

Nenagh Local Area Plan,
Planning Department,
Tipperary County Council,
Civic Offices,
Limerick Road,
Nenagh,
Co Tipperary

11th September 2023

Re: Submission on the Draft Nenagh Local Area Plan 2024 - 2030

Dear Sir / Madam,

HRA PLANNING has been retained by [REDACTED] (our client) to prepare this submission to Tipperary County Council in respect of the Draft Nenagh Local Area Plan 2024 - 2030 (Draft LAP).

Our client has a landholding comprising 43.3 hectares located northeast of the town centre, defined by the N52 to the north and the R497 to the west. The land is located within the defined Nenagh town boundary and the Draft Local Area Plan boundary. It currently benefits from a mix of landuse zonings in the current Nenagh Town & Environs Development Plan 2013 – 2019, including 5.8 hectares of business & employment use and 5.3 hectares of Serviced Sites P2 land.

1.0 Purpose of Submission

A pre-draft submission was made on the LAP seeking mixed use zoning on the entirety of the subject site, save for land immediately surrounding the existing house and land adjoining the river, subject to flooding. It was highlighted to the planning authority at that time that the location of the land adjacent to [REDACTED] which employs circa [REDACTED] people and in proximity to other employment nodes, provides an opportunity to promote synergies enabled through the delivery of mixed-use development, including residential, employment and commercial uses.

Further, the mixed use zoning was sought subject to:

- Preparation of an overall phased masterplan for the land which will guide future development extents and use;

- Maintenance of a green buffer along the N52 as represented in the existing Plan; and
- Provision of dedicated community facilities, including open space to be agreed with the planning authority.
- Provision of a mix of uses, including residential, commercial, employment and community uses;
- Maintenance of an open space / amenity zoning along the Nenagh River to protect against potential flooding and to facilitate continuance of the Nenagh River walkway;

However, rather than zone the subject land for mixed use purposes as requested, the Draft LAP has sought to de-zone the business & employment use to 'Town Environs' use, which really comprises agricultural use. Accordingly, within an overall 43.3 hectares landholding in the environs of Nenagh Town, the Draft LAP has only assigned a development use to 5.3 hectares comprising residential use.

A review of the Serviced Land Assessment (SLA) for Employment Use (Appendix 1) in relation to the 5.8 hectares of land zoned for business & employment use in the existing Development Plan, states that the

"Site is proximate to residentially zoned lands. Expected that waste water services will be available within the lifetime of the Plan. However, the site only has road access onto national routes which is unlikely to be supported, particularly given proximity to the roundabout junction. See Spatial Planning and National Roads Guidelines".

This submission does not seek to re-state the key arguments already made at pre-draft plan stage. Rather this submission demonstrates that an alternative access off the R497 can be secured to service the land and that the site is not dependent on access onto the N52, thereby supporting continuation of business & employment use at this location. It also demonstrates why the Draft LAP should identify 5.81 hectares of land for Strategic Reserve Use, to be developed for residential use at some time in the future.

2.0 Access

A Traffic Report has been prepared by Traffic Transport and Road Safety Associates Ltd. (TTRSA) demonstrating how safe access can be provided off the R497 Borrisokane Road. Access is proposed from a 4-arm roundabout junction at the south-western corner of the existing business & employment use lands. The roundabout also provides access to the Drummin Village estate, replacing the existing t-junction at this location.

Peak hour trip generation for the zoned lands has been estimated based on trip generation traffic count surveys (previously undertaken by TTRSA), covering a range of business and employment uses including; distribution; manufacturing; offices; storage and distribution; and, wholesaling. The estimated trip generation has been based on a gross floor area (GFA) of 27,500m², which would represent 50 percent of the zoned area, and would be typical for the type of development being considered.

The traffic modelling results show that a roundabout complying with TL703 with a 30m ICD, with predicted trips from committed development, planned development and development of the zoned lands, is predicted to operate with 40% spare capacity in 2044 AM peak hour, and 35% spare capacity in the 2044 PM peak hour. The queuing associated with the junction is also predicted to be minimal.

Further TTRSA confirmed that development on that area of land zoned for business & employment use is also not likely to indirectly impact the N52 or the roundabout junction to the north, with development of large format low employment intensity use operators. Development of this nature, including for example warehousing and logistics with associated offices, is predicted to generate 403 daily traffic movements (in PCUs) at this junction, an increase of approximately 4%, thereby under the 5% threshold value normally considered to represent a material intensification.

Thus, contrary to the assumptions made in the Strategic Land Assessment for Employment Uses as detailed in Appendix 1 of the Draft Plan, the subject site is capable of being accessed off the R497, thereby preserving the N52 route. Accordingly, contrary to the opinion of the planning authority the proposed development would not be contrary to the Spatial Planning and National Roads Guidelines.

The subject land can therefore be considered in the same vein as the business & employment zoned land to the north of Gortlandroe, also adjoining the N52. In this instance, the Strategic Land Assessment for Employment Uses noted that the land will require access from Gortlandroe and Drommin road. It also noted that the site had strategic advantages with proximity to motorway for large format low employment intensity use operators. It is submitted to the planning authority that a similar position applies to the subject land in that the subject site also has strategic advantages with proximity to the motorway for large format low employment intensity use operators. Further, having regard to the location of the land, in closer proximity to the town core than the land zoned for business & employment use in Gortlandroe, there is justifiable reason for zoning the subject land on compact and sequential growth reasons, particularly having regard to its spatial location in proximity to existing employment nodes (AIBP Food Group) and neighbouring residential uses.

3.0 Strategic Reserve Land

The National Planning Framework incorporates National Strategic Objectives which seek to tackle the damaging and inefficient pattern of urban sprawl through favouring compact forms of development that focus on consolidating the footprint of our existing settlements with new development. The location of zoned lands and sites within the settlement must be consistent with sequential development patterns, town centre first principles, proximity to services and facilities and the need to reduce carbon emissions.

Section 6.2.3 of the Development Plans – Guidelines for Planning Authorities states that,

“Planning authorities shall adopt a sequential approach when zoning lands for development, whereby the most spatially centrally located development sites in settlements are prioritised for new development first, with more spatially peripherally located development sites being zoned subsequently”.

The subject land offers 426m of road frontage onto the R497 and is located within 470m walking distance of town centre zoned land. As confirmed in the Strategic Land Assessment for Residential Uses, the subject land benefits from roads, footpaths, water, public lighting and foul sewerage. In contrast a site identified as ‘Site 3’ in the Strategic Land Assessment for Residential Uses, situated a similar distance from the subject land, but yet not benefitting from any infrastructure, has been zoned for Strategic Reserve purposes. Similarly, land identified as ‘Site 5’, situated a further distance from the town centre than the subject site, has been zoned for residential use.

Having regard to the precedence set for the selection of residential zoned land and land zoned for Strategic Reserve in the Draft LAP, it is requested that 5.81 hectares of land is zoned for Strategic Reserve purposes, as clearly identified on the attached drawing.

It is submitted to the planning authority that identification of such land for Strategic Reserve purposes would appropriately identify land for future residential development adjoining existing zoned land in proximity to the town centre and in an area of the town appropriately serviced with adequate infrastructure, including roads, footpaths, water, public lighting and foul sewerage.

4.0 The Request

It is requested that the Draft Nenagh LAP is amended to include:

Zoning of 5.8 hectares of land for business & employment use; and

Zoning of 5.81 hectares of land for Strategic Reserve purposes.

