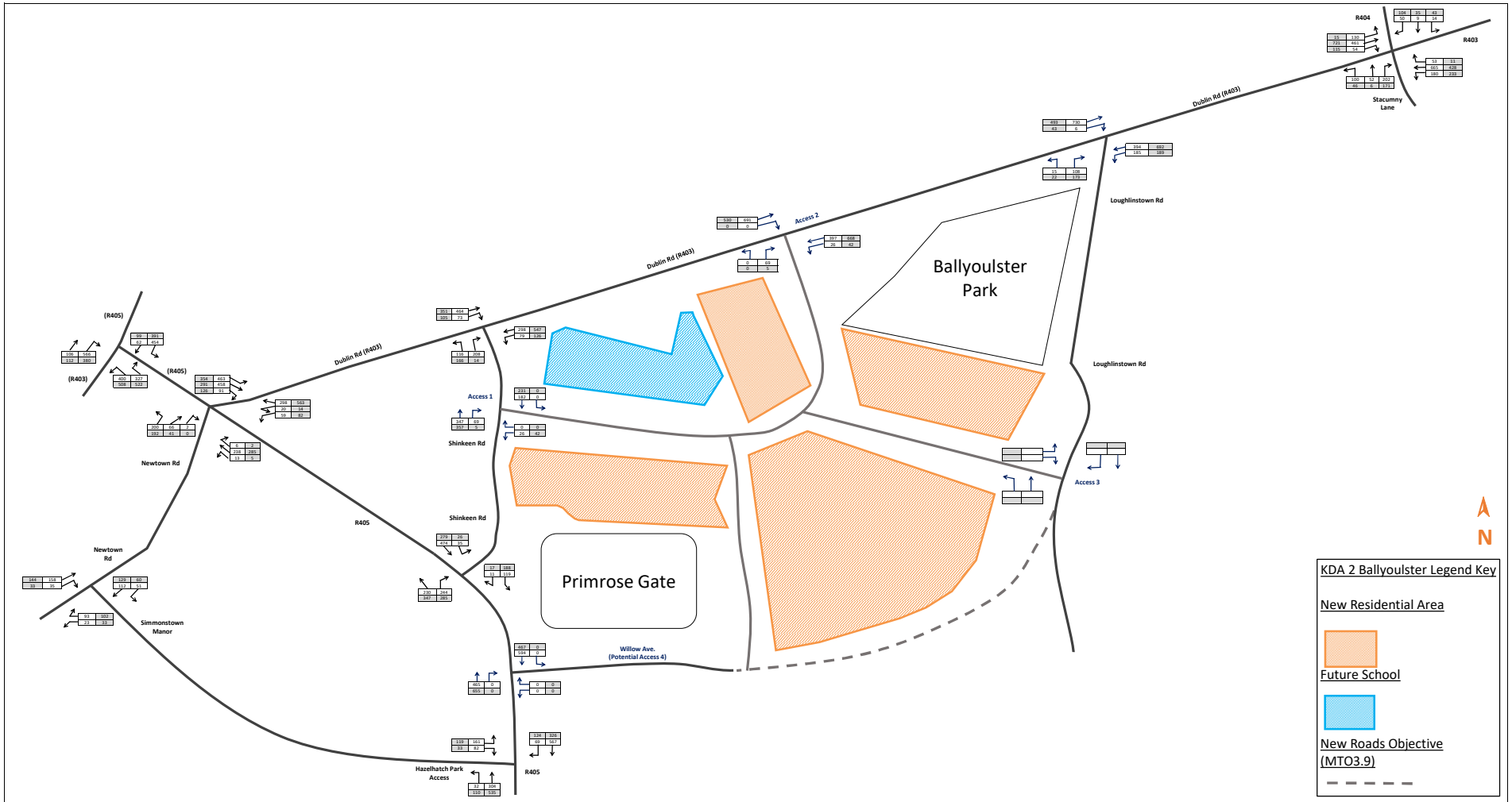
Drawing Title : 2029 Distributed Flows

Key :
AM Peak Hour (08:00 - 09:00)
PM Peak Hour (17:00 - 18:00)
Redistribution Factor 0.25

Drawn by:	Approved by:	Date :
DG	MMK	08/10/2021

Reference : G:\2018\p180221\calcs\excel\Traffic\2021

Figure :	Rev :
16	-



DBFL Consulting Engineers

Dublin Office:
Ormond House, Upper Ormond Quay, Dublin 7 D07 W704
phone: +353 (0) 1 400 4000

Waterford Office:
Maritana Gate, Suite 8b The Atrium, Canada St, Waterford X91 W028
phone: +353 (0) 51 309 500

Cork Office:
14 South Mall, Cork T12 CT91
phone: +353 (0) 21 2024538

email: info@dbfl.ie
website: www.dbfl.ie

Project: Ballyouster KDA SHD - Phase 1 Residential Development

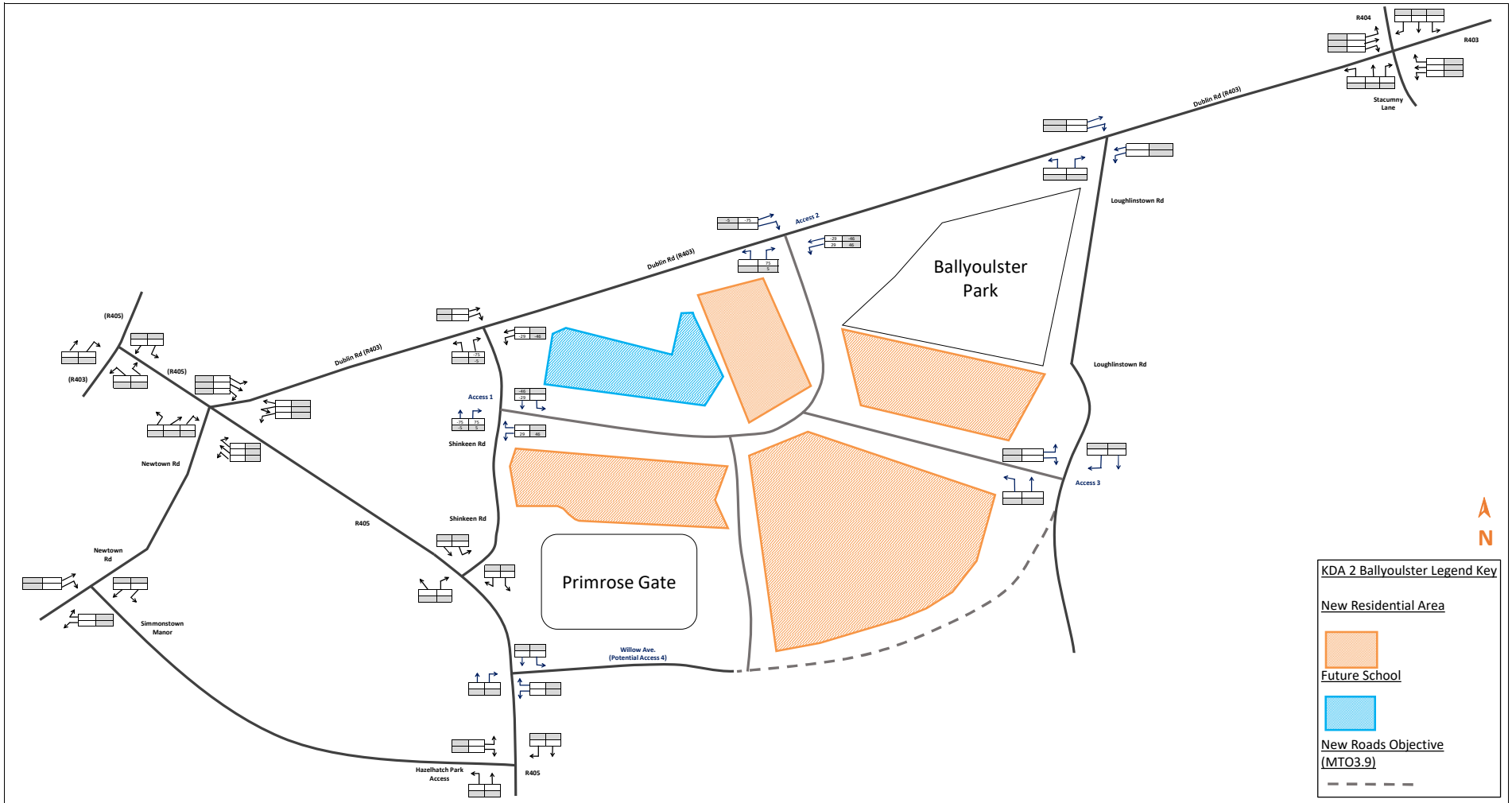
Drawing Title : 2029 DN Redistributed

Key :
AM Peak Hour (08:00 - 09:00)
PM Peak Hour (17:00 - 18:00)

Drawn by:	Approved by:	Date :
DG	MMK	08/10/2021

Reference : G:\2018\p180221\calcs\excel\Traffic\2021

Figure :	Rev :
17	-



DBFL Consulting Engineers

Dublin Office:
Ormond House, Upper Ormond Quay, Dublin 7 D07 W704
phone: +353 (0) 1 400 4000

Waterford Office:
Maritana Gate, Suite 8b The Atrium, Canada St, Waterford X91 W028
phone: +353 (0) 51 309 500

Cork Office:
14 South Mall, Cork T12 CT91
phone: +353 (0) 21 2024538

email: info@dbfl.ie
website: www.dbfl.ie

Project:
Ballyouster KDA SHD - Phase 1 Residential Development

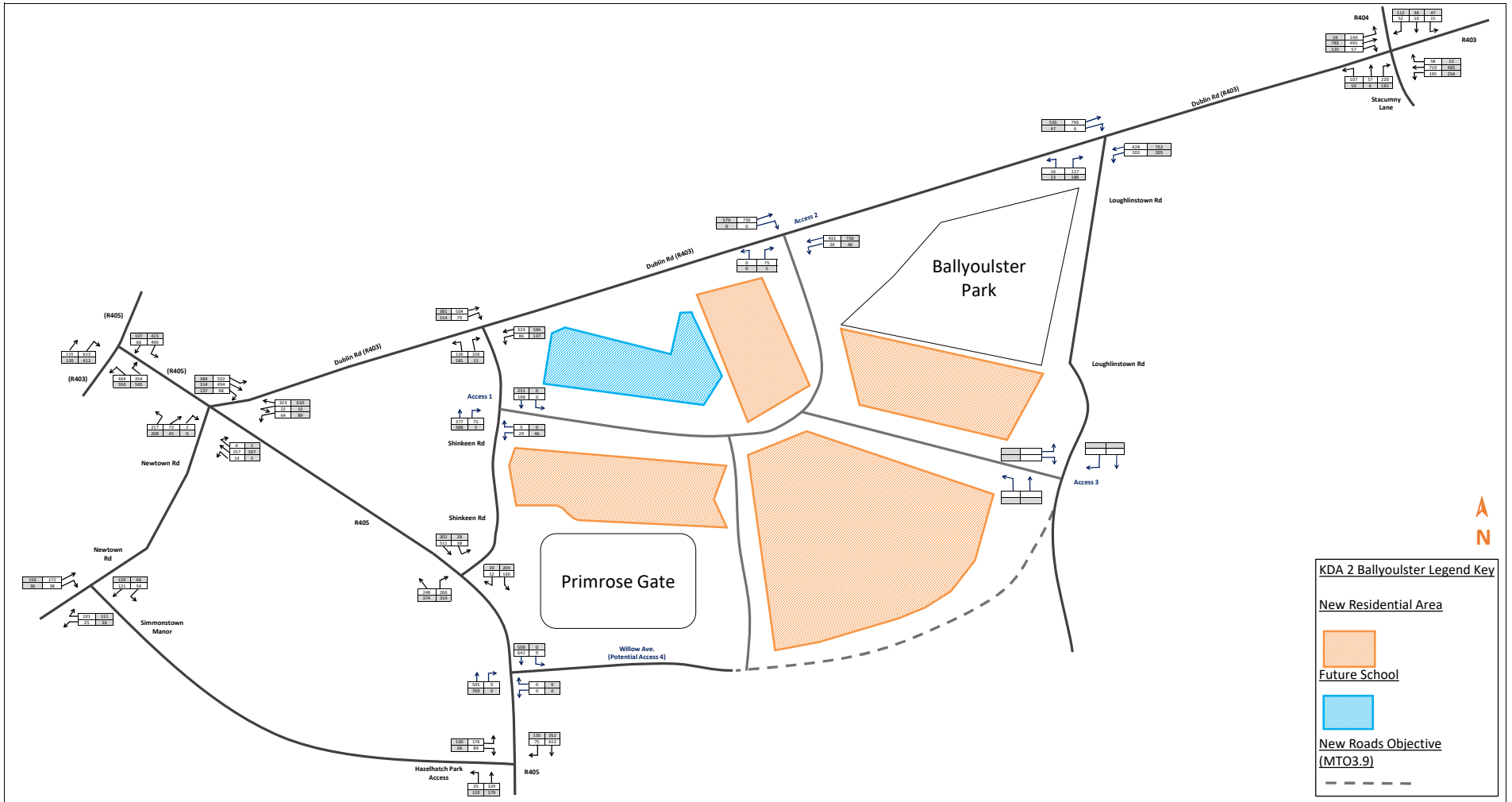
Drawing Title :
2039 Distributed Flows

Key :
AM Peak Hour (08:00 - 09:00)
PM Peak Hour (17:00 - 18:00)
Redistribution Factor 0.25

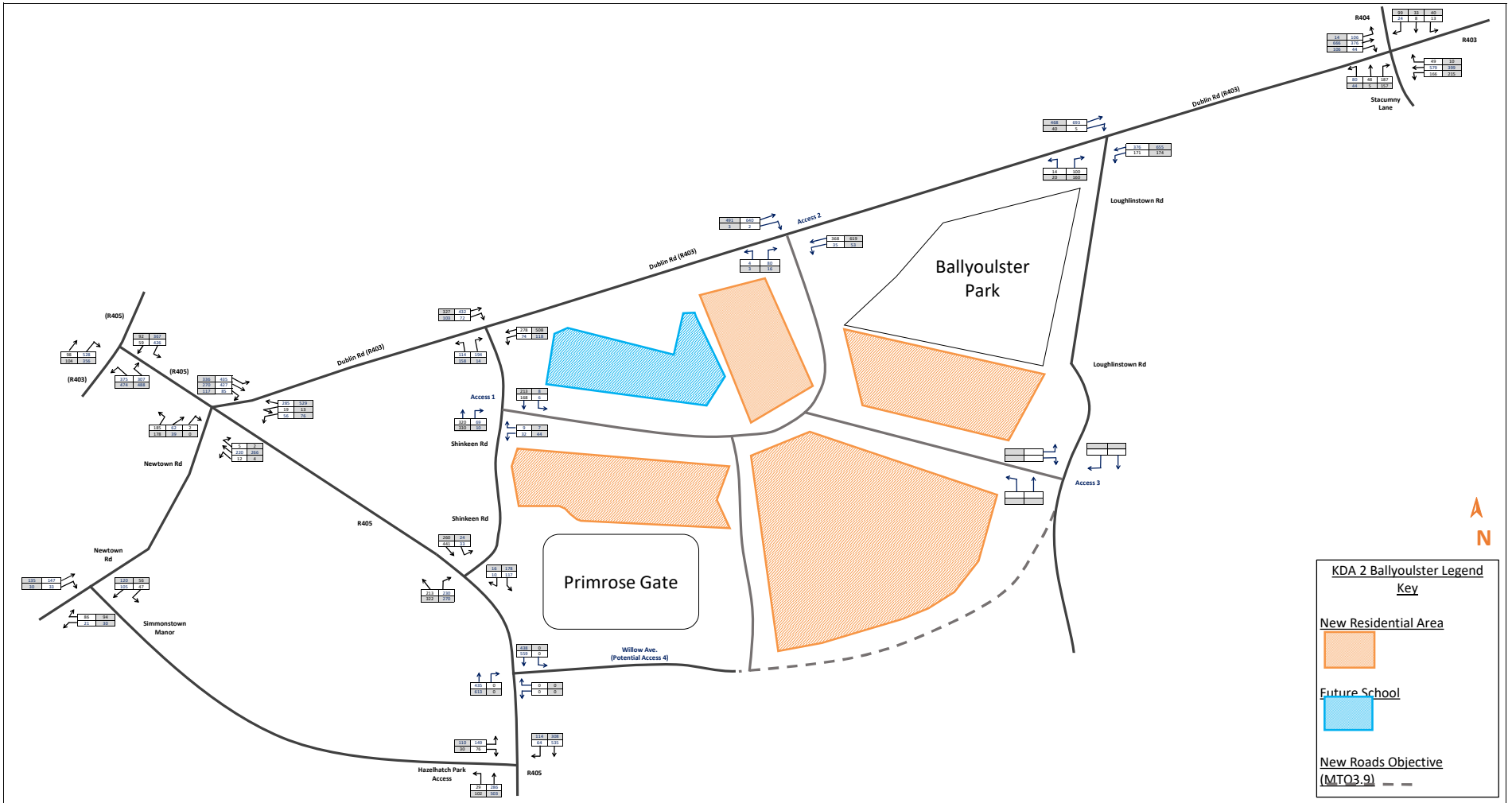
Drawn by:	Approved by:	Date :
DG	MMK	08/10/2021

Reference : G:\2018\p180221\calcs\excel\Traffic\2021

Figure :	Rev :
18	-



DBFL Consulting Engineers	**Dublin Office:** Ormond House, Upper Ormond Quay, Dublin 7 D07 W704 **phone:** +353 (0) 1 400 4000 **Waterford Office:** Maritana Gate, Suite 8b The Atrium, Canada St, Waterford X91 W028 **phone:** +353 (0) 51 309 500 **Cork Office:** 14 South Mall, Cork T12 CT91 **phone:** +353 (0) 21 2024538 **email:** info@dbfl.ie **website:** www.dbfl.ie	**Project:** Ballyouster KDA SHD - Phase 1 Residential Development **Drawing Title :** 2028 DN Redistributed	**Key :** AM Peak Hour (08:00 - 09:00) PM Peak Hour (17:00 - 18:00)	**Drawn by:** DG **Approved by:** MMK **Date :** 08/10/2021 **Reference :** G:\2018\p180221\calcs\excel\Traffic\2021 **Figure :** 19 **Rev :** -	



DBFL Consulting Engineers

Dublin Office:
Ormond House, Upper Ormond Quay, Dublin 7 D07 W704
phone: +353 (0) 1 400 4000

Waterford Office:
Maritana Gate, Suite 8b The Atrium, Canada St, Waterford X91 W028
phone: +353 (0) 51 309 500

Cork Office:
14 South Mall, Cork T12 CT91
phone: +353 (0) 21 2024538

email: info@dbfl.ie
website: www.dbfl.ie

Project: Ballyouster KDA SHD - Phase 1 Residential Development

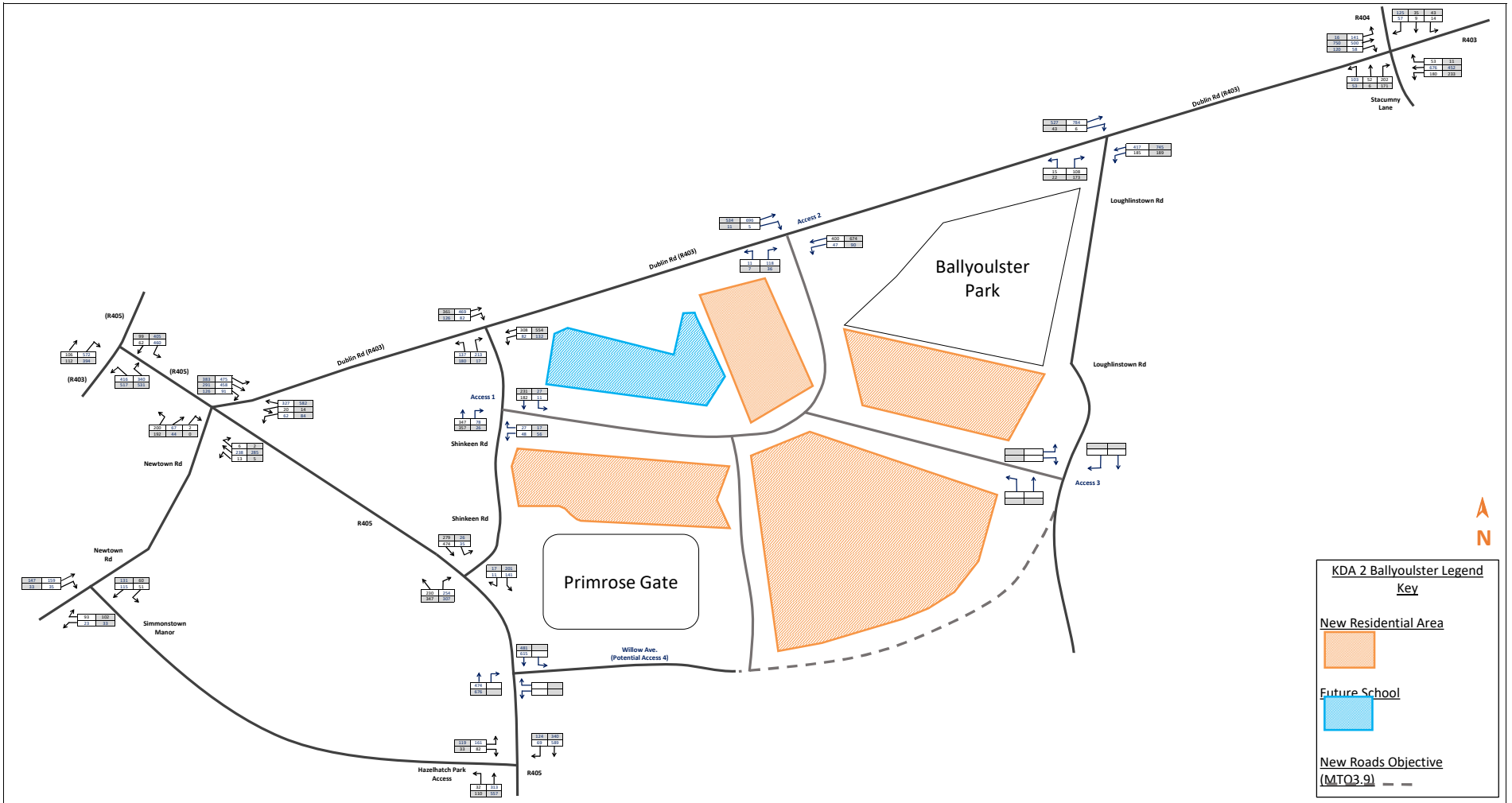
Drawing Title : Do Something 2024

Key :
AM Peak Hour (08:00 - 09:00)
PM Peak Hour (17:00 - 18:00)

Drawn by:	Approved by:	Date :
DG	MMK	11/10/2021

Reference : G:\2018\p180221\calcs\excel\Traffic\2021

Figure :	Rev :
20	-



DBFL Consulting Engineers

Dublin Office:
Ormond House, Upper Ormond Quay, Dublin 7 D07 W704
phone: +353 (0) 1 400 4000
Waterford Office:
Maritana Gate, Suite 8b The Atrium, Canada St, Waterford X91 W028
phone: +353 (0) 51 309 500
Cork Office:
14 South Mall, Cork T12 CT91
phone: +353 (0) 21 2024538
email: info@dbfl.ie
website: www.dbfl.ie

Project: Ballyouster KDA SHD - Phase 1 Residential Development

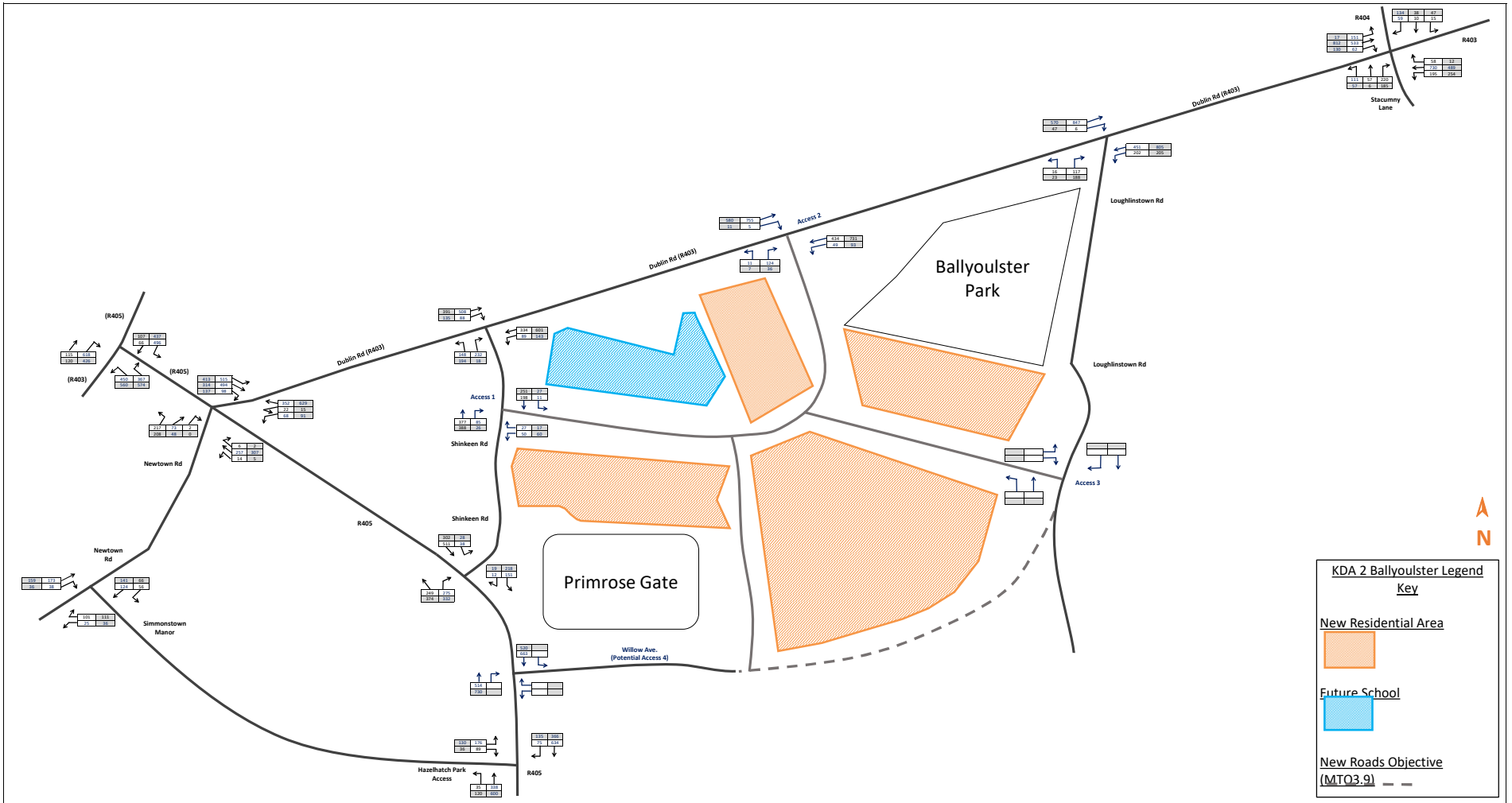
Drawing Title : Do Something 2029

Key :
AM Peak Hour (08:00 - 09:00)
PM Peak Hour (17:00 - 18:00)

Drawn by:	Approved by:	Date :
DG	MMK	11/10/2021

Reference : G:\2018\p180221\calcs\excel\Traffic\2021

Figure :	Rev :
21	-



DBFL Consulting Engineers

Dublin Office:
Ormond House, Upper Ormond Quay, Dublin 7 D07 W704
phone: +353 (0) 1 400 4000
Waterford Office:
Maritana Gate, Suite 8b The Atrium, Canada St, Waterford X91 W028
phone: +353 (0) 51 309 500
Cork Office:
14 South Mall, Cork T12 CT91
phone: +353 (0) 21 2024538
email: info@dbfl.ie
website: www.dbfl.ie

Project: Ballyouster KDA SHD - Phase 1 Residential Development

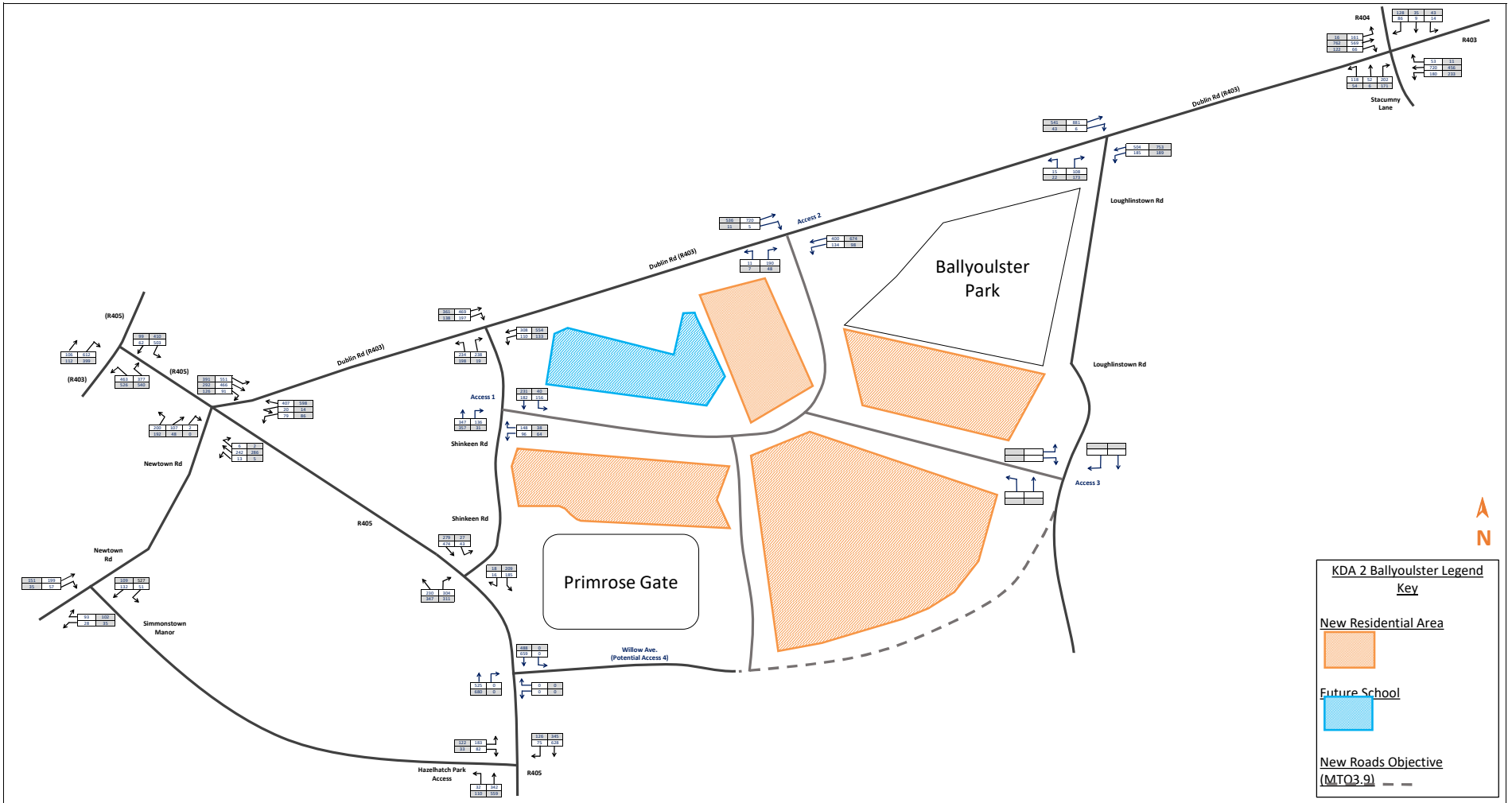
Drawing Title : Do Something 2039

Key :
AM Peak Hour (08:00 - 09:00)
PM Peak Hour (17:00 - 18:00)

