consulting engineers

NRB

"Transportation Assessment Report"

including....

Stage 1 Road Safety Audit,
Preliminary Travel Plan, and
DMURS Statement of Consistency

For

Proposed Residential Apartment Development

At

Units 66 & 67, Fourth Ave., Cookstown Ind Estate, Dublin 24.

SUBMISSION ISSUE

8 Leopardstown Business Centre, Ballyogan Avenue, Leopardstown, Dublin 18
Tel/fax: +353 1 292 1941, E-mail: info@nrb.ie, Web: www.nrb.ie

Registered in Ireland No. 491679

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EXECUTIVE SUMMARY

NRB Consulting Engineers Ltd were appointed to address the Traffic/Transportation issues associated with a planning application for a mixed use residential apartment development on a zoned development site located at 66/67 Fourth Avenue, Cookstown Ind Estate in Tallaght.

The site was previously used for industrial and employment purposes. In this regard, the site has long established traffic and trip generation characteristics, which are likely to have been significantly greater than the now proposed use.

Being located in the heart of Tallaght and within a 10-15 minute walk of The Square and other local large employment centres such as Tallaght Hospital and The Square, the site is well placed to take advantage of non-car modes of travel.

This Transportation Assessment (TA) has been prepared to address any Traffic/Transportation issues associated with the proposal, and specifically the capacity of the existing road network. An independent Road Safety Audit of the Access Design and layout has been prepared and is included as an Appendix to this Report.

The Report has been prepared in accordance with the TII's Traffic & Transportation Assessment Guidelines, and addresses the worst case traffic impact of the proposal. This TA addresses the adequacy of the existing road network to safely and appropriately accommodate the worst case vehicular demands with the development fully occupied, taking account of the existing traffic demands locally.

Comprehensive classified turning movement surveys of the existing affected roads and junctions were carried out during the weekday AM and PM Peak Hours. These formed the basis of the study. The analysis includes the effects of the existing traffic on the local roads and assesses the impact during the traditional peak commuter peaks periods.

The Transportation Assessment confirms that the adjacent road network and the proposed priority controlled access junction are more than adequate to accommodate the worst case traffic associated with the development. The assessment also confirms that the construction and full occupation of the scheme will have a negligible impact upon the operation of the adjacent road network. The Analysis includes the effect of the upgrade/conversion of the existing adjacent 3 arm Roundabout to Traffic Signal Control, which is considered more appropriate in a town centre.

Based on our study, we conclude that there are no adverse traffic/transportation capacity or operational safety issues associated with the construction and occupation of the proposed residential apartment development (including the associated ancillary commercial uses).

1. INTRODUCTION

1.1 This Transportation Assessment (TA) has been prepared by NRB Consulting Engineers Ltd and addresses the Traffic / Transportation issues arising from the proposal to construct and occupy a total of 245 apartments and the commercial element, on the zoned site at Cookstown, Tallaght.

1.2 The proposed development, a high density apartment/residential scheme with an ancillary small commercial use should be considered in the context of its location within the heart of Tallaght Town Centre. A site location plan is included below as Figure 1.1;

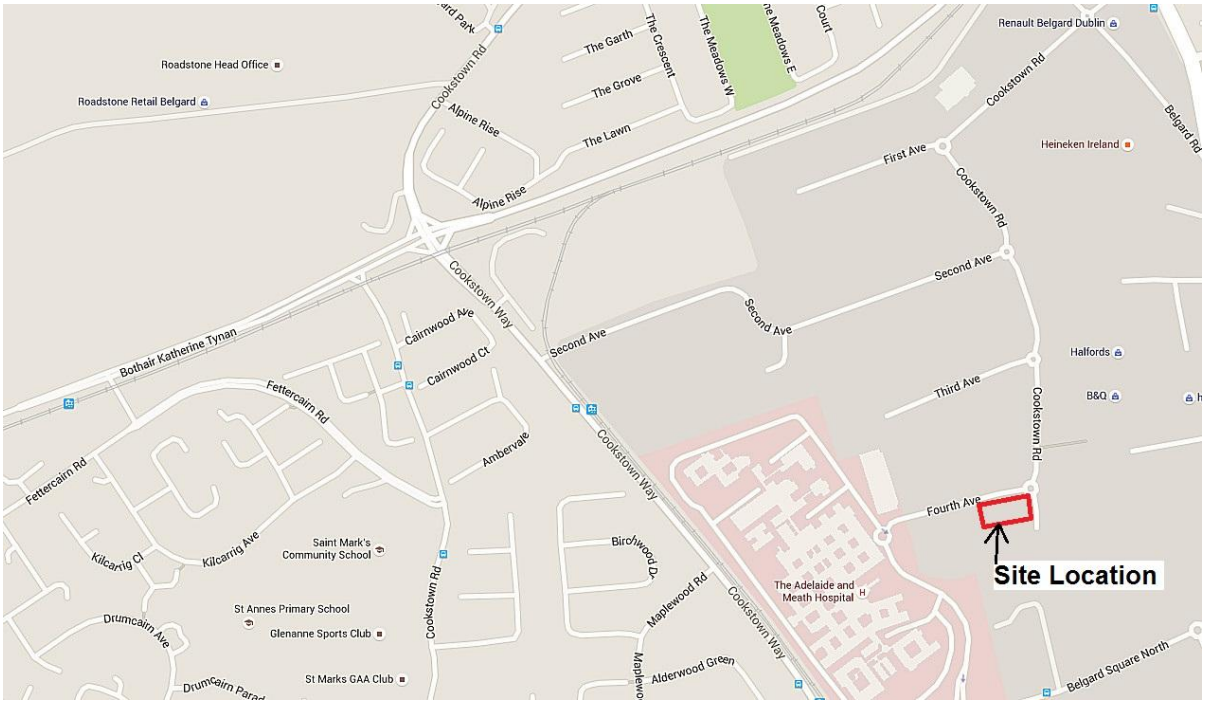


Figure 1.1 - Site Location in Heart of Tallaght

1.3 In describing the Receiving Environment and the Proposed Future Environment, this report addresses the following aspects of the proposed development:

- Relative Small Scale of the development in Traffic terms (conscious of the long established use and nature of the established site),
- Location of the development within the heart of the Town Centre in close proximity to high quality Public Transport Links,
- Traffic & Transportation impact,

- Capacity of the proposed vehicular access to accommodate the worst-case development traffic flows,
- Capacity of the Existing Road Network,
- Adequacy and safety of the existing roads and junctions locally, within the area of influence.
- Future road improvements that will significantly further reduce impact and increase local permeability (including the SDCC Part 8 plan to construct a N-S Link Road connecting Cookstown Industrial Estate Road through to Belgard Square North, and the 3rd party Proposal to construct an E-W Link Road through to Belgard Road).
- The Upgrade of the Fourth Ave/Cookstown Industrial Estate Road to Traffic Signal Control - which is considered more appropriate in a Town Centre Envioronment.

1.4 Recommendations contained within this Transportation Assessment are based on the following sources of information and industry-standard practices; -

- The TII Traffic & Transport Assessment Guidelines,
- Design Manual for Urban Roads and Streets,
- Recent Weekday AM and PM Peak Classified Turning Movements Traffic Survey Data commissioned,
- TII Design Guidance,
- Our experience in assessing the impact of Developments of this Nature, and
- Site Visits and Observations.

1.5 The Report has been prepared in accordance with the requirements of the TII's Traffic & Transport Assessment Guidelines. These are the professional Guidelines used to assess the impact of developments on public roads.

1.6 An independent Stage 1 Road Safety Audit of the design of the access junction, together with the associated Designer Feedback form is included as an Appendix to this Report.

2. EXISTING CONDITIONS, DEVELOPMENT PROPOSALS & PARKING

2.1 The subject development is on the site of 66/67 Fourth Ave, Cookstown Ind Estate, Tallaght, Dublin 24. The sites is adjacent the roundabout at the junction of Fourth Ave and Cookstown Estate Road, as illustrated above as ***Figure 1.1***.

2.2 The site will have a total of 245 apartments with ancillary uses at Ground Floor Level and basement car parking and storage. Vehicular access to the associated basement parking is located from an extended Cookstown Estate Road S, and takes the form of a priority controlled junction. The site is bound to the north by Fourth Ave, to the east by the current cul-de-sac element of Cookstown Estate Road, and to the south and west by existing industrial/development lands.

2.3 It includes a dedicated secure bicycle parking and storage area within the basement. Parking for a total of 79 cars, including mobility-impaired, Set Down, Servicing and 10 proposed Go Car parking spaces (Location TBA), are provided for within the secure basement area.

2.4 Cookstown Estate Road is a single carriageway 2-way road, currently subject to a 50kph speed restriction and is relatively lightly trafficked. It runs generally in a N-S orientation and has wide pedestrian footpaths along both eastern and western boundaries. Our survey indicated that the road carries a weekday AM Peak Hour traffic flow of less than 200 Passenger Car Units (PCUs) to the north of the site and a traffic flow of less than 150 PCUs in the PM Peak Hour. In these terms, the road is considered very lightly trafficked in terms of its link carrying capacity.

2.5 Fourth Ave consists of a single carriageway 2-way road, running generally in an E-W orientation, and is also subject to a 50kph speed limit. It serves some commercial/industrial units located along its length and also serves as the vehicular access route to/from the gated controlled car park for Tallaght Hospital, opened at certain hours during the day. Fourth Ave also has pedestrian footpaths along its length. Our survey indicated that the road carries a weekday AM Peak Hour traffic flow of approximately 171 PCUs, and a traffic flow of approximately 124 PCUs in the PM Peak Hour. In these terms, the road is also considered very lightly trafficked in terms of its link carrying capacity

2.6 The junction of Cookstown Estate Road and Fourth Ave takes the form of a 3 arm partially over-trackable mini roundabout. Observation of capacity performance indicates that the existing junction operates well without any significant issues arising.

2.7 A review of the Road Safety Authority (RSA) on-line database of reported road traffic accidents confirms that there have been no relevant accidents on the adjacent affected roads during the reported period 2005 to date.

Future Road Improvements and Plans

2.8 There are planned road improvements that will significantly further reduce development impact and increase local road permeability of the subject sites. The permeability will be enhanced for all transport modes, and the proposed roads will in particular increase accessibility to established public transport services. These roads include the SDCC Part 8 plan to construct a N-S Link Road connecting Cookstown Industrial Estate Road through to Belgard Square North and the 3rd party Proposal to construct an E-W Link Road through to Belgard Road, through lands known as the "Martlet site".

2.9 Given that the delivery of these roads are out-with the control of the applicant, the beneficial effects of these links has not been included within this assessment. This is considered a robust approach, as it concentrates traffic within the existing established road network.

2.10 However, we have included for the upgrade of the adjacent 3 arm roundabout (At Fourth Ave/Cookstown Estate Rd) to Traffic Signal Control - and the capacity of such a junction together with a preliminary layout design is included herein.

Proposed Development

2.11 The proposed development consists of a residential apartment scheme with an ancillary commercial use at Ground Floor, all in a series of blocks within a courtyard setting, supported by basement car parking and also by dedicated secure bicycle parking area. (Refer to site layout drawing included as ***Appendix A***).

2.12 The overall development comprises a total of 245 apartments, with a commercial element that will not generate significant vehicular traffic movements in its own right, but which has been included within the assessment for robustness. Access to the basement car park will be from an extension to Cookstown Estate Rd South. The fob-controlled barrier/gateways serving as access to the basement parking area is being set back

sufficiently to allow a long car to pull in off the road safely so that it does not affect traffic progression on the public roads in future.

Car Parking and Bicycle Parking Quantum & Justification

2.13 We have reviewed the **car parking** provision in terms of the maximum requirements of the SDCC Development Plan 2016-2022. The site is interpreted as being within SDCC Zone 2, with the resulting breakdowns provided herein below as ***Table 2.1***; -

Table 2.1; - Car Parking Requirements as per SDCC Development Plan

Element	***No.***	***SDCC Max Parking Rate***	***Requires Max No.***
2 Bed Apartments	120	1/unit	120
1 Bed/Studio Apartments	125	0.75/unit	93
Ancillary/Support Units	NA	NA	NA
Total Maximum Parking Required Under SDCC Plan			***213***

2.14 The site includes a dedicated secure bicycle parking and storage area. Dedicated Parking for a total of 79 cars, including mobility-impaired parking spaces, is provided for within the secure basement area, and this meets the MAXIMUM requirements of the SDCC Development Plan as set out above in Table 2.1 above being 37% of the maximum parking number allowed.

Bicycle Parking

2.15 The requirement for bicycle parking has also been assessed and this is included below as ***Table 2.3***

Table 2.3; - Site A - Min Bicycle Parking as per SDCC Development Plan -

Element	***SDCC Max Parking Rate***		***Requires***	
	Long Term	Short Stay	Long Stay	Short Stay
245 Apartments	1/5 units	1/10 units	55	27
Allow for Commercial Unit	1:5 staff	1:50/m^2	1	5
Total Min Cycle Parking Required Under SDCC Plan			***56***	***32***

2.16 Notwithstanding the Bicycle Parking & Storage requirements of the SDCC Development Plan, facilities are being provided to meet the more onerous requirements of The Department of Housing Planning & Local Government "***Sustainable Urban Housing Design Standards for New Apartments***". In the case of bicycle parking, 388 spaces are provided within the site.

Discussion/Justification - Car Parking

2.17 There are a total of 79 private car parking spaces provided within the basement area of the site, including mobility impaired, Go-Car and visitor parking. This is considered appropriate in light of the location of the proposed development immediately adjacent high quality public transport, and in consideration of the provisions of the SDCC Development Plan being "Maximum" standards.

2.18 The development is not a traditional residential apartment development, but is 'Build-to-Let' and, in this regard, the Car Parking requirements are fundamentally different, with anticipated lower car ownership and dependency for this nature of scheme. Given the low number of spaces provided (effectively visitor/mobility impaired parking, Go-Car Spaces & set down provision), the entire scheme will be actively marketed and promoted as a "***Reduced Car Dependency***" scheme and this will be communicated from the outset as part of sales and marketing. The development will also be managed on an on-going basis to ensure that the Reduced Car Dependency nature of the development is continually promoted and enhanced.

2.19 The National Standard, The Department of Housing Planning & Local Government "***Sustainable Urban Housing Design Standards for New Apartments***" sets out the parking requirements based on locational characteristics of any development and states (Paragraph 4.18); -

> ***Car Parking***
>
> ***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.***

2.20 It then goes on to identify the locational characteristics and features that warrant a reduction or elimination in provision of private car parking spaces (Paragraph 4.19) ;-

> ***Central and/or Accessible Urban Locations***
>
> ***In larger scale and higher density developments, comprising wholly of apartments in more central locations that are well served by public transport, the default policy is for car parking provision to be minimised, substantially reduced or wholly eliminated in certain circumstances. The policies above would be particularly applicable in highly accessible areas such as in or adjoining city cores or at a confluence of public***

transport systems such as rail and bus stations located in close proximity.

2.21 In terms of the stated Policy, the subject site meets all the requirements for significantly reducing or eliminating the provision of Private Car Parking, under the headings; -

High Density Development	✓
Comprising Wholly of Apartments	✓
Central Location	✓
Well Served by Public Transport	✓
Rail/Bus in Close Proximity	✓

2.22 In these terms the proposed subject development meets all the necessary requirements for significantly reduced car parking provision, in this case c. 37% of the SDCC Maximum Car Parking requirement.

2.23 The National Apartment Guidance states (Paragraph 4.23); -

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. It is also a requirement to demonstrate specific measures that enable car parking provision to be reduced or avoided.