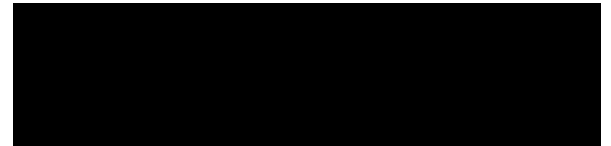
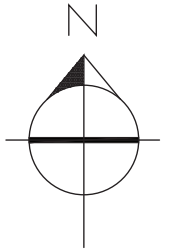
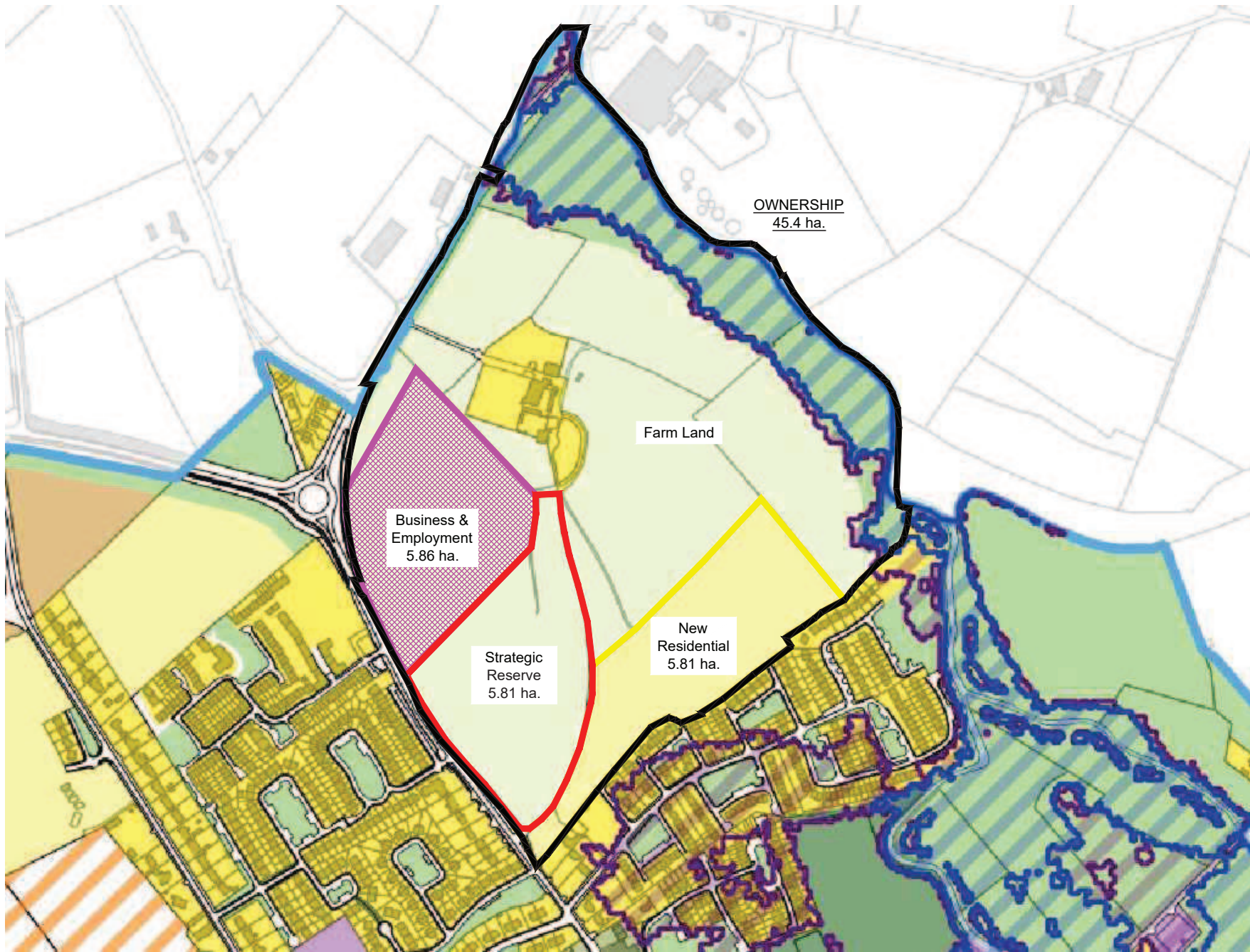
I trust that the submission provides sufficient information at this stage in the process. However, should you require clarification on any issue please do not hesitate to contact us.

Yours faithfully

A large black rectangular redaction box covering the signature area.

Mary Hughes MIPI

Director HRA Planning chartered town planning consultants DAC



Access to Business and Employment Zoned Lands at Nenagh North Td., Nenagh, Co. Tipperary

Traffic Report

8th September 2023

Prepared for



Traffic Transport and Road Safety Associates Ltd.

14 Penrose Wharf

Penrose Quay

Cork

t. +353(0)21 4555601

e. info@ttrsa.com



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Non-technical summary

- TTRSA has been commissioned by [REDACTED] to prepare a Traffic Report covering access off the R497 Borrisokane Road, to business and employment zoned lands, at Nenagh North Td., Nenagh, Co. Tipperary.
- Approximately 5.85 hectares of Mr. Lind's lands are currently zoned for business and employment use within the Nenagh Town and Environs Development Plan 2013-2019 (as extended). These zoned lands are bordered to the north by the N52 national road and to the west by the R497 Borrisokane Road.
- As a new development access is unlikely to be granted onto the N52 where the default national speed limit applies, any access to the zoned lands would need to be from the R497 Borrisokane Road. [REDACTED] proposes access from a 4-arm roundabout junction at the south-western corner of the zoned lands, the roundabout also providing access to the Drummin Village estate, replacing the existing t-junction at this location.
- HRA planning, [REDACTED] planning consultant, has informed TTRSA that the proposed development is likely to comprise warehousing and logistics.
- TTRSA undertook a video-based manual classified traffic count survey at the existing R497/Drummin Village estate junction, on Tuesday 10th May 2022. The local traffic peak hours identified from the traffic count survey were an AM peak hour of 08:15-09:14 and a PM peak hour of 16:45-17:44.
- Existing traffic on the R497 Borrisokane Road, has been growthed to an opening year (for the proposed development of [REDACTED] zoned lands) of 2029, and a future assessment years 2044 (fifteen years after opening) using TII Project Appraisal Guidelines central link based growth factors for County Tipperary.
- Peak hour trip generation for the [REDACTED] zoned lands has been estimated based on trip generation traffic count surveys (previously undertaken by TTRSA), covering range of business and employment uses including; distribution; manufacturing; offices; storage and distribution; and, wholesaling. The estimated trip generation has been based on a gross floor area (GFA) of 29,250m², which would represent 50 percent of the zoned area, and would be typical for the type of development being considered.
- The assessment contained within this Traffic Report also takes account of the committed and planned developments within the Drummin Village estate covered by planning references [REDACTED] and [REDACTED] including the masterplan for subsequent development associated with the latter application.
- As a basis for assessment of the geometric requirements and capacity of a 4-arm roundabout junction on the R497 Borrisokane Road (to provide access to [REDACTED] zoned lands and the Drummin Village estate) TTRSA prepared a geometric layout complying with TL703 (Segregated Roundabout with Shared Active Travel Facilities) within the Cycle Design Manual (CDM) with a 30m inscribed circle diameter (ICD).
- The operation of the 4-arm roundabout junction was assessed using TRL Junctions (ARCADY) traffic modelling software, which is specified by TII as being appropriate to model the capacity of roundabout junctions, for the weekday AM and PM peak hours in the opening and future assessment years, with trips from committed development, planned development and development of the zoned lands.
- The traffic modelling results show that a roundabout complying with TL703 with a 30m ICD, with predicted trips from committed development, planned development and development of the zoned lands, is predicted to operate with 41% spare capacity in 2044 AM peak hour, and 36% spare capacity in the 2044 PM peak hour. The queuing associated with the junction is also predicted to be minimal.
- Based on AADT estimates of: 8216 for the R497 Borrisokane Road; 8855 for the N52 to the north-east of the N52/R497 roundabout; and, 3279 to the west of the N52/R497 roundabout, the N52/R497 roundabout junction has 10175 daily traffic movements. The development of Mr Lind's zoned lands for warehousing and logistics with associated offices is predicted to generate 403 daily traffic movements (in PCUs) at this junction, an increase of approximately 4%, thereby under the 5% threshold value normally considered to represent a material intensification.