Drawn by:	Approved by:	Date :
DG	MMK	11/10/2021

Reference : G:\2018\p180221\calcs\excel\Traffic\2021

Figure :	Rev :
22	-



DBFL Consulting Engineers

Dublin Office:
Ormond House, Upper Ormond Quay, Dublin 7 D07 W704
phone: +353 (0) 1 400 4000
Waterford Office:
Maritana Gate, Suite 8b The Atrium, Canada St, Waterford X91 W028
phone: +353 (0) 51 309 500
Cork Office:
14 South Mall, Cork T12 CT91
phone: +353 (0) 21 2024538
email: info@dbfl.ie
website: www.dbfl.ie

Project: Ballyouster KDA SHD - Phase 1 Residential Development

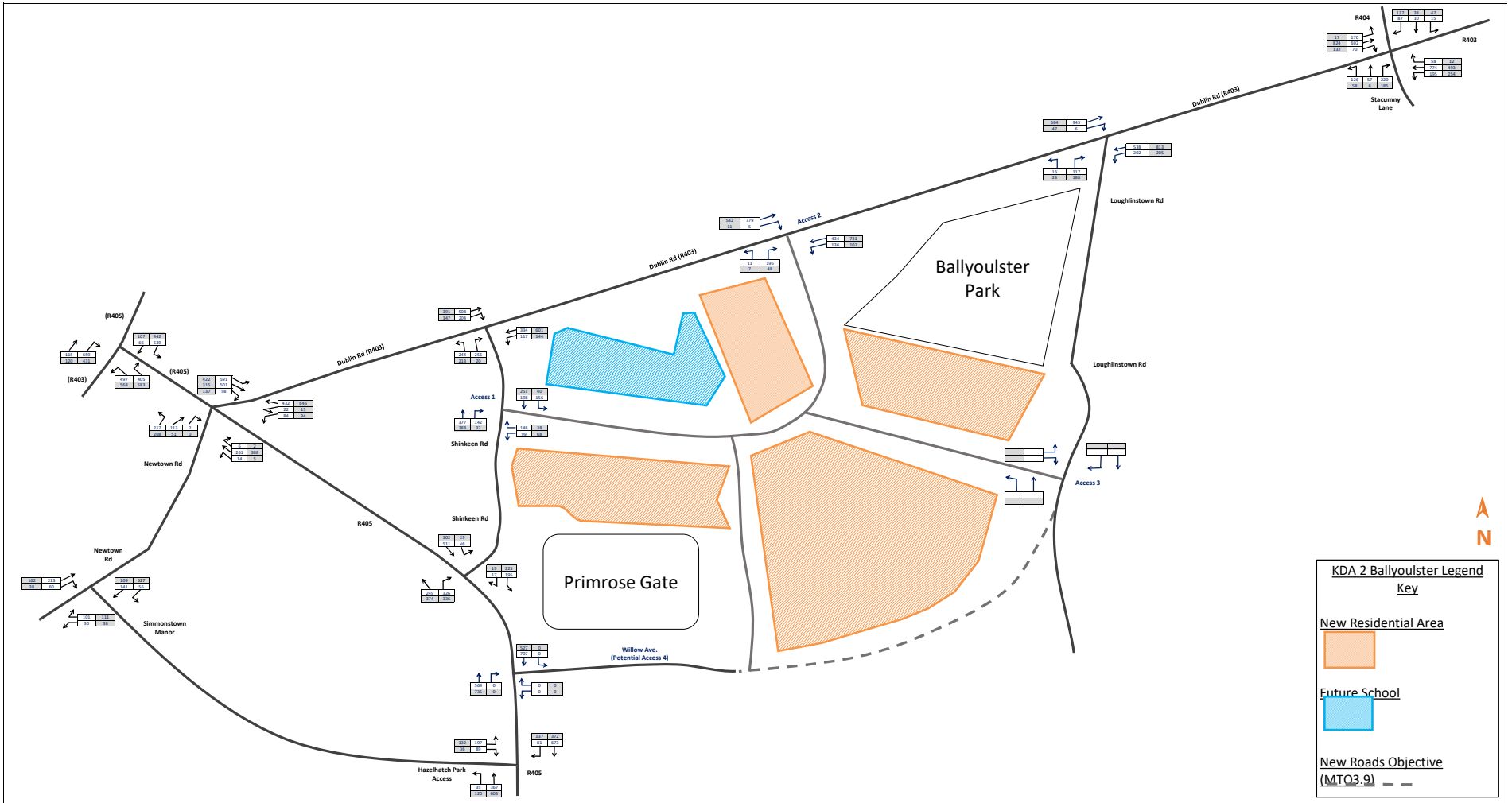
Drawing Title : Sensitivity Analysis 1 - 2029 with Schools

Key :
AM Peak Hour (08:00 - 09:00)
PM Peak Hour (17:00 - 18:00)

Drawn by:	Approved by:	Date :
DG	MMK	11/10/2021

Reference : G:\2018\p180221\calcs\excel\Traffic\2021

Figure :	Rev :
23	-



DBFL Consulting Engineers

Dublin Office:
Ormond House, Upper Ormond Quay, Dublin 7 D07 W704
phone: +353 (0) 1 400 4000
Waterford Office:
Maritana Gate, Suite 8b The Atrium, Canada St, Waterford X91 W028
phone: +353 (0) 51 309 500
Cork Office:
14 South Mall, Cork T12 CT91
phone: +353 (0) 21 2024538
email: info@dbfl.ie
website: www.dbfl.ie

Project: Ballyouster KDA SHD - Phase 1 Residential Development

Drawing Title : Sensitivity Analysis 1 - 2039 with Schools

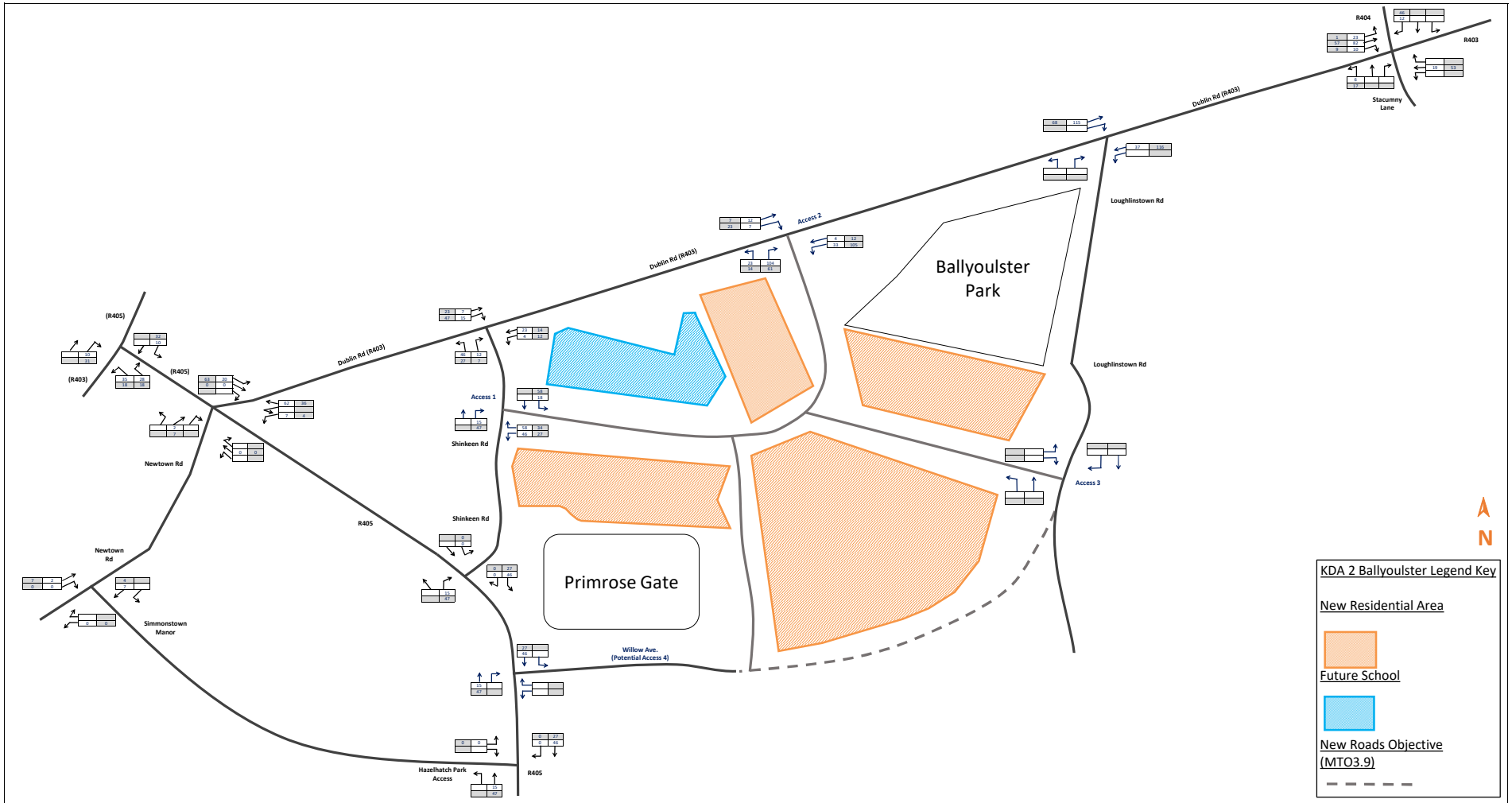
Key :
AM Peak Hour (08:00 - 09:00)
PM Peak Hour (17:00 - 18:00)

Drawn by:	Approved by:	Date :
DG	MMK	11/10/2021

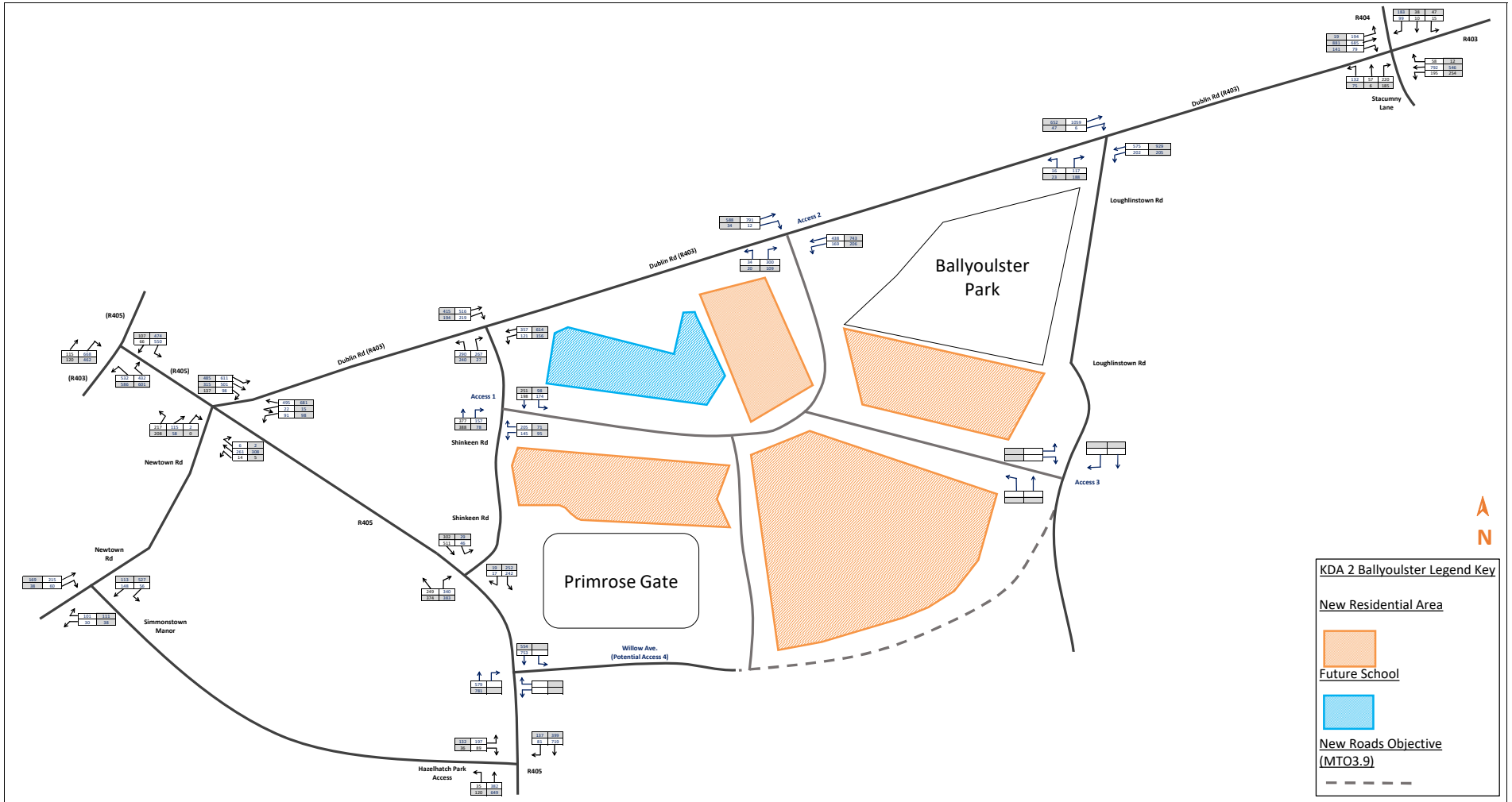
Reference : G:\2018\p180221\calcs\excel\Traffic\2021

Figure : 24

Rev : -



DBFL Consulting Engineers	**Dublin Office:** Ormond House, Upper Ormond Quay, Dublin 7 D07 W704 **phone:** +353 (0) 1 400 4000 **Waterford Office:** Maritana Gate, Suite 8b The Atrium, Canada St, Waterford X91 W028 **phone:** +353 (0) 51 309 500 **Cork Office:** 14 South Mall, Cork T12 CT91 **phone:** +353 (0) 21 2024538 **email:** info@dbfl.ie **website:** www.dbfl.ie	**Project:** Ballyouster KDA SHD - Phase 1 Residential Development **Drawing Title :** Sensitivity Analysis - 298 no. Houses and 552 no. Apartments / Duplexes at Masterplan Lands (Future Design Year 2039)	**Key :** AM Peak Hour (08:00 - 09:00) PM Peak Hour (17:00 - 18:00)	**Drawn by:** DG **Approved by:** MMK **Date :** 11/10/2021 **Reference :** G:\2018\p180221\calcs\excel\Traffic\2021 **Figure :** 25 **Rev :** -	



DBFL Consulting Engineers	**Dublin Office:** Ormond House, Upper Ormond Quay, Dublin 7 D07 W704 **phone:** +353 (0) 1 400 4000 **Waterford Office:** Maritana Gate, Suite 8b The Atrium, Canada St, Waterford X91 W028 **phone:** +353 (0) 51 309 500 **Cork Office:** 14 South Mall, Cork T12 CT91 **phone:** +353 (0) 21 2024538 **email:** info@dbfl.ie **website:** www.dbfl.ie	**Project:** Ballyouster KDA SHD - Phase 1 Residential Development **Drawing Title :** Sensitivity Analysis - 298 no. Houses and 552 no. Apartments / Duplexes at Masterplan Lands (Future Design Year 2039) Sensitivity Analysis - Do Something 2039	**Key :** AM Peak Hour (08:00 - 09:00) PM Peak Hour (17:00 - 18:00)	**Drawn by:** DG **Approved by:** MMK **Date :** 11/10/2021 **Reference :** G:\2018\p180221\calcs\excel\Traffic\2021 **Figure :** 26 **Rev :** -		

APPENDIX B

TRICS Database Output

Calculation Reference: AUDIT-638801-210728-0714

TRIP RATE CALCULATION SELECTION PARAMETERS:

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

Selected regions and areas:

12	**CONNAUGHT**		
	GA	GALWAY	1 days
13	**MUNSTER**		
	WA	WATERFORD	1 days
14	**LEINSTER**		
	LU	LOUTH	3 days
16	**ULSTER (REPUBLIC OF IRELAND)**		
	MG	MONAGHAN	1 days

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

Primary Filtering selection:

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

Parameter: No of Dwellings
Actual Range: 20 to 52 (units:)
Range Selected by User: 18 to 372 (units:)

Parking Spaces Range: All Surveys Included

Parking Spaces per Dwelling Range: All Surveys Included

Bedrooms per Dwelling Range: All Surveys Included

Percentage of dwellings privately owned: All Surveys Included

Public Transport Provision:
Selection by: Include all surveys

Date Range: 01/01/13 to 23/10/20

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

Selected survey days:

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

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

Selected survey types:

Manual count	6 days
Directional ATC Count	0 days

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

Selected Locations:

Edge of Town Centre	4
Suburban Area (PPS6 Out of Centre)	2

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

Selected Location Sub Categories:

Residential Zone	4
No Sub Category	2

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

Secondary Filtering selection:

Use Class:
C3 6 days

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

Population within 500m Range:
All Surveys Included
Population within 1 mile:
1,001 to 5,000 1 days
5,001 to 10,000 3 days
15,001 to 20,000 2 days

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

Population within 5 miles:
5,001 to 25,000 1 days
25,001 to 50,000 3 days
50,001 to 75,000 2 days

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

Car ownership within 5 miles:
0.6 to 1.0 1 days
1.1 to 1.5 5 days

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

Travel Plan:
No 6 days

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

PTAL Rating:
No PTAL Present 6 days

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

LIST OF SITES relevant to selection parameters

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

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

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

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

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

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

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

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

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

Edge of Town Centre
No Sub Category
Total No of Dwellings: 28
Survey date: FRIDAY 06/09/13 Survey Type: MANUAL

6 WA-03-C-01 BLOCKS OF FLATS WATERFORD
UPPER YELLOW ROAD
WATERFORD

Suburban Area (PPS6 Out of Centre)
Residential Zone
Total No of Dwellings: 51
Survey date: TUESDAY 12/05/15 Survey Type: MANUAL

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

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

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	6	36	0.023	6	36	0.073	6	36	0.096
08:00 - 09:00	6	36	0.041	**6**	**36**	**0.142**	6	36	0.183
09:00 - 10:00	6	36	0.069	6	36	0.106	6	36	0.175
10:00 - 11:00	6	36	0.023	6	36	0.055	6	36	0.078
11:00 - 12:00	6	36	0.078	6	36	0.073	6	36	0.151
12:00 - 13:00	6	36	0.078	6	36	0.087	6	36	0.165
13:00 - 14:00	6	36	0.087	6	36	0.060	6	36	0.147
14:00 - 15:00	6	36	0.078	6	36	0.064	6	36	0.142
15:00 - 16:00	6	36	0.083	6	36	0.087	6	36	0.170
16:00 - 17:00	6	36	0.078	6	36	0.096	6	36	0.174
17:00 - 18:00	**6**	**36**	**0.193**	6	36	0.101	**6**	**36**	**0.294**
18:00 - 19:00	6	36	0.138	6	36	0.096	6	36	0.234
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			0.969			1.040			2.009

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

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

Parameter summary

Trip rate parameter range selected: 20 - 52 (units:)
Survey date date range: 01/01/13 - 23/10/20
Number of weekdays (Monday-Friday): 6
Number of Saturdays: 0
Number of Sundays: 0
Surveys automatically removed from selection: 0
Surveys manually removed from selection: 0

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

Calculation Reference: AUDIT-638801-210728-0751

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 03 - RESIDENTIAL
Category : A - HOUSES PRIVATELY OWNED
TOTAL VEHICLES

Selected regions and areas:

12	**CONNAUGHT**		
	LT	LEITRIM	2 days
	RO	ROSCOMMON	2 days
13	**MUNSTER**		
	WA	WATERFORD	1 days
14	**LEINSTER**		
	CC	CARLOW	1 days
	WC	WICKLOW	2 days
	WX	WEXFORD	1 days
15	**GREATER DUBLIN**		
	DL	DUBLIN	1 days
16	**ULSTER (REPUBLIC OF IRELAND)**		
	CV	CAVAN	2 days
	DN	DONEGAL	6 days

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

Primary Filtering selection:

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

Parameter: No of Dwellings
Actual Range: 6 to 280 (units:)
Range Selected by User: 4 to 437 (units:)

Parking Spaces Range: All Surveys Included

Parking Spaces per Dwelling Range: All Surveys Included

Bedrooms per Dwelling Range: All Surveys Included

Percentage of dwellings privately owned: All Surveys Included

Public Transport Provision:
Selection by: Include all surveys

Date Range: 01/01/13 to 30/09/20

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

Selected survey days:

Monday	6 days
Tuesday	1 days
Wednesday	6 days
Thursday	2 days
Friday	3 days

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

Selected survey types:

Manual count	18 days
Directional ATC Count	0 days

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

Selected Locations:

Edge of Town Centre	3
Suburban Area (PPS6 Out of Centre)	5
Edge of Town	10

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

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

Secondary Filtering selection:

Use Class:

C3	18 days

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

Population within 500m Range:
All Surveys Included
Population within 1 mile:

1,001 to 5,000	7 days
5,001 to 10,000	5 days
10,001 to 15,000	5 days
15,001 to 20,000	1 days

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

Population within 5 miles:

5,000 or Less	2 days
5,001 to 25,000	12 days
25,001 to 50,000	3 days
50,001 to 75,000	1 days

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

Car ownership within 5 miles:

0.6 to 1.0	6 days
1.1 to 1.5	10 days
1.6 to 2.0	2 days

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

Travel Plan:

No	18 days

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

PTAL Rating:

No PTAL Present	18 days

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

Covid-19 Restrictions	Yes	At least one survey within the selected data set was undertaken at a time of Covid-19 restrictions

LIST OF SITES relevant to selection parameters

1 **CC-03-A-01** **DETACHED HOUSES** **CARLOW**
R417 ANTHY ROAD
CARLOW

Edge of Town
Residential Zone
Total No of Dwellings: 23
Survey date: WEDNESDAY 25/05/16 Survey Type: MANUAL

2 **CV-03-A-02** **DETACHED & SEMI DETACHED** **CAVAN**
R212 DUBLIN ROAD
CAVAN
KILLYNEBBER
Edge of Town
No Sub Category
Total No of Dwellings: 80
Survey date: MONDAY 22/05/17 Survey Type: MANUAL

3 **CV-03-A-03** **DETACHED HOUSES** **CAVAN**
R212 DUBLIN ROAD
CAVAN
PULLAMORE NEAR
Edge of Town
No Sub Category
Total No of Dwellings: 37
Survey date: MONDAY 22/05/17 Survey Type: MANUAL

4 **DL-03-A-10** **SEMI DETACHED & DETACHED** **DUBLIN**
R124
MALAHIDE
SAINT HELENS
Edge of Town
Residential Zone
Total No of Dwellings: 65
Survey date: WEDNESDAY 20/06/18 Survey Type: MANUAL

5 **DN-03-A-03** **DETACHED/SEMI-DETACHED** **DONEGAL**
THE GRANGE
LETTERKENNY
GLENCAR IRISH
Edge of Town
Residential Zone
Total No of Dwellings: 50
Survey date: MONDAY 01/09/14 Survey Type: MANUAL

6 **DN-03-A-04** **SEMI-DETACHED** **DONEGAL**
GORTLEE ROAD
LETTERKENNY
GORTLEE
Edge of Town
Residential Zone
Total No of Dwellings: 83
Survey date: FRIDAY 26/09/14 Survey Type: MANUAL

7 **DN-03-A-05** **DETACHED/SEMI-DETACHED** **DONEGAL**
GORTLEE ROAD
LETTERKENNY
GORTLEE
Suburban Area (PPS6 Out of Centre)
Residential Zone
Total No of Dwellings: 146
Survey date: WEDNESDAY 03/09/14 Survey Type: MANUAL

8 **DN-03-A-06** **DETACHED HOUSING** **DONEGAL**
GLENFIN ROAD
BALLYBOFEY

Edge of Town
Residential Zone
Total No of Dwellings: 6
Survey date: WEDNESDAY 10/10/18 Survey Type: MANUAL

9 **DN-03-A-07** **DETACHED & SEMI-DETACHED** **DONEGAL**
ST ORANS ROAD
BUNCRANA

Edge of Town Centre
Residential Zone
Total No of Dwellings: 9
Survey date: WEDNESDAY 29/05/19 Survey Type: MANUAL

LIST OF SITES relevant to selection parameters (Cont.)

10 **DN-03-A-08** **SEMI DETACHED & DETACHED** **DONEGAL**
CHURCH ROAD
CARNDONAGH

Suburban Area (PPS6 Out of Centre)
Residential Zone
Total No of Dwellings: 36
Survey date: WEDNESDAY 30/09/20 Survey Type: MANUAL

11 **LT-03-A-01** **SEMI-DETACHED & DETACHED** **LEITRIM**
ARD NA SI
CARRICK-ON-SHANNON
ATTIRORY
Suburban Area (PPS6 Out of Centre)
Residential Zone
Total No of Dwellings: 90
Survey date: FRIDAY 24/04/15 Survey Type: MANUAL

12 **LT-03-A-02** **BUNGALOWS** **LEITRIM**
ARD ÁLAINN
CARRICK-ON-SHANNON
GALLOW'S HILL
Edge of Town Centre
Residential Zone
Total No of Dwellings: 10
Survey date: MONDAY 22/05/17 Survey Type: MANUAL

13 **RO-03-A-03** **DETACHED HOUSES** **ROSCOMMON**
N61
BOYLE
GREATMEADOW
Edge of Town
No Sub Category
Total No of Dwellings: 23
Survey date: THURSDAY 25/09/14 Survey Type: MANUAL

14 **RO-03-A-04** **SEMI DET. & BUNGALOWS** **ROSCOMMON**
EAGLE COURT
ROSCOMMON
ARDNANAGH
Suburban Area (PPS6 Out of Centre)
Residential Zone
Total No of Dwellings: 39
Survey date: FRIDAY 26/09/14 Survey Type: MANUAL

15 **WA-03-A-04** **DETACHED** **WATERFORD**
MAYPARK LANE
WATERFORD

Edge of Town
Residential Zone
Total No of Dwellings: 280
Survey date: TUESDAY 24/06/14 Survey Type: MANUAL

16 **WC-03-A-01** **DETACHED HOUSES** **WICKLOW**
STATION ROAD
WICKLOW
CORPORATION MURRAGH
Edge of Town
No Sub Category
Total No of Dwellings: 50
Survey date: MONDAY 28/05/18 Survey Type: MANUAL

17 **WC-03-A-02** **DETACHED HOUSES** **WICKLOW**
MARLTON ROAD
WICKLOW
FRIARSHILL
Edge of Town Centre
Residential Zone
Total No of Dwellings: 45
Survey date: MONDAY 28/05/18 Survey Type: MANUAL

LIST OF SITES relevant to selection parameters (Cont.)