2.24 Conscious that the scheme is intended to be actively marketed as Reduced Car Dependency, the layout has been designed with the above issues in mind and the drawings clearly show the required features; -

Drop Off Spaces	✓
Apartment Servicing Areas/Spaces	✓
Dedicated Visitor Parking Spaces	✓
Mobility Impaired Spaces	✓
"Go-Car" Spaces	✓
Cycle Parking & Cycle Storage	✓

2.25 In terms of ***specific measures*** to enable car parking provision to be reduced to the level proposed, in this case the specific measures are; -

- The Active Management and Marketing of the Development from the outset as Reduced Car Dependency',
- Very Limited Dedicated Car Parking is intended to be provided to Residents or will any be attached to any rental properties (and same will be Specified in associated Rental Agreements),
- The Location within walking distance of all South Dublin amenities (eg The Square and SDCC HQ, Tallaght Hospital etc) and schools,
- Associated Employment Opportunities locally (*Based on the CSO Census Data, in 2016 there were 2,958 commuters who lived in the Electoral Division of Tallaght - Springfield but worked elsewhere. There were 8,874 commuters who travelled in to this electoral division to work. This resulted in a net in-flow of 5,916 commuters. This indicates that the locality has significant employment opportunities, and these are continually improving*),
- Proximity to the LUAS being served by the LUAS Red Line 'on the doorstep' of both sites,
- Very easy walk distance from the Dublin Bus Terminus at *The Square* (from where 7 high frequency services currently operate)
- 10 x "Go Car" spaces/cars for car sharing provided within the development,
- Copious Cycle Parking and Cycle Storage (Refer Above),
- On site Security and Management by permanent staff and CCTV that will ensure the car parking areas are monitored and policed, with a clamping system in operation, so that the car parking restrictions are closely controlled and enforced.

3. TRIP GENERATION, ASSIGNMENT & DISTRIBUTION

3.1 The Trip Rate Information Computer System (TRICS) database is used to ascertain vehicular trip generation associated with the use of any particular site. This represents industry standard practice for Transportation Assessments in Ireland.

3.2 In this case the worst case assessment is based on TRICS, and a robust and onerous assessment has been undertaken in order to ensure that we thoroughly assess the impact, in terms of stress-testing the access junctions and the road capacity impact of the scheme. In this case the assessment has not considered the beneficial diluting effect of the proposed road improvements, apart from the upgrade of the adjacent roundabout to traffic signal control, and this therefore represents a robust assessment of impact as traffic generated is assumed to be concentrated within the existing network rather than within a more permeable network as planned by SDCC.

3.3 The Trip Rates applied in this case are as set out below as ***Table 3.1 and Table 3.2.***

Table 3.1; - TRICS Data Summary, Apartment Element

Total Worst Case Traffic Generated by Apartments Based on TRICS					
245 Apartments	**PCU Arrivals**		**PCU Departures**		**Total 2-Way Traffic**
Network Period	**Per Unit**	**Dev**	**Per Unit**	**Dev**	**(PCUs)**
Weekday AM Peak Hr	0.057	14	0.229	56	70
Weekday PM Peak Hr	0.209	51	0.105	26	77

Table 3.2; - TRICS Data Summary, Commercial Units

Total Worst Case Traffic Generated by Commercial Unit Based on TRICS					
254 m^2 GFA	**PCU Arrivals**		**PCU Departures**		**Total 2-Way Traffic**
Network Period	**Per 100m^2**	**Dev**	**Per 100m^2**	**Dev**	**(PCUs)**
Weekday AM Peak Hr	2.776	7	1.157	3	10
Weekday PM Peak Hr	4.881	12	5.516	14	26

3.4 We have included herein as ***Appendix B*** the TRICS data output for apartment developments of the nature proposed, upon which the above are based. The total of the above gives a worst case combined Traffic Generation as set out below as ***Table 3.3***.

Table 3.3; - Total Traffic Generated by Entire Development

Network Period	PCU Arrivals	PCU Departures	Total 2-Way Traffic
Weekday AM Peak Hr	21	59	80
Weekday PM Peak Hr	64	40	104

Assignment/Distribution - Future Year Traffic

3.5 We have used hand assignment techniques based on common-sense origin destination traffic patterns, with the worst case traffic assigned to the roads. We have assumed that 100% of the traffic will have the proposed access as origin/destination during the peak hours, as it is considered that this methodology will result in the most onerous assessment of the impact on the adjacent roads.

3.6 The standard methodology applied was to firstly ascertain the base background traffic conditions for both the weekday AM and weekday PM Commuter Peak periods. We then used the TII Project Appraisal Guidelines (Unit 5.5 Link-Based Traffic Growth forecasting) to establish opening/occupation year 2021 and design year 2036 traffic conditions on the local road network.

3.7 The worst case traffic based on the content of the above tables was then applied in order to establish Opening Year and Design Year Traffic Conditions. This is all included in the calculations included herein as ***Appendix C***.

3.8 It should be noted that we have selected an opening year of 2021 as being reasonable and appropriate, however, varying the opening year and design year by 1-3 years will have no significant impact upon the conclusions of the study.

4. TRAFFIC IMPACT - TRAFFIC CAPACITY RESULTS

4.1 The Institution of Highways and Transportation (IHT) Guidelines for Traffic Impact Assessment and the TII Traffic and Transport Assessment Guidelines sets out a mechanism for assessment of developments of this nature and determining whether further assessment is indeed required. This industry standard process requires a **Threshold Assessment** of the impact on the local roads to be provided in order to determine whether further more detailed modelling and assessment of particular critical junctions is necessary.

4.2 The professional guidance referenced above sets out specific increases in traffic volume associated with new development, which, if breeched, requires further detailed analysis to be undertaken. The recommendation is that, if the expected increase is 10% or greater, then further analysis is warranted in circumstances where junctions are within but are nearing capacity. It should be noted that the observed and surveyed traffic on the affected roads within the Industrial Estate are considered very low, and in this regard the addition of new traffic has a more onerous net effect (in simple terms, with low levels of existing traffic the net effect of increased traffic is exacerbated).

4.3 In this regard, it is anticipated that the addition of the proposed development, to long established roads in the area will in reality not result in any significant level of increase in traffic capacity issues arising on the local roads, with all anticipated traffic increases being below the Industry-Standard levels above which further assessment is required. This is particularly the case in terms of impact upon for example Belgard Road Traffic conditions.

4.4 In the case of the subject site, in the context of its former industrial uses, given the previous established volume and nature of the traffic associated with these industrial uses it is expected that the conversion to local residential uses will see a significant improvement in traffic conditions.

4.5 It should also be noted that the proposed road improvements described in Para 2.10-2.11 above will further reduce traffic impact by dispersing and diluting the effect of any additional development related traffic volumes.

4.6 We have nonetheless undertaken further detailed capacity analysis of the following junctions; -

- The Roundabout at Fourth Ave/Cookstown Estate Rd (Modelled as a Roundabout),
- A 3 Arm Traffic Signal Controlled Junction as a direct replacement for the existing Roundabout (designed to accommodate the E-W Link to Belgard Road when it is delivered), and
- The Priority Controlled Vehicular Access.

Roundabout at Fourth Ave/Cookstown Estate Rd

4.7 We have used the TII-approved computer simulation model ARCADY (Assessment of Roundabout Capacity and Delay) to assess the capacity queues and delay at the existing junction and in order to confirm that adequate reserve capacity exists in order to accommodate the proposed development traffic. The results of the modelling are summarised as ***Table 4.1***, with the entire models included herein as ***Appendix D***.

Table 4.1; - ARCADY Summary Results Fourth Ave/Cookstown Esate Roundabout

Modelled Scenario	Period Mean Max Q (PCUs)	Period Max RFC
2021 Opening Year AM Peak	<1	0.2
2021 Opening Year PM Peak	<1	0.12
2036 Design Year AM Peak	<1	0.21
2036 Design Year PM Peak	<1	0.13

4.8 The results confirm that the existing junction is way more than adequate to accommodate the worst case traffic conditions associated with the proposed development, with all RFCs way below the accepted limit of 0.85.

4.9 However, it is accepted that a roundabout may not constitute the most appropriate form of junction within what is to become a residential estate, with the associated increased pedestrian and cyclist movements, and we have therefore undertaken an assessment of this roundabout with Traffic Signal Control in place of the Roundabout (as discussed with Roads Officials in SDCC).

Replacement of Roundabout By Traffic Signal Control

4.10 We have used the TII-approved network software modelling package LiNSiG' (**Lin**ked **Sig**nal) to confirm that the small increases in traffic associated with the construction and operation of the development can be accommodated in the event that this junction is upgraded to Traffic Signal Control as per our drawing included within ***Appendix A***. LiNSiG produces results based on Degrees of Saturation (DoS) and Practical Reserve Capacity (PRC) for the modelled network. A DoS greater that 1.00 (or 100%) indicates that a network or junction is operating at or above capacity, with 90% considered to be the optimum DoS value for signal junctions.

4.11 We have appended the detailed computer simulation model results (LiNSiG Outputs) of the junction modelling in ***Appendix F*** A summary of the results is reproduced below as ***Table 4.2***

Table 4.2; - LiNSiG Summary Output Results
(Fourth Ave/Cookstown Estate Rd Traffic Signal Controlled Junction

Modelled Scenario	PRC (%)	DoS (%)
2021 Opening Year AM Peak	321	15.4
2021 Opening Year PM Peak	456	16.2
2036 Design Year AM Peak	621	12.5
2036 Design Year PM Peak	592	13

4.12 The above analysis confirms that a Traffic Signal Controlled Junction replacing the existing roundabout will have more than adequate capacity to accommodate the worst case traffic demands.

Cookstown Estate Rd Extension - Vehicular Access

4.13 We have undertaken an assessment of the capacity queues and delays at the proposed priority controlled vehicular access junction using the TII-approved simulation model PiCADY (Priority Intersection capacity and Delay). The output of the assessment is included herein as ***Appendix E***, and is summarised below as ***Table 4.3***.

Table 4.3; - PiCADY Summary Results Site Basement Access

Modelled Scenario	Period Mean Max Q (PCUs)	Period Max RFC
2021 Opening Year AM Peak	<1	0.11
2021 Opening Year PM Peak	<1	0.12
2036 Design Year AM Peak	<1	0.11
2036 Design Year PM Peak	<1	0.12

4.14 All Results Above are well below the theoretical maximum accepted RFC of 0.85 and therefore no capacity problems are anticipated at the Access Junction.

4.15 The above assessment confirms that the proposed priority controlled junction will operate very well without any capacity constraints whatsoever occurring.

4.16 The analysis undertaken confirms that there is adequate capacity in the existing and proposed junctions to accommodate the worst case traffic projections without any concerns arising in terms of traffic congestion.

5. CONCLUSIONS

5.1 This Transportation Assessment Report assesses the traffic and transportation impact of the proposal to construct and occupy a residential apartment development on the site at 66/67 Fourth Ave, Cookstown Ind Estate, Tallaght, Dublin 24.

5.2 This Report has been prepared in accordance with the TIIs Traffic & Transport Assessment Guidelines, and is based on industry standard high Trip Generation Rates, in order to provide an onerous and robust assessment of the impact of the proposed development.

5.3 The analysis includes the effects of the existing traffic on the local roads and is based on a comprehensive classified vehicle turning movement survey undertaken for the purposes of this study. The assessment does not include the further beneficial effects associated with the proposals to improve accessibility and reduce impact through the provision of new road links to the subject lands.

5.4 The proposed development site is ideally located within the heart of Tallaght Town Centre, and will therefore benefit from access to non-car modes of travel.

5.5 Car and Bicycle Parking is being provided in compliance with the requirements of the SDCC Development Plan and The Department of Housing Planning & Local Government "***Sustainable Urban Housing Design Standards for New Apartments***".

5.6 An independent Stage 1 Road Safety Audit of the plans has been undertaken and is included as an ***Appendix G*** to this Report. A preliminary Mobility Management Plan (aka Travel Plan) has been prepared to underscore the multi-modal accessibility of the site and this is included as ***Appendix H***. A review of the site has been undertaken in accordance with the requirements of DMURS and the resulting *Statement of Consistency* is included as ***Appendix I***.

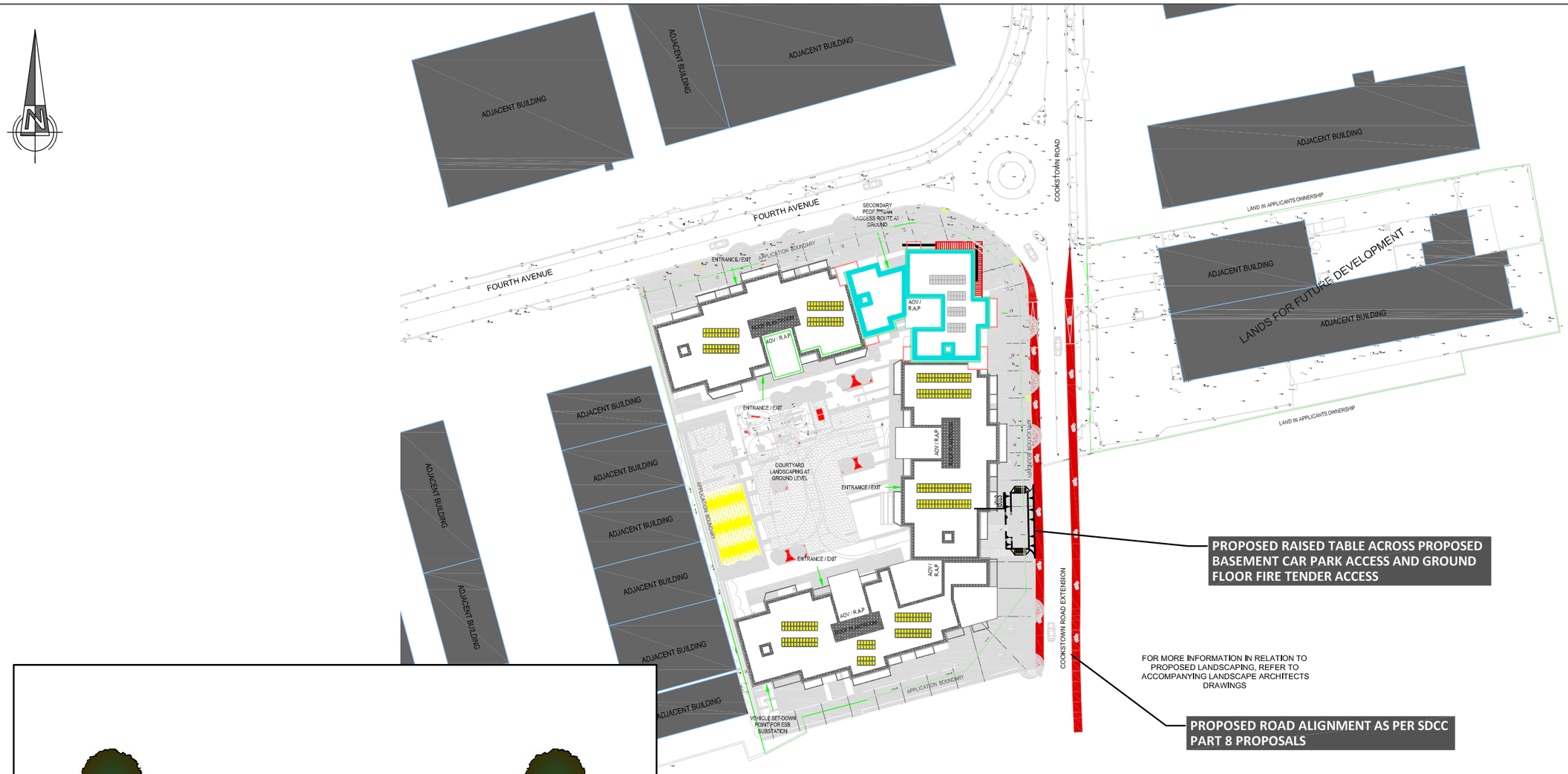
5.7 This report demonstrates that the proposed Development will have a negligible impact upon the established local traffic conditions and can easily be accommodated on the road network without any capacity or road safety concerns arising.