1 Introduction

1.1 Traffic Transport and Road Safety Associates

Traffic Transport and Road Safety Associates Ltd. (TTRSA) is a specialist Traffic Engineering and Transport Planning practice, based in Ireland. The senior managers within TTRSA have extensive experience of developing traffic management schemes, assessing the transport related impacts of development and improving road safety both nationally and internationally.

TTRSA has been commissioned by [REDACTED] to prepare a Traffic Report for access off the R497 Borrisokane Road, to business and employment zoned lands, at Nenagh North Td., Nenagh, Co. Tipperary.

1.2 Proposed development

Approximately 5.85 hectares of [REDACTED] lands are currently zoned for business and employment use within the Nenagh Town and Environs Development Plan 2013-2019 (as extended). These zoned lands are bordered to the north by the N52 national road and to the west by the R497 Borrisokane Road.

Because a new development access is unlikely to be granted onto the N52 national road where the default national speed limit applies, any access to the zoned lands would need to be from the R497 Borrisokane Road. [REDACTED] proposes access from a 4-arm roundabout junction at the south-western corner of the zoned lands, the roundabout also providing access to the Drummin Village estate, replacing the existing t-junction at this location.

HRA planning, [REDACTED] planning consultant, has informed TTRSA that the proposed development is likely to comprise warehousing and logistics.

1.3 Format of this Traffic Report

This Traffic Report has been prepared with cognisance of the Transport Infrastructure Ireland (TII) document 'Traffic and Transport Assessment Guidelines' (PE-PDV-02045) published in May 2014. All prevailing guidance and standards including: the 2023 'Cycle Design Manual' (CDM); 2019 Design Manual for Urban Roads and Streets (DMURS); and/or, the development management standards contained within the Tipperary County Development Plan 2022-2028 (CDP), as appropriate. The remaining sections of the Traffic Report are set out as follows:

- Chapter 2 outlines the existing local conditions into which the proposed development meshes, including the nature of the road network and existing traffic levels; and,
- Chapter 3 assesses the traffic related impact of the zoned lands, including trip generation, distribution, assignment and junction operation.

2 Existing conditions

2.1 The local highway network

As noted in Section 1.2, [REDACTED] proposes access to his zoned lands from a 4-arm roundabout junction at the south-western corner of the zoned lands, the roundabout also providing access to the Drummin Village estate, replacing the existing t-junction at this location (Plate 2.1). In the immediate vicinity of this junction, the R497 is formed from a 6m wide single carriageway bounded by 1.5m wide on-road cycle tracks. A 1.6m wide footpath bounds the eastern side of the R497, whilst the footpath on the western side of the R497 is separated from the carriageway by a wide verge. The posted speed limit is 50km/h.

Plate 2.1: The existing R497/Drummin Village estate junction



2.2 Existing traffic levels

TTRSA undertook a video-based manual classified traffic count survey at the existing R497/Drummin Village estate junction, on Tuesday 10th May 2022. The local traffic peak hours identified from the traffic count survey were an AM peak hour of 08:15-09:14 and a PM peak hour of 16:45-17:44.

Analysis of the traffic data recorded by permanent TII traffic counters on national roads to the north of the N7, shows that traffic volumes on 10th May 2022 were 0.8% over 2022 Annual Average Daily Traffic (AADT) on the N65 to the north of Borrisokane and 4.6% over AADT on the N62 to the north of Roscrea¹. No factoring has therefore been applied to adjust for seasonality.

For the purpose of the assessment contained within this Traffic Report, the traffic count data has been converted into Passenger Car Units (PCUs), using factors of: 0.2 for pedal cycles; 0.4 for motorcycles; 1.0 for cars and light goods vehicles (LGV) including those towing trailers; and 2.3 for buses (PSV) and all types of rigid and articulated Medium and Heavy Commercial Vehicles (HCVs). A summary of the peak hour traffic count data including PCU values is provided as Appendix A.

2.3 Road safety

Consultation of Health Atlas Ireland online collision data for the period 2005-2016 inclusive (the latest period currently publicly available) to the date of the initial issue of this report (5th September 2023) indicates that one collision has been reported on the R497 at the Drummin Village estate junction. The collision involved a bicycle on a Friday morning in 2016, resulting in minor injury to one person.

¹ TII do not have a permanent traffic counter on the N52 in the vicinity of Nenagh.

2.4 Proposed transport schemes

As part of preparing this Traffic Report a review has been undertaken of proposed transport schemes in the vicinity of the proposed development. Whilst the National Transport Authority (NTA) is planning to utilise the R97 Borrisokane Road as an 'Urban Primary' cycle route as part of its Nenagh Cycle Connects network, no significant schemes have been identified that would impact on, or be impacted by, the development of Mr. Lind's zoned lands.

2.5 Other planned developments

Information contained within the online Tipperary County Council Planning Register has been reviewed to the initial date of this Traffic Report (5th September 2023). Planning was granted for 36 residential units within the Drummin Village estate under planning reference [REDACTED]. These units had not been constructed at the time of the traffic count detailed in Section 2.2 of this report. Traffic generated by this development is included as 'committed development trips' within Appendix B.

Planning has also been submitted under planning reference [REDACTED] for further development of the Drummin Village estate, and a masterplan for subsequent development is also included within this application. Whilst a decision has not been made in relation to this application, on the basis that the residential zoned lands adjacent to Drummin Village will be developed, traffic generated by this submitted application is included as 'development trips planning application reference [REDACTED] phases 1-4' within Appendix B.

3 Traffic impact assessment of the proposed development

3.1 Trip generation

Peak hour trip generation for [REDACTED] zoned lands has been estimated based on trip generation traffic count surveys (previously undertaken by TTRSA) covering warehousing and logistics with associated offices on similar sites. The estimated trip generation has been based on a gross floor area (GFA) of 29,250m², which would represent 50 percent of the zoned area, and would be typical for the type of development being considered, taking into account: the land area required for access, car parking and other utilities; and, an element of offices on first floors, located over other associated business use.

The peak hour trip generation rates applied are provided in Table 3.1, and the estimated trips that would be generated by the development of [REDACTED] zoned lands for business and employment use are shown in Table 3.2.

Table 3.1: Peak hour trip generation rate for business and employment use, per 100m²

Time Period	Arrivals				Departures			
	Bicycle	Car/LGV	HGV/Bus	Total	Bicycle	Car/LGV	HGV/Bus	Total
AM Peak	0.017	0.282	0.000	0.299	0.000	0.113	0.000	0.113
PM Peak	0.000	0.056	0.011	0.068	0.017	0.242	0.006	0.265

Trip rates in vehicles

Table 3.2: Estimated trip generation for Mr Lind's zoned lands based on 29,250m² GFA of business and employment use

Time Period	Arrivals				Departures			
	Bicycle	Car/LGV	HGV/Bus	PCUs	Bicycle	Car/LGV	HGV/Bus	PCUs
AM Peak	5	82	0	83	0	33	0	33
PM Peak	0	16	3	24	5	71	2	76

Trips in vehicles, and PCUs, both rounded to the nearest whole number

3.2 Trip distribution and assignment

For the purpose of this assessment the trips predicted to be generated by the proposed development have been distributed and assigned based on 9% of traffic movements being from [REDACTED] zoned lands to the Drummin Village estate, representing local employment opportunities, with the remaining 91% of trips being distributed and assigned onto the R497 Borrisokane Road based on existing proportional traffic flows. The impact of the distribution and assignment of estimated trips generated from the development of [REDACTED] zoned lands in detailed in Appendix B.