18 WX-03-A-01 SEMI-DETACHED WEXFORD
CLONARD ROAD
WEXFORD

Suburban Area (PPS6 Out of Centre)
No Sub Category
Total No of Dwellings: 34
Survey date: THURSDAY 25/09/14 Survey Type: MANUAL

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

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

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	18	61	0.047	18	61	0.184	18	61	0.231
08:00 - 09:00	18	61	0.172	**18**	**61**	**0.510**	18	61	0.682
09:00 - 10:00	18	61	0.243	18	61	0.272	18	61	0.515
10:00 - 11:00	18	61	0.173	18	61	0.206	18	61	0.379
11:00 - 12:00	18	61	0.173	18	61	0.218	18	61	0.391
12:00 - 13:00	18	61	0.258	18	61	0.242	18	61	0.500
13:00 - 14:00	18	61	0.274	18	61	0.276	18	61	0.550
14:00 - 15:00	18	61	0.313	18	61	0.318	18	61	0.631
15:00 - 16:00	18	61	0.363	18	61	0.267	18	61	0.630
16:00 - 17:00	18	61	0.335	18	61	0.231	18	61	0.566
17:00 - 18:00	**18**	**61**	**0.423**	18	61	0.266	**18**	**61**	**0.689**
18:00 - 19:00	18	61	0.345	18	61	0.269	18	61	0.614
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			3.119			3.259			6.378

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

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

Parameter summary

Trip rate parameter range selected:	6 - 280 (units:)
Survey date date range:	01/01/13 - 30/09/20
Number of weekdays (Monday-Friday):	18
Number of Saturdays:	0
Number of Sundays:	0
Surveys automatically removed from selection:	1
Surveys manually removed from selection:	0

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

Calculation Reference: AUDIT-638801-210728-0711

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 04 - EDUCATION
Category : D - NURSERY
TOTAL VEHICLES

Selected regions and areas:

04	**EAST ANGLIA**		
	SF	SUFFOLK	1 days
06	**WEST MIDLANDS**		
	SH	SHROPSHIRE	1 days
	WK	WARWICKSHIRE	1 days
09	**NORTH**		
	TV	TEES VALLEY	1 days
10	**WALES**		
	BG	BRIDGEND	1 days
11	**SCOTLAND**		
	SR	STIRLING	1 days
12	**CONNAUGHT**		
	RO	ROSCOMMON	2 days

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

Primary Filtering selection:

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

Parameter: Gross floor area
Actual Range: 150 to 750 (units: sqm)
Range Selected by User: 150 to 2350 (units: sqm)

Parking Spaces Range: All Surveys Included

Public Transport Provision:
Selection by: Include all surveys

Date Range: 01/01/13 to 27/09/19

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

Selected survey days:

Monday	2 days
Wednesday	2 days
Friday	4 days

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

Selected survey types:

Manual count	8 days
Directional ATC Count	0 days

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

Selected Locations:

Edge of Town Centre	3
Edge of Town	5

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

Selected Location Sub Categories:

Industrial Zone	1
Residential Zone	6
No Sub Category	1

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

Secondary Filtering selection:

Use Class:

E(f)	8 days

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

Population within 500m Range:
All Surveys Included
Population within 1 mile:

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

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

Population within 5 miles:

5,001 to 25,000	2 days
50,001 to 75,000	1 days
75,001 to 100,000	5 days

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

Car ownership within 5 miles:

0.6 to 1.0	2 days
1.1 to 1.5	6 days

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

Travel Plan:

No	8 days

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

PTAL Rating:

No PTAL Present	8 days

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

LIST OF SITES relevant to selection parameters

1 BG-04-D-01 NURSERY BRIDGEND
GEORGE STREET
BRIDGEND
BRIDGEND IND. ESTATE
Edge of Town
Industrial Zone
Total Gross floor area: 210 sqm
Survey date: MONDAY 13/10/14 Survey Type: MANUAL

2 RO-04-D-01 NURSERY ROSCOMMON
PARK VIEW
ROSCOMMON
CRUBY HILL
Edge of Town
Residential Zone
Total Gross floor area: 500 sqm
Survey date: FRIDAY 26/09/14 Survey Type: MANUAL

3 RO-04-D-02 NURSERY ROSCOMMON
CIRCULAR ROAD
ROSCOMMON
BALLYPHEASAN
Edge of Town Centre
Residential Zone
Total Gross floor area: 509 sqm
Survey date: FRIDAY 27/04/18 Survey Type: MANUAL

4 SF-04-D-03 NURSERY SUFFOLK
CAMP ROAD
LOWESTOFT

Edge of Town Centre
Residential Zone
Total Gross floor area: 750 sqm
Survey date: WEDNESDAY 10/12/14 Survey Type: MANUAL

5 SH-04-D-01 NURSERY SHROPSHIRE
OLD COLEHAM
SHREWSBURY

Edge of Town Centre
Residential Zone
Total Gross floor area: 326 sqm
Survey date: WEDNESDAY 28/05/14 Survey Type: MANUAL

6 SR-04-D-01 NURSERY STIRLING
HENDERSON STREET
STIRLING
BRIDGE OF ALLAN
Edge of Town
No Sub Category
Total Gross floor area: 250 sqm
Survey date: MONDAY 16/06/14 Survey Type: MANUAL

7 TV-04-D-01 NURSERY TEES VALLEY
COTSWOLD DRIVE
REDCAR

Edge of Town
Residential Zone
Total Gross floor area: 150 sqm
Survey date: FRIDAY 19/05/17 Survey Type: MANUAL

8 WK-04-D-01 NURSERY WARWICKSHIRE
THE RIDGEWAY
STRATFORD UPON AVON

Edge of Town
Residential Zone
Total Gross floor area: 340 sqm
Survey date: FRIDAY 29/06/18 Survey Type: MANUAL

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

TRIP RATE for Land Use 04 - EDUCATION/D - NURSERY
TOTAL VEHICLES
Calculation factor: 100 sqm
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	8	379	1.614	8	379	0.593	8	379	2.207
08:00 - 09:00	**8**	**379**	**4.778**	8	379	3.460	**8**	**379**	**8.238**
09:00 - 10:00	8	379	2.965	8	379	2.932	8	379	5.897
10:00 - 11:00	8	379	0.890	8	379	0.692	8	379	1.582
11:00 - 12:00	8	379	1.054	8	379	0.527	8	379	1.581
12:00 - 13:00	8	379	2.043	8	379	2.768	8	379	4.811
13:00 - 14:00	8	379	1.021	8	379	1.450	8	379	2.471
14:00 - 15:00	8	379	1.054	8	379	0.857	8	379	1.911
15:00 - 16:00	8	379	0.890	8	379	1.384	8	379	2.274
16:00 - 17:00	8	379	1.516	8	379	1.549	8	379	3.065
17:00 - 18:00	8	379	3.262	**8**	**379**	**4.250**	8	379	7.512
18:00 - 19:00	7	412	0.104	7	412	0.936	7	412	1.040
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			21.191			21.398			42.589

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

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

Parameter summary

Trip rate parameter range selected:	150 - 750 (units: sqm)
Survey date date range:	01/01/13 - 27/09/19
Number of weekdays (Monday-Friday):	8
Number of Saturdays:	0
Number of Sundays:	0
Surveys automatically removed from selection:	0
Surveys manually removed from selection:	0

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

APPENDIX C

TRANSYT Output Files

TRANSYT 15

Filename: 180221 Site Access at Shinkeen Road.t15
Path: G:\2018\p180221\calcs\transyt
Report generation date: 13/05/2022 14:30:55

»A1 - 2024 Do Something : D1 - 2024 AM Peak Hour* :
»A2 - 2024 Do Something : D2 - 2024 PM Peak Hour* :
»A3 - 2029 Do Something : D3 - 2029 AM Peak Hour* :
»A4 - 2029 Do Something : D4 - 2029 PM Peak Hour* :
»A5 - 2039 Do Something : D5 - 2039 AM Peak Hour* :
»A6 - 2039 Do Something : D6 - 2039 PM Peak Hour* :
»A7 - 2039 Sensitivity Analysis 1 : D7 - 2039 AM Peak Hour SA1* :
»A8 - 2039 Sensitivity Analysis 1 : D8 - 2039 PM Peak Hour SA1* :
»A9 - 2039 Sensitivity Analysis 2 : D9 - 2039 AM Peak Hour SA2* :
»A10 - 2039 Sensitivity Analysis 2 : D10 - 2039 PM Peak Hour SA2* :

File summary

File description

File title	Lands at Dublin Road, Celbridge
Location	Shinkeen Road
Site number	
UTCRegion	
Driving side	Left
Date	28/04/2022
Version	
Status	Planning
Identifier	
Client	Kieran Curtin, Receiver over certain assets of Maplewood Developments Limited of Maplewood Developments Limited of Maplewood Developments Limited Kieran Curtin, Receiver over certain assets of Maplewood Developments Limited
Jobnumber	180221
Enumerator	HEADOFFICE\mckennam
Description	

Model and Results

Enable controller offsets	Enable fuel consumption	Enable quick flares	Display journey time results	Display level of service results	Display blocking and starvation results	Display end of red and green queue results	Display excess queue results	Display separate uniform and random results	Display unweighted results	Display TRANSYT 12 style timings	Display effective greens in results	Display Red-With-Amber	Display End-Of-Green Amber
			✓		✓	✓	✓	✓	✓	✓	✓		

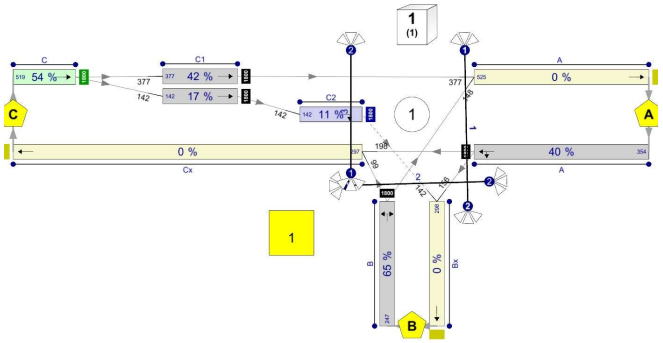
Units

Cost units	Speed units	Distance units	Fuel economy units	Fuel rate units	Mass units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
£	kph	m	mpg	l/h	kg	PCU	PCU	perHour	s	-Hour	perHour

Sorting

Show names instead of IDs	Sorting direction	Sorting type	Ignore prefixes when sorting	Analysis/demand set sorting	Link grouping	Source grouping	Colour Analysis/Demand Sets
	Ascending	Numerical		ID	Normal	Normal	✓

Network Diagrams



A1 - 2024 Do Something
D1 - 2024 AM Peak Hour*

Summary

Data Errors and Warnings

No errors or warnings

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Ite wit wor over PR
1	13/05/2022 14:21:13	13/05/2022 14:21:13	08:00	100	33.26	2.01	32.83	C/1	0	0	B/1	C/1	C/

Analysis Set Details

Name	Description	Demand set	Include in report	Locked
2024 Do Something		D1	✓	

Demand Set Details

Name	Description	Composite	Demand sets	Start time (HH:mm)	Locked
2024 AM Peak Hour				08:00	

Arms and Traffic Streams

Flows

Arm	Traffic Stream	Total Flow (PCU/hr)	Normal Flow (PCU/hr)
A	1	174	174
Ax	1	329	329
B	1	41	41
Bx	1	75	75
C	1	389	389
Cx	1	200	200
C1	1	320	320
	2	69	69
C2	1	69	69

Signal Timings

Network Default: 100s cycle time; 100 steps

Controller Stream

Controller stream	Name	Description	Use sequence	Cycle time source	Cycle time (s)
1	(untitled)		1	NetworkDefault	100

Controller Stream - Properties

Controller stream	Manufacturer name	Type	Model number	(Telephone) Line Number	Site number	Grid reference	Gaining delay type
1	Unspecified						Absolute

Controller Stream - Optimisation

Controller stream	Allow offset optimisation	Allow green split optimisation	Optimisation level	Auto redistribute	Enable stage constraint
1	✓	✓	Offsets And Green Splits	✓	

Phases

Controller stream	Phase	Name	Minimum green (s)	Maximum green (s)	Relative start displacement (s)	Relative end displacement (s)	Type	Blackout Time (s)
1	A	(untitled)	7	300	0	0	Unknown	
	B	(untitled)	7	300	0	0	Unknown	
	C	(untitled)	7	300	0	0	Unknown	
	D	(untitled)	6	300	0	0	Indicative arrow	
	E	(untitled)	6	300	0	0	Pedestrian	0
	F	(untitled)	6	300	0	0	Pedestrian	0
	G	(untitled)	6	300	0	0	Pedestrian	0

Library Stages

Controller stream	Library stage	Phases in stage	User stage minimum (s)
1	1	A, C, D	1
	2	C, D	1
	3	B	1
	4	E, F, G	1

Losing / Gaining Phase Delays

Controller stream	Delay	Type	Phase	From stage	To stage	Relative delay
1	1	Losing	C	1	2	20

Stage Sequences

Controller stream	Sequence	Name	Multiple cycling	Stage IDs	Stage ends
1	1	(untitled)	Single	1, 2, 3, 4	58, 59, 71, 85

Intergreen Matrix for Controller Stream 1

From \ To	A	B	C	D	E	F	G
A		5			5	6	7
B	5		6	5	8	5	6
C		5			6	0	5
D		5			0	6	5
E	10	10	10	10			
F	6	6	6	6			
G	12	12	12	12			

Interstage Matrix for Controller Stream 1

From \ To	1	2	3	4
1	0	0	5	7
2	0	0	5	6
3	6	6	0	8
4	12	12	12	0

Resultant Stages

Controller stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	1	✓	1	A,C,D	97	58	61	1	7
	2	✓	2	C,D	58	59	1	1	1
	3	✓	3	B	64	71	7	1	7
	4	✓	4	E,F,G	79	85	6	1	6

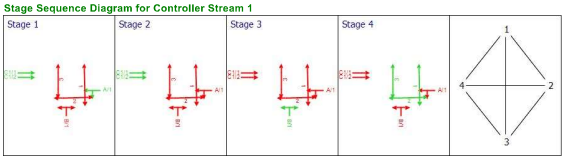
Resultant Phase Green Periods

Controller stream	Phase	Green period	Is base green period	Start time (s)	End time (s)	Duration (s)
1	A	1	✓	97	58	61
	B	1	✓	64	71	7
	C	1	✓	97	59	62
	D	1	✓	97	59	62
	E	1	✓	79	85	6
	F	1	✓	76	85	9
	G	1	✓	77	85	8

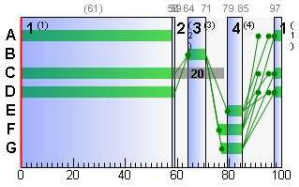
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
A	1	1	1	A	97	58	61
B	1	1	1	B	64	71	7
C1	1	1	1	C	97	59	62
C1	2	1	1	D	97	59	62

Stage Sequence Diagram for Controller Stream 1



Phase Timings Diagram for Controller Stream 1



Traffic Stream Results

Traffic Stream Results: Vehicle summary

Time Segment	Arm	Traffic Stream	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s (per cycle))	Mean Delay per Veh (s)	Mean max queue (PCU)	Utilised storage (%)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
08:00-09:00	A	1	16	477	174	1800	61	8.29	2.04	7.35	5.69	0.88	6.57
	Ax	1	0	Unrestricted	329	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	B	1	28	216	41	1800	7	48.28	1.13	4.32	7.81	0.50	8.31
	Bx	1	0	Unrestricted	75	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	C	1	33	174	389	1800	100	4.22	4.73	13.59	8.47	1.89	8.36
	Cx	1	0	Unrestricted	200	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	C1	1	28	219	320	1800	62	5.49	1.74	87.21	6.93	1.07	8.00
		2	6	1379	69	1800	62	4.61	0.37	18.31	1.25	0.16	1.42
	C2	1	5	1825	69	1476	100	1.31	0.57	28.35	0.36	0.25	0.60

Traffic Stream Results: Stops and delays

Time Segment	Arm	Traffic Stream	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Uniform delay (PCU-hr/hr)	Random plus oversat delay (PCU-hr/hr)	Unweighted cost of delay (£ per hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Uniform stops (Stops per hr)	Random stops (Stops per hr)	Unweighted cost of stops (£ per hr)	Weighted cost of stops (£ per hr)
08:00-09:00	A	1	19.20	8.29	0.39	0.01	5.69	5.69	40.45	69.87	0.52	0.88	0.88
	Ax	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	B	1	18.00	48.28	0.49	0.06	7.81	7.81	97.66	38.04	2.00	0.50	0.50
	Bx	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	C	1	24.00	4.22	0.38	0.08	6.47	6.47	38.73	147.77	2.88	1.89	1.89
	Cx	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	C1	1	1.68	5.49	0.43	0.06	6.93	6.93	26.64	83.25	1.99	1.07	1.07
		2	1.68	4.61	0.09	0.00	1.25	1.25	18.90	12.97	0.07	0.16	0.16
	C2	1	1.20	1.31	0.02	0.00	0.36	0.36	28.49	19.62	0.04	0.25	0.25

Network Results

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Ite wit wor over PR
1	13/05/2022 14:21:13	13/05/2022 14:21:13	08:00	100	33.26	2.01	32.83	C/1	0	0	B/1	C/1	C/

Network Results: Vehicle summary

Time Segment	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Actual green (s (per cycle))	Mean Delay per Veh (s)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
08:00-09:00	33	0	1666	692	4.34	28.51	4.75	33.26

Network Results: Stops and delays

Time Segment	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Uniform delay (PCU-hr/hr)	Random plus oversat delay (PCU-hr/hr)	Unweighted cost of delay (£ per hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Uniform stops (Stops per hr)	Random stops (Stops per hr)	Unweighted cost of stops (£ per hr)	Weighted cost of stops (£ per hr)
08:00-09:00	12.84	4.34	1.80	0.21	28.51	28.51	22.75	371.52	7.50	4.75	4.75

A2 - 2024 Do Something
D2 - 2024 PM Peak Hour*

Summary

Data Errors and Warnings

No errors or warnings

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Ite wit wor over PR
2	13/05/2022 14:21:13	13/05/2022 14:21:14	17:00	100	35.50	2.19	35.42	B/1	0	0	B/1	C/1	B/

Analysis Set Details

Name	Description	Demand set	Include in report	Locked
2024 Do Something		D2	✓	

Demand Set Details

Name	Description	Composite	Demand sets	Start time (HH:mm)	Locked
2024 PM Peak Hour				17:00	

Arms and Traffic Streams

Flows

Arm	Traffic Stream	Total Flow (PCU/hr)	Normal Flow (PCU/hr)
A	1	221	221
Ax	1	337	337
B	1	51	51
Bx	1	18	18
C	1	340	340
Cx	1	257	257
C1	1	330	330
	2	10	10
C2	1	10	10

Signal Timings

Network Default: 100s cycle time; 100 steps

Controller Stream

Controller stream	Name	Description	Use sequence	Cycle time source	Cycle time (s)
1	(untitled)		1	NetworkDefault	100

Controller Stream - Properties

Controller stream	Manufacturer name	Type	Model number	(Telephone) Line Number	Site number	Grid reference	Gaining delay type
1	Unspecified						Absolute

Controller Stream - Optimisation

Controller stream	Allow offset optimisation	Allow green split optimisation	Optimisation level	Auto redistribute	Enable stage constraint
1	✓	✓	Offsets And Green Splits	✓	

Phases

Controller stream	Phase	Name	Minimum green (s)	Maximum green (s)	Relative start displacement (s)	Relative end displacement (s)	Type	Blackout Time (s)
1	A	(untitled)	7	300	0	0	Unknown	
	B	(untitled)	7	300	0	0	Unknown	
	C	(untitled)	7	300	0	0	Unknown	
	D	(untitled)	6	300	0	0	Indicative arrow	
	E	(untitled)	6	300	0	0	Pedestrian	0
	F	(untitled)	6	300	0	0	Pedestrian	0
	G	(untitled)	6	300	0	0	Pedestrian	0

Library Stages

Controller stream	Library stage	Phases in stage	User stage minimum (s)
1	1	A, C, D	1
	2	C, D	1
	3	B	1
	4	E, F, G	1

Losing / Gaining Phase Delays

Controller stream	Delay	Type	Phase	From stage	To stage	Relative delay
1	1	Losing	C	1	2	20

Stage Sequences

Controller stream	Sequence	Name	Multiple cycling	Stage IDs	Stage ends
1	1	(untitled)	Single	1, 2, 3, 4	57, 59, 71, 85

Intergreen Matrix for Controller Stream 1

From \ To	A	B	C	D	E	F	G
A		5			5	6	7
B	5		6	5	8	5	6
C		5			6	0	5
D		5			0	6	5
E	10	10	10	10			
F	6	6	6	6			
G	12	12	12	12			

Interstage Matrix for Controller Stream 1

From \ To	1	2	3	4
1	0	0	5	7
2	0	0	5	6
3	6	6	0	8
4	12	12	12	0

Resultant Stages

Controller stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	1	✓	1	A,C,D	97	57	60	1	7
	2	✓	2	C,D	57	59	2	1	1
	3	✓	3	B	64	71	7	1	7
	4	✓	4	E,F,G	79	85	6	1	6

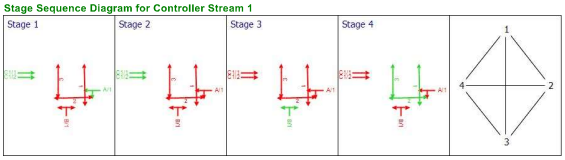
Resultant Phase Green Periods

Controller stream	Phase	Green period	Is base green period	Start time (s)	End time (s)	Duration (s)
1	A	1	✓	97	57	60
	B	1	✓	64	71	7
	C	1	✓	97	59	62
	D	1	✓	97	59	62
	E	1	✓	79	85	6
	F	1	✓	76	85	9
	G	1	✓	77	85	8

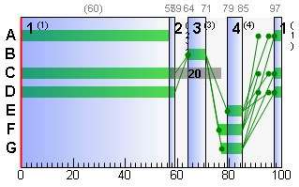
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
A	1	1	1	A	97	57	60
B	1	1	1	B	64	71	7
C1	1	1	1	C	97	59	62
C1	2	1	1	D	97	59	62

Stage Sequence Diagram for Controller Stream 1



Phase Timings Diagram for Controller Stream 1



Traffic Stream Results

Traffic Stream Results: Vehicle summary

Time Segment	Arm	Traffic Stream	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s (per cycle))	Mean Delay per Veh (s)	Mean max queue (PCU)	Utilised storage (%)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
17:00-18:00	A	1	20	347	221	1800	60	9.09	2.73	9.80	7.92	1.19	9.12
	Ax	1	0	Unrestricted	337	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	B	1	35	154	51	1800	7	50.38	1.43	5.47	10.13	0.64	10.77
	Bx	1	0	Unrestricted	18	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	C	1	29	207	340	1800	100	4.26	4.12	11.85	5.72	1.66	7.38
	Cx	1	0	Unrestricted	257	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	C1	1	29	209	330	1800	62	5.43	1.82	90.93	7.07	0.87	7.94
		2	1	10106	10	1800	62	4.52	0.05	2.67	0.18	0.02	0.20
	C2	1	1	12608	10	1412	100	1.40	0.09	4.34	0.06	0.04	0.09

Traffic Stream Results: Stops and delays

Time Segment	Arm	Traffic Stream	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Uniform delay (PCU-hr/hr)	Random plus oversat delay (PCU-hr/hr)	Unweighted cost of delay (£ per hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Uniform stops (Stops per hr)	Random stops (Stops per hr)	Unweighted cost of stops (£ per hr)	Weighted cost of stops (£ per hr)
17:00-18:00	A	1	19.20	9.09	0.53	0.03	7.92	7.92	43.06	94.25	0.91	1.19	1.19
	Ax	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	B	1	18.00	50.38	0.62	0.10	10.13	10.13	99.49	47.34	3.40	0.64	0.64
	Bx	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	C	1	24.00	4.26	0.34	0.06	5.72	5.72	38.95	130.25	2.19	1.66	1.66
	Cx	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	C1	1	1.68	5.43	0.44	0.06	7.07	7.07	20.97	67.06	2.14	0.87	0.87
		2	1.68	4.52	0.01	0.00	0.18	0.18	18.99	1.90	0.00	0.02	0.02
	C2	1	1.20	1.40	0.00	0.00	0.06	0.06	29.52	2.95	0.00	0.04	0.04

Network Results

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Ite wit wor over PR
2	13/05/2022 14:21:13	13/05/2022 14:21:14	17:00	100	35.50	2.19	35.42	B/1	0	0	B/1	C/1	B/

Network Results: Vehicle summary

Time Segment	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Actual green (s (per cycle))	Mean Delay per Veh (s)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
17:00-18:00	35	0	1574	691	5.01	31.08	4.42	35.50

Network Results: Stops and delays

Time Segment	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Uniform delay (PCU-hr/hr)	Random plus oversat delay (PCU-hr/hr)	Unweighted cost of delay (£ per hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Uniform stops (Stops per hr)	Random stops (Stops per hr)	Unweighted cost of stops (£ per hr)	Weighted cost of stops (£ per hr)
17:00-18:00	13.50	5.01	1.95	0.24	31.08	31.08	22.39	343.74	8.65	4.42	4.42

A3 - 2029 Do Something
D3 - 2029 AM Peak Hour*

Summary

Data Errors and Warnings

No errors or warnings

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Ite wit wor over PR
3	13/05/2022 14:21:14	13/05/2022 14:21:14	08:00	100	46.78	2.88	41.67	B/1	0	0	B/1	C/1	B/

Analysis Set Details

Name	Description	Demand set	Include in report	Locked
2029 Do Something		D3	✓	

Demand Set Details

Name	Description	Composite	Demand sets	Start time (HH:mm)	Locked
2029 AM Peak Hour				08:00	

Arms and Traffic Streams

Flows

Arm	Traffic Stream	Total Flow (PCU/hr)	Normal Flow (PCU/hr)
A	1	193	193
Ax	1	374	374
B	1	75	75
Bx	1	89	89
C	1	425	425
Cx	1	230	230
C1	1	347	347
	2	78	78
C2	1	78	78

Signal Timings

Network Default: 100s cycle time; 100 steps

Controller Stream

Controller stream	Name	Description	Use sequence	Cycle time source	Cycle time (s)
1	(untitled)		1	NetworkDefault	100

Controller Stream - Properties

Controller stream	Manufacturer name	Type	Model number	(Telephone) Line Number	Site number	Grid reference	Gaining delay type
1	Unspecified						Absolute

Controller Stream - Optimisation

Controller stream	Allow offset optimisation	Allow green split optimisation	Optimisation level	Auto redistribute	Enable stage constraint
1	✓	✓	Offsets And Green Splits	✓	

Phases

Controller stream	Phase	Name	Minimum green (s)	Maximum green (s)	Relative start displacement (s)	Relative end displacement (s)	Type	Blackout Time (s)
1	A	(untitled)	7	300	0	0	Unknown	
	B	(untitled)	7	300	0	0	Unknown	
	C	(untitled)	7	300	0	0	Unknown	
	D	(untitled)	6	300	0	0	Indicative arrow	
	E	(untitled)	6	300	0	0	Pedestrian	0
	F	(untitled)	6	300	0	0	Pedestrian	0
	G	(untitled)	6	300	0	0	Pedestrian	0

Library Stages

Controller stream	Library stage	Phases in stage	User stage minimum (s)
1	1	A, C, D	1
	2	C, D	1
	3	B	1
	4	E, F, G	1

Losing / Gaining Phase Delays

Controller stream	Delay	Type	Phase	From stage	To stage	Relative delay
1	1	Losing	C	1	2	20

Stage Sequences

Controller stream	Sequence	Name	Multiple cycling	Stage IDs	Stage ends
1	1	(untitled)	Single	1, 2, 3, 4	55, 57, 71, 85

Intergreen Matrix for Controller Stream 1

From \ To	A	B	C	D	E	F	G
A		5			5	6	7
B	5		6	5	8	5	6
C		5			6	0	5
D		5			0	6	5
E	10	10	10	10			
F	6	6	6	6			
G	12	12	12	12			

Interstage Matrix for Controller Stream 1

From \ To	1	2	3	4
1	0	0	5	7
2	0	0	5	6
3	6	6	0	8
4	12	12	12	0

Resultant Stages

Controller stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	1	✓	1	A,C,D	97	55	58	1	7
	2	✓	2	C,D	55	57	2	1	1
	3	✓	3	B	62	71	9	1	7
	4	✓	4	E,F,G	79	85	6	1	6

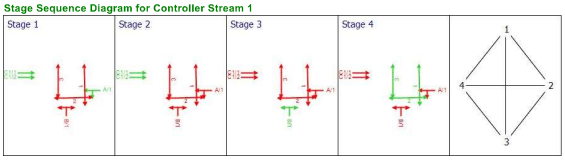
Resultant Phase Green Periods

Controller stream	Phase	Green period	Is base green period	Start time (s)	End time (s)	Duration (s)
1	A	1	✓	97	55	58
	B	1	✓	62	71	9
	C	1	✓	97	57	60
	D	1	✓	97	57	60
	E	1	✓	79	85	6
	F	1	✓	76	85	9
	G	1	✓	77	85	8

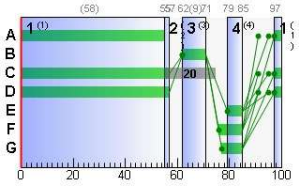
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
A	1	1	1	A	97	55	58
B	1	1	1	B	62	71	9
C1	1	1	1	C	97	57	60
C1	2	1	1	D	97	57	60

Stage Sequence Diagram for Controller Stream 1



Phase Timings Diagram for Controller Stream 1



Traffic Stream Results

Traffic Stream Results: Vehicle summary

Time Segment	Arm	Traffic Stream	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s (per cycle))	Mean Delay per Veh (s)	Mean max queue (PCU)	Utilised storage (%)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
08:00-09:00	A	1	18	395	193	1800	58	9.79	2.43	8.74	7.46	1.07	8.52
	Ax	1	0	Unrestricted	374	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	B	1	42	116	75	1800	9	49.34	2.08	7.99	14.60	0.93	15.52
	Bx	1	0	Unrestricted	89	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	C	1	37	144	425	1800	100	5.29	5.66	16.26	8.87	2.27	11.14
	Cx	1	0	Unrestricted	230	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	C1	1	32	185	347	1800	60	5.82	1.81	90.69	7.97	1.13	9.10
		2	7	1167	78	1800	60	4.82	0.39	19.70	1.48	0.18	1.66
	C2	1	5	1583	78	1458	100	1.63	0.68	34.22	0.50	0.32	0.82

Traffic Stream Results: Stops and delays

Time Segment	Arm	Traffic Stream	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Uniform delay (PCU-hr/hr)	Random plus oversat delay (PCU-hr/hr)	Unweighted cost of delay (£ per hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Uniform stops (Stops per hr)	Random stops (Stops per hr)	Unweighted cost of stops (£ per hr)	Weighted cost of stops (£ per hr)
08:00-09:00	A	1	19.20	9.79	0.50	0.02	7.46	7.46	44.18	84.55	0.73	1.07	1.07
	Ax	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	B	1	18.00	49.34	0.88	0.15	14.60	14.60	98.76	68.86	5.21	0.93	0.93
	Bx	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	C	1	24.00	5.29	0.52	0.11	8.87	8.87	42.54	176.94	3.88	2.27	2.27
	Cx	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	C1	1	1.68	5.82	0.49	0.07	7.97	7.97	26.04	87.73	2.62	1.13	1.13
		2	1.68	4.82	0.10	0.00	1.48	1.48	18.05	13.98	0.10	0.18	0.18
	C2	1	1.20	1.63	0.03	0.00	0.50	0.50	33.07	25.74	0.05	0.32	0.32

Network Results

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Ite wit wor over PR
3	13/05/2022 14:21:14	13/05/2022 14:21:14	08:00	100	46.78	2.88	41.67	B/1	0	0	B/1	C/1	B/

Network Results: Vehicle summary

Time Segment	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Actual green (s (per cycle))	Mean Delay per Veh (s)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
08:00-09:00	42	0	1889	687	5.49	40.88	5.90	46.78

Network Results: Stops and delays

Time Segment	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Uniform delay (PCU-hr/hr)	Random plus oversat delay (PCU-hr/hr)	Unweighted cost of delay (£ per hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Uniform stops (Stops per hr)	Random stops (Stops per hr)	Unweighted cost of stops (£ per hr)	Weighted cost of stops (£ per hr)
08:00-09:00	12.91	5.49	2.53	0.35	40.88	40.88	24.90	457.81	12.58	5.90	5.90

A4 - 2029 Do Something
D4 - 2029 PM Peak Hour*

Summary

Data Errors and Warnings

No errors or warnings

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Ite wit wor over PR
4	13/05/2022 14:21:15	13/05/2022 14:21:15	17:00	100	47.11	2.93	40.56	B/1	0	0	B/1	C/1	B/

Analysis Set Details

Name	Description	Demand set	Include in report	Locked
2029 Do Something		D4	✓	

Demand Set Details

Name	Description	Composite	Demand sets	Start time (HH:mm)	Locked
2029 PM Peak Hour				17:00	

Arms and Traffic Streams

Flows

Arm	Traffic Stream	Total Flow (PCU/hr)	Normal Flow (PCU/hr)
A	1	258	258
Ax	1	374	374
B	1	73	73
Bx	1	53	53
C	1	383	383
Cx	1	287	287
C1	1	357	357
	2	26	26
C2	1	26	26

Signal Timings

Network Default: 100s cycle time; 100 steps

Controller Stream

Controller stream	Name	Description	Use sequence	Cycle time source	Cycle time (s)
1	(untitled)		1	NetworkDefault	100

Controller Stream - Properties

Controller stream	Manufacturer name	Type	Model number	(Telephone) Line Number	Site number	Grid reference	Gaining delay type
1	Unspecified						Absolute

Controller Stream - Optimisation

Controller stream	Allow offset optimisation	Allow green split optimisation	Optimisation level	Auto redistribute	Enable stage constraint
1	✓	✓	Offsets And Green Splits	✓	

Phases

Controller stream	Phase	Name	Minimum green (s)	Maximum green (s)	Relative start displacement (s)	Relative end displacement (s)	Type	Blackout Time (s)
1	A	(untitled)	7	300	0	0	Unknown	
	B	(untitled)	7	300	0	0	Unknown	
	C	(untitled)	7	300	0	0	Unknown	
	D	(untitled)	6	300	0	0	Indicative arrow	
	E	(untitled)	6	300	0	0	Pedestrian	0
	F	(untitled)	6	300	0	0	Pedestrian	0
	G	(untitled)	6	300	0	0	Pedestrian	0

Library Stages

Controller stream	Library stage	Phases in stage	User stage minimum (s)
1	1	A, C, D	1
	2	C, D	1
	3	B	1
	4	E, F, G	1

Losing / Gaining Phase Delays

Controller stream	Delay	Type	Phase	From stage	To stage	Relative delay
1	1	Losing	C	1	2	20

Stage Sequences

Controller stream	Sequence	Name	Multiple cycling	Stage IDs	Stage ends
1	1	(untitled)	Single	1, 2, 3, 4	55, 57, 71, 85

Intergreen Matrix for Controller Stream 1

From \ To	A	B	C	D	E	F	G
A		5			5	6	7
B	5		6	5	8	5	6
C		5			6	0	5
D		5			0	6	5
E	10	10	10	10			
F	6	6	6	6			
G	12	12	12	12			

Interstage Matrix for Controller Stream 1

From \ To	1	2	3	4
1	0	0	5	7
2	0	0	5	6
3	6	6	0	8
4	12	12	12	0

Resultant Stages

Controller stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	1	✓	1	A,C,D	97	55	58	1	7
	2	✓	2	C,D	55	57	2	1	1
	3	✓	3	B	62	71	9	1	7
	4	✓	4	E,F,G	79	85	6	1	6