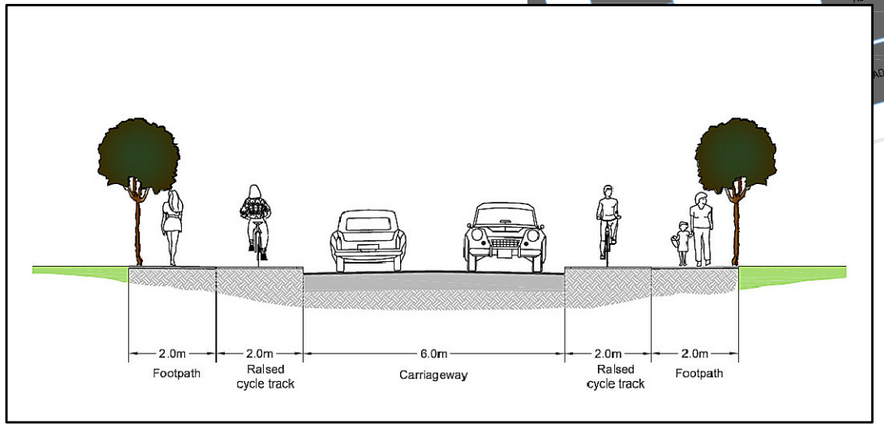
5.8 It is considered that there are no significant Operational Traffic Safety or Road Capacity issues that prevent a positive determination of the application by An Bord Pleanála.

APPENDICES - CONTENT

APPENDIX A

Proposed Development
Layout, Access & Parking Arrangement





PROPOSED SDCC PART 8 NORTH/SOUTH ROAD LINK CROSS SECTION
(Image from SDCC Part 8 drawing no.SRD92-11-02)

NRB Consulting Engineers Ltd recommend that Road and land ownership boundaries are verified through Legal & Land searches by the Client.

This drawing is based upon CWO Architects drawing CRPZB-CWO-00-ZZ-M2-A-001015_SitePlan received 13/09/19. NRB Consulting Engineers Ltd shall not be liable for any inaccuracies or deficiencies.

REV	DATE	AMENDMENTS	DRAWN	CHK	APP

NRB Consulting Engineers Ltd
8 Leopardstown Business Centre
Ballyogan Avenue
Leopardstown
Dublin 18

Phone/Fax: +353 1 292 1941
Email: info@nrb.ie
Web: www.nrb.ie
Registered In Ireland No. 491679

Client

Project: 4th Avenue
Cookstown - Phase 2

Title: Proposed Site Layout

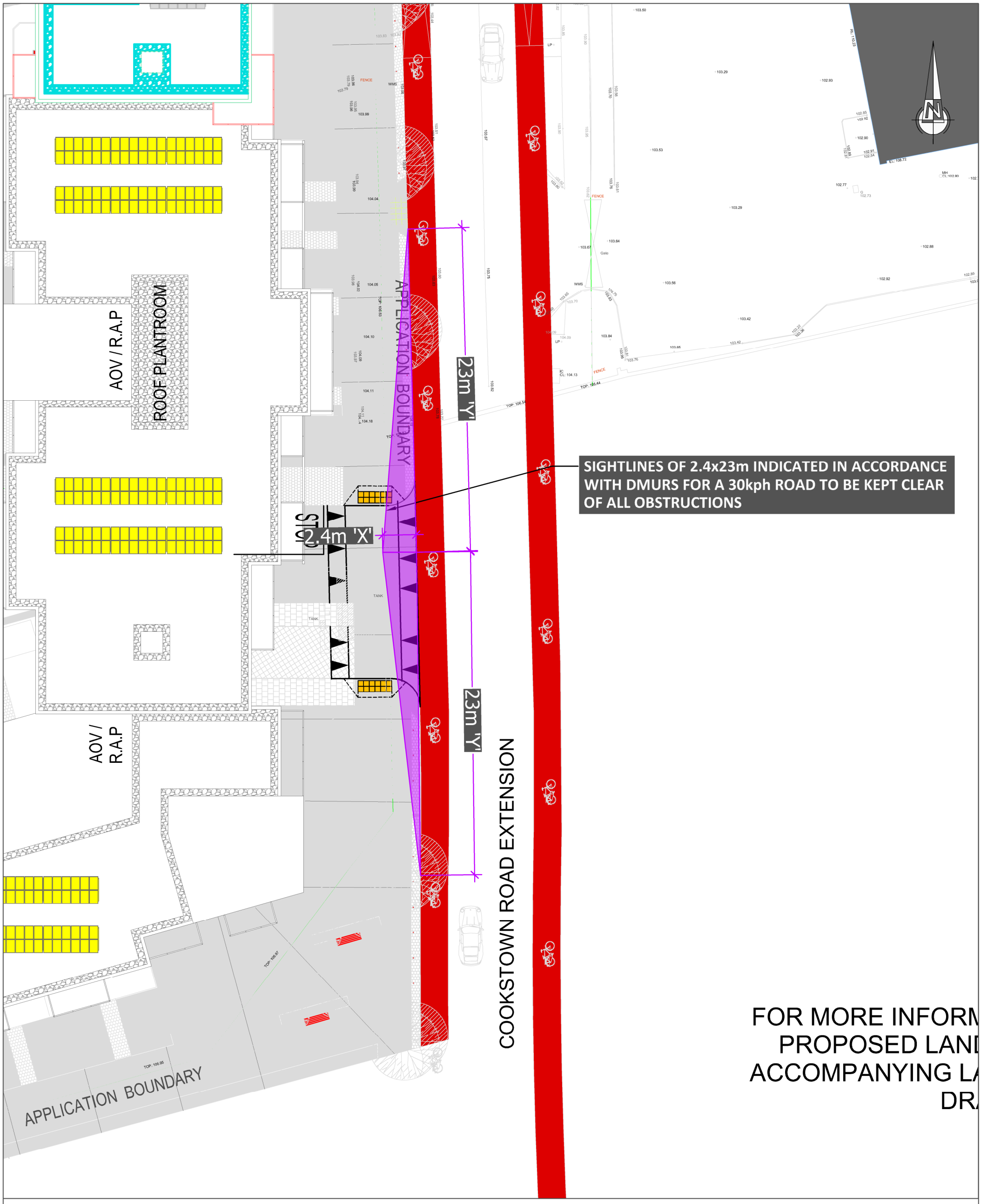
NRB Consulting Engineers Ltd accept no responsibility for any unauthorised amendments to this drawing. Only figured dimensions to be worked to.

Project No.	Drawing No.
16-040	NRB-TA-001

Drawn	Checked	Approved
PB	ER 20/09/19	ER 20/09/19

Date	Scale @ A3	Rev
19-Sep-19	1:1000	C

Purpose of Issue: ☐ Draft ☐ Information ☐ Approval ☐ As Built ☐ Tender ☐ Construction



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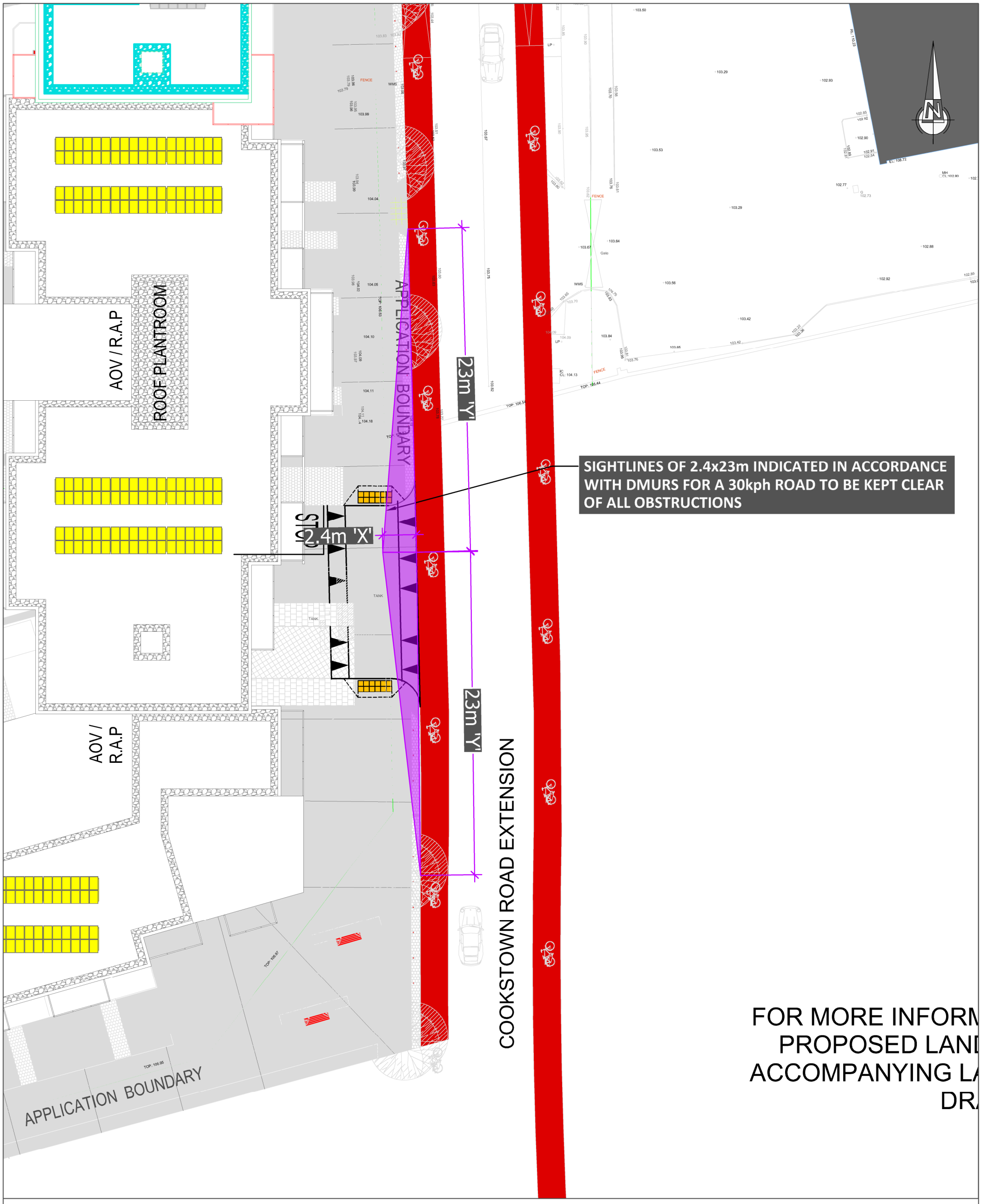
NRB Consulting Engineers Ltd
8 Leopardstown Business Centre
Ballyogan Avenue
Leopardstown
Dublin 18

Phone/Fax: +353 1 292 1941
Email: info@nrb.ie
Web: www.nrb.ie
Registered in Ireland No. 491679

Client		Project No. 16-040	Drawing No. NRB-TA-002
Project: 4th Avenue Cookstown - Phase 2	Drawn: PB	Checked: ER 20/09/19	Approved: ER 20/09/19
Title: Proposed Site Access Sightlines	Date: 19-Sep-19	Scale @ A3: 1:250	Rev: C

Purpose of Issue: ☐ Draft ☐ As Built ☐ Information ☐ Tender ☐ Approval ☐ Construction



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8 Leopardstown Business Centre
Ballyogan Avenue
Leopardstown
Dublin 18

Phone/Fax: +353 1 292 1941
Email: info@nrb.ie
Web: www.nrb.ie
Registered in Ireland No. 491679

Client		Project No. 16-040	Drawing No. NRB-TA-002
Project: 4th Avenue Cookstown - Phase 2	Drawn: PB	Checked: ER 20/09/19	Approved: ER 20/09/19
Title: Proposed Site Access Sightlines	Date: 19-Sep-19	Scale @ A3: 1:250	Rev: C

Purpose of Issue: ☐ Draft ☐ As Built ☐ Information ☐ Tender ☐ Approval ☐ Construction

NRB Consulting Engineers Ltd recommend that Road and land ownership boundaries are verified through Legal & Land searches by the Client.

This drawing is based upon CWO Architects drawing CRPZB-CWO-00-B1-M2-A-001014_BasementPlan received 09/10/19. NRB Consulting Engineers Ltd shall not be liable for any inaccuracies or deficiencies.

REV	DATE	AMENDMENTS	DRAWN	CHK	APP

NRB Consulting Engineers Ltd
8 Leopardstown Business Centre
Ballyogan Avenue
Leopardstown
Dublin 18

Phone/Fax: +353 1 292 1941
Email: info@nrb.ie
Web: www.nrb.ie
Registered in Ireland No. 491679

Client		Project No. 16-040	Drawing No. NRB-TA-003
Project	4th Avenue Cookstown - Phase 2	Drawn PB / Checked ER 09/10/19	Approved ER 09/10/19
Title	Illustration of Suggested Basement Parking Zones	Date 19-Sep-19	Scale @ A3 1:250 / Rev C

NRB Consulting Engineers Ltd accept no responsibility for any unauthorised amendments to this drawing. Only figured dimensions to be worked to.

Purpose of Issue: ☐ Draft ☐ Information ☐ Approval ☐ As Built ☐ Tender ☐ Construction

APPENDIX B

TRICS Trip Generation Output; - Apartments

Calculation Reference: AUDIT-160301-181106-1119

TRIP RATE CALCULATION SELECTION PARAMETERS:

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

Selected regions and areas:

01	GREATER LONDON		
	BT	BRENT	2 days
	EN	ENFIELD	3 days
	HG	HARINGEY	1 days
	HK	HACKNEY	1 days
	HM	HAMMERSMITH AND FULHAM	1 days
	HO	HOUNSLOW	3 days
	HV	HAVERING	1 days
	IS	ISLINGTON	4 days
	KI	KINGSTON	2 days
	KN	KENSINGTON AND CHELSEA	2 days
	NH	NEWHAM	1 days
	RD	RICHMOND	1 days
	SK	SOUTHWARK	2 days
	WH	WANDSWORTH	1 days
02	SOUTH EAST		
	ES	EAST SUSSEX	1 days
	EX	ESSEX	2 days
	HC	HAMPSHIRE	2 days
	OX	OXFORDSHIRE	1 days
03	SOUTH WEST		
	DC	DORSET	1 days
	DV	DEVON	1 days
04	EAST ANGLIA		
	CA	CAMBRIDGESHIRE	2 days
	NF	NORFOLK	1 days
	SF	SUFFOLK	2 days
05	EAST MIDLANDS		
	NT	NOTTINGHAMSHIRE	2 days
06	WEST MIDLANDS		
	WM	WEST MIDLANDS	1 days
07	YORKSHIRE & NORTH LINCOLNSHIRE		
	RI	EAST RIDING OF YORKSHIRE	1 days
08	NORTH WEST		
	GM	GREATER MANCHESTER	2 days
09	NORTH		
	CB	CUMBRIA	3 days
	TV	TEES VALLEY	1 days
10	WALES		
	DB	DENBIGHSHIRE	1 days
11	SCOTLAND		
	EB	CITY OF EDINBURGH	1 days
	SA	SOUTH AYRSHIRE	1 days
	SR	STIRLING	2 days
12	CONNAUGHT		
	GA	GALWAY	1 days
13	MUNSTER		
	WA	WATERFORD	1 days
14	LEINSTER		
	LU	LOUTH	3 days
15	GREATER DUBLIN		
	DL	DUBLIN	9 days
16	ULSTER (REPUBLIC OF IRELAND)		
	MG	MONAGHAN	1 days
17	ULSTER (NORTHERN IRELAND)		
	AN	ANTRIM	1 days

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

Secondary 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:	Number of dwellings
Actual Range:	6 to 493 (units:)
Range Selected by User:	6 to 493 (units:)

Public Transport Provision:
Selection by: Include all surveys

Date Range: 01/01/10 to 03/07/18

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	9 days
Tuesday	19 days
Wednesday	17 days
Thursday	13 days
Friday	11 days

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

Selected survey types:

Manual count	69 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:

Town Centre	5
Edge of Town Centre	25
Suburban Area (PPS6 Out of Centre)	29
Edge of Town	5
Neighbourhood Centre (PPS6 Local Centre)	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:

Development Zone	4
Residential Zone	40
Built-Up Zone	13
High Street	1
No Sub Category	11

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.