3.3 Opening and future year traffic

For the purpose of the assessment contained within this Traffic Report, it is assumed that development of [REDACTED] zoned lands will occur within the plan period. Therefore, existing traffic on the R497 Borrisokane Road has been growthed to an opening year of 2029, and a future assessment years 2044 (fifteen years after opening) using TII Project Appraisal Guidelines central link based growth factors for County Tipperary, with 3.8% HCVs. The growth factors applied being:

- From 2022 to 2029 a factor of 1.092; and,
- From 2022 to 2044 a factor of 1.156.

The impact of this traffic growth is detailed within Appendix B.

3.4 Access junction to the zoned lands

As noted in Section 1.2, [REDACTED] proposes access to his zoned lands from the R497 Borrisokane Road via a 4-arm roundabout junction which will also provide access to the Drummin Village estate. As a basis for assessment of the geometric requirements and capacity of such as junction, TTRSA prepared a geometric layout based on roundabout complying with TL703 of the CDM² (Segregated Roundabout with Shared Active Travel Facilities), with: a 30m inscribed circle diameter (ICD); 3.5m approach and departure lane widths on the R497 Borrisokane Road and access road to the zoned lands and 3.0m approach and departure lane widths for the Drummin Village estate; 5m circulatory width; 3m central run-over area; and, 14m diameter central island.

3.5 Percentage impact of the proposed development on the R497/N52 national road junction

Based on the traffic count survey detailed in Section 2.2 of this report the estimated AADT for the R497 is 8216. 2019 AADT estimates from the National Transport Model (NTpM) for the N52 are 8855 to the north-east of the R497 and 3279 to the west of the R497. Based on these AADT values, the R497/N52 national road junction has 10175 daily traffic movements. The development of [REDACTED] zoned lands for warehousing and logistics with associated offices is predicted to generate 403 daily traffic movements (PCUs) at the R497/N52 national road junction, an increase of approximately 4%. This is under the 5% threshold values for further assessment detailed in TII PE-PDV-02045, normally considered to represent a material intensification.

3.6 Assessment of junction operation

The operation of the 4-arm roundabout junction detailed in Section 3.4 has been assessed using TRL Junction (ARCADY) traffic modelling software, which is specified by TII as being appropriate to model the capacity of roundabout junctions. The assessment covers the weekday AM and PM peak hours in the opening and future assessment years, with trips from committed development, planned development and development of the zoned lands. Traffic related to the scenarios tested is detailed in Appendix C.

The assessment has been undertaken using PCU values. The criteria used to assess the performance of a junction for a given traffic demand within the aforementioned traffic modelling software are:

- Ratio of Flow to Capacity (RFC) is a measure of junction performance in terms of saturation. A value of 1.00, which can also be considered as 100% saturation, represents an arm of the junction operating at maximum capacity, in that any increase in the rate of vehicles arriving on the link will result in significant additional queue lengths. Traditionally a figure of 0.85 or 85% is the maximum acceptable degree of saturation, with anything above this level considered to be congested.

2 TL703 from the CDM included as Appendix C for information only

- Queue lengths (measured in PCUs) are primarily used to check for blocking back through adjacent junctions.

The results of the assessment are summarised in Table 3.3, and the modelling output file is included as Appendix D of this Traffic Report.

In summary, the results show that [REDACTED] proposal to access his zoned lands via a roundabout junction on the R497 Borrisokane Road, also providing access to the Drummin Village estate, are achievable in capacity terms based on a roundabout layout complying with TL703 of the CDM. Based on the geometric characteristics detailed in Section 3.4, and with predicted trips from committed development, planned development and development of the zoned lands, the resulting roundabout junction is predicted to operate with 41% spare capacity in 2044 AM peak hour, and 36% spare capacity in the 2044 PM peak hour. The queuing associated with the junction is also predicted to be minimal.

Table 3.1 – Summary of ARCADY output for a 4-arm R497/Drummin Village/zoned lands roundabout junction (complying with the requirements of CDM TL703)

	AM				PM			
	Set ID	Queue (PCU)	Delay (s)	RFC	Set ID	Queue (PCU)	Delay (s)	RFC
2029 With Committed and Planned Development								
Arm A	D1	0.9	7.23	0.47	D4	1.2	8.50	0.54
Arm B		0.3	6.49	0.21		0.2	5.95	0.13
Arm C		0.7	6.06	0.39		0.7	6.25	0.41
Arm D		0.0	0.00	0.00		0.0	0.00	0.00
2029 With Committed, Planned and Zoned Development								
Arm A	D2	1.1	8.07	0.52	D5	1.4	9.26	0.57
Arm B		0.3	7.04	0.24		0.2	6.21	0.14
Arm C		0.8	6.77	0.44		0.8	6.45	0.42
Arm D		0.0	4.92	0.05		0.1	5.32	0.11
2044 With Committed, Planned and Zoned Development								
Arm A	D3	1.5	9.35	0.59	D6	1.8	11.04	0.64
Arm B		0.3	7.35	0.24		0.2	6.56	0.14
Arm C		1.1	7.59	0.50		1.0	7.15	0.48
Arm D		0.1	5.12	0.05		0.1	5.54	0.11

Appendix A

Traffic Count Data

Video-based Manual Classified Count Tuesday 10th May 2022
Existing R497/Drummin Village estate junction, Nenagh, Co. Tipperary



Arm A = R497 to/from Town Centre
 Arm B = Drummin Village estate
 Arm C = R497 to/from N52

PCU Factors

Cycle 0.2
 Motorcycle 0.4
 Car/LGV 1
 HGV/PSV 2.3

Incidents: None
Weather: Dry

Cycle	A-B	A-C	B-A	B-C	C-A	C-B
08:15 – 08:29	0	0	0	0	0	0
08:30 – 08:44	0	0	0	0	0	0
08:45 – 08:59	0	0	1	0	0	0
09:00 – 09:15	0	0	0	1	0	0
16:45 – 16:59	0	0	0	0	0	0
17:00 – 17:14	0	0	0	0	3	1
17:15 – 17:29	0	0	0	0	3	0
17:30 – 17:44	1	0	0	1	0	0

Motorcycle	A-B	A-C	B-A	B-C	C-A	C-B
08:15 – 08:29	0	0	0	0	0	0
08:30 – 08:44	0	0	0	0	0	0
08:45 – 08:59	0	0	0	0	0	0
09:00 – 09:15	0	0	0	0	0	0
16:45 – 16:59	0	0	0	0	0	0
17:00 – 17:14	0	0	0	0	1	0
17:15 – 17:29	0	0	0	0	0	0
17:30 – 17:44	0	0	0	0	0	0

Car / LGV	A-B	A-C	B-A	B-C	C-A	C-B
08:15 – 08:29	7	73	5	9	83	1
08:30 – 08:44	6	115	17	18	89	2
08:45 – 08:59	13	82	6	18	78	5
09:00 – 09:15	11	49	8	3	81	1
16:45 – 16:59	9	86	11	4	72	4
17:00 – 17:14	9	83	6	3	86	8
17:15 – 17:29	17	89	7	2	66	9
17:30 – 17:44	15	99	10	1	81	8

HGV/PSV	A-B	A-C	B-A	B-C	C-A	C-B
08:15 – 08:29	0	7	0	0	0	0
08:30 – 08:44	0	6	0	0	2	0
08:45 – 08:59	0	5	0	1	3	1
09:00 – 09:15	2	3	1	0	4	0
16:45 – 16:59	0	2	1	0	3	0
17:00 – 17:14	2	6	1	0	0	0
17:15 – 17:29	0	4	0	0	4	0
17:30 – 17:44	0	1	0	0	4	0

Total Vehicles	A-B	A-C	B-A	B-C	C-A	C-B
08:15 – 08:29	7	80	5	9	83	1
08:30 – 08:44	6	121	17	18	91	2
08:45 – 08:59	13	87	7	19	81	6
09:00 – 09:15	13	52	9	4	85	1
16:45 – 16:59	9	88	12	4	75	4
17:00 – 17:14	11	89	7	3	90	9
17:15 – 17:29	17	93	7	2	73	9
17:30 – 17:44	16	100	10	2	85	8