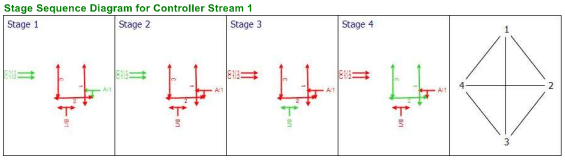
Resultant Phase Green Periods

Controller stream	Phase	Green period	Is base green period	Start time (s)	End time (s)	Duration (s)
1	A	1	✓	97	55	58
	B	1	✓	62	71	9
	C	1	✓	97	57	60
	D	1	✓	97	57	60
	E	1	✓	79	85	6
	F	1	✓	76	85	9
	G	1	✓	77	85	8

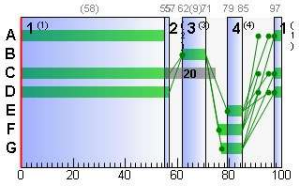
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
A	1	1	1	A	97	55	58
B	1	1	1	B	62	71	9
C1	1	1	1	C	97	57	60
C1	2	1	1	D	97	57	60

Stage Sequence Diagram for Controller Stream 1



Phase Timings Diagram for Controller Stream 1



Traffic Stream Results

Traffic Stream Results: Vehicle summary

Time Segment	Arm	Traffic Stream	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s (per cycle))	Mean Delay per Veh (s)	Mean max queue (PCU)	Utilised storage (%)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
17:00-18:00	A	1	24	270	258	1800	58	10.36	3.41	12.24	10.54	1.50	12.04
	Ax	1	0	Unrestricted	374	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	B	1	41	122	73	1800	9	48.98	2.02	7.75	14.10	0.90	15.01
	Bx	1	0	Unrestricted	53	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	C	1	34	165	383	1800	100	5.36	5.09	14.63	8.09	2.06	10.16
	Cx	1	0	Unrestricted	287	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	C1	1	33	177	357	1800	60	5.78	1.89	94.66	8.14	0.91	9.05
		2	2	3701	26	1800	60	4.76	0.13	6.62	0.49	0.06	0.55
	C2	1	2	4642	26	1370	100	1.96	0.27	13.27	0.20	0.11	0.31

Traffic Stream Results: Stops and delays

Time Segment	Arm	Traffic Stream	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Uniform delay (PCU-hr/hr)	Random plus oversat delay (PCU-hr/hr)	Unweighted cost of delay (£ per hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Uniform stops (Stops per hr)	Random stops (Stops per hr)	Unweighted cost of stops (£ per hr)	Weighted cost of stops (£ per hr)
17:00-18:00	A	1	19.20	10.36	0.70	0.04	10.54	10.54	46.29	118.03	1.40	1.50	1.50
	Ax	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	B	1	18.00	48.98	0.86	0.14	14.10	14.10	98.46	67.03	4.85	0.90	0.90
	Bx	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	C	1	24.00	5.36	0.48	0.09	8.09	8.09	42.98	161.48	3.14	2.06	2.06
	Cx	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	C1	1	1.68	5.78	0.49	0.08	8.14	8.14	20.43	70.12	2.81	0.91	0.91
		2	1.68	4.76	0.03	0.00	0.49	0.49	18.19	4.72	0.01	0.06	0.06
	C2	1	1.20	1.96	0.01	0.00	0.20	0.20	33.13	8.61	0.01	0.11	0.11

Network Results

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Ite wit wor over PR
4	13/05/2022 14:21:15	13/05/2022 14:21:15	17:00	100	47.11	2.93	40.56	B/1	0	0	B/1	C/1	B/

Network Results: Vehicle summary

Time Segment	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Actual green (s (per cycle))	Mean Delay per Veh (s)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
17:00-18:00	41	0	1837	687	5.74	41.57	5.54	47.11

Network Results: Stops and delays

Time Segment	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Uniform delay (PCU-hr/hr)	Random plus oversat delay (PCU-hr/hr)	Unweighted cost of delay (£ per hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Uniform stops (Stops per hr)	Random stops (Stops per hr)	Unweighted cost of stops (£ per hr)	Weighted cost of stops (£ per hr)
17:00-18:00	13.45	5.74	2.59	0.34	41.57	41.57	24.07	429.98	12.22	5.54	5.54

A5 - 2039 Do Something
D5 - 2039 AM Peak Hour*

Summary

Data Errors and Warnings

No errors or warnings

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Ite wit wor over PR
5	13/05/2022 14:21:15	13/05/2022 14:21:16	08:00	100	51.13	3.17	42.78	B/1	0	0	B/1	C/1	B/

Analysis Set Details

Name	Description	Demand set	Include in report	Locked
2039 Do Something		D5	✓	

Demand Set Details

Name	Description	Composite	Demand sets	Start time (HH:mm)	Locked
2039 AM Peak Hour				08:00	

Arms and Traffic Streams

Flows

Arm	Traffic Stream	Total Flow (PCU/hr)	Normal Flow (PCU/hr)
A	1	209	209
Ax	1	404	404
B	1	77	77
Bx	1	96	96
C	1	462	462
Cx	1	248	248
C1	1	377	377
	2	85	85
C2	1	85	85

Signal Timings

Network Default: 100s cycle time; 100 steps

Controller Stream

Controller stream	Name	Description	Use sequence	Cycle time source	Cycle time (s)
1	(untitled)		1	NetworkDefault	100

Controller Stream - Properties

Controller stream	Manufacturer name	Type	Model number	(Telephone) Line Number	Site number	Grid reference	Gaining delay type
1	Unspecified						Absolute

Controller Stream - Optimisation

Controller stream	Allow offset optimisation	Allow green split optimisation	Optimisation level	Auto redistribute	Enable stage constraint
1	✓	✓	Offsets And Green Splits	✓	

Phases

Controller stream	Phase	Name	Minimum green (s)	Maximum green (s)	Relative start displacement (s)	Relative end displacement (s)	Type	Blackout Time (s)
1	A	(untitled)	7	300	0	0	Unknown	
	B	(untitled)	7	300	0	0	Unknown	
	C	(untitled)	7	300	0	0	Unknown	
	D	(untitled)	6	300	0	0	Indicative arrow	
	E	(untitled)	6	300	0	0	Pedestrian	0
	F	(untitled)	6	300	0	0	Pedestrian	0
	G	(untitled)	6	300	0	0	Pedestrian	0

Library Stages

Controller stream	Library stage	Phases in stage	User stage minimum (s)
1	1	A, C, D	1
	2	C, D	1
	3	B	1
	4	E, F, G	1

Losing / Gaining Phase Delays

Controller stream	Delay	Type	Phase	From stage	To stage	Relative delay
1	1	Losing	C	1	2	20

Stage Sequences

Controller stream	Sequence	Name	Multiple cycling	Stage IDs	Stage ends
1	1	(untitled)	Single	1, 2, 3, 4	55, 57, 71, 85

Intergreen Matrix for Controller Stream 1

		To						
		A	B	C	D	E	F	G
From	A		5			5	6	7
	B	5		6	5	8	5	6
	C		5			6	0	5
	D		5			0	6	5
	E	10	10	10	10			
	F	6	6	6	6			
	G	12	12	12	12			

Interstage Matrix for Controller Stream 1

		To			
		1	2	3	4
From	1	0	0	5	7
	2	0	0	5	6
	3	6	6	0	8
	4	12	12	12	0

Resultant Stages

Controller stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	1	✓	1	A,C,D	97	55	58	1	7
	2	✓	2	C,D	55	57	2	1	1
	3	✓	3	B	62	71	9	1	7
	4	✓	4	E,F,G	79	85	6	1	6

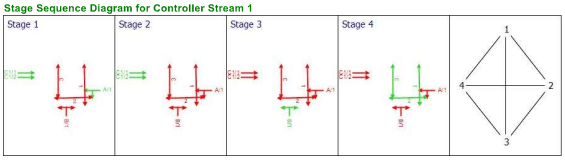
Resultant Phase Green Periods

Controller stream	Phase	Green period	Is base green period	Start time (s)	End time (s)	Duration (s)
1	A	1	✓	97	55	58
	B	1	✓	62	71	9
	C	1	✓	97	57	60
	D	1	✓	97	57	60
	E	1	✓	79	85	6
	F	1	✓	76	85	9
	G	1	✓	77	85	8

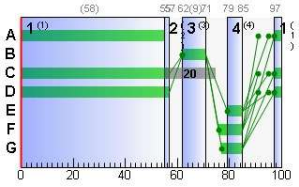
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
A	1	1	1	A	97	55	58
B	1	1	1	B	62	71	9
C1	1	1	1	C	97	57	60
C1	2	1	1	D	97	57	60

Stage Sequence Diagram for Controller Stream 1



Phase Timings Diagram for Controller Stream 1



Traffic Stream Results

Traffic Stream Results: Vehicle summary

Time Segment	Arm	Traffic Stream	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s (per cycle))	Mean Delay per Veh (s)	Mean max queue (PCU)	Utilised storage (%)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
08:00-09:00	A	1	20	357	209	1800	58	9.93	2.69	9.68	8.19	1.18	9.37
	Ax	1	0	Unrestricted	404	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	B	1	43	110	77	1800	9	49.70	2.17	8.31	15.10	0.96	16.06
	Bx	1	0	Unrestricted	96	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	C	1	41	121	462	1800	100	6.22	6.43	18.48	11.33	2.62	13.95
	Cx	1	0	Unrestricted	248	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	C1	1	34	162	377	1800	60	5.59	1.86	92.97	8.32	0.86	9.17
		2	8	1063	85	1800	60	4.65	0.40	20.11	1.56	0.18	1.74
	C2	1	6	1418	85	1434	100	1.59	0.61	30.43	0.53	0.31	0.84

Traffic Stream Results: Stops and delays

Time Segment	Arm	Traffic Stream	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Uniform delay (PCU-hr/hr)	Random plus oversat delay (PCU-hr/hr)	Unweighted cost of delay (£ per hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Uniform stops (Stops per hr)	Random stops (Stops per hr)	Unweighted cost of stops (£ per hr)	Weighted cost of stops (£ per hr)
08:00-09:00	A	1	19.20	8.93	0.55	0.02	8.19	8.19	45.04	93.26	0.87	1.18	1.18
	Ax	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	B	1	18.00	49.70	0.91	0.16	15.10	15.10	99.34	70.91	5.59	0.96	0.96
	Bx	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	C	1	24.00	6.22	0.66	0.14	11.33	11.33	45.31	204.32	5.02	2.62	2.62
	Cx	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	C1	1	1.68	5.59	0.50	0.09	8.32	8.32	18.11	65.05	3.22	0.86	0.86
		2	1.68	4.65	0.11	0.00	1.56	1.56	16.93	14.28	0.12	0.18	0.18
	C2	1	1.20	1.59	0.04	0.00	0.53	0.53	29.11	24.68	0.07	0.31	0.31

Network Results

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Ite wit wor over PR
5	13/05/2022 14:21:15	13/05/2022 14:21:16	08:00	100	51.13	3.17	42.78	B/1	0	0	B/1	C/1	B/

Network Results: Vehicle summary

Time Segment	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Actual green (s (per cycle))	Mean Delay per Veh (s)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
08:00-09:00	43	0	2043	687	5.59	45.02	6.11	51.13

Network Results: Stops and delays

Time Segment	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Uniform delay (PCU-hr/hr)	Random plus oversat delay (PCU-hr/hr)	Unweighted cost of delay (£ per hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Uniform stops (Stops per hr)	Random stops (Stops per hr)	Unweighted cost of stops (£ per hr)	Weighted cost of stops (£ per hr)
08:00-09:00	12.89	5.59	2.75	0.42	45.02	45.02	23.86	472.49	14.88	6.11	6.11

A6 - 2039 Do Something
D6 - 2039 PM Peak Hour*

Summary

Data Errors and Warnings

No errors or warnings

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Ite wit wor over PR
6	13/05/2022 14:21:16	13/05/2022 14:21:16	17:00	100	52.47	3.26	38.89	B/1	0	0	B/1	C/1	B/

Analysis Set Details

Name	Description	Demand set	Include in report	Locked
2039 Do Something		D6	✓	

Demand Set Details

Name	Description	Composite	Demand sets	Start time (HH:mm)	Locked
2039 PM Peak Hour				17:00	

Arms and Traffic Streams

Flows

Arm	Traffic Stream	Total Flow (PCU/hr)	Normal Flow (PCU/hr)
A	1	278	278
Ax	1	405	405
B	1	77	77
Bx	1	53	53
C	1	414	414
Cx	1	311	311
C1	1	388	388
	2	26	26
C2	1	26	26

Signal Timings

Network Default: 100s cycle time; 100 steps

Controller Stream

Controller stream	Name	Description	Use sequence	Cycle time source	Cycle time (s)
1	(untitled)		1	NetworkDefault	100

Controller Stream - Properties

Controller stream	Manufacturer name	Type	Model number	(Telephone) Line Number	Site number	Grid reference	Gaining delay type
1	Unspecified						Absolute

Controller Stream - Optimisation

Controller stream	Allow offset optimisation	Allow green split optimisation	Optimisation level	Auto redistribute	Enable stage constraint
1	✓	✓	Offsets And Green Splits	✓	

Phases

Controller stream	Phase	Name	Minimum green (s)	Maximum green (s)	Relative start displacement (s)	Relative end displacement (s)	Type	Blackout Time (s)
1	A	(untitled)	7	300	0	0	Unknown	
	B	(untitled)	7	300	0	0	Unknown	
	C	(untitled)	7	300	0	0	Unknown	
	D	(untitled)	6	300	0	0	Indicative arrow	
	E	(untitled)	6	300	0	0	Pedestrian	0
	F	(untitled)	6	300	0	0	Pedestrian	0
	G	(untitled)	6	300	0	0	Pedestrian	0

Library Stages

Controller stream	Library stage	Phases in stage	User stage minimum (s)
1	1	A, C, D	1
	2	C, D	1
	3	B	1
	4	E, F, G	1

Losing / Gaining Phase Delays

Controller stream	Delay	Type	Phase	From stage	To stage	Relative delay
1	1	Losing	C	1	2	20

Stage Sequences

Controller stream	Sequence	Name	Multiple cycling	Stage IDs	Stage ends
1	1	(untitled)	Single	1, 2, 3, 4	54, 56, 71, 85

Intergreen Matrix for Controller Stream 1

From \ To	A	B	C	D	E	F	G
A		5			5	6	7
B	5		6	5	8	5	6
C		5			6	0	5
D		5			0	6	5
E	10	10	10	10			
F	6	6	6	6			
G	12	12	12	12			

Interstage Matrix for Controller Stream 1

From \ To	1	2	3	4
1	0	0	5	7
2	0	0	5	6
3	6	6	0	8
4	12	12	12	0

Resultant Stages

Controller stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	1	✓	1	A,C,D	97	54	57	1	7
	2	✓	2	C,D	54	56	2	1	1
	3	✓	3	B	61	71	10	1	7
	4	✓	4	E,F,G	79	85	6	1	6

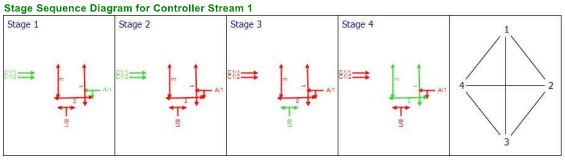
Resultant Phase Green Periods

Controller stream	Phase	Green period	Is base green period	Start time (s)	End time (s)	Duration (s)
1	A	1	✓	97	54	57
	B	1	✓	61	71	10
	C	1	✓	97	56	59
	D	1	✓	97	56	59
	E	1	✓	79	85	6
	F	1	✓	76	85	9
	G	1	✓	77	85	8

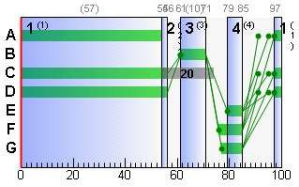
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
A	1	1	1	A	97	54	57
B	1	1	1	B	61	71	10
C1	1	1	1	C	97	56	59
C1	2	1	1	D	97	56	59

Stage Sequence Diagram for Controller Stream 1



Phase Timings Diagram for Controller Stream 1



Traffic Stream Results

Traffic Stream Results: Vehicle summary

Time Segment	Arm	Traffic Stream	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s (per cycle))	Mean Delay per Veh (s)	Mean max queue (PCU)	Utilised storage (%)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
17:00-18:00	A	1	27	238	278	1800	57	11.06	3.83	13.77	12.13	1.68	13.81
	Ax	1	0	Unrestricted	405	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	B	1	39	131	77	1800	10	47.11	2.09	8.01	14.31	0.93	15.24
	Bx	1	0	Unrestricted	53	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	C	1	37	141	414	1800	100	6.22	5.75	16.52	10.15	2.35	12.51
	Cx	1	0	Unrestricted	311	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	C1	1	36	151	388	1800	59	5.91	1.96	97.90	9.05	0.98	10.03
		2	2	3638	26	1800	59	4.74	0.12	6.24	0.49	0.06	0.54
	C2	1	2	4553	26	1344	100	2.21	0.26	12.86	0.23	0.11	0.34

Traffic Stream Results: Stops and delays

Time Segment	Arm	Traffic Stream	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Uniform delay (PCU-hr/hr)	Random plus oversat delay (PCU-hr/hr)	Unweighted cost of delay (£ per hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Uniform stops (Stops per hr)	Random stops (Stops per hr)	Unweighted cost of stops (£ per hr)	Weighted cost of stops (£ per hr)
17:00-18:00	A	1	19.20	11.06	0.81	0.05	12.13	12.13	48.30	132.54	1.74	1.68	1.68
	Ax	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	B	1	18.00	47.11	0.89	0.12	14.31	14.31	96.47	69.93	4.35	0.93	0.93
	Bx	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	C	1	24.00	6.22	0.60	0.11	10.15	10.15	45.37	183.83	3.98	2.35	2.35
	Cx	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	C1	1	1.68	5.91	0.54	0.10	9.05	9.05	20.16	74.61	3.61	0.98	0.98
		2	1.68	4.74	0.03	0.00	0.49	0.49	17.17	4.45	0.01	0.06	0.06
	C2	1	1.20	2.21	0.02	0.00	0.23	0.23	35.06	9.11	0.01	0.11	0.11

Network Results

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Ite wit wor over PR
6	13/05/2022 14:21:16	13/05/2022 14:21:16	17:00	100	52.47	3.26	38.89	B/1	0	0	B/1	C/1	B/

Network Results: Vehicle summary

Time Segment	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Actual green (s (per cycle))	Mean Delay per Veh (s)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
17:00-18:00	39	0	1978	685	5.94	46.35	6.12	52.47

Network Results: Stops and delays

Time Segment	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Uniform delay (PCU-hr/hr)	Random plus oversat delay (PCU-hr/hr)	Unweighted cost of delay (£ per hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Uniform stops (Stops per hr)	Random stops (Stops per hr)	Unweighted cost of stops (£ per hr)	Weighted cost of stops (£ per hr)
17:00-18:00	13.46	5.94	2.88	0.38	46.35	46.35	24.68	474.47	13.70	6.12	6.12

A7 - 2039 Sensitivity Analysis 1
D7 - 2039 AM Peak Hour SA1*

Summary

Data Errors and Warnings

No errors or warnings

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Ite wit wor over PR
7	13/05/2022 14:21:17	13/05/2022 14:21:17	08:00	100	125.33	7.94	65.34	B/1	0	0	B/1	C/1	B/

Analysis Set Details

Name	Description	Demand set	Include in report	Locked
2039 Sensitivity Analysis 1		D7	✓	

Demand Set Details

Name	Description	Composite	Demand sets	Start time (HH:mm)	Locked
2039 AM Peak Hour SA1				08:00	

Arms and Traffic Streams

Flows

Arm	Traffic Stream	Total Flow (PCU/hr)	Normal Flow (PCU/hr)
A	1	354	354
Ax	1	525	525
B	1	247	247
Bx	1	298	298
C	1	519	519
Cx	1	297	297
C1	1	377	377
	2	142	142
C2	1	142	142

Signal Timings

Network Default: 100s cycle time; 100 steps

Controller Stream

Controller stream	Name	Description	Use sequence	Cycle time source	Cycle time (s)
1	(untitled)		1	NetworkDefault	100

Controller Stream - Properties

Controller stream	Manufacturer name	Type	Model number	(Telephone) Line Number	Site number	Grid reference	Gaining delay type
1	Unspecified						Absolute

Controller Stream - Optimisation

Controller stream	Allow offset optimisation	Allow green split optimisation	Optimisation level	Auto redistribute	Enable stage constraint
1	✓	✓	Offsets And Green Splits	✓	

Phases

Controller stream	Phase	Name	Minimum green (s)	Maximum green (s)	Relative start displacement (s)	Relative end displacement (s)	Type	Blackout Time (s)
1	A	(untitled)	7	300	0	0	Unknown	
	B	(untitled)	7	300	0	0	Unknown	
	C	(untitled)	7	300	0	0	Unknown	
	D	(untitled)	6	300	0	0	Indicative arrow	
	E	(untitled)	6	300	0	0	Pedestrian	0
	F	(untitled)	6	300	0	0	Pedestrian	0
	G	(untitled)	6	300	0	0	Pedestrian	0

Library Stages

Controller stream	Library stage	Phases in stage	User stage minimum (s)
1	1	A, C, D	1
	2	C, D	1
	3	B	1
	4	E, F, G	1

Losing / Gaining Phase Delays

Controller stream	Delay	Type	Phase	From stage	To stage	Relative delay
1	1	Losing	C	1	2	20

Stage Sequences

Controller stream	Sequence	Name	Multiple cycling	Stage IDs	Stage ends
1	1	(untitled)	Single	1, 2, 3, 4	45, 46, 71, 85

Intergreen Matrix for Controller Stream 1

From \ To	A	B	C	D	E	F	G
A		5			5	6	7
B	5		6	5	8	5	6
C		5			6	0	5
D		5			0	6	5
E	10	10	10	10			
F	6	6	6	6			
G	12	12	12	12			

Interstage Matrix for Controller Stream 1

From \ To	1	2	3	4
1	0	0	5	7
2	0	0	5	6
3	6	6	0	8
4	12	12	12	0

Resultant Stages

Controller stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	1	✓	1	A,C,D	97	45	48	1	7
	2	✓	2	C,D	45	46	1	1	1
	3	✓	3	B	51	71	20	1	7
	4	✓	4	E,F,G	79	85	6	1	6

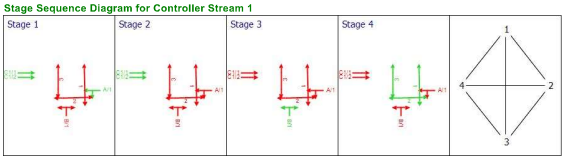
Resultant Phase Green Periods

Controller stream	Phase	Green period	Is base green period	Start time (s)	End time (s)	Duration (s)
1	A	1	✓	97	45	48
	B	1	✓	51	71	20
	C	1	✓	97	46	49
	D	1	✓	97	46	49
	E	1	✓	79	85	6
	F	1	✓	76	85	9
	G	1	✓	77	85	8

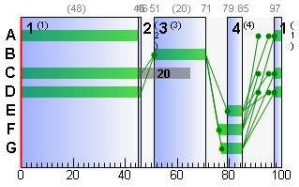
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
A	1	1	1	A	97	45	48
B	1	1	1	B	51	71	20
C1	1	1	1	C	97	46	49
C1	2	1	1	D	97	46	49

Stage Sequence Diagram for Controller Stream 1



Phase Timings Diagram for Controller Stream 1



Traffic Stream Results

Traffic Stream Results: Vehicle summary

Time Segment	Arm	Traffic Stream	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s (per cycle))	Mean Delay per Veh (s)	Mean max queue (PCU)	Utilised storage (%)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
08:00-09:00	A	1	40	124	354	1800	48	17.56	6.33	22.75	24.52	2.79	27.31
	Ax	1	0	Unrestricted	525	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	B	1	65	38	247	1800	20	44.99	6.85	26.25	43.83	3.04	46.87
	Bx	1	0	Unrestricted	298	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	C	1	54	66	519	1800	100	12.16	9.69	27.86	24.90	4.05	28.95
	Cx	1	0	Unrestricted	297	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	C1	1	42	115	377	1800	49	7.84	1.86	92.77	11.66	1.00	12.66
		2	17	418	142	1800	49	6.98	0.66	33.02	3.91	0.51	4.42
	C2	1	11	714	142	1284	100	6.92	1.98	99.09	3.88	1.24	5.12

Traffic Stream Results: Stops and delays

Time Segment	Arm	Traffic Stream	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Uniform delay (PCU-hr/hr)	Random plus oversat delay (PCU-hr/hr)	Unweighted cost of delay (£ per hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Uniform stops (Stops per hr)	Random stops (Stops per hr)	Unweighted cost of stops (£ per hr)	Weighted cost of stops (£ per hr)
08:00-09:00	A	1	19.20	17.56	1.59	0.13	24.52	24.52	82.85	217.67	4.82	2.79	2.79
	Ax	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	B	1	18.00	44.99	2.48	0.60	43.83	43.83	98.29	221.48	21.29	3.04	3.04
	Bx	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	C	1	24.00	12.16	1.44	0.32	24.90	24.90	62.26	311.73	11.38	4.05	4.05
	Cx	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	C1	1	1.68	7.84	0.67	0.15	11.66	11.66	21.16	74.39	5.40	1.00	1.00
		2	1.68	6.98	0.26	0.02	3.91	3.91	28.51	39.17	1.31	0.51	0.51
	C2	1	1.20	6.92	0.27	0.01	3.88	3.88	69.86	98.96	0.25	1.24	1.24

Network Results

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Ite wit wor over PR
7	13/05/2022 14:21:17	13/05/2022 14:21:17	08:00	100	125.33	7.94	65.34	B/1	0	0	B/1	C/1	B/

Network Results: Vehicle summary

Time Segment	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Actual green (s (per cycle))	Mean Delay per Veh (s)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
08:00-09:00	65	0	2901	666	9.85	112.69	12.64	125.33

Network Results: Stops and delays

Time Segment	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Uniform delay (PCU-hr/hr)	Random plus oversat delay (PCU-hr/hr)	Unweighted cost of delay (£ per hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Uniform stops (Stops per hr)	Random stops (Stops per hr)	Unweighted cost of stops (£ per hr)	Weighted cost of stops (£ per hr)
08:00-09:00	13.16	9.85	6.70	1.23	112.69	112.69	34.74	963.39	44.45	12.64	12.64

A8 - 2039 Sensitivity Analysis 1
D8 - 2039 PM Peak Hour SA1*

Summary

Data Errors and Warnings

No errors or warnings

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Ite wit wor over PR
8	13/05/2022 14:21:17	13/05/2022 14:21:18	17:00	100	69.01	4.34	42.60	C/1	0	0	C1/1	C/1	C/

Analysis Set Details

Name	Description	Demand set	Include in report	Locked
2039 Sensitivity Analysis 1		D8	✓	

Demand Set Details

Name	Description	Composite	Demand sets	Start time (HH:mm)	Locked
2039 PM Peak Hour SA1				17:00	

Arms and Traffic Streams

Flows

Arm	Traffic Stream	Total Flow (PCU/hr)	Normal Flow (PCU/hr)
A	1	291	291
Ax	1	426	426
B	1	106	106
Bx	1	72	72
C	1	420	420
Cx	1	319	319
C1	1	388	388
	2	32	32
C2	1	32	32

Signal Timings

Network Default: 100s cycle time; 100 steps

Controller Stream

Controller stream	Name	Description	Use sequence	Cycle time source	Cycle time (s)
1	(untitled)		1	NetworkDefault	100

Controller Stream - Properties

Controller stream	Manufacturer name	Type	Model number	(Telephone) Line Number	Site number	Grid reference	Gaining delay type
1	Unspecified						Absolute

Controller Stream - Optimisation

Controller stream	Allow offset optimisation	Allow green split optimisation	Optimisation level	Auto redistribute	Enable stage constraint
1	✓	✓	Offsets And Green Splits	✓	

Phases

Controller stream	Phase	Name	Minimum green (s)	Maximum green (s)	Relative start displacement (s)	Relative end displacement (s)	Type	Blackout Time (s)
1	A	(untitled)	7	300	0	0	Unknown	
	B	(untitled)	7	300	0	0	Unknown	
	C	(untitled)	7	300	0	0	Unknown	
	D	(untitled)	6	300	0	0	Indicative arrow	
	E	(untitled)	6	300	0	0	Pedestrian	0
	F	(untitled)	6	300	0	0	Pedestrian	0
	G	(untitled)	6	300	0	0	Pedestrian	0

Library Stages

Controller stream	Library stage	Phases in stage	User stage minimum (s)
1	1	A, C, D	1
	2	C, D	1
	3	B	1
	4	E, F, G	1

Losing / Gaining Phase Delays

Controller stream	Delay	Type	Phase	From stage	To stage	Relative delay
1	1	Losing	C	1	2	20

Stage Sequences

Controller stream	Sequence	Name	Multiple cycling	Stage IDs	Stage ends
1	1	(untitled)	Single	1, 2, 3, 4	47, 49, 71, 85

Intergreen Matrix for Controller Stream 1

From \ To	A	B	C	D	E	F	G
A		5			5	6	7
B	5		6	5	8	5	6
C		5			6	0	5
D		5			0	6	5
E	10	10	10	10			
F	6	6	6	6			
G	12	12	12	12			

Interstage Matrix for Controller Stream 1

From \ To	1	2	3	4
1	0	0	5	7
2	0	0	5	6
3	6	6	0	8
4	12	12	12	0

Resultant Stages

Controller stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	1	✓	1	A,C,D	97	47	50	1	7
	2	✓	2	C,D	47	49	2	1	1
	3	✓	3	B	54	71	17	1	7
	4	✓	4	E,F,G	79	85	6	1	6

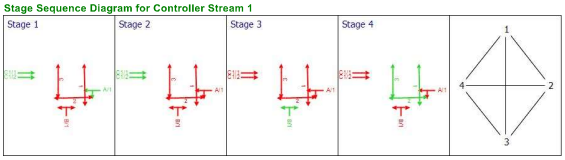
Resultant Phase Green Periods

Controller stream	Phase	Green period	Is base green period	Start time (s)	End time (s)	Duration (s)
1	A	1	✓	97	47	50
	B	1	✓	54	71	17
	C	1	✓	97	49	52
	D	1	✓	97	49	52
	E	1	✓	79	85	6
	F	1	✓	76	85	9
	G	1	✓	77	85	8

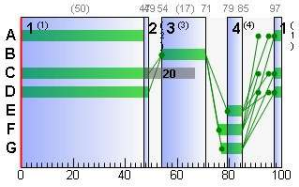
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
A	1	1	1	A	97	47	50
B	1	1	1	B	54	71	17
C1	1	1	1	C	97	49	52
C1	2	1	1	D	97	49	52

Stage Sequence Diagram for Controller Stream 1



Phase Timings Diagram for Controller Stream 1



Traffic Stream Results

Traffic Stream Results: Vehicle summary

Time Segment	Arm	Traffic Stream	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s (per cycle))	Mean Delay per Veh (s)	Mean max queue (PCU)	Utilised storage (%)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
17:00-18:00	A	1	32	184	291	1800	50	15.24	4.76	17.11	17.49	2.10	19.58
	Ax	1	0	Unrestricted	426	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	B	1	33	175	108	1800	17	38.42	2.64	10.12	16.07	1.17	17.24
	Bx	1	0	Unrestricted	72	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	C	1	43	111	420	1800	100	9.29	6.92	19.91	15.38	2.89	18.27
	Cx	1	0	Unrestricted	319	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	C1	1	41	121	388	1800	52	7.50	2.03	101.69	11.48	1.03	12.51
		2	3	2583	32	1800	52	5.98	0.16	7.84	0.76	0.07	0.83
	C2	1	2	3701	32	1351	100	3.18	0.39	19.65	0.40	0.19	0.59