TRIP RATE for Land Use 03 - RESIDENTIAL/C - FLATS PRIVATELY OWNED
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	69	83	0.038	69	83	0.120	69	83	0.158
08:00 - 09:00	69	83	0.047	69	83	0.158	69	83	0.205
09:00 - 10:00	69	83	0.057	69	83	0.076	69	83	0.133
10:00 - 11:00	69	83	0.048	69	83	0.061	69	83	0.109
11:00 - 12:00	69	83	0.053	69	83	0.057	69	83	0.110
12:00 - 13:00	69	83	0.062	69	83	0.060	69	83	0.122
13:00 - 14:00	69	83	0.061	69	83	0.066	69	83	0.127
14:00 - 15:00	69	83	0.058	69	83	0.060	69	83	0.118
15:00 - 16:00	69	83	0.075	69	83	0.054	69	83	0.129
16:00 - 17:00	69	83	0.091	69	83	0.060	69	83	0.151
17:00 - 18:00	69	83	0.139	69	83	0.060	69	83	0.199
18:00 - 19:00	69	83	0.120	69	83	0.069	69	83	0.189
19:00 - 20:00	15	118	0.088	15	118	0.053	15	118	0.141
20:00 - 21:00	15	118	0.061	15	118	0.038	15	118	0.099
21:00 - 22:00	2	15	0.133	2	15	0.100	2	15	0.233
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			1.131			1.092			2.223

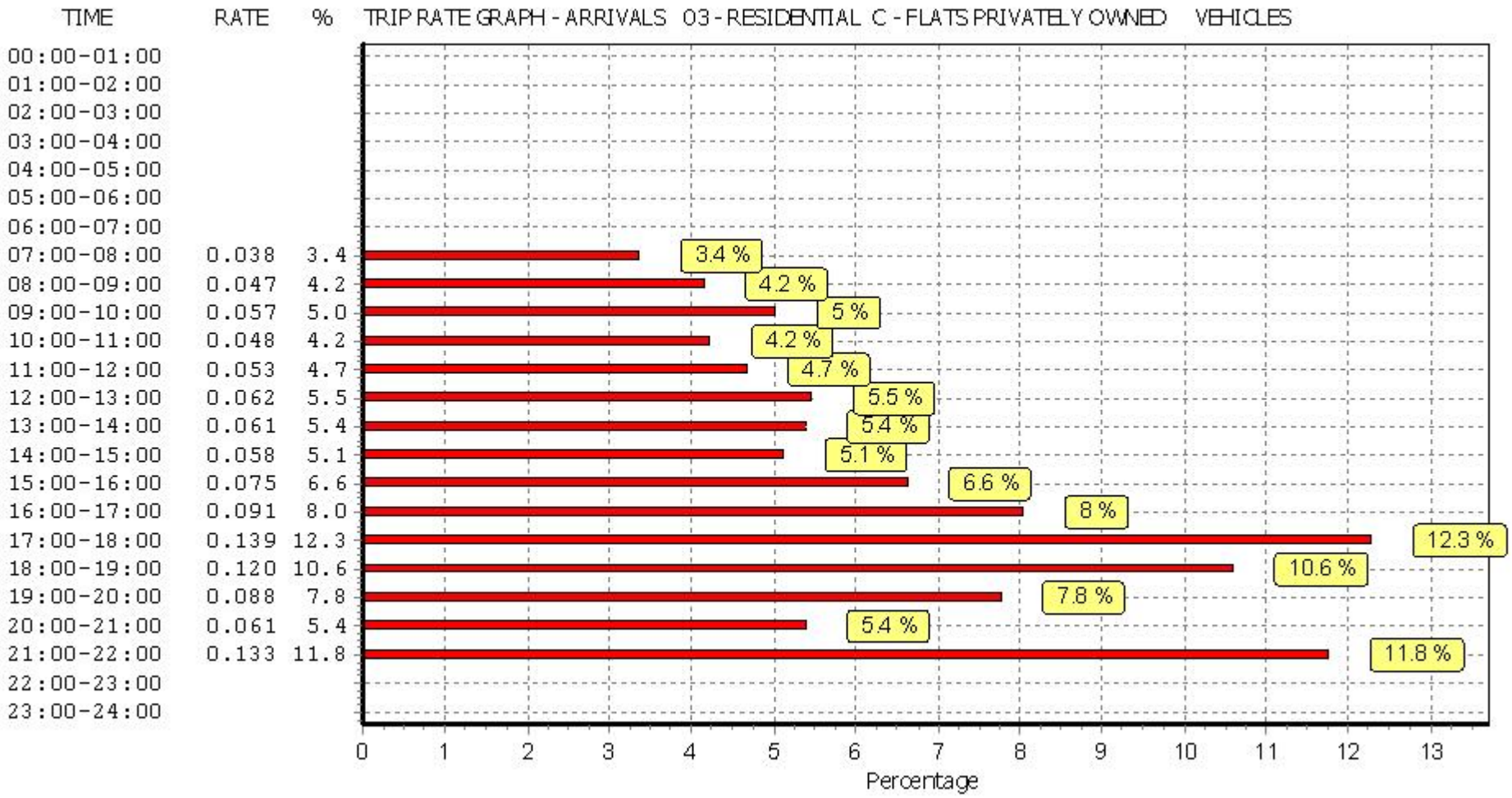
This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are 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.*

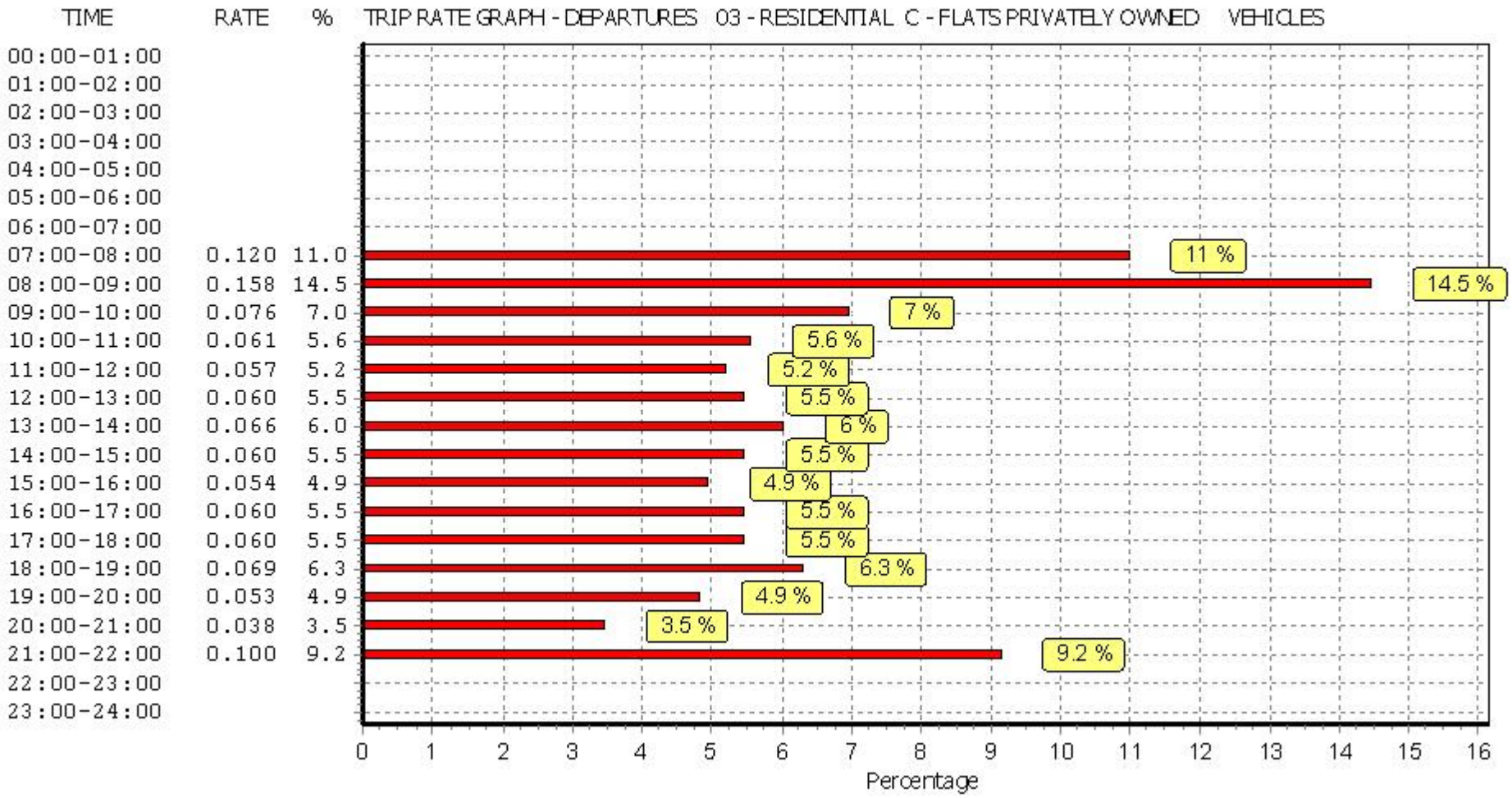
Parameter summary

Trip rate parameter range selected:	6 - 493 (units:)
Survey date date range:	01/01/10 - 03/07/18
Number of weekdays (Monday-Friday):	69
Number of Saturdays:	0
Number of Sundays:	0
Surveys automatically removed from selection:	2
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.



This graph is a visual representation of the trip rate calculation results screen. The same time periods and trip rates are displayed, but in addition there is an additional column showing the percentage of the total trip rate by individual time period, allowing peak periods to be easily identified through observation. Note that the type of count and the selected direction is shown at the top of the graph.



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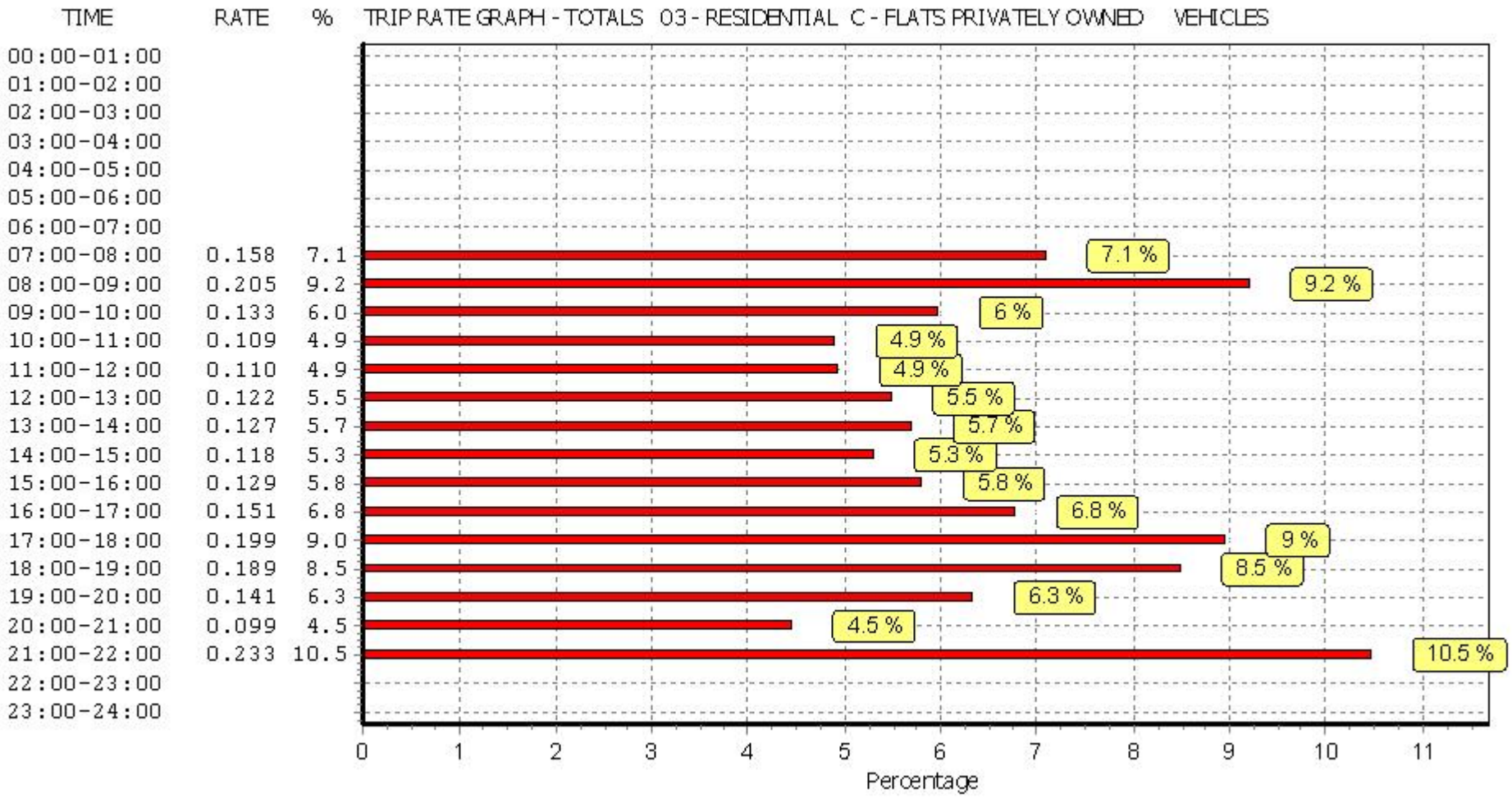

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TRIP RATE for Land Use 03 - RESIDENTIAL/C - FLATS PRIVATELY OWNED
TAXIS
Calculation factor: 1 DWELLS
BOLD print indicates peak (busiest) period

	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	69	83	0.003	69	83	0.003	69	83	0.006
08:00 - 09:00	69	83	0.004	69	83	0.003	69	83	0.007
09:00 - 10:00	69	83	0.003	69	83	0.003	69	83	0.006
10:00 - 11:00	69	83	0.002	69	83	0.002	69	83	0.004
11:00 - 12:00	69	83	0.003	69	83	0.003	69	83	0.006
12:00 - 13:00	69	83	0.002	69	83	0.002	69	83	0.004
13:00 - 14:00	69	83	0.002	69	83	0.002	69	83	0.004
14:00 - 15:00	69	83	0.002	69	83	0.003	69	83	0.005
15:00 - 16:00	69	83	0.003	69	83	0.003	69	83	0.006
16:00 - 17:00	69	83	0.003	69	83	0.004	69	83	0.007
17:00 - 18:00	69	83	0.004	69	83	0.003	69	83	0.007
18:00 - 19:00	69	83	0.003	69	83	0.004	69	83	0.007
19:00 - 20:00	15	118	0.004	15	118	0.005	15	118	0.009
20:00 - 21:00	15	118	0.005	15	118	0.004	15	118	0.009
21:00 - 22:00	2	15	0.000	2	15	0.000	2	15	0.000
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			0.043			0.044			0.087

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.