PCUS	A-B	A-C	B-A	B-C	C-A	C-B
08:15 – 08:29	7	89	5	9	83	1
08:30 – 08:44	6	129	17	18	94	2
08:45 – 08:59	13	94	6	20	85	7
09:00 – 09:15	16	56	10	3	90	1
16:45 – 16:59	9	91	13	4	79	4
17:00 – 17:14	14	97	8	3	87	8
17:15 – 17:29	17	98	7	2	76	9
17:30 – 17:44	15	101	10	1	90	8

PCUs are rounded to the nearest whole number

PCUS	A-B	A-C	B-A	B-C	C-A	C-B
AM Peak Hour	42	367	39	51	352	11
PM Peak Hour	55	387	39	10	332	29

PCUs are rounded to the nearest whole number

Appendix B

Traffic Calculations Summary - Scenarios

Traffic Calculations – Summary

Proposed R497/Drummin Village/Zoned Lanes Roundabout Junction, Nenagh



Arm A = R497 to/from Town Centre

Arm B = Drummin Village estate

Arm C = R497 to/from N52

Arm D = Access to Zoned Lands

Scenario	A-B	A-C	A-D	B-A	B-C	B-D	C-A	C-B	C-D	D-A	D-B	D-C
2022 AM Peak Hour Traffic Count (08:15-09:14)	42	367	0	39	51	0	352	11	0	0	0	0
2029 AM Peak Hour (Factor = 1.092) Background Traffic Growth	42	367	0	39	51	0	352	11	0	0	0	0
AM Peak Hour Committed Development Trips	4	0	0	5	6	0	0	1	0	0	0	0
AM Peak Development Trips Planning App. Ref. 2360551 Phases 1-4	15	0	0	19	24	0	0	4	0	0	0	0
2029 AM Peak Hour With Committed and Planned Development	60	367	0	62	81	0	352	16	0	0	0	0
AM Peak Hour Zoned Lands Development Trips	0	0	55	0	0	10	0	0	49	13	3	14
2029 AM Peak Hour with Committed, Planned and Zoned Lands	60	367	55	62	81	10	352	16	49	13	3	14
2044 AM Peak Hour (Factor 1.156) Background Traffic Growth	42	425	0	39	51	0	407	11	0	0	0	0
2044 AM Peak Hour with Committed, Planned and Zoned Lands	60	425	55	62	81	10	407	16	49	13	3	14
2022 PM Peak Hour Traffic Count (16:45-17:44)	55	387	0	39	10	0	332	29	0	0	0	0
2029 PM Peak Hour (Factor = 1.092) Background Traffic Growth	55	387	0	39	10	0	332	29	0	0	0	0
PM Peak Hour Committed Development Trips	8	0	0	6	2	0	0	4	0	0	0	0
PM Peak Development Trips Planning App. Ref. 2360551 Phases 1-4	32	0	0	23	6	0	0	17	0	0	0	0
2029 PM Peak Hour With Committed and Planned Development	94	387	0	67	18	0	332	50	0	0	0	0
PM Peak Hour Zoned Lands Development Trips	0	0	13	0	0	2	0	0	10	57	12	63
2029 PM Peak Hour with Committed, Planned and Zoned Lands	94	387	13	67	18	2	332	50	10	57	12	63
2044 PM Peak Hour (Factor 1.156) Background Traffic Growth	55	447	0	39	10	0	384	29	0	0	0	0
2044 PM Peak Hour with Committed, Planned and Zoned Lands	94	447	13	67	18	2	384	50	10	57	12	63

Data in PCUs rounded to the nearest whole number

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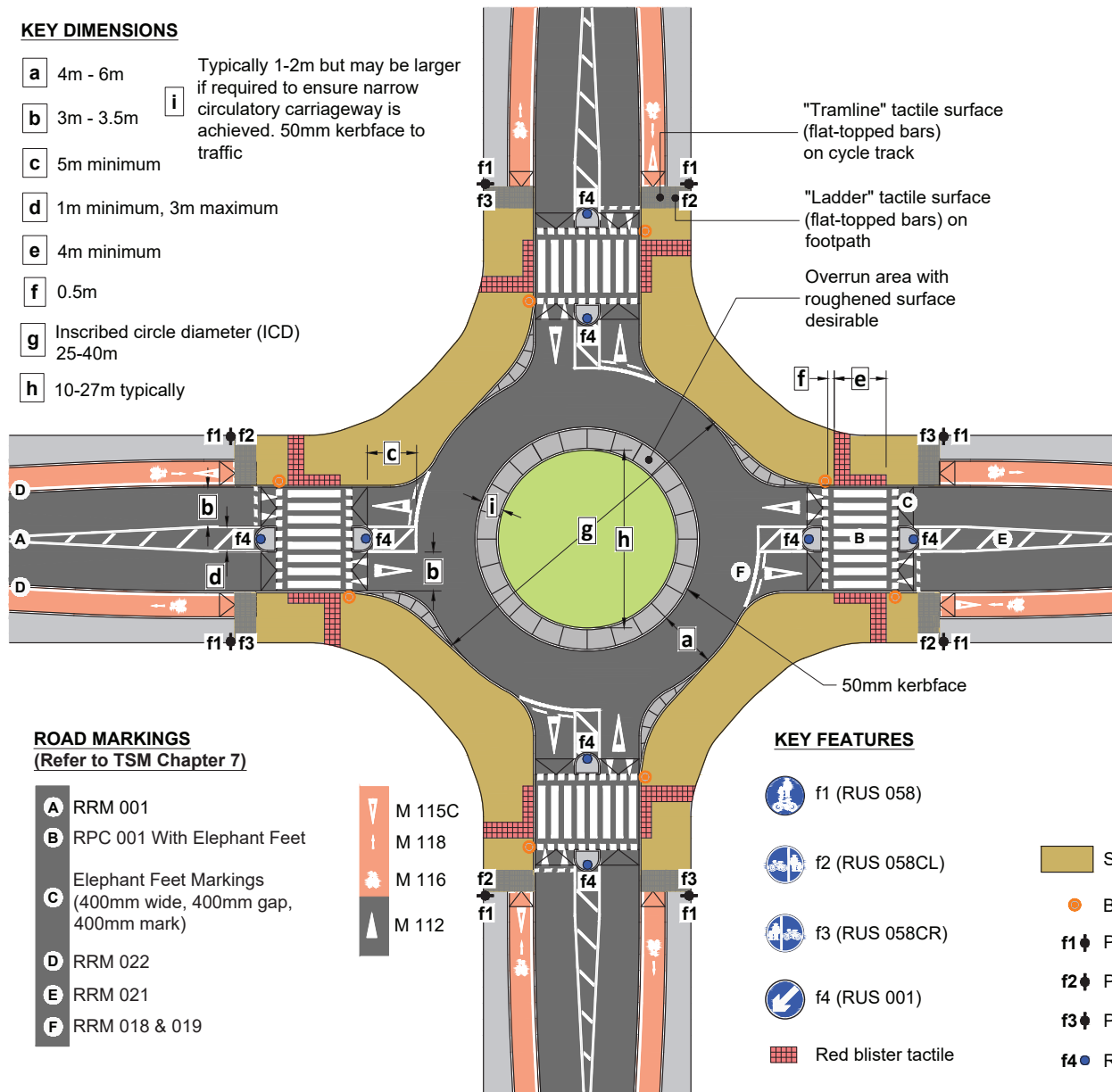
Appendix C

Cycle Design Manual – TL703 Segregated Roundabout with Shared Active Travel Facilities

TL703 Segregated Roundabout with Shared Active Travel Facilities

KEY DIMENSIONS

- a** 4m - 6m
 - b** 3m - 3.5m
 - c** 5m minimum
 - d** 1m minimum, 3m maximum
 - e** 4m minimum
 - f** 0.5m
 - g** Inscribed circle diameter (ICD) 25-40m
 - h** 10-27m typically
- i** Typically 1-2m but may be larger if required to ensure narrow circulatory carriageway is achieved. 50mm kerbface to traffic