Traffic Stream Results: Stops and delays

Time Segment	Arm	Traffic Stream	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Uniform delay (PCU-hr/hr)	Random plus oversat delay (PCU-hr/hr)	Unweighted cost of delay (£ per hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Uniform stops (Stops per hr)	Random stops (Stops per hr)	Unweighted cost of stops (£ per hr)	Weighted cost of stops (£ per hr)
17:00-18:00	A	1	19.20	15.24	1.16	0.07	17.49	17.49	57.46	164.56	2.64	2.10	2.10
	Ax	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	B	1	18.00	38.42	1.05	0.08	16.07	16.07	88.21	90.67	2.83	1.17	1.17
	Bx	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	C	1	24.00	9.29	0.93	0.16	15.38	15.38	54.80	224.50	5.66	2.89	2.89
	Cx	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	C1	1	1.68	7.50	0.67	0.14	11.48	11.48	21.20	77.26	4.99	1.03	1.03
		2	1.68	5.98	0.05	0.00	0.76	0.76	17.59	5.61	0.02	0.07	0.07
	C2	1	1.20	3.18	0.03	0.00	0.40	0.40	46.25	14.79	0.01	0.19	0.19

Network Results

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Ite wit wor over PR
8	13/05/2022 14:21:17	13/05/2022 14:21:18	17:00	100	69.01	4.34	42.60	C/1	0	0	C1/1	C/1	C/

Network Results: Vehicle summary

Time Segment	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Actual green (s (per cycle))	Mean Delay per Veh (s)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
17:00-18:00	43	0	2086	671	7.48	61.57	7.44	69.01

Network Results: Stops and delays

Time Segment	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Uniform delay (PCU-hr/hr)	Random plus oversat delay (PCU-hr/hr)	Unweighted cost of delay (£ per hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Uniform stops (Stops per hr)	Random stops (Stops per hr)	Unweighted cost of stops (£ per hr)	Weighted cost of stops (£ per hr)
17:00-18:00	13.48	7.48	3.89	0.45	61.57	61.57	28.45	577.39	16.16	7.44	7.44

A9 - 2039 Sensitivity Analysis 2
D9 - 2039 AM Peak Hour SA2*

Summary

Data Errors and Warnings

No errors or warnings

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Ite wit wor over PR
9	13/05/2022 14:21:18	13/05/2022 14:21:18	08:00	100	203.22	13.17	92.59	B/1	1	7	B/1	C/1	B/

Analysis Set Details

Name	Description	Demand set	Include in report	Locked
2039 Sensitivity Analysis 2		D9	✓	

Demand Set Details

Name	Description	Composite	Demand sets	Start time (HH:mm)	Locked
2039 AM Peak Hour SA2				08:00	

Arms and Traffic Streams

Flows

Arm	Traffic Stream	Total Flow (PCU/hr)	Normal Flow (PCU/hr)
A	1	372	372
Ax	1	582	582
B	1	350	350
Bx	1	331	331
C	1	534	534
Cx	1	343	343
C1	1	377	377
	2	157	157
C2	1	157	157

Signal Timings

Network Default: 100s cycle time; 100 steps

Controller Stream

Controller stream	Name	Description	Use sequence	Cycle time source	Cycle time (s)
1	(untitled)		1	NetworkDefault	100

Controller Stream - Properties

Controller stream	Manufacturer name	Type	Model number	(Telephone) Line Number	Site number	Grid reference	Gaining delay type
1	Unspecified						Absolute

Controller Stream - Optimisation

Controller stream	Allow offset optimisation	Allow green split optimisation	Optimisation level	Auto redistribute	Enable stage constraint
1	✓	✓	Offsets And Green Splits	✓	

Phases

Controller stream	Phase	Name	Minimum green (s)	Maximum green (s)	Relative start displacement (s)	Relative end displacement (s)	Type	Blackout Time (s)
1	A	(untitled)	7	300	0	0	Unknown	
	B	(untitled)	7	300	0	0	Unknown	
	C	(untitled)	7	300	0	0	Unknown	
	D	(untitled)	6	300	0	0	Indicative arrow	
	E	(untitled)	6	300	0	0	Pedestrian	0
	F	(untitled)	6	300	0	0	Pedestrian	0
	G	(untitled)	6	300	0	0	Pedestrian	0

Library Stages

Controller stream	Library stage	Phases in stage	User stage minimum (s)
1	1	A, C, D	1
	2	C, D	1
	3	B	1
	4	E, F, G	1

Losing / Gaining Phase Delays

Controller stream	Delay	Type	Phase	From stage	To stage	Relative delay
1	1	Losing	C	1	2	20

Stage Sequences

Controller stream	Sequence	Name	Multiple cycling	Stage IDs	Stage ends
1	1	(untitled)	Single	1, 2, 3, 4	45, 46, 71, 85

Intergreen Matrix for Controller Stream 1

From \	A	B	C	D	E	F	G
A		5			5	6	7
B	5		6	5	8	5	6
C		5			6	0	5
D		5			0	6	5
E	10	10	10	10			
F	6	6	6	6			
G	12	12	12	12			

Interstage Matrix for Controller Stream 1

From \ To	1	2	3	4
1	0	0	5	7
2	0	0	5	6
3	6	6	0	8
4	12	12	12	0

Resultant Stages

Controller stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	1	✓	1	A,C,D	97	45	48	1	7
	2	✓	2	C,D	45	46	1	1	1
	3	✓	3	B	51	71	20	1	7
	4	✓	4	E,F,G	79	85	6	1	6

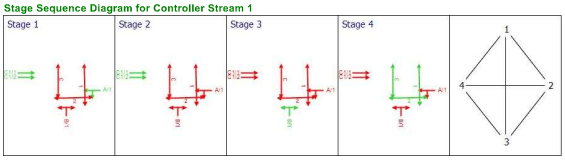
Resultant Phase Green Periods

Controller stream	Phase	Green period	Is base green period	Start time (s)	End time (s)	Duration (s)
1	A	1	✓	97	45	48
	B	1	✓	51	71	20
	C	1	✓	97	46	49
	D	1	✓	97	46	49
	E	1	✓	79	85	6
	F	1	✓	76	85	9
	G	1	✓	77	85	8

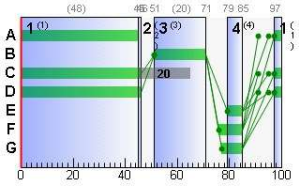
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
A	1	1	1	A	97	45	48
B	1	1	1	B	51	71	20
C1	1	1	1	C	97	46	49
C1	2	1	1	D	97	46	49

Stage Sequence Diagram for Controller Stream 1



Phase Timings Diagram for Controller Stream 1



Traffic Stream Results

Traffic Stream Results: Vehicle summary

Time Segment	Arm	Traffic Stream	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s (per cycle))	Mean Delay per Veh (s)	Mean max queue (PCU)	Utilised storage (%)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
08:00-09:00	A	1	42	113	372	1800	48	17.88	6.77	24.32	26.24	2.98	29.21
	Ax	1	0	Unrestricted	582	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	B	1	93	-3	350	1800	20	82.26	13.76	52.74	113.57	5.92	119.49
	Bx	1	0	Unrestricted	331	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	C	1	56	62	534	1800	100	12.54	10.14	29.15	26.41	4.23	30.64
	Cx	1	0	Unrestricted	343	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	C1	1	42	115	377	1800	49	7.75	1.82	91.16	11.52	0.96	12.48
		2	20	344	157	1800	49	7.52	0.74	37.07	4.66	0.73	5.38
	C2	1	12	624	157	1263	100	7.42	2.01	100.36	4.59	1.42	6.01

Traffic Stream Results: Stops and delays

Time Segment	Arm	Traffic Stream	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Uniform delay (PCU-hr/hr)	Random plus oversat delay (PCU-hr/hr)	Unweighted cost of delay (£ per hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Uniform stops (Stops per hr)	Random stops (Stops per hr)	Unweighted cost of stops (£ per hr)	Weighted cost of stops (£ per hr)
08:00-09:00	A	1	19.20	17.88	1.69	0.15	26.24	26.24	63.78	231.77	5.50	2.98	2.98
	Ax	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	B	1	18.00	82.26	3.77	4.23	113.57	113.57	134.99	335.55	136.90	5.92	5.92
	Bx	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	C	1	24.00	12.54	1.51	0.35	26.41	26.41	63.18	324.92	12.44	4.23	4.23
	Cx	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	C1	1	1.68	7.75	0.66	0.15	11.52	11.52	20.26	70.98	5.40	0.96	0.96
		2	1.68	7.52	0.30	0.03	4.66	4.66	36.92	56.12	1.85	0.73	0.73
	C2	1	1.20	7.42	0.31	0.01	4.59	4.59	71.95	112.64	0.32	1.42	1.42

Network Results

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Ite wit wor over PR
9	13/05/2022 14:21:18	13/05/2022 14:21:18	08:00	100	203.22	13.17	92.59	B/1	1	7	B/1	C/1	B/

Network Results: Vehicle summary

Time Segment	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Actual green (s (per cycle))	Mean Delay per Veh (s)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
08:00-09:00	93	-3	3203	666	14.80	186.99	16.23	203.22

Network Results: Stops and delays

Time Segment	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Uniform delay (PCU-hr/hr)	Random plus oversat delay (PCU-hr/hr)	Unweighted cost of delay (£ per hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Uniform stops (Stops per hr)	Random stops (Stops per hr)	Unweighted cost of stops (£ per hr)	Weighted cost of stops (£ per hr)
08:00-09:00	13.24	14.80	8.25	4.92	186.99	186.99	40.41	1131.98	162.42	16.23	16.23

A10 - 2039 Sensitivity Analysis 2
D10 - 2039 PM Peak Hour SA2*

Summary

Data Errors and Warnings

No errors or warnings

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Ite wit wor over PR
10	13/05/2022 14:21:19	13/05/2022 14:21:19	17:00	100	94.08	5.94	48.54	B/1	0	0	B/1	C/1	B/

Analysis Set Details

Name	Description	Demand set	Include in report	Locked
2039 Sensitivity Analysis 2		D10	✓	

Demand Set Details

Name	Description	Composite	Demand sets	Start time (HH:mm)	Locked
2039 PM Peak Hour SA2				17:00	

Arms and Traffic Streams

Flows

Arm	Traffic Stream	Total Flow (PCU/hr)	Normal Flow (PCU/hr)
A	1	349	349
Ax	1	459	459
B	1	166	166
Bx	1	176	176
C	1	466	466
Cx	1	346	346
C1	1	388	388
	2	78	78
C2	1	78	78

Signal Timings

Network Default: 100s cycle time; 100 steps

Controller Stream

Controller stream	Name	Description	Use sequence	Cycle time source	Cycle time (s)
1	(untitled)		1	NetworkDefault	100

Controller Stream - Properties

Controller stream	Manufacturer name	Type	Model number	(Telephone) Line Number	Site number	Grid reference	Gaining delay type
1	Unspecified						Absolute

Controller Stream - Optimisation

Controller stream	Allow offset optimisation	Allow green split optimisation	Optimisation level	Auto redistribute	Enable stage constraint
1	✓	✓	Offsets And Green Splits	✓	

Phases

Controller stream	Phase	Name	Minimum green (s)	Maximum green (s)	Relative start displacement (s)	Relative end displacement (s)	Type	Blackout Time (s)
1	A	(untitled)	7	300	0	0	Unknown	
	B	(untitled)	7	300	0	0	Unknown	
	C	(untitled)	7	300	0	0	Unknown	
	D	(untitled)	6	300	0	0	Indicative arrow	
	E	(untitled)	6	300	0	0	Pedestrian	0
	F	(untitled)	6	300	0	0	Pedestrian	0
	G	(untitled)	6	300	0	0	Pedestrian	0

Library Stages

Controller stream	Library stage	Phases in stage	User stage minimum (s)
1	1	A, C, D	1
	2	C, D	1
	3	B	1
	4	E, F, G	1

Losing / Gaining Phase Delays

Controller stream	Delay	Type	Phase	From stage	To stage	Relative delay
1	1	Losing	C	1	2	20

Stage Sequences

Controller stream	Sequence	Name	Multiple cycling	Stage IDs	Stage ends
1	1	(untitled)	Single	1, 2, 3, 4	46, 48, 71, 85

Intergreen Matrix for Controller Stream 1

From \ To	A	B	C	D	E	F	G
A		5			5	6	7
B	5		6	5	8	5	6
C		5			6	0	5
D		5			0	6	5
E	10	10	10	10			
F	6	6	6	6			
G	12	12	12	12			

Interstage Matrix for Controller Stream 1

From \ To	1	2	3	4
1	0	0	5	7
2	0	0	5	6
3	6	6	0	8
4	12	12	12	0

Resultant Stages

Controller stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	1	✓	1	A,C,D	97	46	49	1	7
	2	✓	2	C,D	46	48	2	1	1
	3	✓	3	B	53	71	18	1	7
	4	✓	4	E,F,G	79	85	6	1	6

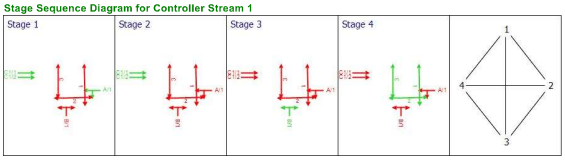
Resultant Phase Green Periods

Controller stream	Phase	Green period	Is base green period	Start time (s)	End time (s)	Duration (s)
1	A	1	✓	97	46	49
	B	1	✓	53	71	18
	C	1	✓	97	48	51
	D	1	✓	97	48	51
	E	1	✓	79	85	6
	F	1	✓	76	85	9
	G	1	✓	77	85	8

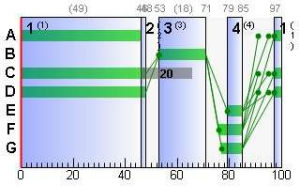
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
A	1	1	1	A	97	46	49
B	1	1	1	B	53	71	18
C1	1	1	1	C	97	48	51
C1	2	1	1	D	97	48	51

Stage Sequence Diagram for Controller Stream 1



Phase Timings Diagram for Controller Stream 1



Traffic Stream Results

Traffic Stream Results: Vehicle summary

Time Segment	Arm	Traffic Stream	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s (per cycle))	Mean Delay per Veh (s)	Mean max queue (PCU)	Utilised storage (%)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
17:00-18:00	A	1	39	132	349	1800	49	16.77	6.13	22.04	23.09	2.67	25.76
	Ax	1	0	Unrestricted	459	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	B	1	49	85	168	1800	18	41.07	4.33	16.80	26.89	1.92	28.82
	Bx	1	0	Unrestricted	176	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	C	1	48	88	466	1800	100	10.52	8.12	23.33	19.33	3.39	22.72
	Cx	1	0	Unrestricted	346	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	C1	1	41	117	388	1800	51	7.59	1.98	99.16	11.61	0.93	12.54
		2	8	980	78	1800	51	6.16	0.37	18.65	1.89	0.17	2.06
	C2	1	6	1386	78	1288	100	5.18	1.14	57.07	1.59	0.59	2.19

Traffic Stream Results: Stops and delays

Time Segment	Arm	Traffic Stream	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Uniform delay (PCU-hr/hr)	Random plus oversat delay (PCU-hr/hr)	Unweighted cost of delay (£ per hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Uniform stops (Stops per hr)	Random stops (Stops per hr)	Unweighted cost of stops (£ per hr)	Weighted cost of stops (£ per hr)
17:00-18:00	A	1	19.20	16.77	1.50	0.12	23.09	23.09	81.03	208.59	4.40	2.67	2.67
	Ax	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	B	1	18.00	41.07	1.67	0.23	26.89	26.89	92.42	145.34	8.07	1.92	1.92
	Bx	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	C	1	24.00	10.52	1.14	0.22	19.33	19.33	58.06	262.68	7.87	3.39	3.39
	Cx	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	C1	1	1.68	7.59	0.67	0.15	11.61	11.61	19.05	68.65	5.25	0.93	0.93
		2	1.68	6.16	0.13	0.00	1.89	1.89	17.18	13.26	0.14	0.17	0.17
	C2	1	1.20	5.18	0.11	0.00	1.59	1.59	60.57	47.17	0.07	0.59	0.59

Network Results

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Ite wit wor ove PR
10	13/05/2022 14:21:19	13/05/2022 14:21:19	17:00	100	94.08	5.94	48.54	B/1	0	0	B/1	C/1	B/

Network Results: Vehicle summary

Time Segment	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Actual green (s (per cycle))	Mean Delay per Veh (s)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
17:00-18:00	49	0	2506	669	8.54	84.41	9.67	94.08

Network Results: Stops and delays

Time Segment	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Uniform delay (PCU-hr/hr)	Random plus oversat delay (PCU-hr/hr)	Unweighted cost of delay (£ per hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Uniform stops (Stops per hr)	Random stops (Stops per hr)	Unweighted cost of stops (£ per hr)	Weighted cost of stops (£ per hr)
17:00-18:00	13.38	8.54	5.22	0.72	84.41	84.41	30.79	745.70	25.81	9.67	9.67

TRANSYT 15

Version: 15.5.2.7994

For sales and distribution information, program advice and maintenance, contact TRL:
+44 (0)1344 379777 software@trl.co.uk www.trlsoftware.co.uk

Filename: 180221 Site Access at Dublin Road.t15
Path: G:\2018\p180221\calcs\transyt
Report generation date: 13/05/2022 14:59:44

»A1 - 2024 Do Something : D1 - 2024 AM Peak Hour* :
»A2 - 2024 Do Something : D2 - 2024 PM Peak Hour* :
»A3 - 2029 Do Something : D3 - 2029 AM Peak Hour* :
»A4 - 2029 Do Something : D4 - 2029 PM Peak Hour* :
»A5 - 2039 Do Something : D5 - 2039 AM Peak Hour* :
»A6 - 2039 Do Something : D6 - 2039 PM Peak Hour* :
»A7 - 2039 Sensitivity Analysis 1 : D7 - 2039 AM Peak Hour SA1* :
»A8 - 2039 Sensitivity Analysis 1 : D8 - 2039 PM Peak Hour SA1* :
»A9 - 2039 Sensitivity Analysis 2 : D9 - 2039 AM Peak Hour SA2* :
»A10 - 2039 Sensitivity Analysis 2 : D10 - 2039 PM Peak Hour SA2* :

File summary

File description

File title	Lands at Dublin Road, Celbridge
Location	Dublin Road
Site number	
UTCRegion	
Driving side	Left
Date	28/04/2022
Version	
Status	Planning
Identifier	
Client	Kieran Curtin. Receiver over certain assets of Maplewood Developments Limited of Maplewood Developments Limited of Maplewood Developments Limited Kieran Curtin, Receiver over certain assets of Maplewood Developments Limited
Jobnumber	180221
Enumerator	HEADOFFICE\mckennam
Description	

Model and Results

Enable controller offsets	Enable fuel consumption	Enable quick flares	Display journey time results	Display level of service results	Display blocking and starvation results	Display end of red and green queue results	Display excess queue results	Display separate uniform and random results	Display unweighted results	Display TRANSYT 12 style timings	Display effective greens in results	Display Red-With-Amber	Display End-Of-Green Amber
			✓		✓	✓	✓	✓	✓	✓	✓		

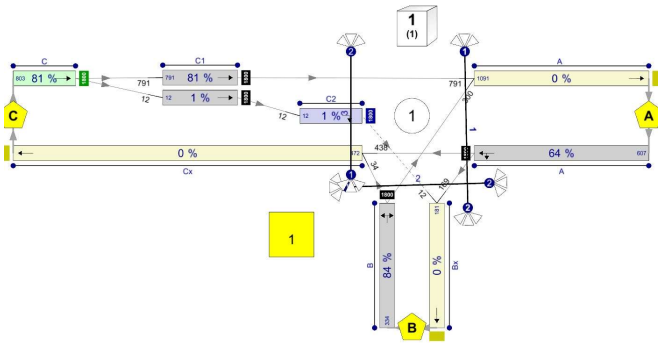
Units

Cost units	Speed units	Distance units	Fuel economy units	Fuel rate units	Mass units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
£	kph	m	mpg	l/h	kg	PCU	PCU	perHour	s	-Hour	perHour

Sorting

Show names instead of IDs	Sorting direction	Sorting type	Ignore prefixes when sorting	Analysis/demand set sorting	Link grouping	Source grouping	Colour Analysis/Demand Sets
	Ascending	Numerical		ID	Normal	Normal	✓

Network Diagrams



A1 - 2024 Do Something
D1 - 2024 AM Peak Hour*

Summary

Data Errors and Warnings

No errors or warnings

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Ite wit wor over PR
1	13/05/2022 14:50:24	13/05/2022 14:50:24	08:00	100	72.86	4.49	53.87	C1/1	0	0	C1/1	C/1	C1/

Analysis Set Details

Name	Description	Demand set	Include in report	Locked
2024 Do Something		D1	✓	

Demand Set Details

Name	Description	Composite	Demand sets	Start time (HH:mm)	Locked
2024 AM Peak Hour				08:00	

Arms and Traffic Streams

Modelling

Arm	Traffic Stream	Traffic model	Stop weighting multiplier (%)	Delay weighting multiplier (%)	Assignment Cost Weighting (%)	Exclude from results calculation	Max queue storage (PCU)	Has queue limit	Has degree of saturation limit
A	1	NetworkDefault	100	100	100		0.00		
Ax	1	NetworkDefault	100	100	100		0.00		
B	1	NetworkDefault	100	100	100		0.00		
Bx	1	NetworkDefault	100	100	100		0.00		
C	1	NetworkDefault	100	100	100		0.00		
Cx	1	NetworkDefault	100	100	100		0.00		
C1	1	Flare	100	100	100		0.00		
	2	Flare	100	100	100		0.00		
C2	1	Flare	100	100	100		0.00		

Modelling - Advanced

Arm	Traffic Stream	Initial queue (PCU)	Type of Vehicle-in-Service	Vehicle-in-Service	Type of random parameter	Random parameter	Auto cycle time	Cycle time
(ALL)	(ALL)	0.00	NetworkDefault	Not-Included	NetworkDefault	0.50	✓	100

Normal traffic - Modelling

Arm	Traffic Stream	Stop weighting (%)	Delay weighting (%)
(ALL)	(ALL)	100	100

Normal traffic - Advanced

Arm	Traffic Stream	Dispersion type for Normal Traffic
(ALL)	(ALL)	NetworkDefault

Flows

Arm	Traffic Stream	Total Flow (PCU/hr)	Normal Flow (PCU/hr)
A	1	403	403
Ax	1	720	720
B	1	84	84
Bx	1	37	37
C	1	642	642
Cx	1	372	372
C1	1	640	640
	2	2	2
C2	1	2	2

Pedestrian Crossings

Pedestrian Crossings - Modelling

Crossing	Side	Delay weighting (%)	Assignment Cost Weighting (%)	Exclude from results calculation	Max queue storage (Ped)	Has queue limit	Has degree of saturation limit
(ALL)	(ALL)	100	100		0.00		

Signal Timings

Network Default: 100s cycle time; 100 steps

Phases

Controller stream	Phase	Name	Minimum green (s)	Maximum green (s)	Relative start displacement (s)	Relative end displacement (s)	Type	Blackout Time (s)
1	A	(untitled)	7	300	0	0	Unknown	
	B	(untitled)	7	300	0	0	Unknown	
	C	(untitled)	7	300	0	0	Unknown	
	D	(untitled)	6	300	0	0	Indicative arrow	
	E	(untitled)	6	300	0	0	Pedestrian	0
	F	(untitled)	6	300	0	0	Pedestrian	0
	G	(untitled)	6	300	0	0	Pedestrian	0

Library Stages

Controller stream	Library stage	Phases in stage	User stage minimum (s)
1	1	A, C, D	1
	2	C, D	1
	3	B	1
	4	E, F, G	1

Losing / Gaining Phase Delays

Controller stream	Delay	Type	Phase	From stage	To stage	Relative delay
1	1	Losing	C	1	2	20

Stage Sequences

Controller stream	Sequence	Name	Multiple cycling	Stage IDs	Stage ends
1	1	(untitled)	Single	1, 2, 3, 4	53, 56, 70, 83

Intergreen Matrix for Controller Stream 1

From \ To	A	B	C	D	E	F	G
A		5			5	6	7
B	5		5	5	7	5	6
C		5			7		5
D		5				7	5
E	8	8	8				
F	8	8		8			
G	8	8	8	8			

Interstage Matrix for Controller Stream 1

From \ To	1	2	3	4
1	0	0	5	7
2	0	0	5	7
3	5	5	0	7
4	8	8	8	0

Resultant Stages

Controller stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	1	✓	1	A,C,D	91	53	62	1	7
	2	✓	2	C,D	53	56	3	1	1
	3	✓	3	B	61	70	9	1	7
	4	✓	4	E,F,G	77	83	6	1	6

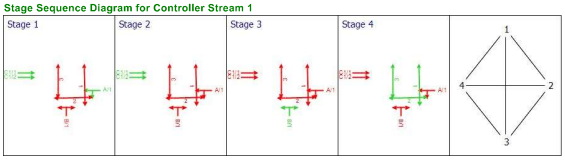
Resultant Phase Green Periods

Controller stream	Phase	Green period	Is base green period	Start time (s)	End time (s)	Duration (s)
1	A	1	✓	91	53	62
	B	1	✓	61	70	9
	C	1	✓	91	56	65
	D	1	✓	91	56	65
	E	1	✓	77	83	6
	F	1	✓	75	83	8
	G	1	✓	76	83	7

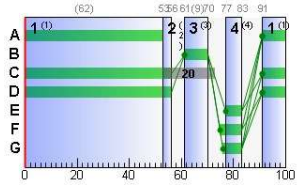
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
A	1	1	1	A	91	53	62
B	1	1	1	B	61	70	9
C1	1	1	1	C	91	56	65
C1	2	1	1	D	91	56	65

Stage Sequence Diagram for Controller Stream 1



Phase Timings Diagram for Controller Stream 1



Traffic Stream Results

Traffic Stream Results: Vehicle summary

Time Segment	Arm	Traffic Stream	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s (per cycle))	Mean Delay per Veh (s)	Mean max queue (PCU)	Utilised storage (%)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
08:00-09:00	A	1	36	153	403	1800	62	9.70	5.36	19.26	15.42	2.34	17.76
	Ax	1	0	Unrestricted	720	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	B	1	47	93	84	1800	9	51.14	2.39	9.18	16.94	1.07	18.01
	Bx	1	0	Unrestricted	37	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	C	1	53	70	642	1800	100	7.43	9.21	26.49	18.83	3.80	22.62
	Cx	1	0	Unrestricted	372	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	C1	1	54	67	640	1800	65	4.96	2.29	114.36	12.53	1.90	14.42
		2	0	53360	2	1800	65	2.84	0.00	0.00	0.02	0.00	0.03
	C2	1	0	51772	2	1153	100	2.03	0.02	0.87	0.02	0.01	0.02

Traffic Stream Results: Stops and delays

Time Segment	Arm	Traffic Stream	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Uniform delay (PCU-hr/hr)	Random plus oversat delay (PCU-hr/hr)	Unweighted cost of delay (£ per hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Uniform stops (Stops per hr)	Random stops (Stops per hr)	Unweighted cost of stops (£ per hr)	Weighted cost of stops (£ per hr)
08:00-09:00	A	1	19.20	9.70	0.99	0.10	15.42	15.42	46.39	183.43	3.51	2.34	2.34
	Ax	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	B	1	18.00	51.14	0.99	0.20	16.94	16.94	101.26	77.96	7.10	1.07	1.07
	Bx	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	C	1	24.00	7.43	1.03	0.30	18.83	18.83	47.16	292.16	10.61	3.80	3.80
	Cx	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	C1	1	1.68	4.96	0.57	0.31	12.53	12.53	23.63	140.02	11.24	1.90	1.90
		2	1.68	2.84	0.00	0.00	0.02	0.02	11.07	0.22	0.00	0.00	0.00
	C2	1	1.20	2.03	0.00	0.00	0.02	0.02	28.02	0.56	0.00	0.01	0.01

Network Results

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Ite wit wor over PR
1	13/05/2022 14:50:24	13/05/2022 14:50:24	08:00	100	72.86	4.49	53.87	C1/1	0	0	C1/1	C/1	C1/

Network Results: Vehicle summary

Time Segment	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Actual green (s (per cycle))	Mean Delay per Veh (s)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
08:00-09:00	54	0	2902	701	5.57	63.75	9.11	72.86

Network Results: Stops and delays

Time Segment	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Uniform delay (PCU-hr/hr)	Random plus oversat delay (PCU-hr/hr)	Unweighted cost of delay (£ per hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Uniform stops (Stops per hr)	Random stops (Stops per hr)	Unweighted cost of stops (£ per hr)	Weighted cost of stops (£ per hr)
08:00-09:00	13.54	5.57	3.58	0.91	63.75	63.75	25.05	694.35	32.46	9.11	9.11

A2 - 2024 Do Something
D2 - 2024 PM Peak Hour*

Summary

Data Errors and Warnings

No errors or warnings

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Ite wit wor over PR
2	13/05/2022 14:50:24	13/05/2022 14:50:25	17:00	100	57.09	3.44	55.72	A/1	0	0	A/1	C/1	A/

Analysis Set Details

Name	Description	Demand set	Include in report	Locked
2024 Do Something		D2	✓	

Demand Set Details

Name	Description	Composite	Demand sets	Start time (HH:mm)	Locked
2024 PM Peak Hour				17:00	

Arms and Traffic Streams

Modelling

Arm	Traffic Stream	Traffic model	Stop weighting multiplier (%)	Delay weighting multiplier (%)	Assignment Cost Weighting (%)	Exclude from results calculation	Max queue storage (PCU)	Has queue limit	Has degree of saturation limit
A	1	NetworkDefault	100	100	100		0.00		
Ax	1	NetworkDefault	100	100	100		0.00		
B	1	NetworkDefault	100	100	100		0.00		
Bx	1	NetworkDefault	100	100	100		0.00		
C	1	NetworkDefault	100	100	100		0.00		
Cx	1	NetworkDefault	100	100	100		0.00		
C1	1	Flare	100	100	100		0.00		
	2	Flare	100	100	100		0.00		
C2	1	Flare	100	100	100		0.00		

Modelling - Advanced

Arm	Traffic Stream	Initial queue (PCU)	Type of Vehicle-in-Service	Vehicle-in-Service	Type of random parameter	Random parameter	Auto cycle time	Cycle time
(ALL)	(ALL)	0.00	NetworkDefault	Not-Included	NetworkDefault	0.50	✓	100

Normal traffic - Modelling

Arm	Traffic Stream	Stop weighting (%)	Delay weighting (%)
(ALL)	(ALL)	100	100

Normal traffic - Advanced

Arm	Traffic Stream	Dispersion type for Normal Traffic
(ALL)	(ALL)	NetworkDefault

Flows

Arm	Traffic Stream	Total Flow (PCU/hr)	Normal Flow (PCU/hr)
A	1	672	672
Ax	1	507	507
B	1	19	19
Bx	1	56	56
C	1	494	494
Cx	1	622	622
C1	1	491	491
	2	3	3
C2	1	3	3