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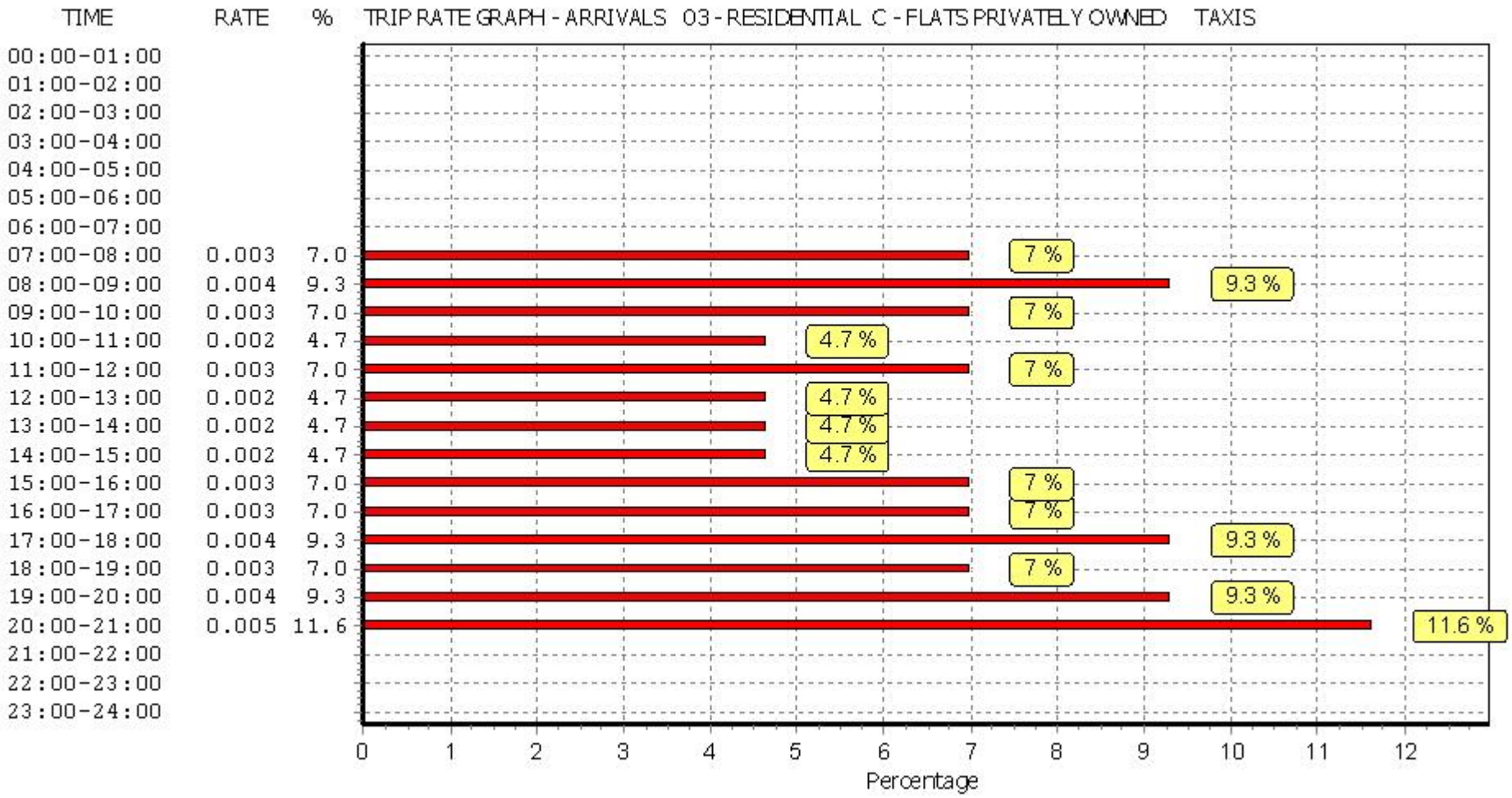
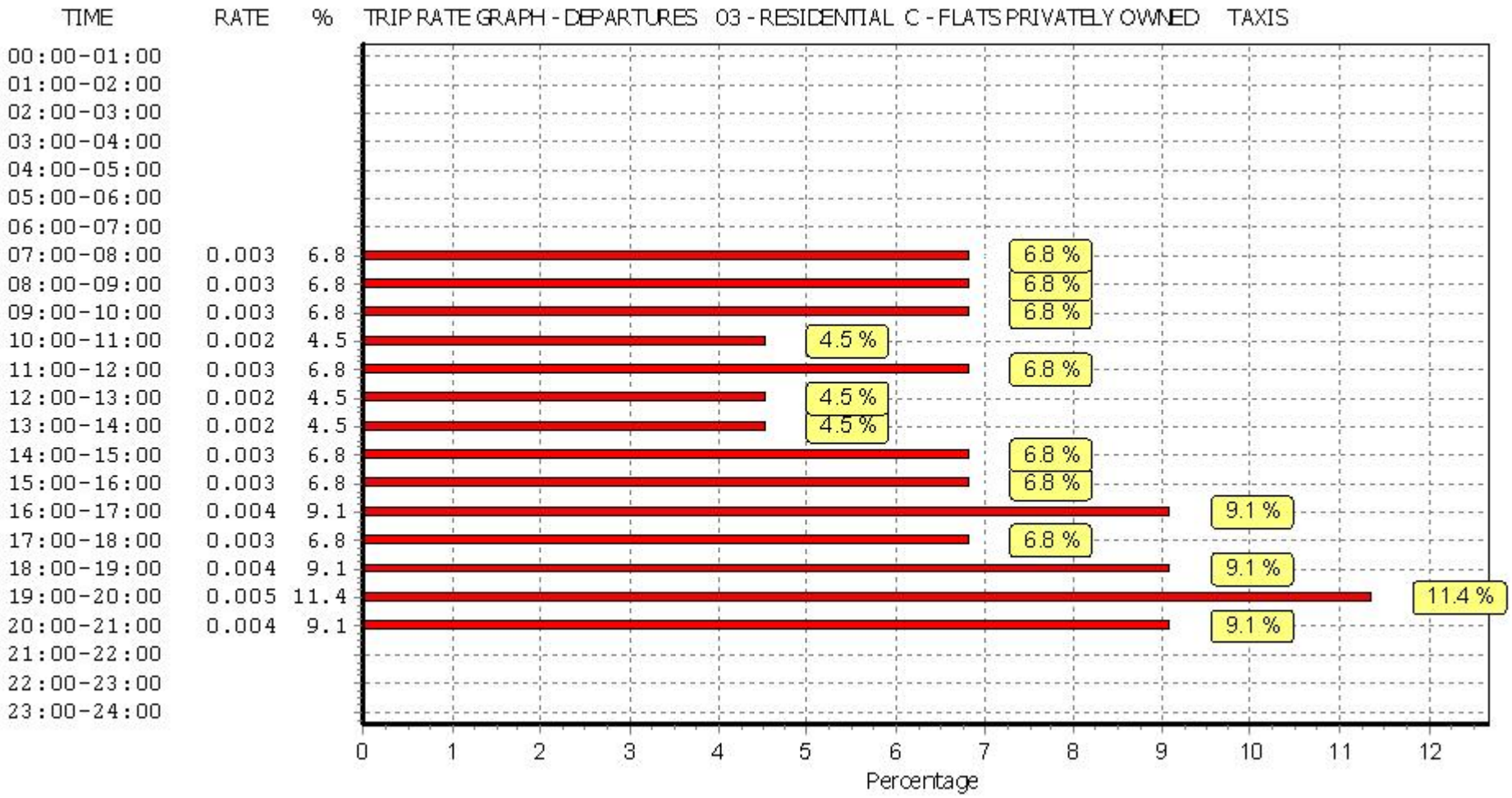


This graph is a visual representation of the trip rate calculation results screen. The same time periods and trip rates are displayed, but in addition there is an additional column showing the percentage of the total trip rate by individual time period, allowing peak periods to be easily identified through observation. Note that the type of count and the selected direction is shown at the top of the graph.



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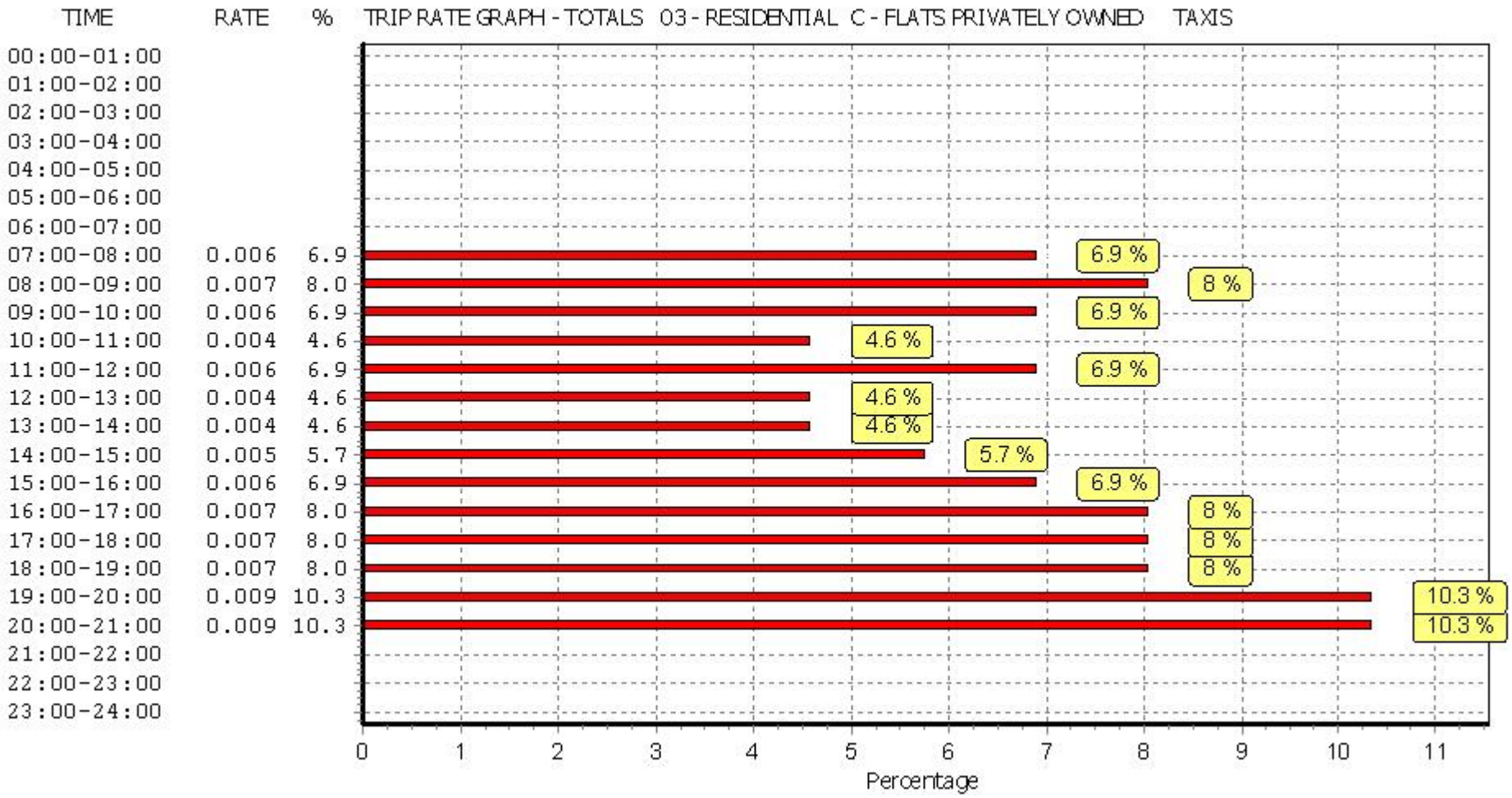

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TRIP RATE for Land Use 03 - RESIDENTIAL/C - FLATS PRIVATELY OWNED
OGVS
Calculation factor: 1 DWELLS
BOLD print indicates peak (busiest) period

	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	69	83	0.002	69	83	0.003	69	83	0.005
08:00 - 09:00	69	83	0.001	69	83	0.001	69	83	0.002
09:00 - 10:00	69	83	0.002	69	83	0.002	69	83	0.004
10:00 - 11:00	69	83	0.003	69	83	0.002	69	83	0.005
11:00 - 12:00	69	83	0.001	69	83	0.001	69	83	0.002
12:00 - 13:00	69	83	0.001	69	83	0.001	69	83	0.002
13:00 - 14:00	69	83	0.001	69	83	0.002	69	83	0.003
14:00 - 15:00	69	83	0.001	69	83	0.001	69	83	0.002
15:00 - 16:00	69	83	0.001	69	83	0.001	69	83	0.002
16:00 - 17:00	69	83	0.001	69	83	0.001	69	83	0.002
17:00 - 18:00	69	83	0.001	69	83	0.000	69	83	0.001
18:00 - 19:00	69	83	0.000	69	83	0.000	69	83	0.000
19:00 - 20:00	15	118	0.000	15	118	0.000	15	118	0.000
20:00 - 21:00	15	118	0.000	15	118	0.000	15	118	0.000
21:00 - 22:00	2	15	0.000	2	15	0.000	2	15	0.000
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			0.015			0.015			0.030