ROAD MARKINGS

(Refer to TSM Chapter 7)

- A** RRM 001
- B** RPC 001 With Elephant Feet
- C** Elephant Feet Markings (400mm wide, 400mm gap, 400mm mark)
- D** RRM 022
- E** RRM 021
- F** RRM 018 & 019

- M 115C
- M 118
- M 116
- M 112

KEY FEATURES

f1 (RUS 058)

f2 (RUS 058CL)

f3 (RUS 058CR)

f4 (RUS 001)

Red blister tactile

Shared Area

Belisha Beacon

f1 Pole with sign RUS 058 on side f1

f2 Pole with sign RUS 058CL on side f2

f3 Pole with sign RUS 058CR on side f3

f4 Reflective bollard with sign RUS 001 on side f4

NOTES:

1. Suitable in urban areas only and for traffic capacities up to 25,000 vehicles per day.
2. Other protected roundabout layouts (TL 701 or TL 702) are preferred, where space permits, to maintain segregation between modes.
3. Not appropriate for new development schemes with segregated cycle infrastructure; space should be made available for protected roundabout layouts (TL 701 or TL 702).
4. ICD typically 25-40m.
5. Single lane approaches only.
6. Approach arms perpendicular to central island with no flaring. Consider overrun areas at exit kerbs if required for larger vehicles.
7. Narrow circulatory carriageway with overrun area around central island for larger vehicles.
8. Combined zebra crossings (TL 605) to be provide on all arms. Crossing should be raised and set back 5m minimum from yield line.
9. Provision of refuge islands in zebra crossings recommended where space permits.
10. Belisha beacons or zebra crossing signs may be considered.



Appendix D

ARCADY Modelling Output File

Junctions 9
ARCADY 9 - Roundabout Module
Version: 9.5.1.7462 © Copyright TRL Limited, 2019
For sales and distribution information, program advice and maintenance, contact TRL: +44 (0)1344 379777 software@trl.co.uk www.trlsoftware.co.uk
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Filename: Geo_Layout_TL703_whd.j9
Path: \\192.168.1.33\trsa\projects\T230806_Nenagh_Chris_Lind_Lands_Traffic_Report\update\arcady
Report generation date: 08/09/2023 11:31:25

- »2029 With Committed and Planned Development, AM
- »2029 With Committed, Planned and Zoned Development, AM
- »2044 With Committed, Planned and Zoned Development, AM
- »2029 With Committed and Planned Development, PM
- »2029 With Committed, Planned and Zoned Development, PM
- »2044 With Committed, Planned and Zoned Development, PM

Summary of junction performance

		AM			PM			
	Set ID	Queue (PCU)	Delay (s)	RFC	Set ID	Queue (PCU)	Delay (s)	RFC
2029 With Committed and Planned Development								
Arm A	D1	0.9	7.23	0.47	D4	1.2	8.50	0.54
Arm B		0.3	6.49	0.21		0.2	5.95	0.13
Arm C		0.7	6.06	0.39		0.7	6.25	0.41
Arm D		0.0	0.00	0.00		0.0	0.00	0.00
2029 With Committed, Planned and Zoned Development								
Arm A	D2	1.1	8.07	0.52	D5	1.4	9.26	0.57
Arm B		0.3	7.04	0.24		0.2	6.21	0.14
Arm C		0.8	6.77	0.44		0.8	6.45	0.42
Arm D		0.0	4.92	0.05		0.1	5.32	0.11
2044 With Committed, Planned and Zoned Development								
Arm A	D3	1.5	9.35	0.59	D6	1.8	11.04	0.64
Arm B		0.3	7.35	0.24		0.2	6.56	0.14
Arm C		1.1	7.59	0.50		1.0	7.15	0.48
Arm D		0.1	5.12	0.05		0.1	5.54	0.11

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

File summary

File Description

Title	Geometric Layout 1 WHD - TL703 Compliant
Location	Nenagh, Co. Tipperary
Site number	
Date	08/09/2023
Version	Traffic Report
Status	Final
Identifier	
Client	██████████
Jobnumber	230806
Enumerator	TTRSA
Description	

Units

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

Analysis Options

Vehicle length (m)	Calculate Queue Percentiles	Calculate detailed queueing delay	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
5.75				0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	2029 With Committed and Planned Development	AM	ONE HOUR	08:00	09:30	15	✓
D2	2029 With Committed, Planned and Zoned Development	AM	ONE HOUR	08:00	09:30	15	✓
D3	2044 With Committed, Planned and Zoned Development	AM	ONE HOUR	08:00	09:30	15	✓
D4	2029 With Committed and Planned Development	PM	ONE HOUR	16:30	18:00	15	✓
D5	2029 With Committed, Planned and Zoned Development	PM	ONE HOUR	16:30	18:00	15	✓
D6	2044 With Committed, Planned and Zoned Development	PM	ONE HOUR	16:30	18:00	15	✓

Analysis Set Details

ID	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	✓	100.000	100.000

2029 With Committed and Planned Development, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		A, B, C, D	6.66	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
A	R497 to/from Town Centre	
B	Drummin Village Estate	
C	R497 to/from N52	
D	Access to Zoned Lands	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
A	3.48	3.90	0.3	6.0	30.0	17.7	
B	3.05	3.84	1.3	6.0	30.0	17.4	
C	3.49	4.13	1.3	6.0	30.0	14.6	
D	3.26	4.05	4.1	6.0	30.0	21.3	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
A	0.493	1001
B	0.479	933
C	0.508	1063
D	0.496	1039

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	2029 With Committed and Planned Development	AM	ONE HOUR	08:00	09:30	15	✓

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.30

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A		ONE HOUR	✓	427	100.000
B		ONE HOUR	✓	143	100.000
C		ONE HOUR	✓	368	100.000
D		ONE HOUR	✓	0	100.000

Origin-Destination Data

Demand (PCU/hr)

	To				
	A	B	C	D	
From	A	0	60	367	0
	B	62	0	81	0
	C	352	16	0	0
	D	0	0	0	0

Vehicle Mix

Heavy Vehicle Percentages

	To				
	A	B	C	D	
From	A	4	4	4	4
	B	4	4	4	4
	C	4	4	4	4
	D	4	4	4	4

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
A	0.47	7.23	0.9	A	392	588
B	0.21	6.49	0.3	A	131	197
C	0.39	6.06	0.7	A	338	507
D	0.00	0.00	0.0	A	0	0

Main Results for each time segment

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A	321	80	12	995	0.323	319	310	0.0	0.5	5.577	A
B	108	27	275	801	0.134	107	57	0.0	0.2	5.436	A
C	277	69	46	1039	0.267	276	335	0.0	0.4	4.937	A
D	0	0	322	879	0.000	0	0	0.0	0.0	0.000	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A	384	96	14	994	0.386	383	372	0.5	0.7	6.180	A
B	129	32	329	775	0.166	128	68	0.2	0.2	5.839	A
C	331	83	56	1034	0.320	330	402	0.4	0.5	5.362	A
D	0	0	386	847	0.000	0	0	0.0	0.0	0.000	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A	470	118	18	992	0.474	469	455	0.7	0.9	7.203	A
B	157	39	403	740	0.213	157	83	0.2	0.3	6.480	A
C	405	101	68	1028	0.394	404	492	0.5	0.7	6.050	A
D	0	0	473	804	0.000	0	0	0.0	0.0	0.000	A

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A	470	118	18	992	0.474	470	456	0.9	0.9	7.234	A
B	157	39	404	739	0.213	157	84	0.3	0.3	6.490	A
C	405	101	68	1028	0.394	405	493	0.7	0.7	6.065	A
D	0	0	473	804	0.000	0	0	0.0	0.0	0.000	A