Pedestrian Crossings

Pedestrian Crossings - Modelling

Crossing	Side	Delay weighting (%)	Assignment Cost Weighting (%)	Exclude from results calculation	Max queue storage (Ped)	Has queue limit	Has degree of saturation limit
(ALL)	(ALL)	100	100		0.00		

Signal Timings

Network Default: 100s cycle time; 100 steps

Phases

Controller stream	Phase	Name	Minimum green (s)	Maximum green (s)	Relative start displacement (s)	Relative end displacement (s)	Type	Blackout Time (s)
1	A	(untitled)	7	300	0	0	Unknown	
	B	(untitled)	7	300	0	0	Unknown	
	C	(untitled)	7	300	0	0	Unknown	
	D	(untitled)	6	300	0	0	Indicative arrow	
	E	(untitled)	6	300	0	0	Pedestrian	0
	F	(untitled)	6	300	0	0	Pedestrian	0
	G	(untitled)	6	300	0	0	Pedestrian	0

Library Stages

Controller stream	Library stage	Phases in stage	User stage minimum (s)
1	1	A, C, D	1
	2	C, D	1
	3	B	1
	4	E, F, G	1

Losing / Gaining Phase Delays

Controller stream	Delay	Type	Phase	From stage	To stage	Relative delay
1	1	Losing	C	1	2	20

Stage Sequences

Controller stream	Sequence	Name	Multiple cycling	Stage IDs	Stage ends
1	1	(untitled)	Single	1, 2, 3, 4	57, 58, 70, 83

Intergreen Matrix for Controller Stream 1

From \ To	A	B	C	D	E	F	G
A		5			5	6	7
B	5		5	5	7	5	6
C		5			7		5
D		5				7	5
E	8	8	8				
F	8	8		8			
G	8	8	8	8			

Interstage Matrix for Controller Stream 1

From \ To	1	2	3	4
1	0	0	5	7
2	0	0	5	7
3	5	5	0	7
4	8	8	8	0

Resultant Stages

Controller stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	1	✓	1	A,C,D	91	57	66	1	7
	2	✓	2	C,D	57	58	1	1	1
	3	✓	3	B	63	70	7	1	7
	4	✓	4	E,F,G	77	83	6	1	6

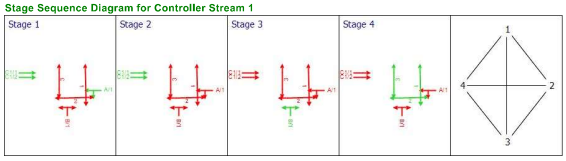
Resultant Phase Green Periods

Controller stream	Phase	Green period	Is base green period	Start time (s)	End time (s)	Duration (s)
1	A	1	✓	91	57	66
	B	1	✓	63	70	7
	C	1	✓	91	58	67
	D	1	✓	91	58	67
	E	1	✓	77	83	6
	F	1	✓	75	83	8
	G	1	✓	76	83	7

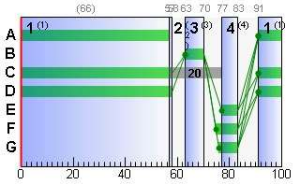
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
A	1	1	1	A	91	57	66
B	1	1	1	B	63	70	7
C1	1	1	1	C	91	58	67
C1	2	1	1	D	91	58	67

Stage Sequence Diagram for Controller Stream 1



Phase Timings Diagram for Controller Stream 1



Traffic Stream Results

Traffic Stream Results: Vehicle summary

Time Segment	Arm	Traffic Stream	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s (per cycle))	Mean Delay per Veh (s)	Mean max queue (PCU)	Utilised storage (%)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
17:00-18:00	A	1	56	62	672	1800	66	10.56	10.06	36.14	28.00	4.37	32.37
	Ax	1	0	Unrestricted	507	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	B	1	13	582	19	1800	7	44.68	0.50	1.90	3.35	0.22	3.57
	Bx	1	0	Unrestricted	56	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	C	1	40	128	494	1800	100	4.70	5.89	16.94	9.15	2.35	11.50
	Cx	1	0	Unrestricted	622	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	C1	1	40	124	491	1800	67	4.28	2.01	100.51	8.28	1.22	9.50
		2	0	36620	3	1800	67	3.01	0.00	0.00	0.04	0.01	0.04
	C2	1	0	25060	3	839	100	7.12	0.04	2.15	0.08	0.02	0.10

Traffic Stream Results: Stops and delays

Time Segment	Arm	Traffic Stream	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Uniform delay (PCU-hr/hr)	Random plus oversat delay (PCU-hr/hr)	Unweighted cost of delay (£ per hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Uniform stops (Stops per hr)	Random stops (Stops per hr)	Unweighted cost of stops (£ per hr)	Weighted cost of stops (£ per hr)
17:00-18:00	A	1	19.20	10.56	1.62	0.35	28.00	28.00	51.90	336.21	12.52	4.37	4.37
	Ax	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	B	1	18.00	44.68	0.23	0.01	3.35	3.35	92.70	17.26	0.36	0.22	0.22
	Bx	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	C	1	24.00	4.70	0.52	0.13	9.15	9.15	37.98	182.96	4.64	2.35	2.35
	Cx	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	C1	1	1.68	4.28	0.45	0.13	8.28	8.28	19.83	92.53	4.82	1.22	1.22
		2	1.68	3.01	0.00	0.00	0.04	0.04	13.64	0.41	0.00	0.01	0.01
	C2	1	1.20	7.12	0.01	0.00	0.08	0.08	51.48	1.54	0.00	0.02	0.02

Network Results

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Ite wit wor ove PR
2	13/05/2022 14:50:24	13/05/2022 14:50:25	17:00	100	57.09	3.44	55.72	A/1	0	0	A/1	C/1	A/

Network Results: Vehicle summary

Time Segment	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Actual green (s (per cycle))	Mean Delay per Veh (s)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
17:00-18:00	56	0	2867	707	4.32	48.90	8.19	57.09

Network Results: Stops and delays

Time Segment	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Uniform delay (PCU-hr/hr)	Random plus oversat delay (PCU-hr/hr)	Unweighted cost of delay (£ per hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Uniform stops (Stops per hr)	Random stops (Stops per hr)	Unweighted cost of stops (£ per hr)	Weighted cost of stops (£ per hr)
17:00-18:00	14.01	4.32	2.82	0.62	48.90	48.90	22.79	630.92	22.34	8.19	8.19

A3 - 2029 Do Something
D3 - 2029 AM Peak Hour*

Summary

Data Errors and Warnings

No errors or warnings

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Ite wit wor ove PR
3	13/05/2022 14:50:25	13/05/2022 14:50:26	08:00	100	101.22	6.31	61.38	C1/1	0	0	C1/1	C/1	C1/

Analysis Set Details

Name	Description	Demand set	Include in report	Locked
2029 Do Something		D3	✓	

Demand Set Details

Name	Description	Composite	Demand sets	Start time (HH:mm)	Locked
2029 AM Peak Hour				08:00	

Arms and Traffic Streams

Modelling

Arm	Traffic Stream	Traffic model	Stop weighting multiplier (%)	Delay weighting multiplier (%)	Assignment Cost Weighting (%)	Exclude from results calculation	Max queue storage (PCU)	Has queue limit	Has degree of saturation limit
A	1	NetworkDefault	100	100	100		0.00		
Ax	1	NetworkDefault	100	100	100		0.00		
B	1	NetworkDefault	100	100	100		0.00		
Bx	1	NetworkDefault	100	100	100		0.00		
C	1	NetworkDefault	100	100	100		0.00		
Cx	1	NetworkDefault	100	100	100		0.00		
C1	1	Flare	100	100	100		0.00		
	2	Flare	100	100	100		0.00		
C2	1	Flare	100	100	100		0.00		

Modelling - Advanced

Arm	Traffic Stream	Initial queue (PCU)	Type of Vehicle-in-Service	Vehicle-in-Service	Type of random parameter	Random parameter	Auto cycle time	Cycle time
(ALL)	(ALL)	0.00	NetworkDefault	Not-Included	NetworkDefault	0.50	✓	100

Normal traffic - Modelling

Arm	Traffic Stream	Stop weighting (%)	Delay weighting (%)
(ALL)	(ALL)	100	100

Normal traffic - Advanced

Arm	Traffic Stream	Dispersion type for Normal Traffic
(ALL)	(ALL)	NetworkDefault

Flows

Arm	Traffic Stream	Total Flow (PCU/hr)	Normal Flow (PCU/hr)
A	1	447	447
Ax	1	814	814
B	1	129	129
Bx	1	52	52
C	1	701	701
Cx	1	411	411
C1	1	696	696
	2	5	5
C2	1	5	5

Pedestrian Crossings

Pedestrian Crossings - Modelling

Crossing	Side	Delay weighting (%)	Assignment Cost Weighting (%)	Exclude from results calculation	Max queue storage (Ped)	Has queue limit	Has degree of saturation limit
(ALL)	(ALL)	100	100		0.00		

Signal Timings

Network Default: 100s cycle time; 100 steps

Phases

Controller stream	Phase	Name	Minimum green (s)	Maximum green (s)	Relative start displacement (s)	Relative end displacement (s)	Type	Blackout Time (s)
1	A	(untitled)	7	300	0	0	Unknown	
	B	(untitled)	7	300	0	0	Unknown	
	C	(untitled)	7	300	0	0	Unknown	
	D	(untitled)	6	300	0	0	Indicative arrow	
	E	(untitled)	6	300	0	0	Pedestrian	0
	F	(untitled)	6	300	0	0	Pedestrian	0
	G	(untitled)	6	300	0	0	Pedestrian	0

Library Stages

Controller stream	Library stage	Phases in stage	User stage minimum (s)
1	1	A, C, D	1
	2	C, D	1
	3	B	1
	4	E, F, G	1

Losing / Gaining Phase Delays

Controller stream	Delay	Type	Phase	From stage	To stage	Relative delay
1	1	Losing	C	1	2	20

Stage Sequences

Controller stream	Sequence	Name	Multiple cycling	Stage IDs	Stage ends
1	1	(untitled)	Single	1, 2, 3, 4	51, 53, 70, 83

Intergreen Matrix for Controller Stream 1

From \ To	A	B	C	D	E	F	G
A		5			5	6	7
B	5		5	5	7	5	6
C		5			7		5
D		5				7	5
E	8	8	8				
F	8	8		8			
G	8	8	8	8			

Interstage Matrix for Controller Stream 1

From \ To	1	2	3	4
1	0	0	5	7
2	0	0	5	7
3	5	5	0	7
4	8	8	8	0

Resultant Stages

Controller stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	1	✓	1	A,C,D	91	51	60	1	7
	2	✓	2	C,D	51	53	2	1	1
	3	✓	3	B	58	70	12	1	7
	4	✓	4	E,F,G	77	83	6	1	6

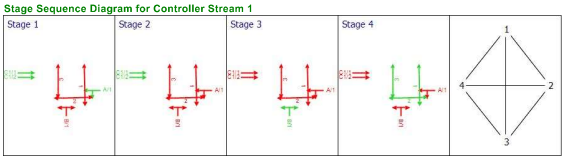
Resultant Phase Green Periods

Controller stream	Phase	Green period	Is base green period	Start time (s)	End time (s)	Duration (s)
1	A	1	✓	91	51	60
	B	1	✓	58	70	12
	C	1	✓	91	53	62
	D	1	✓	91	53	62
	E	1	✓	77	83	6
	F	1	✓	75	83	8
	G	1	✓	76	83	7

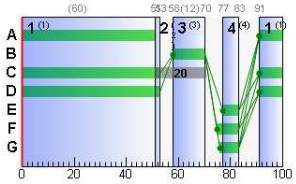
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
A	1	1	1	A	91	51	60
B	1	1	1	B	58	70	12
C1	1	1	1	C	91	53	62
C1	2	1	1	D	91	53	62

Stage Sequence Diagram for Controller Stream 1



Phase Timings Diagram for Controller Stream 1



Traffic Stream Results

Traffic Stream Results: Vehicle summary

Time Segment	Arm	Traffic Stream	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s (per cycle))	Mean Delay per Veh (s)	Mean max queue (PCU)	Utilised storage (%)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
08:00-09:00	A	1	41	121	447	1800	60	11.24	6.47	23.26	19.82	2.84	22.66
	Ax	1	0	Unrestricted	814	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	B	1	55	63	129	1800	12	50.07	3.67	14.05	25.48	1.63	27.11
	Bx	1	0	Unrestricted	52	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	C	1	60	49	701	1800	100	10.12	11.75	33.79	27.98	4.86	32.84
	Cx	1	0	Unrestricted	411	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	C1	1	61	47	696	1800	62	5.91	2.49	124.26	16.23	2.24	18.47
		2	0	20312	5	1800	62	3.02	0.01	0.72	0.06	0.01	0.07
	C2	1	0	19893	5	1111	100	2.85	0.05	2.36	0.06	0.02	0.08

Traffic Stream Results: Stops and delays

Time Segment	Arm	Traffic Stream	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Uniform delay (PCU-hr/hr)	Random plus oversat delay (PCU-hr/hr)	Unweighted cost of delay (£ per hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Uniform stops (Stops per hr)	Random stops (Stops per hr)	Unweighted cost of stops (£ per hr)	Weighted cost of stops (£ per hr)
08:00-09:00	A	1	19.20	11.24	1.26	0.14	19.82	19.82	50.67	221.47	5.01	2.84	2.84
	Ax	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	B	1	18.00	50.07	1.46	0.33	25.48	25.48	100.90	118.44	11.72	1.63	1.63
	Bx	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	C	1	24.00	10.12	1.51	0.46	27.98	27.98	55.28	371.06	16.43	4.86	4.86
	Cx	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	C1	1	1.68	5.91	0.66	0.49	16.23	16.23	25.66	161.26	17.36	2.24	2.24
		2	1.68	3.02	0.00	0.00	0.06	0.06	10.34	0.52	0.00	0.01	0.01
	C2	1	1.20	2.85	0.00	0.00	0.06	0.06	33.49	1.67	0.00	0.02	0.02

Network Results

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Ite wit wor over PR
3	13/05/2022 14:50:25	13/05/2022 14:50:26	08:00	100	101.22	6.31	61.38	C1/1	0	0	C1/1	C/1	C1/

Network Results: Vehicle summary

Time Segment	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Actual green (s (per cycle))	Mean Delay per Veh (s)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
08:00-09:00	61	0	3260	696	6.97	89.63	11.60	101.22

Network Results: Stops and delays

Time Segment	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Uniform delay (PCU-hr/hr)	Random plus oversat delay (PCU-hr/hr)	Unweighted cost of delay (£ per hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Uniform stops (Stops per hr)	Random stops (Stops per hr)	Unweighted cost of stops (£ per hr)	Weighted cost of stops (£ per hr)
08:00-09:00	13.57	6.97	4.89	1.42	89.63	89.63	28.37	874.42	50.51	11.60	11.60

A4 - 2029 Do Something
D4 - 2029 PM Peak Hour*

Summary

Data Errors and Warnings

No errors or warnings

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Ite wit wor over PR
4	13/05/2022 14:50:26	13/05/2022 14:50:26	17:00	100	75.44	4.60	63.35	A/1	0	0	A/1	C/1	A/

Analysis Set Details

Name	Description	Demand set	Include in report	Locked
2029 Do Something		D4	✓	

Demand Set Details

Name	Description	Composite	Demand sets	Start time (HH:mm)	Locked
2029 PM Peak Hour				17:00	

Arms and Traffic Streams

Modelling

Arm	Traffic Stream	Traffic model	Stop weighting multiplier (%)	Delay weighting multiplier (%)	Assignment Cost Weighting (%)	Exclude from results calculation	Max queue storage (PCU)	Has queue limit	Has degree of saturation limit
A	1	NetworkDefault	100	100	100		0.00		
Ax	1	NetworkDefault	100	100	100		0.00		
B	1	NetworkDefault	100	100	100		0.00		
Bx	1	NetworkDefault	100	100	100		0.00		
C	1	NetworkDefault	100	100	100		0.00		
Cx	1	NetworkDefault	100	100	100		0.00		
C1	1	Flare	100	100	100		0.00		
	2	Flare	100	100	100		0.00		
C2	1	Flare	100	100	100		0.00		

Modelling - Advanced

Arm	Traffic Stream	Initial queue (PCU)	Type of Vehicle-in-Service	Vehicle-in-Service	Type of random parameter	Random parameter	Auto cycle time	Cycle time
(ALL)	(ALL)	0.00	NetworkDefault	Not-Included	NetworkDefault	0.50	✓	100

Normal traffic - Modelling

Arm	Traffic Stream	Stop weighting (%)	Delay weighting (%)
(ALL)	(ALL)	100	100

Normal traffic - Advanced

Arm	Traffic Stream	Dispersion type for Normal Traffic
(ALL)	(ALL)	NetworkDefault

Flows

Arm	Traffic Stream	Total Flow (PCU/hr)	Normal Flow (PCU/hr)
A	1	764	764
Ax	1	570	570
B	1	43	43
Bx	1	101	101
C	1	545	545
Cx	1	681	681
C1	1	534	534
	2	11	11
C2	1	11	11

Pedestrian Crossings

Pedestrian Crossings - Modelling

Crossing	Side	Delay weighting (%)	Assignment Cost Weighting (%)	Exclude from results calculation	Max queue storage (Ped)	Has queue limit	Has degree of saturation limit
(ALL)	(ALL)	100	100		0.00		

Signal Timings

Network Default: 100s cycle time; 100 steps

Phases

Controller stream	Phase	Name	Minimum green (s)	Maximum green (s)	Relative start displacement (s)	Relative end displacement (s)	Type	Blackout Time (s)
1	A	(untitled)	7	300	0	0	Unknown	
	B	(untitled)	7	300	0	0	Unknown	
	C	(untitled)	7	300	0	0	Unknown	
	D	(untitled)	6	300	0	0	Indicative arrow	
	E	(untitled)	6	300	0	0	Pedestrian	0
	F	(untitled)	6	300	0	0	Pedestrian	0
	G	(untitled)	6	300	0	0	Pedestrian	0

Library Stages

Controller stream	Library stage	Phases in stage	User stage minimum (s)
1	1	A, C, D	1
	2	C, D	1
	3	B	1
	4	E, F, G	1

Losing / Gaining Phase Delays

Controller stream	Delay	Type	Phase	From stage	To stage	Relative delay
1	1	Losing	C	1	2	20

Stage Sequences

Controller stream	Sequence	Name	Multiple cycling	Stage IDs	Stage ends
1	1	(untitled)	Single	1, 2, 3, 4	57, 58, 70, 83

Intergreen Matrix for Controller Stream 1

From \ To	A	B	C	D	E	F	G
A		5			5	6	7
B	5		5	5	7	5	6
C		5			7		5
D		5				7	5
E	8	8	8				
F	8	8		8			
G	8	8	8	8			

Interstage Matrix for Controller Stream 1

From \ To	1	2	3	4
1	0	0	5	7
2	0	0	5	7
3	5	5	0	7
4	8	8	8	0

Resultant Stages

Controller stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	1	✓	1	A,C,D	91	57	66	1	7
	2	✓	2	C,D	57	58	1	1	1
	3	✓	3	B	63	70	7	1	7
	4	✓	4	E,F,G	77	83	6	1	6

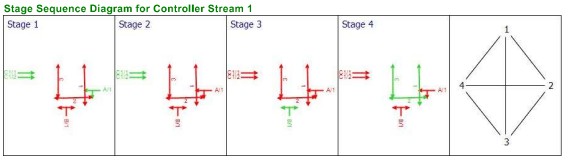
Resultant Phase Green Periods

Controller stream	Phase	Green period	Is base green period	Start time (s)	End time (s)	Duration (s)
1	A	1	✓	91	57	66
	B	1	✓	63	70	7
	C	1	✓	91	58	67
	D	1	✓	91	58	67
	E	1	✓	77	83	6
	F	1	✓	75	83	8
	G	1	✓	76	83	7

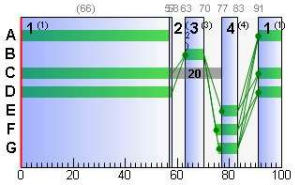
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
A	1	1	1	A	91	57	66
B	1	1	1	B	63	70	7
C1	1	1	1	C	91	58	67
C2	2	1	1	D	91	58	67

Stage Sequence Diagram for Controller Stream 1



Phase Timings Diagram for Controller Stream 1



Traffic Stream Results

Traffic Stream Results: Vehicle summary

Time Segment	Arm	Traffic Stream	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s (per cycle))	Mean Delay per Veh (s)	Mean max queue (PCU)	Utilised storage (%)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
17:00-18:00	A	1	63	42	764	1800	66	12.03	12.64	45.43	36.25	5.46	41.70
	Ax	1	0	Unrestricted	570	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	B	1	30	201	43	1800	7	48.68	1.19	4.55	8.26	0.53	8.78
	Bx	1	0	Unrestricted	101	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	C	1	44	107	545	1800	100	5.23	6.68	19.20	11.25	2.71	13.97
	Cx	1	0	Unrestricted	681	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	C1	1	44	106	534	1800	67	4.30	2.08	103.80	9.05	1.28	10.34
		2	1	9915	11	1800	67	2.90	0.04	1.97	0.13	0.02	0.14
	C2	1	1	6213	11	772	100	9.78	0.17	8.66	0.42	0.08	0.50

Traffic Stream Results: Stops and delays

Time Segment	Arm	Traffic Stream	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Uniform delay (PCU-hr/hr)	Random plus oversat delay (PCU-hr/hr)	Unweighted cost of delay (£ per hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Uniform stops (Stops per hr)	Random stops (Stops per hr)	Unweighted cost of stops (£ per hr)	Weighted cost of stops (£ per hr)
17:00-18:00	A	1	19.20	12.03	2.01	0.54	36.25	36.25	56.97	415.74	19.48	5.46	5.46
	Ax	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	B	1	18.00	48.68	0.52	0.06	8.26	8.26	98.03	39.91	2.24	0.53	0.53
	Bx	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	C	1	24.00	5.23	0.82	0.17	11.25	11.25	39.73	210.47	6.03	2.71	2.71
	Cx	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	C1	1	1.68	4.30	0.47	0.17	9.05	9.05	19.16	96.28	6.05	1.28	1.28
		2	1.68	2.90	0.01	0.00	0.13	0.13	12.79	1.41	0.00	0.02	0.02
	C2	1	1.20	9.78	0.03	0.00	0.42	0.42	57.13	6.28	0.00	0.08	0.08

Network Results

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Ite wit wor over PR
4	13/05/2022 14:50:26	13/05/2022 14:50:26	17:00	100	75.44	4.60	63.35	A/1	0	0	A/1	C/1	A/

Network Results: Vehicle summary

Time Segment	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Actual green (s (per cycle))	Mean Delay per Veh (s)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
17:00-18:00	63	0	3260	707	5.08	65.36	10.08	75.44

Network Results: Stops and delays

Time Segment	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Uniform delay (PCU-hr/hr)	Random plus oversat delay (PCU-hr/hr)	Unweighted cost of delay (£ per hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Uniform stops (Stops per hr)	Random stops (Stops per hr)	Unweighted cost of stops (£ per hr)	Weighted cost of stops (£ per hr)
17:00-18:00	14.01	5.08	3.66	0.94	65.36	65.36	24.66	770.09	33.81	10.08	10.08

A5 - 2039 Do Something
D5 - 2039 AM Peak Hour*

Summary

Data Errors and Warnings

No errors or warnings

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Ite wit wor over PR
5	13/05/2022 14:50:26	13/05/2022 14:50:27	08:00	100	121.59	7.61	67.65	C1/1	0	0	C1/1	C/1	C1/

Analysis Set Details

Name	Description	Demand set	Include in report	Locked
2039 Do Something		D5	✓	

Demand Set Details

Name	Description	Composite	Demand sets	Start time (HH:mm)	Locked
2039 AM Peak Hour				08:00	

Arms and Traffic Streams

Modelling

Arm	Traffic Stream	Traffic model	Stop weighting multiplier (%)	Delay weighting multiplier (%)	Assignment Cost Weighting (%)	Exclude from results calculation	Max queue storage (PCU)	Has queue limit	Has degree of saturation limit
A	1	NetworkDefault	100	100	100		0.00		
Ax	1	NetworkDefault	100	100	100		0.00		
B	1	NetworkDefault	100	100	100		0.00		
Bx	1	NetworkDefault	100	100	100		0.00		
C	1	NetworkDefault	100	100	100		0.00		
Cx	1	NetworkDefault	100	100	100		0.00		
C1	1	Flare	100	100	100		0.00		
	2	Flare	100	100	100		0.00		
C2	1	Flare	100	100	100		0.00		

Modelling - Advanced

Arm	Traffic Stream	Initial queue (PCU)	Type of Vehicle-in-Service	Vehicle-in-Service	Type of random parameter	Random parameter	Auto cycle time	Cycle time
(ALL)	(ALL)	0.00	NetworkDefault	Not-Included	NetworkDefault	0.50	✓	100

Normal traffic - Modelling

Arm	Traffic Stream	Stop weighting (%)	Delay weighting (%)
(ALL)	(ALL)	100	100

Normal traffic - Advanced

Arm	Traffic Stream	Dispersion type for Normal Traffic
(ALL)	(ALL)	NetworkDefault

Flows

Arm	Traffic Stream	Total Flow (PCU/hr)	Normal Flow (PCU/hr)
A	1	483	483
Ax	1	879	879
B	1	135	135
Bx	1	54	54
C	1	760	760
Cx	1	445	445
C1	1	755	755
	2	5	5
C2	1	5	5

Pedestrian Crossings

Pedestrian Crossings - Modelling

Crossing	Side	Delay weighting (%)	Assignment Cost Weighting (%)	Exclude from results calculation	Max queue storage (Ped)	Has queue limit	Has degree of saturation limit
(ALL)	(ALL)	100	100		0.00		

Signal Timings

Network Default: 100s cycle time; 100 steps

Phases

Controller stream	Phase	Name	Minimum green (s)	Maximum green (s)	Relative start displacement (s)	Relative end displacement (s)	Type	Blackout Time (s)
1	A	(untitled)	7	300	0	0	Unknown	
	B	(untitled)	7	300	0	0	Unknown	
	C	(untitled)	7	300	0	0	Unknown	
	D	(untitled)	6	300	0	0	Indicative arrow	
	E	(untitled)	6	300	0	0	Pedestrian	0
	F	(untitled)	6	300	0	0	Pedestrian	0
	G	(untitled)	6	300	0	0	Pedestrian	0

Library Stages

Controller stream	Library stage	Phases in stage	User stage minimum (s)
1	1	A, C, D	1
	2	C, D	1
	3	B	1
	4	E, F, G	1

Losing / Gaining Phase Delays

Controller stream	Delay	Type	Phase	From stage	To stage	Relative delay
1	1	Losing	C	1	2	20

Stage Sequences

Controller stream	Sequence	Name	Multiple cycling	Stage IDs	Stage ends
1	1	(untitled)	Single	1, 2, 3, 4	48, 52, 70, 83

Intergreen Matrix for Controller Stream 1

From \ To	A	B	C	D	E	F	G
A		5			5	6	7
B	5		5	5	7	5	6
C		5			7		5
D		5				7	5
E	8	8	8				
F	8	8		8			
G	8	8	8	8			

Interstage Matrix for Controller Stream 1

From \ To	1	2	3	4
1	0	0	5	7
2	0	0	5	7
3	5	5	0	7
4	8	8	8	0

Resultant Stages

Controller stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	1	✓	1	A,C,D	91	48	57	1	7
	2	✓	2	C,D	48	52	4	1	1
	3	✓	3	B	57	70	13	1	7
	4	✓	4	E,F,G	77	83	6	1	6

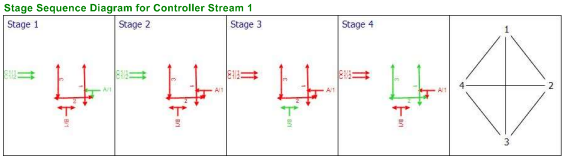
Resultant Phase Green Periods

Controller stream	Phase	Green period	Is base green period	Start time (s)	End time (s)	Duration (s)
1	A	1	✓	91	48	57
	B	1	✓	57	70	13
	C	1	✓	91	52	61
	D	1	✓	91	52	61
	E	1	✓	77	83	6
	F	1	✓	75	83	8
	G	1	✓	76	83	7

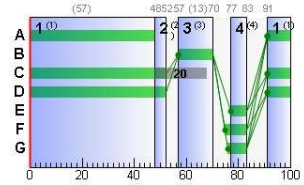
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
A	1	1	1	A	91	48	57
B	1	1	1	B	57	70	13
C1	1	1	1	C	91	52	61
C1	2	1	1	D	91	52	61

Stage Sequence Diagram for Controller Stream 1



Phase Timings Diagram for Controller Stream 1



Traffic Stream Results

Traffic Stream Results: Vehicle summary

Time Segment	Arm	Traffic Stream	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s (per cycle))	Mean Delay per Veh (s)	Mean max queue (PCU)	Utilised storage (%)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
08:00-09:00	A	1	46	95	483	1800	57	13.54	7.85	28.20	25.79	3.43	29.23
	Ax	1	0	Unrestricted	879	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	B	1	54	68	135	1800	13	48.11	3.75	14.39	25.62	1.67	27.29
	Bx	1	0	Unrestricted	54	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	C	1	67	35	760	1800	100	12.21	13.96	40.13	36.59	5.82	42.41
	Cx	1	0	Unrestricted	445	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	C1	1	68	33	755	1800	61	6.70	2.70	135.10	19.96	2.55	22.51
		2	0	19988	5	1800	61	2.96	0.01	0.66	0.06	0.01	0.06
	C2	1	0	19478	5	1088	100	3.42	0.05	2.67	0.07	0.02	0.09

Traffic Stream Results: Stops and delays

Time Segment	Arm	Traffic Stream	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Uniform delay (PCU-hr/hr)	Random plus oversat delay (PCU-hr/hr)	Unweighted cost of delay (£ per hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Uniform stops (Stops per hr)	Random stops (Stops per hr)	Unweighted cost of stops (£ per hr)	Weighted cost of stops (£ per hr)
08:00-09:00	A	1	19.20	13.54	1.62	0.20	25.79	25.79	56.70	266.72	7.13	3.43	3.43
	Ax	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	B	1	18.00	48.11	1.50	0.30	25.62	25.62	98.78	122.60	10.75	1.67	1.67
	Bx	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	C	1	24.00	12.21	1.92	0.66	36.59	36.59	61.04	440.36	23.54	5.82	5.82
	Cx	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	C1	1	1.68	6.70	0.70	0.70	19.96	19.96	26.92	178.16	25.06	2.55	2.55
		2	1.68	2.96	0.00	0.00	0.06	0.06	9.54	0.48	0.00	0.01	0.01
	C2	1	1.20	3.42	0.00	0.00	0.07	0.07	35.62	1.78	0.00	0.02	0.02

Network Results

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Ite wit wor over PR
5	13/05/2022 14:50:26	13/05/2022 14:50:27	08:00	100	121.59	7.61	67.65	C1/1	0	0	C1/1	C/1	C1/

Network Results: Vehicle summary

Time Segment	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Actual green (s (per cycle))	Mean Delay per Veh (s)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
08:00-09:00	68	0	3521	692	7.78	108.09	13.50	121.59