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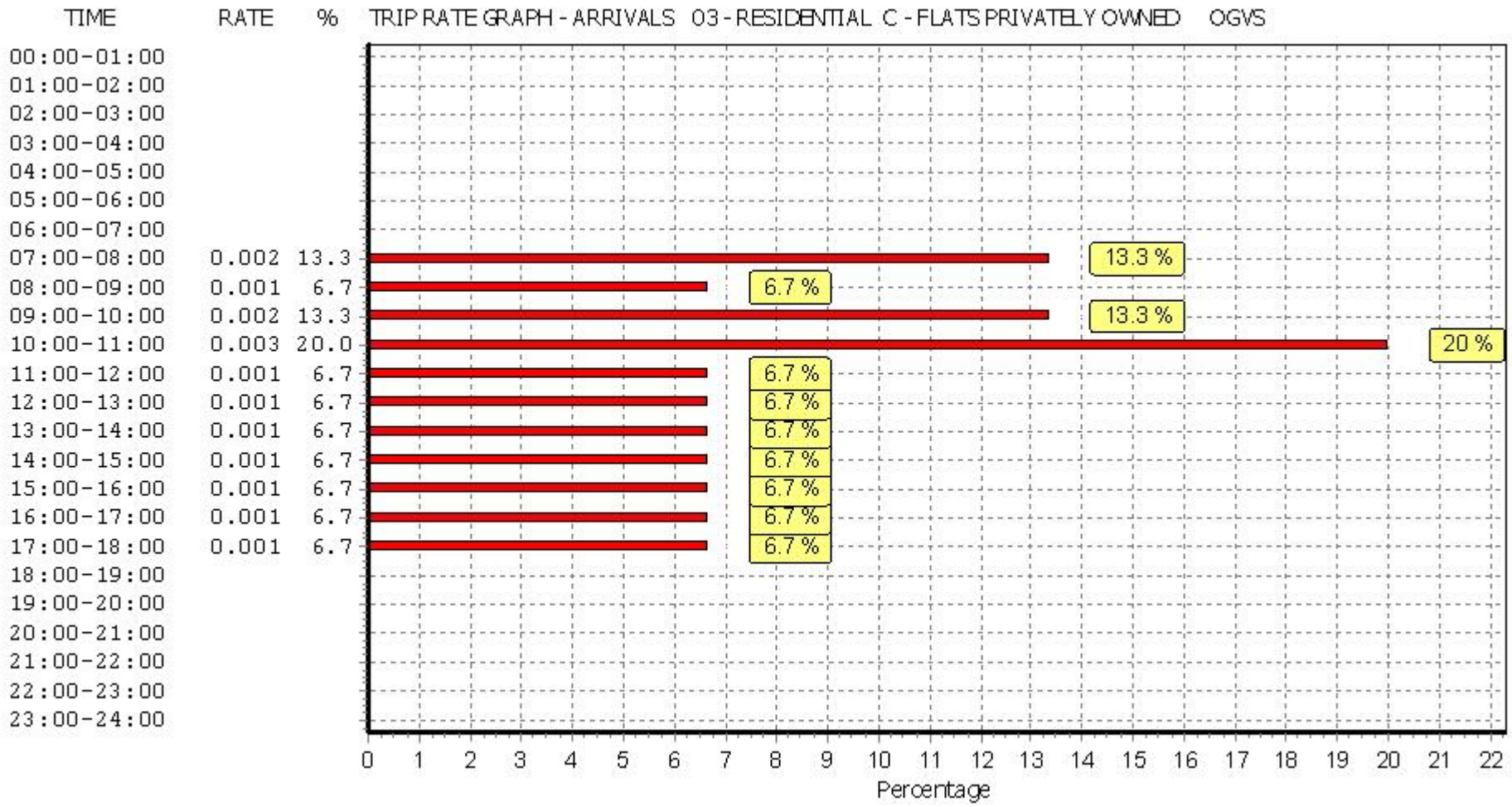
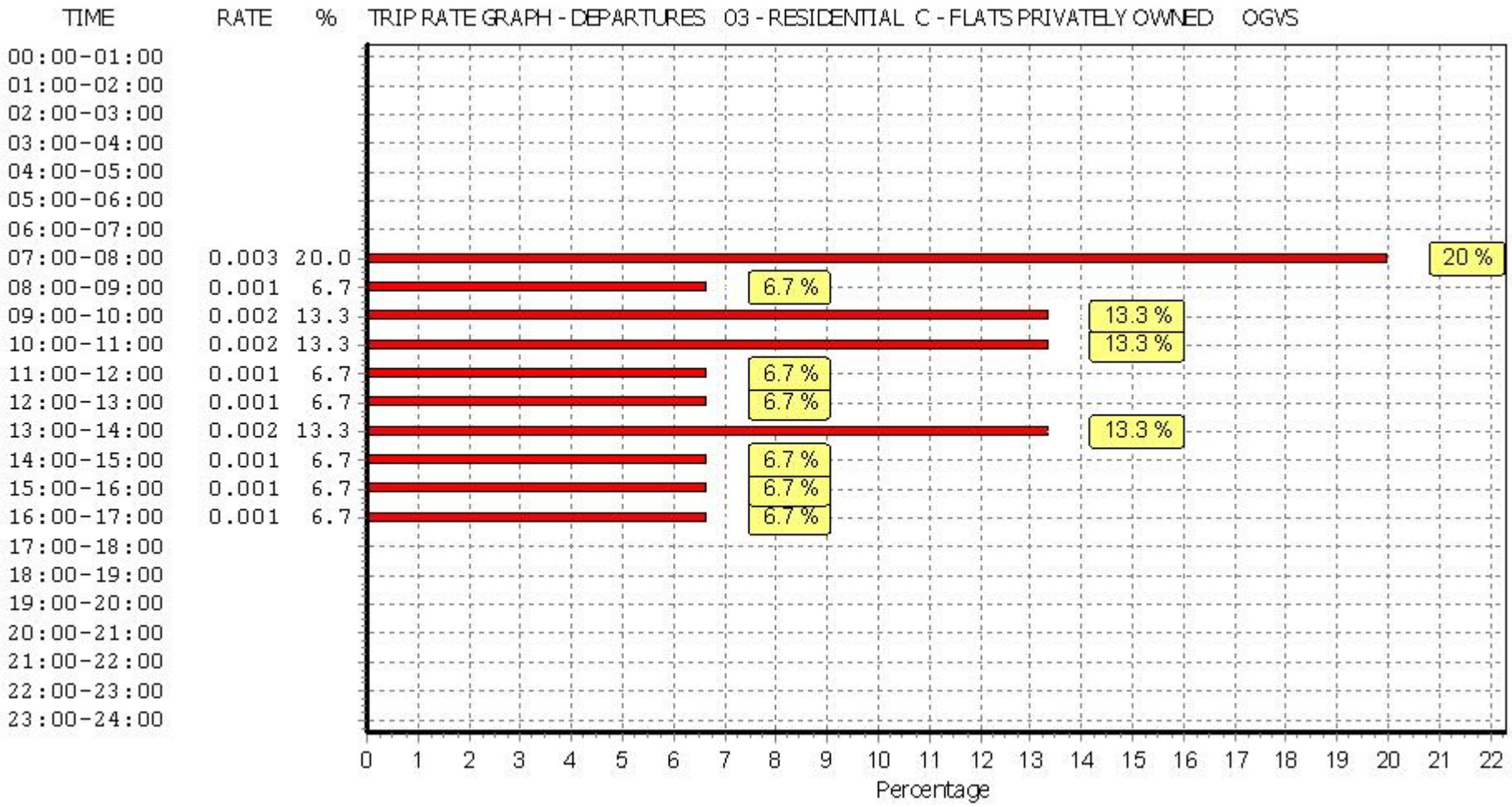


This graph is a visual representation of the trip rate calculation results screen. The same time periods and trip rates are displayed, but in addition there is an additional column showing the percentage of the total trip rate by individual time period, allowing peak periods to be easily identified through observation. Note that the type of count and the selected direction is shown at the top of the graph.



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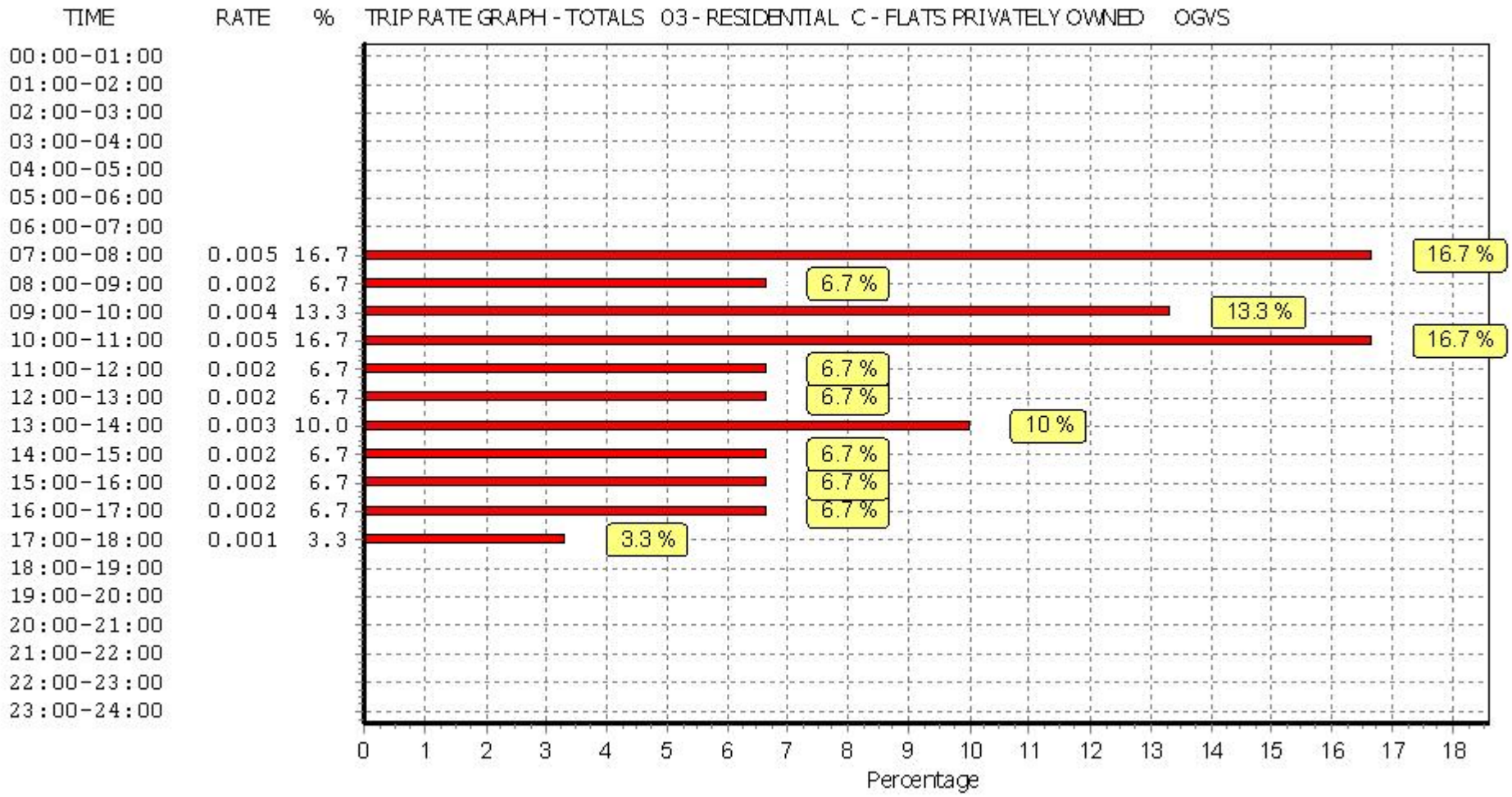

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TRIP RATE for Land Use 03 - RESIDENTIAL/C - FLATS PRIVATELY OWNED
PSVS
Calculation factor: 1 DWELLS
BOLD print indicates peak (busiest) period

	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	69	83	0.000	69	83	0.001	69	83	0.001
08:00 - 09:00	69	83	0.000	69	83	0.000	69	83	0.000
09:00 - 10:00	69	83	0.000	69	83	0.000	69	83	0.000
10:00 - 11:00	69	83	0.000	69	83	0.000	69	83	0.000
11:00 - 12:00	69	83	0.000	69	83	0.000	69	83	0.000
12:00 - 13:00	69	83	0.000	69	83	0.000	69	83	0.000
13:00 - 14:00	69	83	0.000	69	83	0.000	69	83	0.000
14:00 - 15:00	69	83	0.000	69	83	0.000	69	83	0.000
15:00 - 16:00	69	83	0.000	69	83	0.000	69	83	0.000
16:00 - 17:00	69	83	0.000	69	83	0.000	69	83	0.000
17:00 - 18:00	69	83	0.000	69	83	0.000	69	83	0.000
18:00 - 19:00	69	83	0.000	69	83	0.000	69	83	0.000
19:00 - 20:00	15	118	0.000	15	118	0.000	15	118	0.000
20:00 - 21:00	15	118	0.000	15	118	0.000	15	118	0.000
21:00 - 22:00	2	15	0.000	2	15	0.000	2	15	0.000
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			0.000			0.001			0.001

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.

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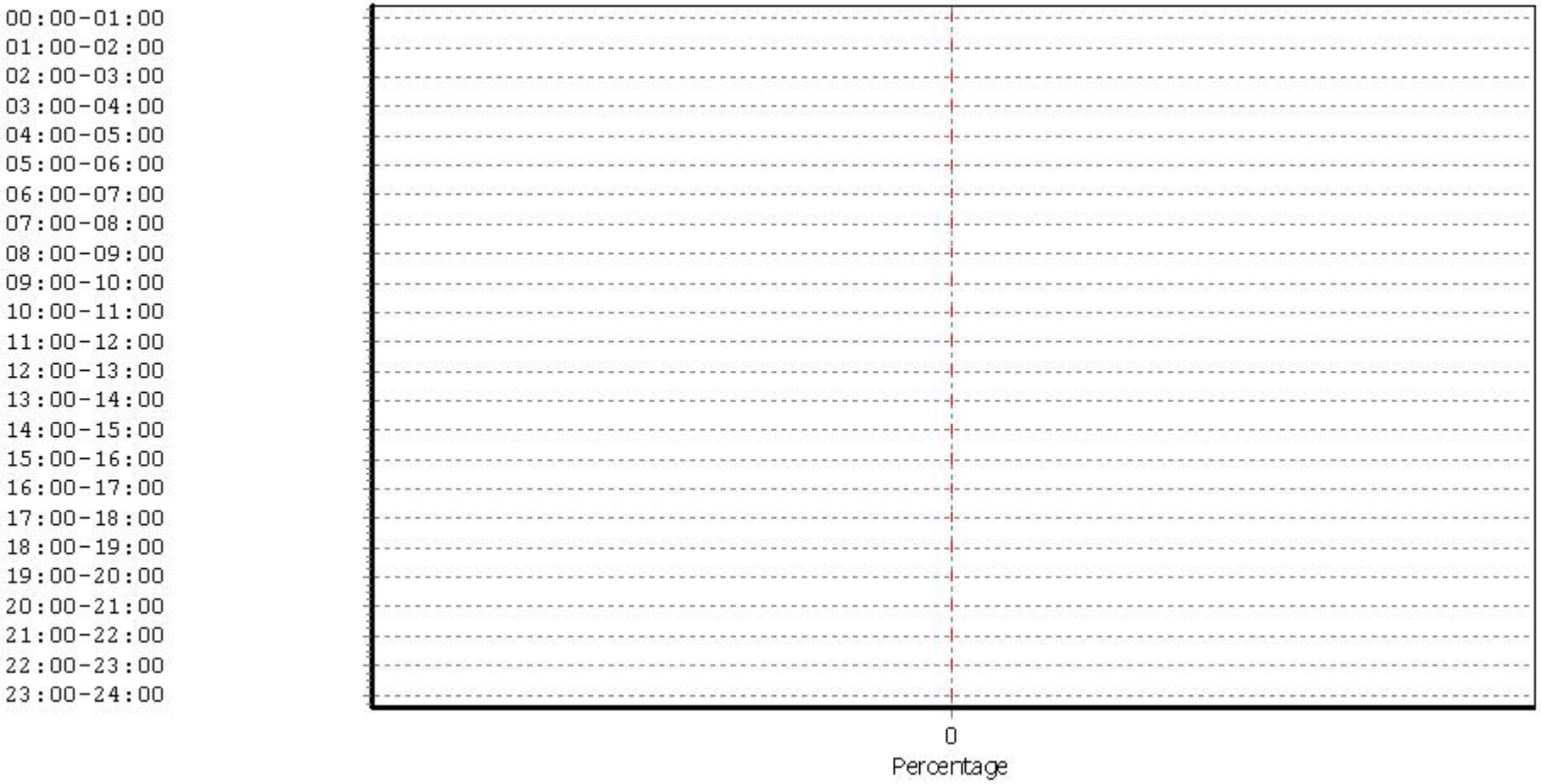
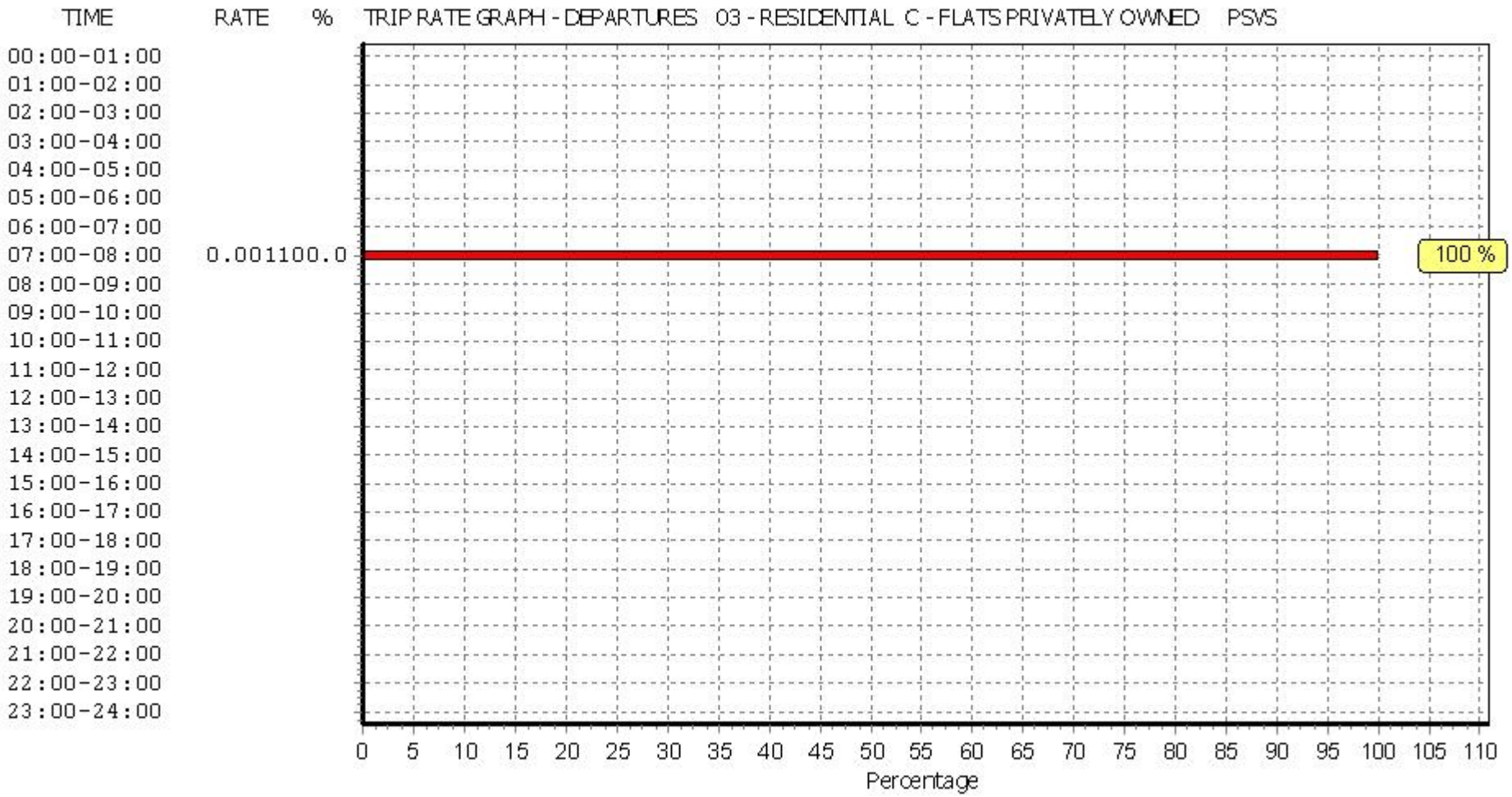
TIME RATE % TRIP RATE GRAPH - ARRIVALS 03 - RESIDENTIAL C - FLATS PRIVATELY OWNED PSVS