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A	384	96	14	994	0.386	385	373	0.9	0.7	6.217	A
B	129	32	331	774	0.166	129	69	0.3	0.2	5.853	A
C	331	83	56	1034	0.320	332	404	0.7	0.5	5.383	A
D	0	0	387	846	0.000	0	0	0.0	0.0	0.000	A

09:15 - 09:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A	321	80	12	995	0.323	322	312	0.7	0.5	5.619	A
B	108	27	277	800	0.135	108	57	0.2	0.2	5.456	A
C	277	69	47	1039	0.267	278	338	0.5	0.4	4.966	A
D	0	0	324	878	0.000	0	0	0.0	0.0	0.000	A

2029 With Committed, Planned and Zoned Development, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		A, B, C, D	7.33	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D2	2029 With Committed, Planned and Zoned Development	AM	ONE HOUR	08:00	09:30	15	✓

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.30

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A		ONE HOUR	✓	467	100.000
B		ONE HOUR	✓	150	100.000
C		ONE HOUR	✓	403	100.000
D		ONE HOUR	✓	33	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		A	B	C	D
From	A	0	60	367	40
	B	62	0	81	7
	C	352	0	16	35
	D	14	3	16	0

Vehicle Mix

Heavy Vehicle Percentages

	To				
	A	B	C	D	
From	A	4	4	4	4
	B	4	4	4	4
	C	4	4	4	4
	D	4	4	4	4

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
A	0.52	8.07	1.1	A	429	643
B	0.24	7.04	0.3	A	138	206
C	0.44	6.77	0.8	A	370	555
D	0.05	4.92	0.0	A	30	45

Main Results for each time segment

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A	352	88	26	988	0.356	349	320	0.0	0.6	5.893	A
B	113	28	328	776	0.146	112	47	0.0	0.2	5.688	A
C	303	76	82	1021	0.297	302	359	0.0	0.4	5.237	A
D	25	6	322	879	0.028	25	61	0.0	0.0	4.422	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A	420	105	31	985	0.426	419	384	0.6	0.8	6.660	A
B	135	34	394	744	0.181	135	57	0.2	0.2	6.196	A
C	362	91	98	1013	0.358	362	431	0.4	0.6	5.796	A
D	30	7	386	847	0.035	30	74	0.0	0.0	4.620	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A	514	129	38	982	0.524	513	470	0.8	1.1	8.025	A
B	165	41	482	702	0.235	165	69	0.2	0.3	7.027	A
C	444	111	120	1002	0.443	443	527	0.6	0.8	6.744	A
D	36	9	472	804	0.045	36	90	0.0	0.0	4.919	A

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A	514	129	39	982	0.524	514	471	1.1	1.1	8.074	A
B	165	41	483	701	0.235	165	69	0.3	0.3	7.043	A
C	444	111	120	1002	0.443	444	528	0.8	0.8	6.770	A
D	36	9	473	804	0.045	36	90	0.0	0.0	4.922	A

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A	420	105	32	985	0.426	421	386	1.1	0.8	6.715	A
B	135	34	396	743	0.181	135	57	0.3	0.2	6.215	A
C	362	91	98	1013	0.358	363	433	0.8	0.6	5.824	A
D	30	7	388	846	0.035	30	74	0.0	0.0	4.625	A

09:15 - 09:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A	352	88	26	988	0.356	352	323	0.8	0.6	5.951	A
B	113	28	331	774	0.146	113	48	0.2	0.2	5.715	A
C	303	76	82	1021	0.297	304	362	0.6	0.4	5.275	A
D	25	6	324	878	0.028	25	62	0.0	0.0	4.429	A

2044 With Committed, Planned and Zoned Development, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		A, B, C, D	8.28	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D3	2044 With Committed, Planned and Zoned Development	AM	ONE HOUR	08:00	09:30	15	✓

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.30

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A		ONE HOUR	✓	525	100.000
B		ONE HOUR	✓	150	100.000
C		ONE HOUR	✓	458	100.000
D		ONE HOUR	✓	33	100.000

Origin-Destination Data

Demand (PCU/hr)

	To				
	A	B	C	D	
From	A	0	60	425	40
	B	62	0	81	7
	C	407	16	0	35
	D	14	3	16	0

Vehicle Mix

Heavy Vehicle Percentages

	To				
	A	B	C	D	
From	A	4	4	4	4
	B	4	4	4	4
	C	4	4	4	4
	D	4	4	4	4

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
A	0.59	9.35	1.5	A	482	723
B	0.24	7.35	0.3	A	138	206
C	0.50	7.59	1.1	A	420	630
D	0.05	5.12	0.1	A	30	45

Main Results for each time segment

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A	395	99	26	988	0.400	392	361	0.0	0.7	6.315	A
B	113	28	360	761	0.148	112	59	0.0	0.2	5.819	A
C	345	86	82	1021	0.338	343	390	0.0	0.5	5.551	A
D	25	6	363	859	0.029	25	61	0.0	0.0	4.530	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A	472	118	31	985	0.479	471	433	0.7	1.0	7.327	A
B	135	34	431	726	0.186	135	71	0.2	0.2	6.385	A
C	412	103	98	1013	0.406	411	468	0.5	0.7	6.268	A
D	30	7	435	823	0.036	30	74	0.0	0.0	4.763	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A	578	145	38	982	0.589	576	530	1.0	1.5	9.256	A
B	165	41	528	680	0.243	165	87	0.2	0.3	7.326	A
C	504	126	120	1002	0.503	503	573	0.7	1.0	7.554	A
D	36	9	533	774	0.047	36	90	0.0	0.1	5.118	A

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A	578	145	39	982	0.589	578	532	1.5	1.5	9.347	A
B	165	41	530	679	0.243	165	87	0.3	0.3	7.346	A
C	504	126	120	1002	0.503	504	575	1.0	1.1	7.594	A
D	36	9	534	774	0.047	36	90	0.1	0.1	5.122	A

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A	472	118	32	985	0.479	474	436	1.5	1.0	7.418	A
B	135	34	434	725	0.186	135	71	0.3	0.2	6.409	A
C	412	103	98	1013	0.407	413	471	1.1	0.7	6.315	A
D	30	7	437	822	0.036	30	74	0.1	0.0	4.772	A

09:15 - 09:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A	395	99	26	988	0.400	396	364	1.0	0.7	6.397	A
B	113	28	363	759	0.149	113	60	0.2	0.2	5.852	A
C	345	86	82	1021	0.338	346	394	0.7	0.5	5.600	A
D	25	6	366	857	0.029	25	62	0.0	0.0	4.540	A

2029 With Committed and Planned Development, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		A, B, C, D	7.36	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D4	2029 With Committed and Planned Development	PM	ONE HOUR	16:30	18:00	15	✓

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.30

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A		ONE HOUR	✓	481	100.000
B		ONE HOUR	✓	85	100.000
C		ONE HOUR	✓	382	100.000
D		ONE HOUR	✓	0	100.000

Origin-Destination Data

Demand (PCU/hr)

		To				
		A	B	C	D	
From	A	0	94	387	0	
	B	67	0	18	0	
	C	332	50	0	0	
	D	0	0	0	0	

Vehicle Mix

Heavy Vehicle Percentages

	To				
	A	B	C	D	
From	A	4	4	4	4
	B	4	4	4	4
	C	4	4	4	4
	D	4	4	4	4

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
A	0.54	8.50	1.2	A	441	662
B	0.13	5.95	0.2	A	78	117
C	0.41	6.25	0.7	A	351	526
D	0.00	0.00	0.0	A	0	0

Main Results for each time segment

16:30 - 16:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A	362	91	37	982	0.369	360	299	0.0	0.6	6.043	A
B	64	16	289	794	0.081	64	108	0.0	0.1	5.168	A
C	288	72	50	1037	0.277	286	303	0.0	0.4	5.019	A
D	0	0	336	872	0.000	0	0	0.0	0.0	0.000	A