Network Results: Stops and delays

Time Segment	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Uniform delay (PCU-hr/hr)	Random plus oversat delay (PCU-hr/hr)	Unweighted cost of delay (£ per hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Uniform stops (Stops per hr)	Random stops (Stops per hr)	Unweighted cost of stops (£ per hr)	Weighted cost of stops (£ per hr)
08:00-09:00	13.57	7.78	5.75	1.86	108.09	108.09	30.58	1010.10	66.48	13.50	13.50

A6 - 2039 Do Something
D6 - 2039 PM Peak Hour*

Summary

Data Errors and Warnings

No errors or warnings

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Ite wit wor over PR
6	13/05/2022 14:50:27	13/05/2022 14:50:27	17:00	100	86.87	5.31	68.33	A/1	0	0	A/1	C/1	A/

Analysis Set Details

Name	Description	Demand set	Include in report	Locked
2039 Do Something		D6	✓	

Demand Set Details

Name	Description	Composite	Demand sets	Start time (HH:mm)	Locked
2039 PM Peak Hour				17:00	

Arms and Traffic Streams

Modelling

Arm	Traffic Stream	Traffic model	Stop weighting multiplier (%)	Delay weighting multiplier (%)	Assignment Cost Weighting (%)	Exclude from results calculation	Max queue storage (PCU)	Has queue limit	Has degree of saturation limit
A	1	NetworkDefault	100	100	100		0.00		
Ax	1	NetworkDefault	100	100	100		0.00		
B	1	NetworkDefault	100	100	100		0.00		
Bx	1	NetworkDefault	100	100	100		0.00		
C	1	NetworkDefault	100	100	100		0.00		
Cx	1	NetworkDefault	100	100	100		0.00		
C1	1	Flare	100	100	100		0.00		
	2	Flare	100	100	100		0.00		
C2	1	Flare	100	100	100		0.00		

Modelling - Advanced

Arm	Traffic Stream	Initial queue (PCU)	Type of Vehicle-in-Service	Vehicle-in-Service	Type of random parameter	Random parameter	Auto cycle time	Cycle time
(ALL)	(ALL)	0.00	NetworkDefault	Not-Included	NetworkDefault	0.50	✓	100

Normal traffic - Modelling

Arm	Traffic Stream	Stop weighting (%)	Delay weighting (%)
(ALL)	(ALL)	100	100

Normal traffic - Advanced

Arm	Traffic Stream	Dispersion type for Normal Traffic
(ALL)	(ALL)	NetworkDefault

Flows

Arm	Traffic Stream	Total Flow (PCU/hr)	Normal Flow (PCU/hr)
A	1	824	824
Ax	1	616	616
B	1	43	43
Bx	1	104	104
C	1	591	591
Cx	1	738	738
C1	1	580	580
	2	11	11
C2	1	11	11

Pedestrian Crossings

Pedestrian Crossings - Modelling

Crossing	Side	Delay weighting (%)	Assignment Cost Weighting (%)	Exclude from results calculation	Max queue storage (Ped)	Has queue limit	Has degree of saturation limit
(ALL)	(ALL)	100	100		0.00		

Signal Timings

Network Default: 100s cycle time; 100 steps

Phases

Controller stream	Phase	Name	Minimum green (s)	Maximum green (s)	Relative start displacement (s)	Relative end displacement (s)	Type	Blackout Time (s)
1	A	(untitled)	7	300	0	0	Unknown	
	B	(untitled)	7	300	0	0	Unknown	
	C	(untitled)	7	300	0	0	Unknown	
	D	(untitled)	6	300	0	0	Indicative arrow	
	E	(untitled)	6	300	0	0	Pedestrian	0
	F	(untitled)	6	300	0	0	Pedestrian	0
	G	(untitled)	6	300	0	0	Pedestrian	0

Library Stages

Controller stream	Library stage	Phases in stage	User stage minimum (s)
1	1	A, C, D	1
	2	C, D	1
	3	B	1
	4	E, F, G	1

Losing / Gaining Phase Delays

Controller stream	Delay	Type	Phase	From stage	To stage	Relative delay
1	1	Losing	C	1	2	20

Stage Sequences

Controller stream	Sequence	Name	Multiple cycling	Stage IDs	Stage ends
1	1	(untitled)	Single	1, 2, 3, 4	57, 58, 70, 83

Intergreen Matrix for Controller Stream 1

From \ To	A	B	C	D	E	F	G
A		5			5	6	7
B	5		5	5	7	5	6
C		5			7		5
D		5				7	5
E	8	8	8				
F	8	8		8			
G	8	8	8	8			

Interstage Matrix for Controller Stream 1

From \ To	1	2	3	4
1	0	0	5	7
2	0	0	5	7
3	5	5	0	7
4	8	8	8	0

Resultant Stages

Controller stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	1	✓	1	A,C,D	91	57	66	1	7
	2	✓	2	C,D	57	58	1	1	1
	3	✓	3	B	63	70	7	1	7
	4	✓	4	E,F,G	77	83	6	1	6

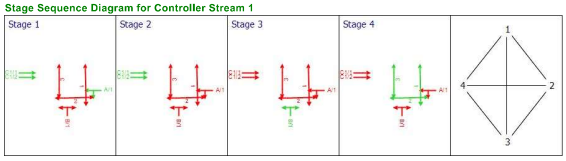
Resultant Phase Green Periods

Controller stream	Phase	Green period	Is base green period	Start time (s)	End time (s)	Duration (s)
1	A	1	✓	91	57	66
	B	1	✓	63	70	7
	C	1	✓	91	58	67
	D	1	✓	91	58	67
	E	1	✓	77	83	6
	F	1	✓	75	83	8
	G	1	✓	76	83	7

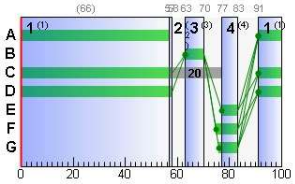
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
A	1	1	1	A	91	57	66
B	1	1	1	B	63	70	7
C1	1	1	1	C	91	58	67
C1	2	1	1	D	91	58	67

Stage Sequence Diagram for Controller Stream 1



Phase Timings Diagram for Controller Stream 1



Traffic Stream Results

Traffic Stream Results: Vehicle summary

Time Segment	Arm	Traffic Stream	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s (per cycle))	Mean Delay per Veh (s)	Mean max queue (PCU)	Utilised storage (%)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
17:00-18:00	A	1	68	32	824	1800	66	13.24	14.46	51.98	43.03	6.30	49.33
	Ax	1	0	Unrestricted	616	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	B	1	30	201	43	1800	7	48.68	1.19	4.55	8.26	0.53	8.78
	Bx	1	0	Unrestricted	104	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	C	1	47	90	591	1800	100	5.80	7.60	21.85	13.51	3.09	16.60
	Cx	1	0	Unrestricted	738	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	C1	1	47	90	580	1800	67	4.37	2.15	107.42	10.00	1.43	11.43
		2	1	9915	11	1800	67	2.77	0.04	1.84	0.12	0.02	0.14
	C2	1	1	5919	11	736	100	11.70	0.18	9.12	0.51	0.08	0.59

Traffic Stream Results: Stops and delays

Time Segment	Arm	Traffic Stream	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Uniform delay (PCU-hr/hr)	Random plus oversat delay (PCU-hr/hr)	Unweighted cost of delay (£ per hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Uniform stops (Stops per hr)	Random stops (Stops per hr)	Unweighted cost of stops (£ per hr)	Weighted cost of stops (£ per hr)
17:00-18:00	A	1	19.20	13.24	2.30	0.73	43.03	43.03	60.95	476.07	26.12	6.30	6.30
	Ax	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	B	1	18.00	48.68	0.52	0.06	8.26	8.26	98.03	39.91	2.24	0.53	0.53
	Bx	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	C	1	24.00	5.80	0.74	0.21	13.51	13.51	41.65	238.60	7.58	3.09	3.09
	Cx	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	C1	1	1.68	4.37	0.49	0.21	10.00	10.00	19.63	106.21	7.64	1.43	1.43
		2	1.68	2.77	0.01	0.00	0.12	0.12	11.96	1.31	0.00	0.02	0.02
	C2	1	1.20	11.70	0.04	0.00	0.51	0.51	60.52	6.65	0.00	0.08	0.08

Network Results

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Ite wit wor over PR
6	13/05/2022 14:50:27	13/05/2022 14:50:27	17:00	100	86.87	5.31	68.33	A/1	0	0	A/1	C/1	A/

Network Results: Vehicle summary

Time Segment	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Actual green (s (per cycle))	Mean Delay per Veh (s)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
17:00-18:00	68	0	3518	707	5.44	75.43	11.44	86.87

Network Results: Stops and delays

Time Segment	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Uniform delay (PCU-hr/hr)	Random plus oversat delay (PCU-hr/hr)	Unweighted cost of delay (£ per hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Uniform stops (Stops per hr)	Random stops (Stops per hr)	Unweighted cost of stops (£ per hr)	Weighted cost of stops (£ per hr)
17:00-18:00	14.01	5.44	4.09	1.22	75.43	75.43	25.93	868.76	43.59	11.44	11.44

A7 - 2039 Sensitivity Analysis 1
D7 - 2039 AM Peak Hour SA1*

Summary

Data Errors and Warnings

No errors or warnings

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Ite wit wor over PR
7	13/05/2022 14:50:28	13/05/2022 14:50:28	08:00	100	164.35	10.41	72.13	C1/1	0	0	C1/1	C/1	C1/

Analysis Set Details

Name	Description	Demand set	Include in report	Locked
2039 Sensitivity Analysis 1		D7	✓	

Demand Set Details

Name	Description	Composite	Demand sets	Start time (HH:mm)	Locked
2039 AM Peak Hour SA1				08:00	

Arms and Traffic Streams

Modelling

Arm	Traffic Stream	Traffic model	Stop weighting multiplier (%)	Delay weighting multiplier (%)	Assignment Cost Weighting (%)	Exclude from results calculation	Max queue storage (PCU)	Has queue limit	Has degree of saturation limit
A	1	NetworkDefault	100	100	100		0.00		
Ax	1	NetworkDefault	100	100	100		0.00		
B	1	NetworkDefault	100	100	100		0.00		
Bx	1	NetworkDefault	100	100	100		0.00		
C	1	NetworkDefault	100	100	100		0.00		
Cx	1	NetworkDefault	100	100	100		0.00		
C1	1	Flare	100	100	100		0.00		
	2	Flare	100	100	100		0.00		
C2	1	Flare	100	100	100		0.00		

Modelling - Advanced

Arm	Traffic Stream	Initial queue (PCU)	Type of Vehicle-in-Service	Vehicle-in-Service	Type of random parameter	Random parameter	Auto cycle time	Cycle time
(ALL)	(ALL)	0.00	NetworkDefault	Not-Included	NetworkDefault	0.50	✓	100

Normal traffic - Modelling

Arm	Traffic Stream	Stop weighting (%)	Delay weighting (%)
(ALL)	(ALL)	100	100

Normal traffic - Advanced

Arm	Traffic Stream	Dispersion type for Normal Traffic
(ALL)	(ALL)	NetworkDefault

Flows

Arm	Traffic Stream	Total Flow (PCU/hr)	Normal Flow (PCU/hr)
A	1	570	570
Ax	1	975	975
B	1	207	207
Bx	1	141	141
C	1	784	784
Cx	1	445	445
C1	1	779	779
	2	5	5
C2	1	5	5

Pedestrian Crossings

Pedestrian Crossings - Modelling

Crossing	Side	Delay weighting (%)	Assignment Cost Weighting (%)	Exclude from results calculation	Max queue storage (Ped)	Has queue limit	Has degree of saturation limit
(ALL)	(ALL)	100	100		0.00		

Signal Timings

Network Default: 100s cycle time; 100 steps

Phases

Controller stream	Phase	Name	Minimum green (s)	Maximum green (s)	Relative start displacement (s)	Relative end displacement (s)	Type	Blackout Time (s)
1	A	(untitled)	7	300	0	0	Unknown	
	B	(untitled)	7	300	0	0	Unknown	
	C	(untitled)	7	300	0	0	Unknown	
	D	(untitled)	6	300	0	0	Indicative arrow	
	E	(untitled)	6	300	0	0	Pedestrian	0
	F	(untitled)	6	300	0	0	Pedestrian	0
	G	(untitled)	6	300	0	0	Pedestrian	0

Library Stages

Controller stream	Library stage	Phases in stage	User stage minimum (s)
1	1	A, C, D	1
	2	C, D	1
	3	B	1
	4	E, F, G	1

Losing / Gaining Phase Delays

Controller stream	Delay	Type	Phase	From stage	To stage	Relative delay
1	1	Losing	C	1	2	20

Stage Sequences

Controller stream	Sequence	Name	Multiple cycling	Stage IDs	Stage ends
1	1	(untitled)	Single	1, 2, 3, 4	48, 50, 70, 83

Intergreen Matrix for Controller Stream 1

From \ To	A	B	C	D	E	F	G
A		5			5	6	7
B	5		5	5	7	5	6
C		5			7		5
D		5				7	5
E	8	8	8				
F	8	8		8			
G	8	8	8	8			

Interstage Matrix for Controller Stream 1

From \ To	1	2	3	4
1	0	0	5	7
2	0	0	5	7
3	5	5	0	7
4	8	8	8	0

Resultant Stages

Controller stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	1	✓	1	A,C,D	91	48	57	1	7
	2	✓	2	C,D	48	50	2	1	1
	3	✓	3	B	55	70	15	1	7
	4	✓	4	E,F,G	77	83	6	1	6

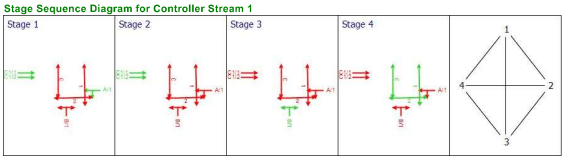
Resultant Phase Green Periods

Controller stream	Phase	Green period	Is base green period	Start time (s)	End time (s)	Duration (s)
1	A	1	✓	91	48	57
	B	1	✓	55	70	15
	C	1	✓	91	50	59
	D	1	✓	91	50	59
	E	1	✓	77	83	6
	F	1	✓	75	83	8
	G	1	✓	76	83	7

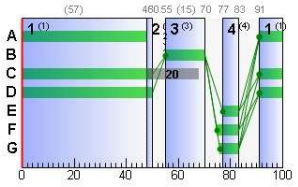
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
A	1	1	1	A	91	48	57
B	1	1	1	B	55	70	15
C1	1	1	1	C	91	50	59
C1	2	1	1	D	91	50	59

Stage Sequence Diagram for Controller Stream 1



Phase Timings Diagram for Controller Stream 1



Traffic Stream Results

Traffic Stream Results: Vehicle summary

Time Segment	Arm	Traffic Stream	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s (per cycle))	Mean Delay per Veh (s)	Mean max queue (PCU)	Utilised storage (%)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
08:00-09:00	A	1	55	65	570	1800	57	14.98	9.99	35.89	33.67	4.37	38.04
	Ax	1	0	Unrestricted	975	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	B	1	72	25	207	1800	15	55.23	6.29	24.11	45.10	2.79	47.89
	Bx	1	0	Unrestricted	141	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	C	1	71	27	784	1800	100	14.56	15.67	45.04	45.02	6.57	51.59
	Cx	1	0	Unrestricted	445	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	C1	1	72	25	779	1800	59	7.76	2.92	146.16	23.84	2.79	26.63
		2	0	19340	5	1800	59	3.08	0.01	0.64	0.06	0.01	0.07
	C2	1	0	17954	5	1003	100	5.17	0.06	3.22	0.10	0.03	0.13

Traffic Stream Results: Stops and delays

Time Segment	Arm	Traffic Stream	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Uniform delay (PCU-hr/hr)	Random plus oversat delay (PCU-hr/hr)	Unweighted cost of delay (£ per hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Uniform stops (Stops per hr)	Random stops (Stops per hr)	Unweighted cost of stops (£ per hr)	Weighted cost of stops (£ per hr)
08:00-09:00	A	1	19.20	14.98	2.04	0.33	33.67	33.67	61.17	336.95	11.71	4.37	4.37
	Ax	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	B	1	18.00	55.23	2.29	0.88	45.10	45.10	107.59	192.10	30.62	2.79	2.79
	Bx	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	C	1	24.00	14.56	2.31	0.86	45.02	45.02	66.87	493.64	30.60	6.57	6.57
	Cx	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	C1	1	1.68	7.76	0.76	0.92	23.84	23.84	28.60	189.92	32.89	2.79	2.79
		2	1.68	3.08	0.00	0.00	0.06	0.06	9.25	0.46	0.00	0.01	0.01
	C2	1	1.20	5.17	0.01	0.00	0.10	0.10	45.90	2.29	0.00	0.03	0.03

Network Results

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Ite wit wor over PR
7	13/05/2022 14:50:28	13/05/2022 14:50:28	08:00	100	164.35	10.41	72.13	C1/1	0	0	C1/1	C/1	C1/

Network Results: Vehicle summary

Time Segment	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Actual green (s (per cycle))	Mean Delay per Veh (s)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
08:00-09:00	72	0	3911	690	9.58	147.79	16.57	164.35

Network Results: Stops and delays

Time Segment	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Uniform delay (PCU-hr/hr)	Random plus oversat delay (PCU-hr/hr)	Unweighted cost of delay (£ per hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Uniform stops (Stops per hr)	Random stops (Stops per hr)	Unweighted cost of stops (£ per hr)	Weighted cost of stops (£ per hr)
08:00-09:00	13.69	9.58	7.42	2.99	147.79	147.79	33.78	1215.36	105.81	16.57	16.57

A8 - 2039 Sensitivity Analysis 1
D8 - 2039 PM Peak Hour SA1*

Summary

Data Errors and Warnings

No errors or warnings

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Ite wit wor over PR
8	13/05/2022 14:50:28	13/05/2022 14:50:29	17:00	100	94.38	5.80	70.12	A/1	0	0	A/1	C/1	A/

Analysis Set Details

Name	Description	Demand set	Include in report	Locked
2039 Sensitivity Analysis 1		D8	✓	

Demand Set Details

Name	Description	Composite	Demand sets	Start time (HH:mm)	Locked
2039 PM Peak Hour SA1				17:00	

Arms and Traffic Streams

Modelling

Arm	Traffic Stream	Traffic model	Stop weighting multiplier (%)	Delay weighting multiplier (%)	Assignment Cost Weighting (%)	Exclude from results calculation	Max queue storage (PCU)	Has queue limit	Has degree of saturation limit
A	1	NetworkDefault	100	100	100		0.00		
Ax	1	NetworkDefault	100	100	100		0.00		
B	1	NetworkDefault	100	100	100		0.00		
Bx	1	NetworkDefault	100	100	100		0.00		
C	1	NetworkDefault	100	100	100		0.00		
Cx	1	NetworkDefault	100	100	100		0.00		
C1	1	Flare	100	100	100		0.00		
	2	Flare	100	100	100		0.00		
C2	1	Flare	100	100	100		0.00		

Modelling - Advanced

Arm	Traffic Stream	Initial queue (PCU)	Type of Vehicle-in-Service	Vehicle-in-Service	Type of random parameter	Random parameter	Auto cycle time	Cycle time
(ALL)	(ALL)	0.00	NetworkDefault	Not-Included	NetworkDefault	0.50	✓	100

Normal traffic - Modelling

Arm	Traffic Stream	Stop weighting (%)	Delay weighting (%)
(ALL)	(ALL)	100	100

Normal traffic - Advanced

Arm	Traffic Stream	Dispersion type for Normal Traffic
(ALL)	(ALL)	NetworkDefault

Flows

Arm	Traffic Stream	Total Flow (PCU/hr)	Normal Flow (PCU/hr)
A	1	833	833
Ax	1	630	630
B	1	55	55
Bx	1	113	113
C	1	593	593
Cx	1	738	738
C1	1	582	582
	2	11	11
C2	1	11	11

Pedestrian Crossings

Pedestrian Crossings - Modelling

Crossing	Side	Delay weighting (%)	Assignment Cost Weighting (%)	Exclude from results calculation	Max queue storage (Ped)	Has queue limit	Has degree of saturation limit
(ALL)	(ALL)	100	100		0.00		

Signal Timings

Network Default: 100s cycle time; 100 steps

Phases

Controller stream	Phase	Name	Minimum green (s)	Maximum green (s)	Relative start displacement (s)	Relative end displacement (s)	Type	Blackout Time (s)
1	A	(untitled)	7	300	0	0	Unknown	
	B	(untitled)	7	300	0	0	Unknown	
	C	(untitled)	7	300	0	0	Unknown	
	D	(untitled)	6	300	0	0	Indicative arrow	
	E	(untitled)	6	300	0	0	Pedestrian	0
	F	(untitled)	6	300	0	0	Pedestrian	0
	G	(untitled)	6	300	0	0	Pedestrian	0

Library Stages

Controller stream	Library stage	Phases in stage	User stage minimum (s)
1	1	A, C, D	1
	2	C, D	1
	3	B	1
	4	E, F, G	1

Losing / Gaining Phase Delays

Controller stream	Delay	Type	Phase	From stage	To stage	Relative delay
1	1	Losing	C	1	2	20

Stage Sequences

Controller stream	Sequence	Name	Multiple cycling	Stage IDs	Stage ends
1	1	(untitled)	Single	1, 2, 3, 4	56, 58, 70, 83

Intergreen Matrix for Controller Stream 1

From \ To	A	B	C	D	E	F	G
A		5			5	6	7
B	5		5	5	7	5	6
C		5			7		5
D		5				7	5
E	8	8	8				
F	8	8		8			
G	8	8	8	8			

Interstage Matrix for Controller Stream 1

From \ To	1	2	3	4
1	0	0	5	7
2	0	0	5	7
3	5	5	0	7
4	8	8	8	0

Resultant Stages

Controller stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	1	✓	1	A,C,D	91	56	65	1	7
	2	✓	2	C,D	56	58	2	1	1
	3	✓	3	B	63	70	7	1	7
	4	✓	4	E,F,G	77	83	6	1	6

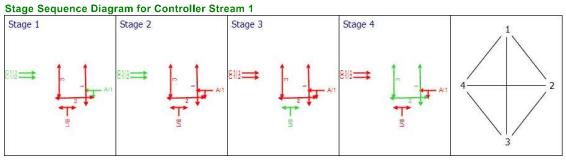
Resultant Phase Green Periods

Controller stream	Phase	Green period	Is base green period	Start time (s)	End time (s)	Duration (s)
1	A	1	✓	91	56	65
	B	1	✓	63	70	7
	C	1	✓	91	58	67
	D	1	✓	91	58	67
	E	1	✓	77	83	6
	F	1	✓	75	83	8
	G	1	✓	76	83	7

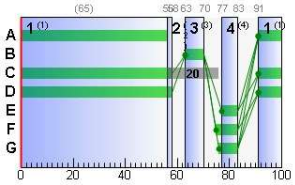
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
A	1	1	1	A	91	56	65
B	1	1	1	B	63	70	7
C1	1	1	1	C	91	58	67
C1	2	1	1	D	91	58	67

Stage Sequence Diagram for Controller Stream 1



Phase Timings Diagram for Controller Stream 1



Traffic Stream Results

Traffic Stream Results: Vehicle summary

Time Segment	Arm	Traffic Stream	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s (per cycle))	Mean Delay per Veh (s)	Mean max queue (PCU)	Utilised storage (%)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
17:00-18:00	A	1	70	28	833	1800	65	14.29	15.39	55.32	46.94	6.65	53.59
	Ax	1	0	Unrestricted	630	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	B	1	38	136	55	1800	7	51.31	1.55	5.95	11.13	0.69	11.82
	Bx	1	0	Unrestricted	113	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	C	1	47	90	593	1800	100	5.82	7.63	21.92	13.61	3.10	16.72
	Cx	1	0	Unrestricted	738	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	C1	1	48	89	582	1800	67	4.38	2.15	107.59	10.05	1.43	11.48
		2	1	9915	11	1800	67	2.77	0.04	1.83	0.12	0.02	0.14
	C2	1	1	5964	11	741	100	12.65	0.19	9.43	0.55	0.09	0.64

Traffic Stream Results: Stops and delays

Time Segment	Arm	Traffic Stream	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Uniform delay (PCU-hr/hr)	Random plus oversat delay (PCU-hr/hr)	Unweighted cost of delay (£ per hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Uniform stops (Stops per hr)	Random stops (Stops per hr)	Unweighted cost of stops (£ per hr)	Weighted cost of stops (£ per hr)
17:00-18:00	A	1	19.20	14.29	2.49	0.82	46.94	46.94	63.64	501.04	29.11	6.65	6.65
	Ax	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	B	1	18.00	51.31	0.67	0.12	11.13	11.13	100.31	51.05	4.12	0.69	0.69
	Bx	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	C	1	24.00	5.82	0.75	0.21	13.61	13.61	41.75	239.90	7.66	3.10	3.10
	Cx	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	C1	1	1.68	4.38	0.49	0.22	10.05	10.05	19.63	106.51	7.72	1.43	1.43
		2	1.68	2.77	0.01	0.00	0.12	0.12	11.93	1.31	0.00	0.02	0.02
	C2	1	1.20	12.65	0.04	0.00	0.55	0.55	62.52	6.87	0.00	0.09	0.09

Network Results

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Ite wit wor over PR
8	13/05/2022 14:50:28	13/05/2022 14:50:29	17:00	100	94.38	5.80	70.12	A/1	0	0	A/1	C/1	A/

Network Results: Vehicle summary

Time Segment	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Actual green (s (per cycle))	Mean Delay per Veh (s)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
17:00-18:00	70	0	3566	706	5.86	82.40	11.98	94.38

Network Results: Stops and delays

Time Segment	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Uniform delay (PCU-hr/hr)	Random plus oversat delay (PCU-hr/hr)	Unweighted cost of delay (£ per hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Uniform stops (Stops per hr)	Random stops (Stops per hr)	Unweighted cost of stops (£ per hr)	Weighted cost of stops (£ per hr)
17:00-18:00	14.02	5.86	4.44	1.36	82.40	82.40	26.79	906.68	48.61	11.98	11.98

A9 - 2039 Sensitivity Analysis 2
D9 - 2039 AM Peak Hour SA2*

Summary

Data Errors and Warnings

No errors or warnings

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Ite wit wor over PR
9	13/05/2022 14:50:29	13/05/2022 14:50:29	08:00	100	255.67	16.49	84.34	B/1	0	0	B/1	C/1	B/

Analysis Set Details

Name	Description	Demand set	Include in report	Locked
2039 Sensitivity Analysis 2		D9	✓	

Demand Set Details

Name	Description	Composite	Demand sets	Start time (HH:mm)	Locked
2039 AM Peak Hour SA2				08:00	

Arms and Traffic Streams

Modelling

Arm	Traffic Stream	Traffic model	Stop weighting multiplier (%)	Delay weighting multiplier (%)	Assignment Cost Weighting (%)	Exclude from results calculation	Max queue storage (PCU)	Has queue limit	Has degree of saturation limit
A	1	NetworkDefault	100	100	100		0.00		
Ax	1	NetworkDefault	100	100	100		0.00		
B	1	NetworkDefault	100	100	100		0.00		
Bx	1	NetworkDefault	100	100	100		0.00		
C	1	NetworkDefault	100	100	100		0.00		
Cx	1	NetworkDefault	100	100	100		0.00		
C1	1	Flare	100	100	100		0.00		
	2	Flare	100	100	100		0.00		
C2	1	Flare	100	100	100		0.00		

Modelling - Advanced

Arm	Traffic Stream	Initial queue (PCU)	Type of Vehicle-in-Service	Vehicle-in-Service	Type of random parameter	Random parameter	Auto cycle time	Cycle time
(ALL)	(ALL)	0.00	NetworkDefault	Not-Included	NetworkDefault	0.50	✓	100

Normal traffic - Modelling

Arm	Traffic Stream	Stop weighting (%)	Delay weighting (%)
(ALL)	(ALL)	100	100

Normal traffic - Advanced

Arm	Traffic Stream	Dispersion type for Normal Traffic
(ALL)	(ALL)	NetworkDefault

Flows

Arm	Traffic Stream	Total Flow (PCU/hr)	Normal Flow (PCU/hr)
A	1	607	607
Ax	1	1091	1091
B	1	334	334
Bx	1	181	181
C	1	803	803
Cx	1	472	472
C1	1	791	791
	2	12	12
C2	1	12	12

Pedestrian Crossings

Pedestrian Crossings - Modelling

Crossing	Side	Delay weighting (%)	Assignment Cost Weighting (%)	Exclude from results calculation	Max queue storage (Ped)	Has queue limit	Has degree of saturation limit
(ALL)	(ALL)	100	100		0.00		

Signal Timings

Network Default: 100s cycle time; 100 steps

Phases

Controller stream	Phase	Name	Minimum green (s)	Maximum green (s)	Relative start displacement (s)	Relative end displacement (s)	Type	Blackout Time (s)
1	A	(untitled)	7	300	0	0	Unknown	
	B	(untitled)	7	300	0	0	Unknown	
	C	(untitled)	7	300	0	0	Unknown	
	D	(untitled)	6	300	0	0	Indicative arrow	
	E	(untitled)	6	300	0	0	Pedestrian	0
	F	(untitled)	6	300	0	0	Pedestrian	0
	G	(untitled)	6	300	0	0	Pedestrian	0

Library Stages

Controller stream	Library stage	Phases in stage	User stage minimum (s)
1	1	A, C, D	1
	2	C, D	1
	3	B	1
	4	E, F, G	1

Losing / Gaining Phase Delays

Controller stream	Delay	Type	Phase	From stage	To stage	Relative delay
1	1	Losing	C	1	2	20

Stage Sequences

Controller stream	Sequence	Name	Multiple cycling	Stage IDs	Stage ends
1	1	(untitled)	Single	1, 2, 3, 4	43, 44, 70, 83

Intergreen Matrix for Controller Stream 1

From \ To	A	B	C	D	E	F	G
A		5			5	6	7
B	5		5	5	7	5	6
C		5			7		5
D		5				7	5
E	8	8	8				
F	8	8		8			
G	8	8	8	8			

Interstage Matrix for Controller Stream 1

From \ To	1	2	3	4
1	0	0	5	7
2	0	0	5	7
3	5	5	0	7
4	8	8	8	0

Resultant Stages

Controller stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	1	✓	1	A,C,D	91	43	52	1	7
	2	✓	2	C,D	43	44	1	1	1
	3	✓	3	B	49	70	21	1	7
	4	✓	4	E,F,G	77	83	6	1	6

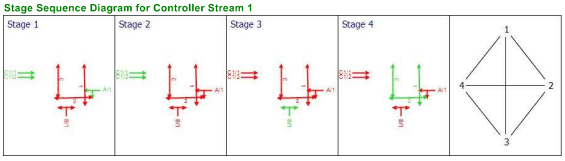
Resultant Phase Green Periods

Controller stream	Phase	Green period	Is base green period	Start time (s)	End time (s)	Duration (s)
1	A	1	✓	91	43	52
	B	1	✓	49	70	21
	C	1	✓	91	44	53
	D	1	✓	91	44	53
	E	1	✓	77	83	6
	F	1	✓	75	83	8
	G	1	✓	76	83	7

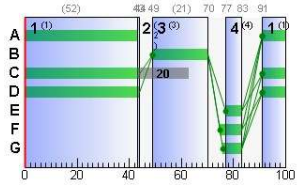
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
A	1	1	1	A	91	43	52
B	1	1	1	B	49	70	21
C1	1	1	1	C	91	44	53
C1	2	1	1	D	91	44	53