This graph is a visual representation of the trip rate calculation results screen. The same time periods and trip rates are displayed, but in addition there is an additional column showing the percentage of the total trip rate by individual time period, allowing peak periods to be easily identified through observation. Note that the type of count and the selected direction is shown at the top of the graph.



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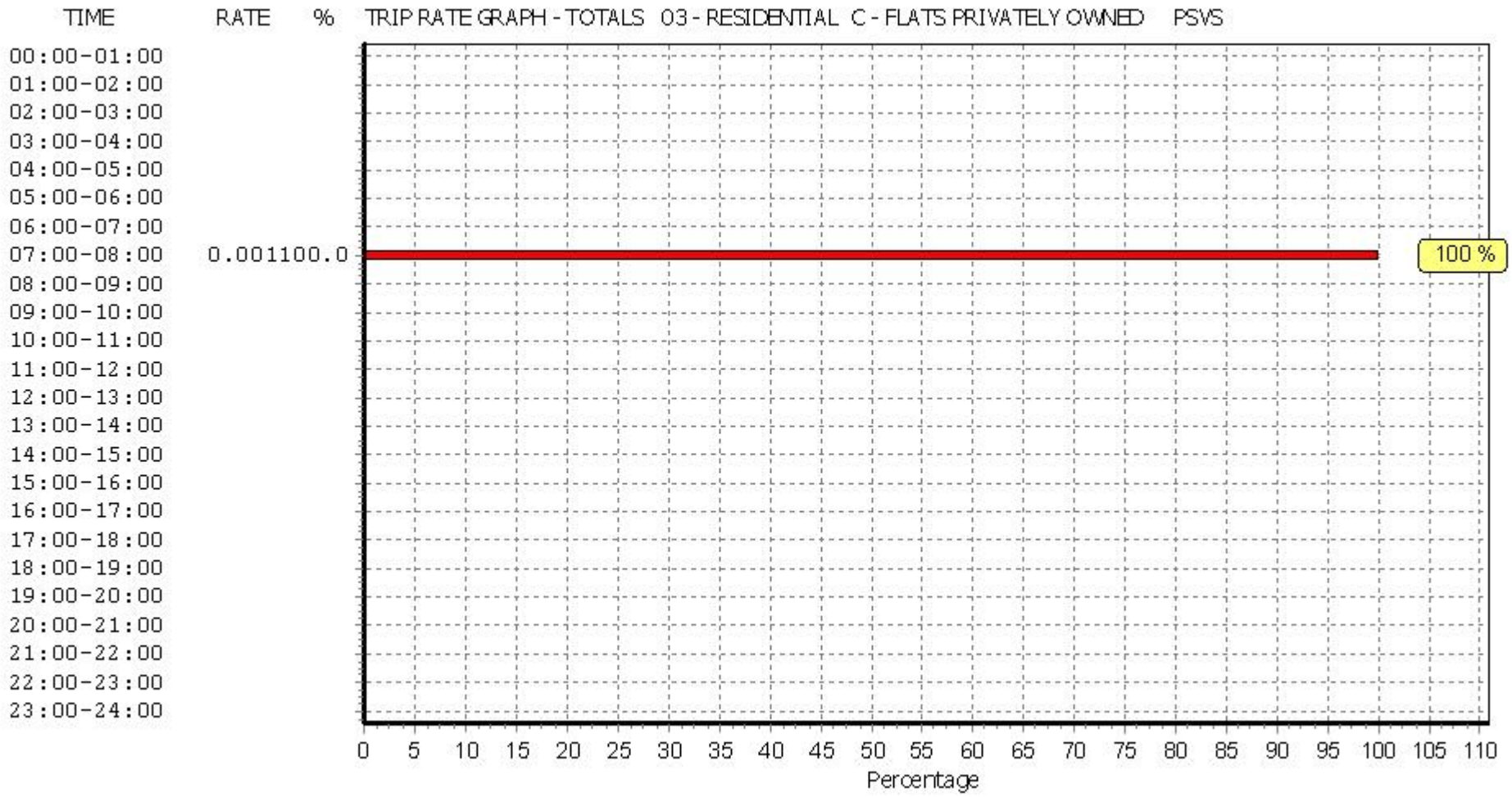


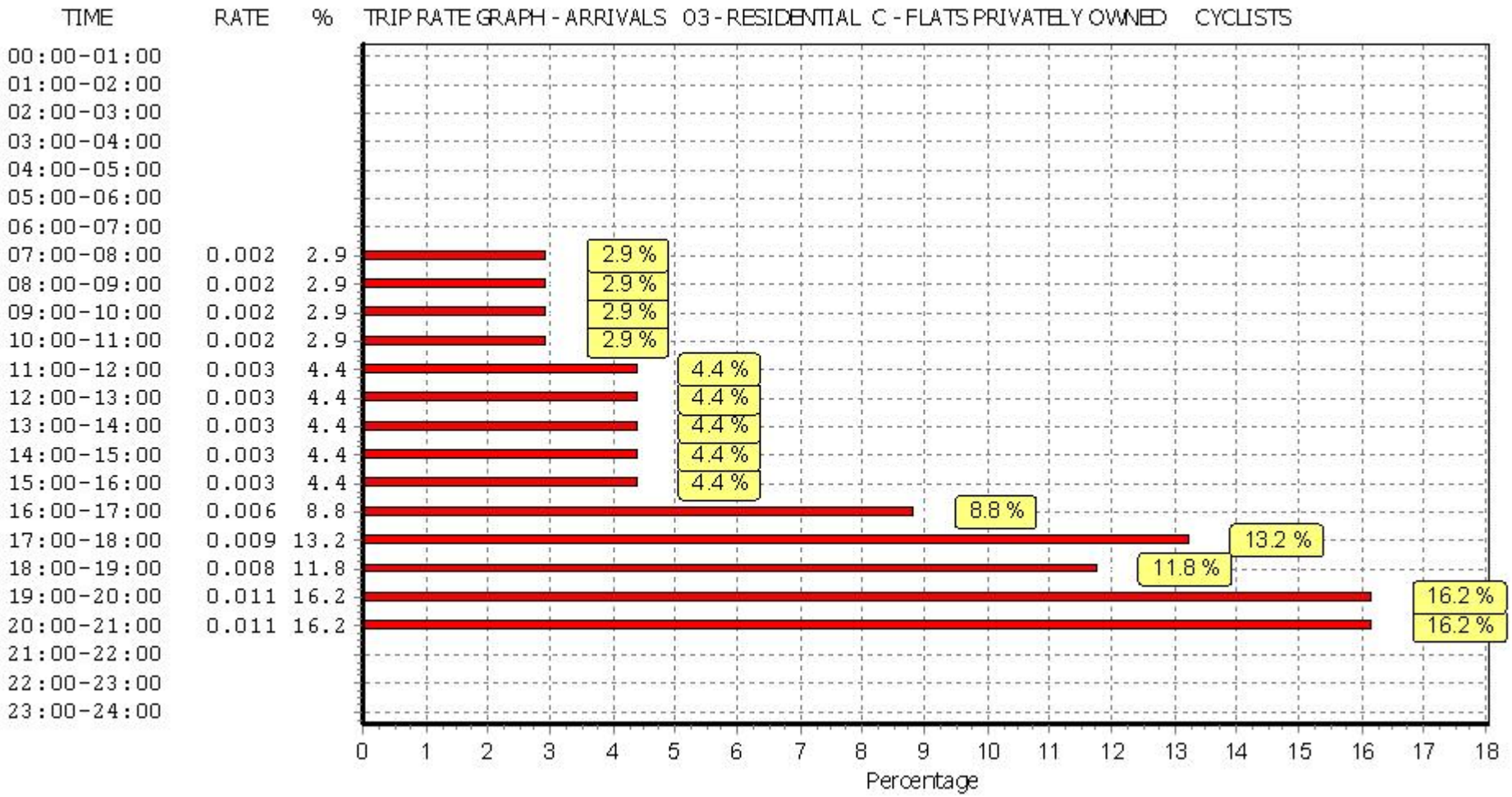
This graph is a visual representation of the trip rate calculation results screen. The same time periods and trip rates are displayed, but in addition there is an additional column showing the percentage of the total trip rate by individual time period, allowing peak periods to be easily identified through observation. Note that the type of count and the selected direction is shown at the top of the graph.

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

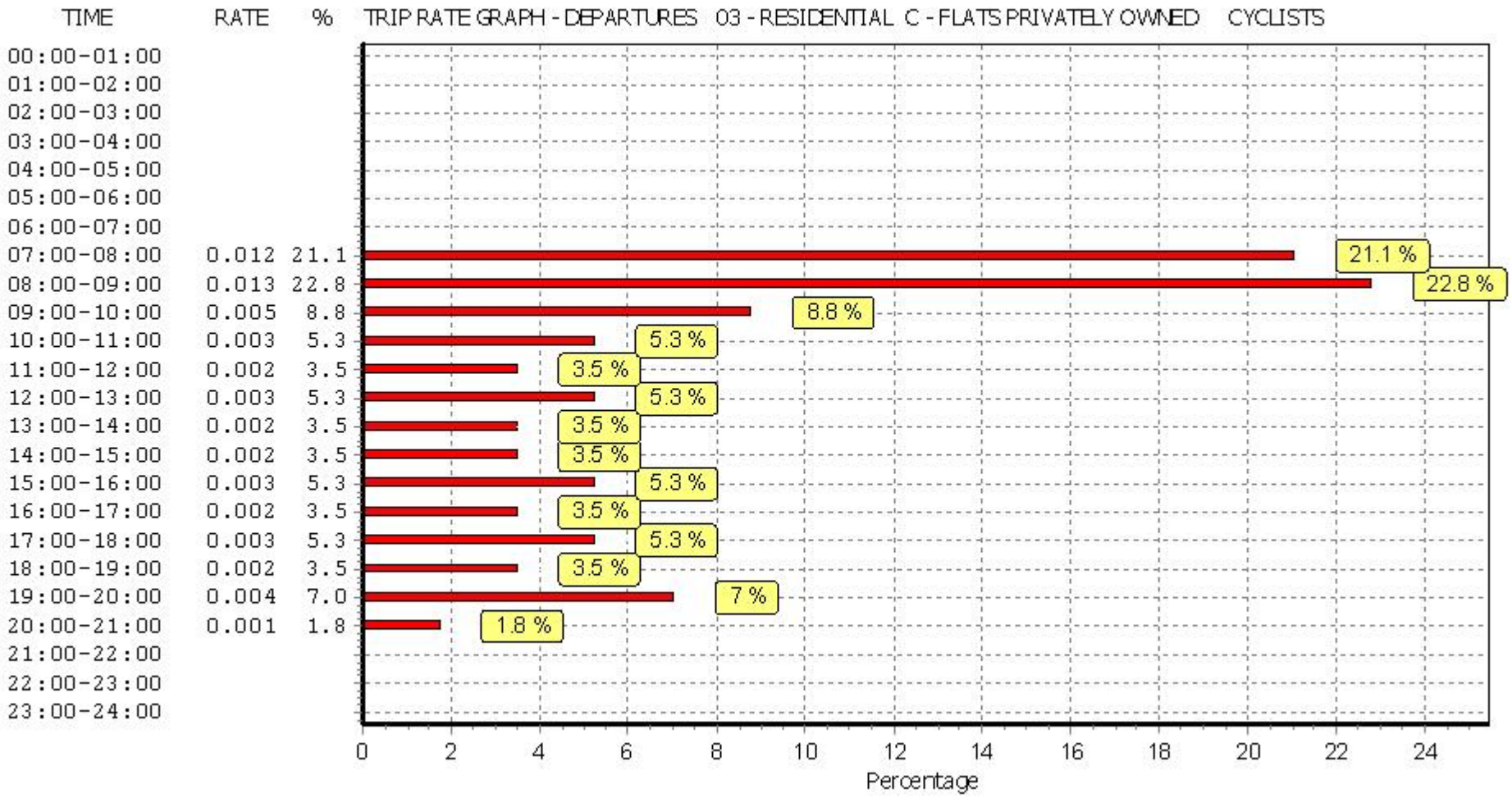
	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	69	83	0.002	69	83	0.012	69	83	0.014
08:00 - 09:00	69	83	0.002	69	83	0.013	69	83	0.015
09:00 - 10:00	69	83	0.002	69	83	0.005	69	83	0.007
10:00 - 11:00	69	83	0.002	69	83	0.003	69	83	0.005
11:00 - 12:00	69	83	0.003	69	83	0.002	69	83	0.005
12:00 - 13:00	69	83	0.003	69	83	0.003	69	83	0.006
13:00 - 14:00	69	83	0.003	69	83	0.002	69	83	0.005
14:00 - 15:00	69	83	0.003	69	83	0.002	69	83	0.005
15:00 - 16:00	69	83	0.003	69	83	0.003	69	83	0.006
16:00 - 17:00	69	83	0.006	69	83	0.002	69	83	0.008
17:00 - 18:00	69	83	0.009	69	83	0.003	69	83	0.012
18:00 - 19:00	69	83	0.008	69	83	0.002	69	83	0.010
19:00 - 20:00	15	118	0.011	15	118	0.004	15	118	0.015
20:00 - 21:00	15	118	0.011	15	118	0.001	15	118	0.012
21:00 - 22:00	2	15	0.000	2	15	0.000	2	15	0.000
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			0.068			0.057			0.125

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.*



This graph is a visual representation of the trip rate calculation results screen. The same time periods and trip rates are displayed, but in addition there is an additional column showing the percentage of the total trip rate by individual time period, allowing peak periods to be easily identified through observation. Note that the type of count and the selected direction is shown at the top of the graph.