16:45 - 17:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A	432	108	45	979	0.442	432	358	0.6	0.8	6.891	A
B	76	19	347	767	0.100	76	129	0.1	0.1	5.472	A
C	343	86	60	1032	0.333	343	363	0.4	0.5	5.478	A
D	0	0	403	839	0.000	0	0	0.0	0.0	0.000	A

17:00 - 17:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A	530	132	55	974	0.544	528	438	0.8	1.2	8.441	A
B	94	23	425	729	0.128	93	158	0.1	0.2	5.938	A
C	421	105	74	1025	0.410	420	445	0.5	0.7	6.232	A
D	0	0	493	794	0.000	0	0	0.0	0.0	0.000	A

17:15 - 17:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A	530	132	55	974	0.544	530	439	1.2	1.2	8.500	A
B	94	23	426	729	0.128	94	159	0.2	0.2	5.946	A
C	421	105	74	1025	0.410	421	446	0.7	0.7	6.248	A
D	0	0	494	793	0.000	0	0	0.0	0.0	0.000	A

17:30 - 17:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A	432	108	45	979	0.442	434	359	1.2	0.8	6.954	A
B	76	19	349	766	0.100	77	130	0.2	0.1	5.482	A
C	343	86	60	1032	0.333	344	365	0.7	0.5	5.498	A
D	0	0	405	838	0.000	0	0	0.0	0.0	0.000	A

17:45 - 18:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A	362	91	38	982	0.369	363	301	0.8	0.6	6.108	A
B	64	16	292	793	0.081	64	109	0.1	0.1	5.184	A
C	288	72	51	1037	0.277	288	306	0.5	0.4	5.047	A
D	0	0	339	871	0.000	0	0	0.0	0.0	0.000	A

2029 With Committed, Planned and Zoned Development, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		A, B, C, D	7.67	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D5	2029 With Committed, Planned and Zoned Development	PM	ONE HOUR	16:30	18:00	15	✓

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.30

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A		ONE HOUR	✓	493	100.000
B		ONE HOUR	✓	87	100.000
C		ONE HOUR	✓	392	100.000
D		ONE HOUR	✓	76	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		A	B	C	D
From	A	0	94	387	12
	B	67	0	18	2
	C	332	50	0	10
	D	33	7	36	0

Vehicle Mix

Heavy Vehicle Percentages

	To				
	A	B	C	D	
From	A	4	4	4	4
	B	4	4	4	4
	C	4	4	4	4
	D	4	4	4	4

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
A	0.57	9.26	1.4	A	452	679
B	0.14	6.21	0.2	A	80	120
C	0.42	6.45	0.8	A	360	540
D	0.11	5.32	0.1	A	70	105

Main Results for each time segment

16:30 - 16:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A	371	93	70	967	0.384	369	323	0.0	0.6	6.291	A
B	65	16	325	777	0.084	65	113	0.0	0.1	5.303	A
C	295	74	61	1032	0.286	293	330	0.0	0.4	5.105	A
D	57	14	336	872	0.066	57	18	0.0	0.1	4.634	A

16:45 - 17:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A	443	111	83	960	0.462	442	388	0.6	0.9	7.286	A
B	78	20	390	746	0.105	78	135	0.1	0.1	5.656	A
C	352	88	73	1026	0.344	352	396	0.4	0.5	5.603	A
D	68	17	403	839	0.081	68	22	0.1	0.1	4.903	A

17:00 - 17:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A	543	136	102	951	0.571	541	475	0.9	1.4	9.177	A
B	96	24	477	704	0.136	96	166	0.1	0.2	6.205	A
C	432	108	89	1017	0.424	431	484	0.5	0.8	6.430	A
D	84	21	493	794	0.105	84	26	0.1	0.1	5.319	A

17:15 - 17:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A	543	136	102	950	0.571	543	476	1.4	1.4	9.260	A
B	96	24	479	704	0.136	96	166	0.2	0.2	6.215	A
C	432	108	89	1017	0.424	432	486	0.8	0.8	6.449	A
D	84	21	494	793	0.105	84	26	0.1	0.1	5.322	A

17:30 - 17:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A	443	111	84	960	0.462	445	389	1.4	0.9	7.370	A
B	78	20	393	745	0.105	78	136	0.2	0.1	5.671	A
C	352	88	73	1026	0.344	353	398	0.8	0.6	5.628	A
D	68	17	405	838	0.082	68	22	0.1	0.1	4.911	A

17:45 - 18:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A	371	93	70	966	0.384	372	326	0.9	0.7	6.370	A
B	65	16	328	776	0.084	66	114	0.1	0.1	5.322	A
C	295	74	61	1032	0.286	296	333	0.6	0.4	5.136	A
D	57	14	339	871	0.066	57	18	0.1	0.1	4.644	A

2044 With Committed, Planned and Zoned Development, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		A, B, C, D	8.86	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D6	2044 With Committed, Planned and Zoned Development	PM	ONE HOUR	16:30	18:00	15	✓

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.30

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A		ONE HOUR	✓	553	100.000
B		ONE HOUR	✓	87	100.000
C		ONE HOUR	✓	444	100.000
D		ONE HOUR	✓	76	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		A	B	C	D
From	A	0	94	447	12
	B	67	0	18	2
	C	384	50	0	10
	D	33	7	36	0

Vehicle Mix

Heavy Vehicle Percentages

	To				
	A	B	C	D	
From	A	4	4	4	4
	B	4	4	4	4
	C	4	4	4	4
	D	4	4	4	4

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
A	0.64	11.04	1.8	B	507	761
B	0.14	6.56	0.2	A	80	120
C	0.48	7.15	1.0	A	407	611
D	0.11	5.54	0.1	A	70	105

Main Results for each time segment

16:30 - 16:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A	416	104	70	967	0.431	413	362	0.0	0.8	6.789	A
B	65	16	370	756	0.087	65	113	0.0	0.1	5.468	A
C	334	84	61	1032	0.324	332	374	0.0	0.5	5.385	A
D	57	14	375	853	0.067	57	18	0.0	0.1	4.747	A

16:45 - 17:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A	497	124	83	960	0.518	496	434	0.8	1.1	8.118	A
B	78	20	444	720	0.109	78	135	0.1	0.1	5.882	A
C	399	100	73	1026	0.389	398	449	0.5	0.7	6.017	A
D	68	17	450	816	0.084	68	22	0.1	0.1	5.055	A

17:00 - 17:15

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A	609	152	102	951	0.641	606	532	1.1	1.8	10.873	B
B	96	24	543	673	0.142	96	166	0.1	0.2	6.541	A
C	489	122	89	1017	0.480	488	549	0.7	1.0	7.115	A
D	84	21	550	766	0.109	84	26	0.1	0.1	5.539	A

17:15 - 17:30

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A	609	152	102	950	0.641	609	533	1.8	1.8	11.045	B
B	96	24	545	672	0.143	96	166	0.2	0.2	6.556	A
C	489	122	89	1017	0.481	489	552	1.0	1.0	7.147	A
D	84	21	552	765	0.109	84	26	0.1	0.1	5.544	A

17:30 - 17:45

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A	497	124	84	960	0.518	500	436	1.8	1.1	8.267	A
B	78	20	447	719	0.109	78	136	0.2	0.1	5.903	A
C	399	100	73	1026	0.389	400	453	1.0	0.7	6.052	A
D	68	17	452	815	0.084	68	22	0.1	0.1	5.065	A

17:45 - 18:00

Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit side) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
A	416	104	70	966	0.431	418	365	1.1	0.8	6.902	A
B	65	16	374	754	0.087	66	114	0.1	0.1	5.489	A
C	334	84	61	1032	0.324	335	378	0.7	0.5	5.429	A
D	57	14	378	851	0.067	57	18	0.1	0.1	4.760	A