Stage Sequence Diagram for Controller Stream 1



Phase Timings Diagram for Controller Stream 1



Traffic Stream Results

Traffic Stream Results: Vehicle summary

Time Segment	Arm	Traffic Stream	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s (per cycle))	Mean Delay per Veh (s)	Mean max queue (PCU)	Utilised storage (%)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
08:00-09:00	A	1	64	41	607	1800	52	19.94	12.36	44.40	47.75	5.45	53.20
	Ax	1	0	Unrestricted	1091	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	B	1	84	7	334	1800	21	59.74	10.89	41.75	78.70	4.81	83.51
	Bx	1	0	Unrestricted	181	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	C	1	81	12	803	1800	100	22.21	19.47	55.97	70.36	8.27	78.63
	Cx	1	0	Unrestricted	472	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	C1	1	81	11	791	1800	53	11.82	3.73	186.48	36.86	2.84	39.71
		2	1	7190	12	1800	53	3.61	0.03	1.52	0.17	0.01	0.18
	C2	1	1	7517	12	1016	100	7.59	0.18	9.21	0.36	0.08	0.44

Traffic Stream Results: Stops and delays

Time Segment	Arm	Traffic Stream	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Uniform delay (PCU-hr/hr)	Random plus oversat delay (PCU-hr/hr)	Unweighted cost of delay (£ per hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Uniform stops (Stops per hr)	Random stops (Stops per hr)	Unweighted cost of stops (£ per hr)	Weighted cost of stops (£ per hr)
08:00-09:00	A	1	19.20	19.94	2.81	0.55	47.75	47.75	71.55	414.59	19.74	5.45	5.45
	Ax	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	B	1	18.00	59.74	3.47	2.08	78.70	78.70	114.82	312.78	70.73	4.81	4.81
	Bx	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	C	1	24.00	22.21	3.33	1.62	70.36	70.36	82.15	602.28	57.39	8.27	8.27
	Cx	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	C1	1	1.68	11.82	0.87	1.73	36.86	36.86	28.66	165.62	61.06	2.84	2.84
		2	1.68	3.61	0.01	0.00	0.17	0.17	9.13	1.09	0.00	0.01	0.01
	C2	1	1.20	7.59	0.03	0.00	0.36	0.36	55.65	6.67	0.00	0.08	0.08

Network Results

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Ite wit wor over PR
9	13/05/2022 14:50:29	13/05/2022 14:50:29	08:00	100	255.67	16.49	84.34	B/1	0	0	B/1	C/1	B/

Network Results: Vehicle summary

Time Segment	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Actual green (s (per cycle))	Mean Delay per Veh (s)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
08:00-09:00	84	0	4303	679	13.80	234.21	21.47	255.67

Network Results: Stops and delays

Time Segment	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Uniform delay (PCU-hr/hr)	Random plus oversat delay (PCU-hr/hr)	Unweighted cost of delay (£ per hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Uniform stops (Stops per hr)	Random stops (Stops per hr)	Unweighted cost of stops (£ per hr)	Weighted cost of stops (£ per hr)
08:00-09:00	13.76	13.80	10.51	5.98	234.21	234.21	39.79	1503.05	208.92	21.47	21.47

A10 - 2039 Sensitivity Analysis 2
D10 - 2039 PM Peak Hour SA2*

Summary

Data Errors and Warnings

No errors or warnings

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Ite wit wor over PR
10	13/05/2022 14:50:30	13/05/2022 14:50:30	17:00	100	187.42	11.91	87.87	A/1	0	0	A/1	C/1	A/

Analysis Set Details

Name	Description	Demand set	Include in report	Locked
2039 Sensitivity Analysis 2		D10	✓	

Demand Set Details

Name	Description	Composite	Demand sets	Start time (HH:mm)	Locked
2039 PM Peak Hour SA2				17:00	

Arms and Traffic Streams

Modelling

Arm	Traffic Stream	Traffic model	Stop weighting multiplier (%)	Delay weighting multiplier (%)	Assignment Cost Weighting (%)	Exclude from results calculation	Max queue storage (PCU)	Has queue limit	Has degree of saturation limit
A	1	NetworkDefault	100	100	100		0.00		
Ax	1	NetworkDefault	100	100	100		0.00		
B	1	NetworkDefault	100	100	100		0.00		
Bx	1	NetworkDefault	100	100	100		0.00		
C	1	NetworkDefault	100	100	100		0.00		
Cx	1	NetworkDefault	100	100	100		0.00		
C1	1	Flare	100	100	100		0.00		
	2	Flare	100	100	100		0.00		
C2	1	Flare	100	100	100		0.00		

Modelling - Advanced

Arm	Traffic Stream	Initial queue (PCU)	Type of Vehicle-in-Service	Vehicle-in-Service	Type of random parameter	Random parameter	Auto cycle time	Cycle time
(ALL)	(ALL)	0.00	NetworkDefault	Not-Included	NetworkDefault	0.50	✓	100

Normal traffic - Modelling

Arm	Traffic Stream	Stop weighting (%)	Delay weighting (%)
(ALL)	(ALL)	100	100

Normal traffic - Advanced

Arm	Traffic Stream	Dispersion type for Normal Traffic
(ALL)	(ALL)	NetworkDefault

Flows

Arm	Traffic Stream	Total Flow (PCU/hr)	Normal Flow (PCU/hr)
A	1	949	949
Ax	1	697	697
B	1	129	129
Bx	1	240	240
C	1	622	622
Cx	1	763	763
C1	1	588	588
	2	34	34
C2	1	34	34

Pedestrian Crossings

Pedestrian Crossings - Modelling

Crossing	Side	Delay weighting (%)	Assignment Cost Weighting (%)	Exclude from results calculation	Max queue storage (Ped)	Has queue limit	Has degree of saturation limit
(ALL)	(ALL)	100	100		0.00		

Signal Timings

Network Default: 100s cycle time; 100 steps

Phases

Controller stream	Phase	Name	Minimum green (s)	Maximum green (s)	Relative start displacement (s)	Relative end displacement (s)	Type	Blackout Time (s)
1	A	(untitled)	7	300	0	0	Unknown	
	B	(untitled)	7	300	0	0	Unknown	
	C	(untitled)	7	300	0	0	Unknown	
	D	(untitled)	6	300	0	0	Indicative arrow	
	E	(untitled)	6	300	0	0	Pedestrian	0
	F	(untitled)	6	300	0	0	Pedestrian	0
	G	(untitled)	6	300	0	0	Pedestrian	0

Library Stages

Controller stream	Library stage	Phases in stage	User stage minimum (s)
1	1	A, C, D	1
	2	C, D	1
	3	B	1
	4	E, F, G	1

Losing / Gaining Phase Delays

Controller stream	Delay	Type	Phase	From stage	To stage	Relative delay
1	1	Losing	C	1	2	20

Stage Sequences

Controller stream	Sequence	Name	Multiple cycling	Stage IDs	Stage ends
1	1	(untitled)	Single	1, 2, 3, 4	50, 52, 70, 83

Intergreen Matrix for Controller Stream 1

From \ To	A	B	C	D	E	F	G
A		5			5	6	7
B	5		5	5	7	5	6
C		5			7		5
D		5				7	5
E	8	8	8				
F	8	8		8			
G	8	8	8	8			

Interstage Matrix for Controller Stream 1

From \ To	1	2	3	4
1	0	0	5	7
2	0	0	5	7
3	5	5	0	7
4	8	8	8	0

Resultant Stages

Controller stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	1	✓	1	A,C,D	91	50	59	1	7
	2	✓	2	C,D	50	52	2	1	1
	3	✓	3	B	57	70	13	1	7
	4	✓	4	E,F,G	77	83	6	1	6

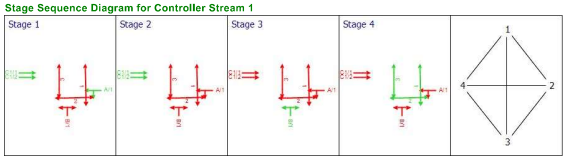
Resultant Phase Green Periods

Controller stream	Phase	Green period	Is base green period	Start time (s)	End time (s)	Duration (s)
1	A	1	✓	91	50	59
	B	1	✓	57	70	13
	C	1	✓	91	52	61
	D	1	✓	91	52	61
	E	1	✓	77	83	6
	F	1	✓	75	83	8
	G	1	✓	76	83	7

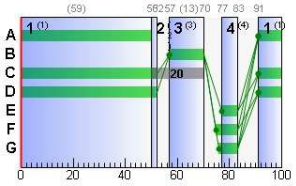
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
A	1	1	1	A	91	50	59
B	1	1	1	B	57	70	13
C1	1	1	1	C	91	52	61
C1	2	1	1	D	91	52	61

Stage Sequence Diagram for Controller Stream 1



Phase Timings Diagram for Controller Stream 1



Traffic Stream Results

Traffic Stream Results: Vehicle summary

Time Segment	Arm	Traffic Stream	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s (per cycle))	Mean Delay per Veh (s)	Mean max queue (PCU)	Utilised storage (%)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
17:00-18:00	A	1	88	2	949	1800	59	28.32	25.15	90.38	106.01	10.96	116.98
	Ax	1	0	Unrestricted	697	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	B	1	51	76	129	1800	13	47.25	3.56	13.65	24.04	1.59	25.63
	Bx	1	0	Unrestricted	240	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	C	1	54	66	622	1800	100	8.93	9.82	28.24	21.91	4.07	25.98
	Cx	1	0	Unrestricted	763	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	C1	1	53	71	588	1800	61	5.49	2.25	112.68	12.74	1.28	14.02
		2	3	2854	34	1800	61	3.51	0.11	5.69	0.47	0.05	0.52
	C2	1	4	1906	34	758	100	29.11	0.78	39.09	3.90	0.40	4.30

Traffic Stream Results: Stops and delays

Time Segment	Arm	Traffic Stream	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Uniform delay (PCU-hr/hr)	Random plus oversat delay (PCU-hr/hr)	Unweighted cost of delay (£ per hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Uniform stops (Stops per hr)	Random stops (Stops per hr)	Unweighted cost of stops (£ per hr)	Weighted cost of stops (£ per hr)
17:00-18:00	A	1	19.20	28.32	4.46	3.00	106.01	106.01	92.13	769.16	105.15	10.96	10.96
	Ax	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	B	1	18.00	47.25	1.43	0.27	24.04	24.04	98.08	117.15	9.37	1.59	1.59
	Bx	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	C	1	24.00	8.93	1.22	0.32	21.91	21.91	52.24	313.39	11.52	4.07	4.07
	Cx	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	C1	1	1.68	5.49	0.60	0.29	12.74	12.74	17.35	91.56	10.48	1.28	1.28
		2	1.68	3.51	0.03	0.00	0.47	0.47	12.03	4.07	0.02	0.05	0.05
	C2	1	1.20	29.11	0.27	0.00	3.90	3.90	92.92	31.56	0.04	0.40	0.40

Network Results

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Ite wit wor over PR
10	13/05/2022 14:50:30	13/05/2022 14:50:30	17:00	100	187.42	11.91	87.87	A/1	0	0	A/1	C/1	A/

Generated on 13/05/2022 15:00:40 using TRANSYT 15 (15.5.2.7994)

Network Results: Vehicle summary

Time Segment	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Actual green (s (per cycle))	Mean Delay per Veh (s)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
17:00-18:00	88	0	4056	694	10.57	169.07	18.35	187.42

Network Results: Stops and delays

Time Segment	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Uniform delay (PCU-hr/hr)	Random plus oversat delay (PCU-hr/hr)	Unweighted cost of delay (£ per hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Uniform stops (Stops per hr)	Random stops (Stops per hr)	Unweighted cost of stops (£ per hr)	Weighted cost of stops (£ per hr)
17:00-18:00	14.04	10.57	8.02	3.89	169.07	169.07	36.08	1326.89	136.57	18.35	18.35

APPENDIX D

Indicative Car Parking Assignment

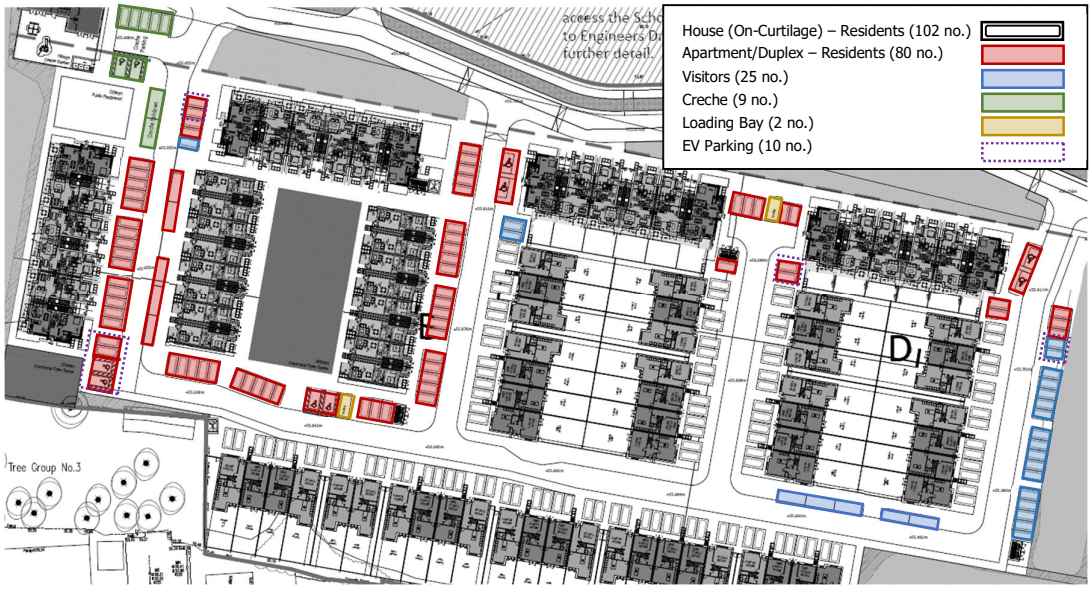


Figure D1: Indicative Car Parking Assignment at Site A

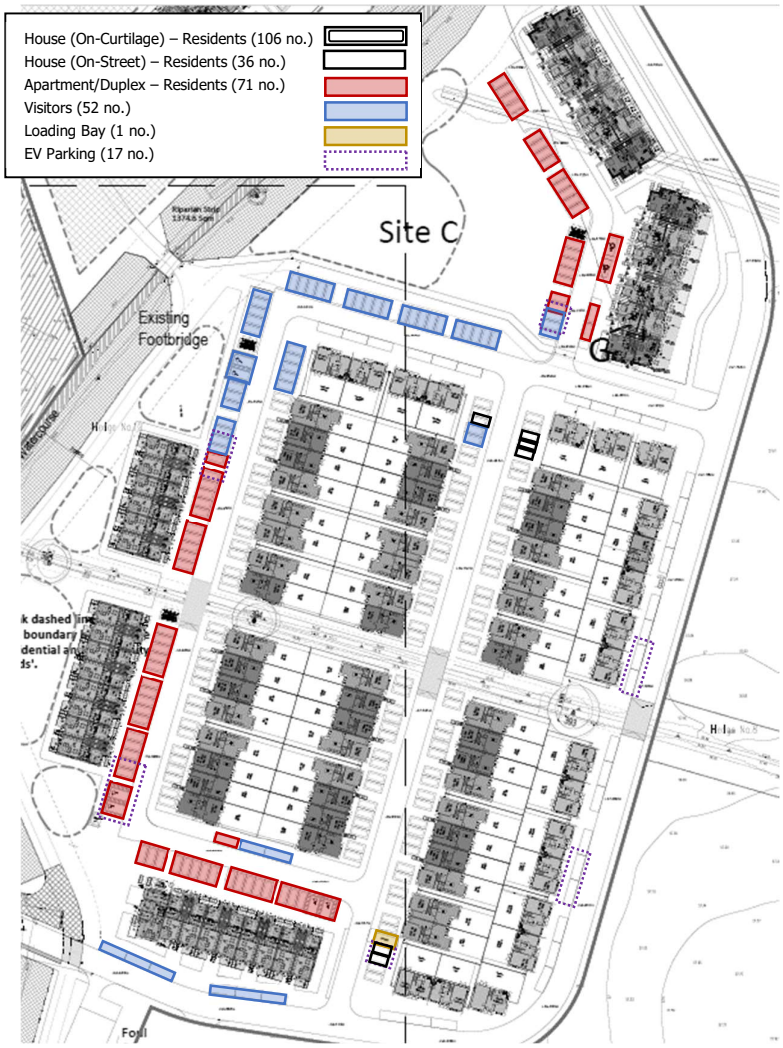


Figure D2: Indicative Car Parking Assignment at Site C

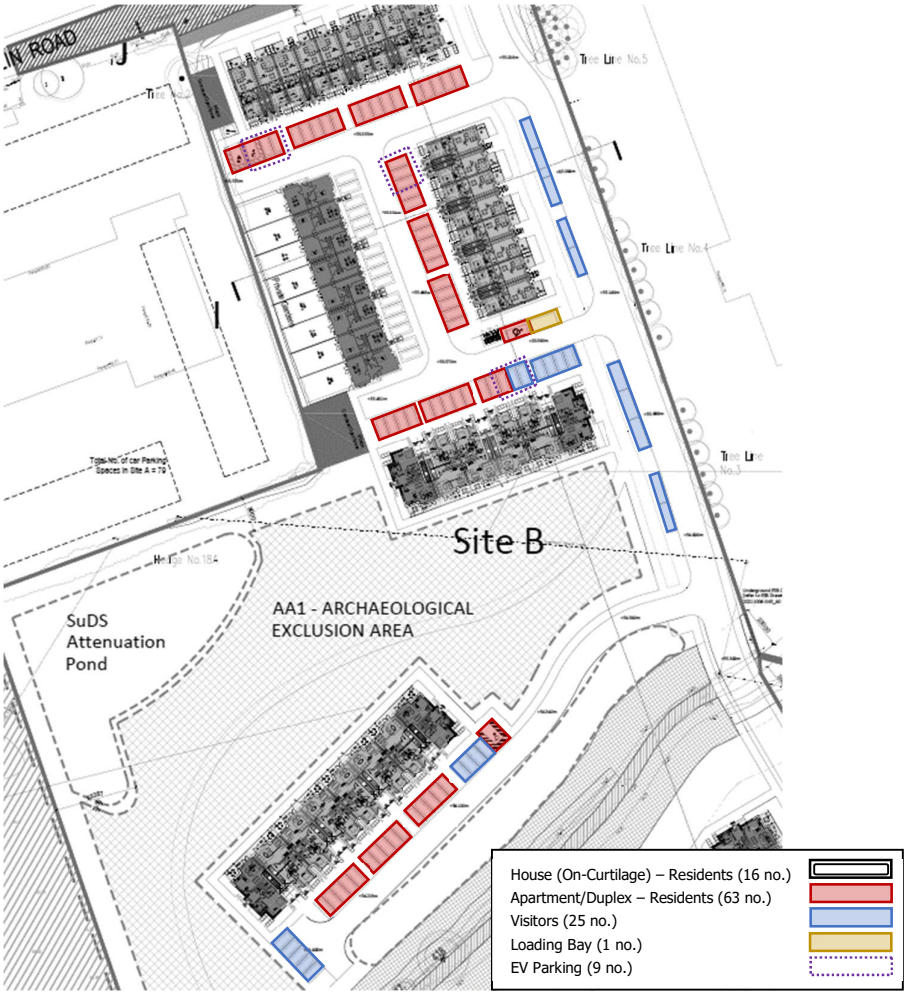


Figure D3: Indicative Car Parking Assignment at Site B

APPENDIX E

Response to KCC Opinion

KCC Opinion

Transportation has the following comments:

1. Applicant to provide two signalised junctions at Dublin and Shinkeen Road for proposed development. Junction designs to be in accordance with DMURS and to include road layout, dimensions and cross sections, drainage, services, road lining and signing, public lighting, reduced corner radii, short crossing locations for VRU's, provision of TOUCAN crossings for cyclists, concrete bays for junctions, and surfacing details.

   The developer shall also submit, a detailed design for the proposed traffic signals. Signal works to include:

   a. the provision of the traffic signals,
   b. the provision of an integral ELV UTC/MOVA type controller with LED signals,
   c. the provision of a 180degree multi sensor CCTV camera and a PTZ CCTV camera at the junction to assist monitoring of traffic flows.

   The Applicant shall also include a design for the installation of SCOOT/MOVA signalised junction at the junctions.

   All installations shall be integrated into the existing SCOOT/UTC network and shall be connected to Kildare County Council's Traffic Management Centre located in the Council's headquarters in Aras Chill Dara, Naas. The cost of the design and implementation of these works shall be borne solely by the Applicant. The detailed design of this signalised junctions shall be agreed in writing with the Planning Authority prior to work commencing on site. The agreed junction improvements shall be constructed and implemented prior to the commencement of development.

   The details of the above shall be to the requirements of the Kildare Co. Co. Traffic Management Section and the application shall include written confirmation of this by the Roads and Transport Directorate.

2. An Additional TOUCAN crossing to be provided at Site C for VRU's, location to be agreed prior to commencement of development. The details of the above shall be to the requirements

   of the Kildare Co. Co. Traffic Management Section TOUCAN crossing layout TMC002 and the application shall include written confirmation of this by the Roads and Transport Directorate.

3. Applicant to provide a 2.0m footpath and a 2.0m cycle path on the Dublin and Shinkeen Road along front boundaries of the development. Applicant to submit drawings detailing same.

4. Applicant to submit road design drawings indicating road, footpath, cycle path and car parking dimensions throughout the development, footpath and cycle paths to be 2.0m minimum width, 2.0m footpaths to be provided in Home zones. Corner radii 4.5-6m to be provided. All car parking spaces to be 2.5m x 5.0m in dimension.

5. Applicant to continue 2.0m footpath along road at site C on both sides.

6. Applicant to provide a drawing detailing the proposed permanent pedestrian/cyclist permeability and accesses from pocket park at Site A to Willow Crescent. Proposed access design to include footpath and cycle path design, kerbing, tactile paving, landscaping, lighting and railing details. Gates not to be provided. Design should include measures to enhance the safety of pedestrians and cyclists and to discourage anti-social behaviour. Applicant to provide a shared footpath/cycle path of minimum 5.0m, 2.0m footpath and 3.0m cycle path.

7. The Applicant to provide swept path analysis drawings for proposed development.

8. The Applicant to provide a Traffic Management Plan. Construction traffic to access the development via the M4 and Dublin Road and avoid Celbridge Town.

9. The Applicant to submit an **independent** Road Safety Audit for the proposed development. All RSA recommendations to be incorporated into the design.

10. Applicant to provide loading bays for each residential block and creche building. Applicant to address.

11. There is a shortfall in car parking provided. The Applicant to provide a clear car parking schedule for housing (incl. duplex, apartment), crèche and visitor car parking in accordance with standards from KCC Development Plan Chapter 17. Applicant to colour code the categories in order to establish if adequate car parking is located adjacent to the accommodation. All car parking spaces to be 2.5m x 5.0m in dimension. Applicant to outline location and level of visitor car parking and creche car park markings.

12. All car parking spaces serving the development shall be provide with electrical connections, to allow for the provision of charging points and in the case of visitor spaces shall be provided with electrical charging points by the developer. The Applicant to detail EV charging facilities and arrangements.

13. Applicant to show car parking for housing in Lot B DBFL drawing 180221-DBFL-ZO-SP-DR-C-2001 dated 4-11-21.

14. As the Applicant has proposed reduced car parking standards as per section 4.22 of the (DHPLG) "Design Standards for New Apartments" March 2018, they are requested to submit a Mobility Management Plan. The Mobility Management Plan is to contain:

    a. The estimated number of trips for 123 houses, 188 no. apartments, 32 maisonettes and proposed crèche.

    b. Details of the Travel Information Point that is to be situated in the crèche.

    c. Full details of all existing public transport links and timetables serving Celbridge and links to commuter rail timetables at Celbridge, Co. Kildare. This is also to list all public transport links to prominent employment centres.

    d. Walking and cycling routes in Celbridge.

    e. The manner in which future residents of the housing, apartments and crèche will be informed of the reduced parking standard and vehicular parking spaces available prior to the occupation of these units.

    f. The manner in which the Mobility Management Plan will be made available to future residents.

    g. During the lifetime of this Mobility Management Plan, the developer shall submit annual survey results of the modal splits and origin of trips of staff of the crèche.

Responses to KCC Opinion

Ref	Response
1	Signalised junctions have been designed into the scheme - details of which have been forwarded to KCC for comment prior to submission of the application. Detailed design including design of SCOOT/MOVA ducting will be provided prior to commencement of construction. Same will be agreed in advance of construction with KCC.
2	N/A – Site C no longer on eastern side of the road carriageway
3	The Shinkeen Road corridor currently benefits from cycle lanes and footpaths on both sides of the corridor for which the subject proposals aim to respect and tie into. Accordingly proposals on the Shinkeen Road corridor have been designed to allow for consistency of facilities between those proposed along the site boundary and those to the north and south tie-in locations. The subject scheme provides for dedicated cycle & pedestrian infrastructure through the subject site providing a safe & low traffic route between the Dublin Road access and the Shinkeen Road corridor which, as stated above, benefits from existing dedicated pedestrian and cycle facilities on both sides of the corridor. Cycle facilities have been provided along the site frontage on the Dublin Road

Ref	Response
	corridor. The proposed infrastructure extends the entire width of the subject site boundary on the Dublin Road corridor and has liaised with the adjacent land owner (Rye River Brewing Co) so that the provision within each boundary are aligned. As per the KCC Opinion, the proposed facilities at the Dublin Road corridor comprise a 2m wide footpath and 2m wide cycle track.
4	This is identified in the drawings submitted as part of the full planning application documentation including DBFL Roads Drawing 180221-DBFL-Z0-SP-DR-C-2000
5	N/A – Site C no longer on eastern section of the site
6	The proposed development includes pedestrian infrastructure up to the application site boundary to facilitate potential future filtered permeable links with the existing residential settlement of Willow Crescent by way of 2 no. non-vehicular connections, subject to agreement.
7	These have been undertaken and will be included with the full planning application documentation including 180221-DBFL-Z0-SP-DR-C-2000
8	A Preliminary Construction and Environmental Management Plan has been produced and ~~will be~~is included with the full planning application documentation. A Construction Traffic Management Plan will be compiled prior to commencement of construction activities on-site.
9	A Quality Audit (including Road Safety Audit) has been undertaken by Bruton Consulting who are fully independent of the design team. Items arising from the Quality Audit are incorporated into the final scheme design submitted as part of the Stage 3 Submission.
10	4 no. Loading bays to residential blocks have been incorporated into the design.
11	The car parking provision proposed takes cognisance of the apartment guidelines for the apartment / duplex units (i.e. 1 space per unit plus 1 visitor space per 3-4 units) and of the development plan for the houses (i.e. 2 per unit). The Stage 2 parking numbers had assigned 10% visitor parking to all residential units (including houses) which is not specified in the development plan. Accordingly, the Schedule of Accommodation has been updated to reflect compliance with both the apartment guidelines for the apartment / duplex units and the development plan requirement for the house units albeit with additional visitor spaces assigned to the house units.
12	A section within the TTA Report provides details of EV charging infrastructure
13	The Stage 3 submission drawings will show all car parking spaces proposed including drawing 180221-DBFL-Z0-SP-DR-C-2000 in addition to the architect's site layout plan and Appendix D of this TTA report.
14	A MMP report has been produced and is submitted with the application. This incorporates the recommended details

APPENDIX F

Response to ABP Opinion

The Board set out eight items of further specific information which were to be provided as part of the final planning application. The below provides a response to the relevant items relating to transport:

4. A rationale for the siting, design and layout of the proposed entrance from the Dublin Road, having regard to the status and function of the proposed boulevard serving this wider KDA and key community and educational uses for the town

Response

The Dublin Road access has been positioned taking cognisance of the existing local access located opposite the subject site boundary on the Dublin Road corridor. By providing a stagger, a right tun pocket can be accommodated into this existing private access whilst maximising the right turn lane length for vehicles entering the proposed development site. Maximising the right turn lane length future proofs this junction for potential future vehicle demand once the future schools and wider KDA2 residential lands are developed.

It is also noted that, within the subject site boundary, significant archaeological constraints were uncovered which has limited the areas of the subject lands upon which development can be undertaken. Accordingly, in order to achieve the required residential densities, maximising the development lands to the west of the proposed local distributor road particularly on the Dublin Road section of the lands was necessary.

6. A report responding to the matters raised in the report of the Kildare County Council Transportation Department dated 25/11/2021. The report shall include, inter alia, the following:

a) Details of proposed junction design at Shinkeen Road and Dublin Road, including proposals for signalisation where required.

b) Proposals to address the lack of pedestrian and cycle facilities along the Dublin Road.

c) A Quality Audit in accordance with Advice Note 4 of DMURS. Such audit should consider the quality of pedestrian and cycle connections to services and amenities in the surrounding area.

d) A parking management plan.

e) A Travel Plan / Mobility Management Plan.

f) A Construction Traffic Management Plan which should have regard to the proposed phasing of development under item no. 3 above.

Appendix E provides a detailed response to the matters raised in the report of Kildare County Council Transportation Department dated 25/11/2021. In addition, the following is confirmed:

a) Section 4 of this TTA provides a detailed description of the proposed site access junctions which are proposed to be signal controlled in response to the KCC Opinion and in the interest of provision for vulnerable road users.

b) It is acknowledged that the Celbridge Local Area Plan 2017-2023 identifies an objective for road and footpath improvements along the Dublin Road. To allow for this, the building line along the Dublin Road corridor has been set back to ensure appropriate cycle and pedestrian facilities can be introduced in the future by the Planning Authority. Whilst no scheme has been developed to date by the Planning Authority, this allows for sufficient space that will be compatible with numerous potential future cycle schemes on the Dublin Road corridor. The subject site layout incorporates a 2m wide footpath and 2m wide cycle track within the site boundary on the southern side of the Dublin Road corridor. Should an alternative arrangement be preferred, this can be easily incorporated into the subject scheme due to the significant set back proposed at this location. In the interim (before a cycle scheme along the Dublin Road corridor is developed), the proposed cycle and pedestrian link through the subject lands offers a safe and attractive connection between the Dublin Road corridor and existing cycle facilities on Shinkeen Road which in turn link with the Dublin Road corridor. The subject scheme proposes the provision of a two-way off-road cycle track between the access junctions on the Shinkeen Road and Dublin Road corridors. The north-south link provides a safe and attractive cycle / pedestrian route between the Dublin Road site access and the existing cycle / pedestrian infrastructure on Shinkeen Road. This will significantly enhance the local cycle / pedestrian network creating a shorter safer cycle / pedestrian route between the Dublin Road corridor (for residents residing here) and Hazelhatch & Celbridge Train Station. This north-south pedestrian / cycle link will be further extended southwards as part of the Phase 2 development on the wider KDA 2 lands as far as the future Roads Objective MTO3.9.

c) A Quality Audit (inc. Road Safety Audit) has been undertaken by an independent Auditor (Bruton Consulting Engineers) and is submitted as part of this planning application.

d) A parking management plan is outlined in Section 4 of this TTA and Appendix D.

e) A Mobility Management Plan has be submitted as part of the subject planning application (Report No. 180221-DBFL-TR-XX-RP-C-0006 MMP)

f) A Construction and Environmental Management Plan has been included as part of this planning application (Report No. 180221-DBFL-XX-XX-RP-C-0004-CEMP). A Construction Traffic Management Plan will be compiled by the contractor prior to commencement of construction.