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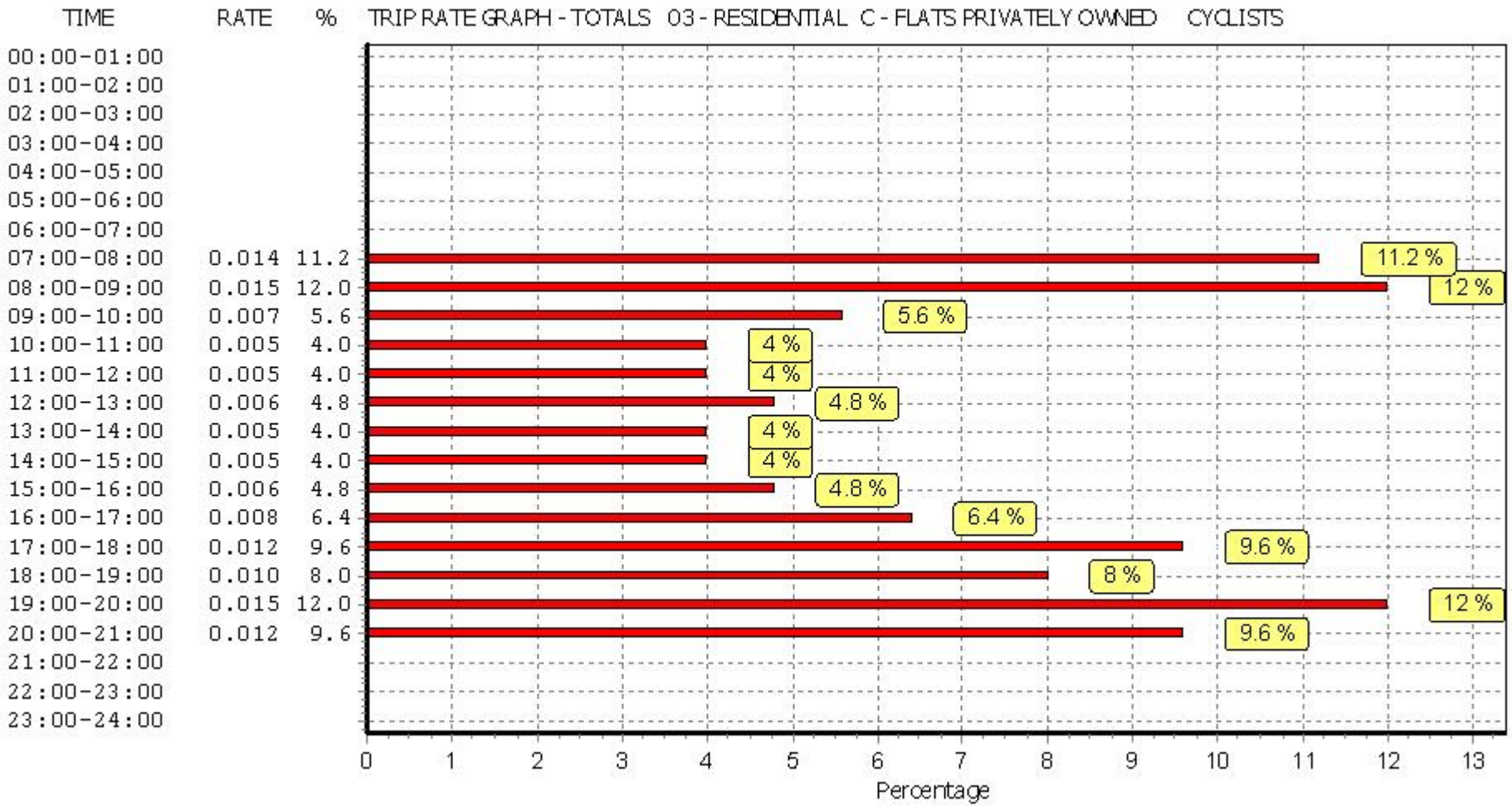

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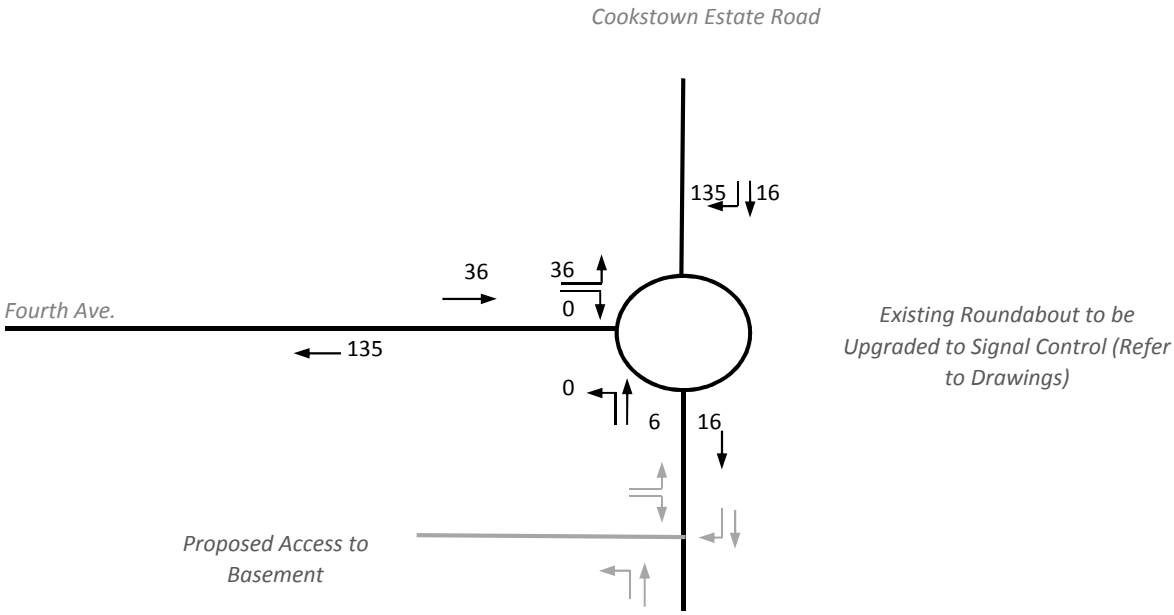
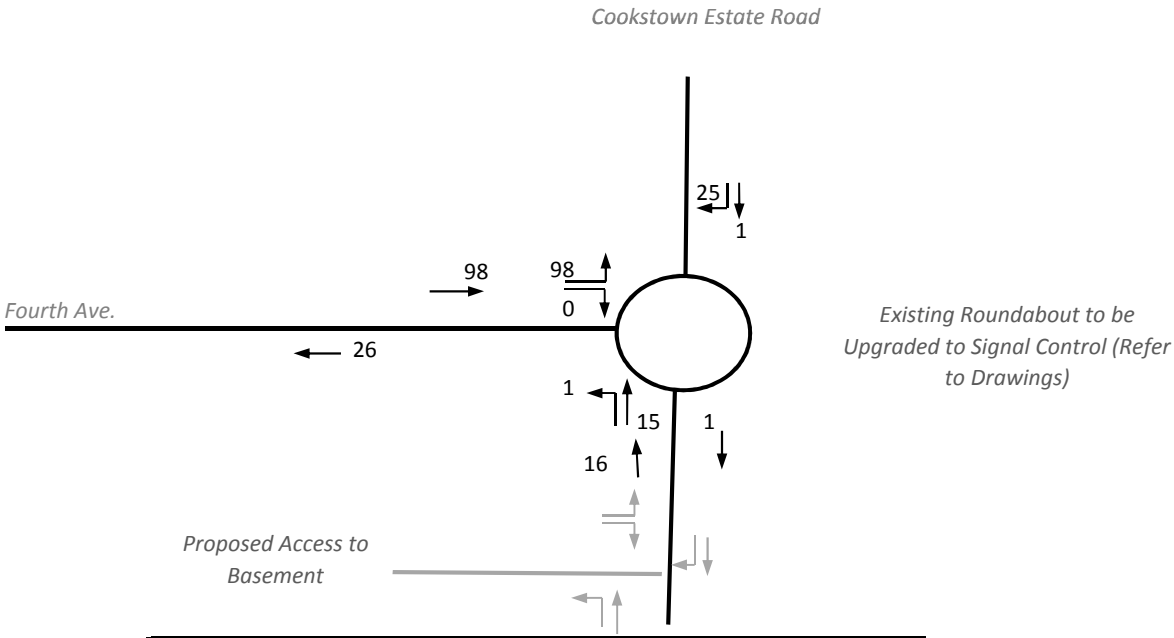
APPENDIX C

Traffic Surveys, Trip Distribution & Network Traffic Flow Projections & Diagrams

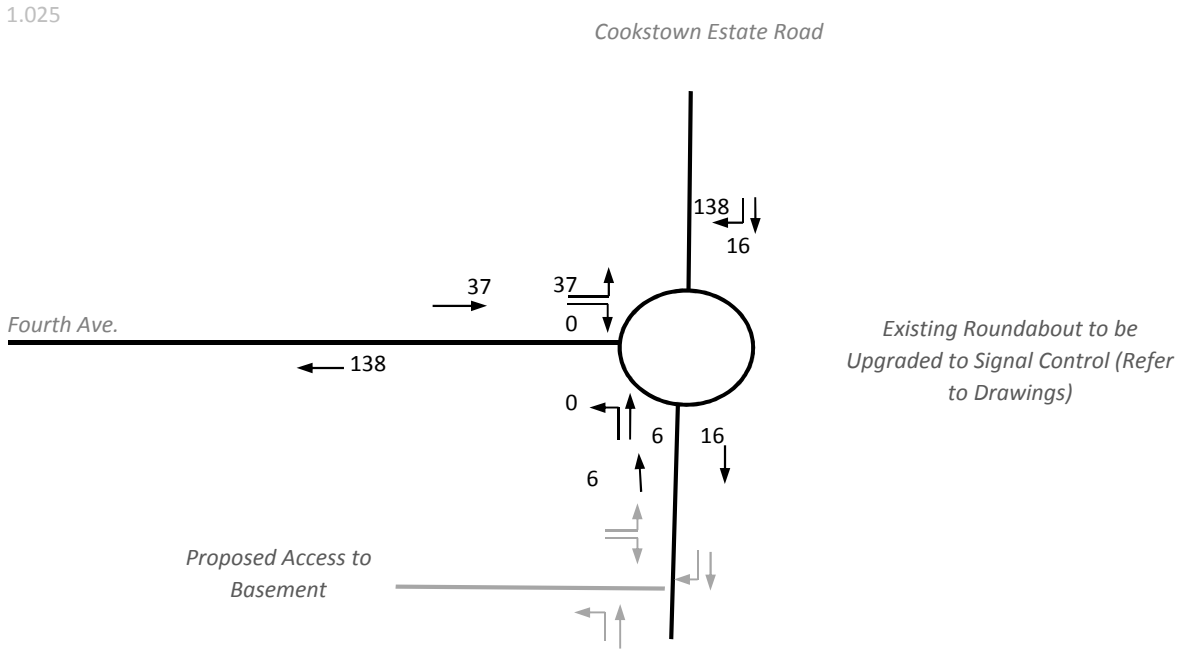


As-Surveyed Traffic Flows
Weekday AM Peak Hour 0800-0900H (PCUs)
W/O SITE DEVELOPMENT

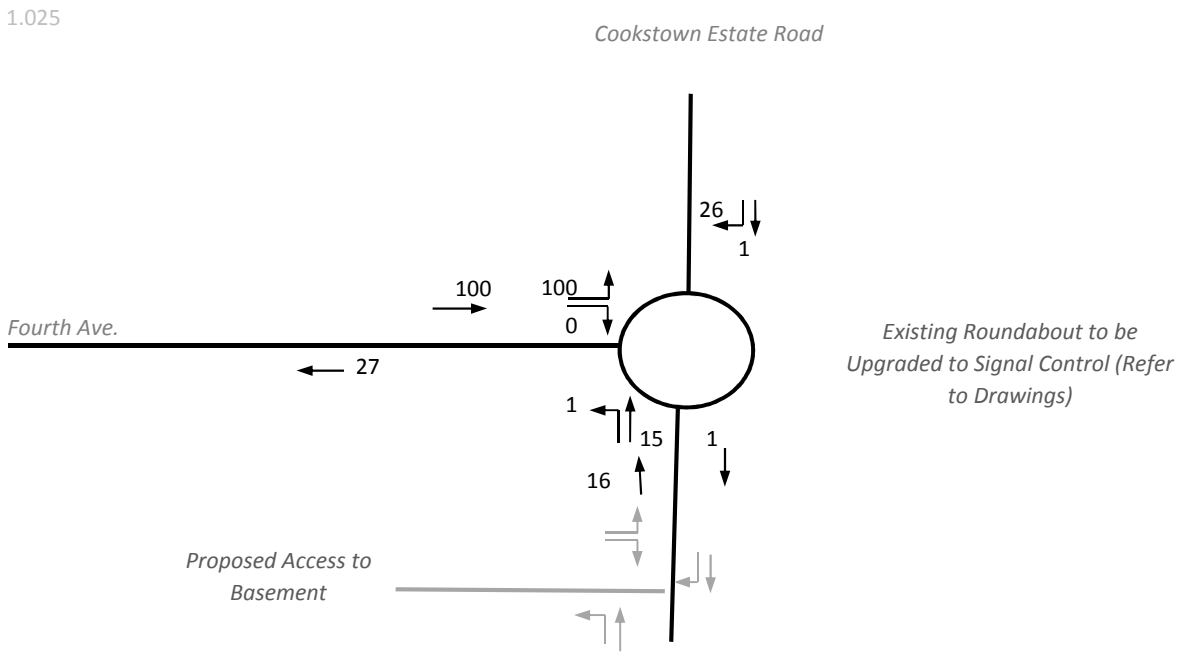


As-Surveyed Traffic Flows
Weekday PM Peak Hour 1700-1800H (PCUs)
W/O SITE DEVELOPMENT

NRA Project Appraisal Guidelines Unit 5.5, Table 5.5.1 National Traffic Growth Forecasts for SDCC, Medium Growth to 2021 factor is 1.025 and to 2036 factor is 1.104 - These have been used to Factor the Background Traffic to Selected Opening & Design Year Conditions.

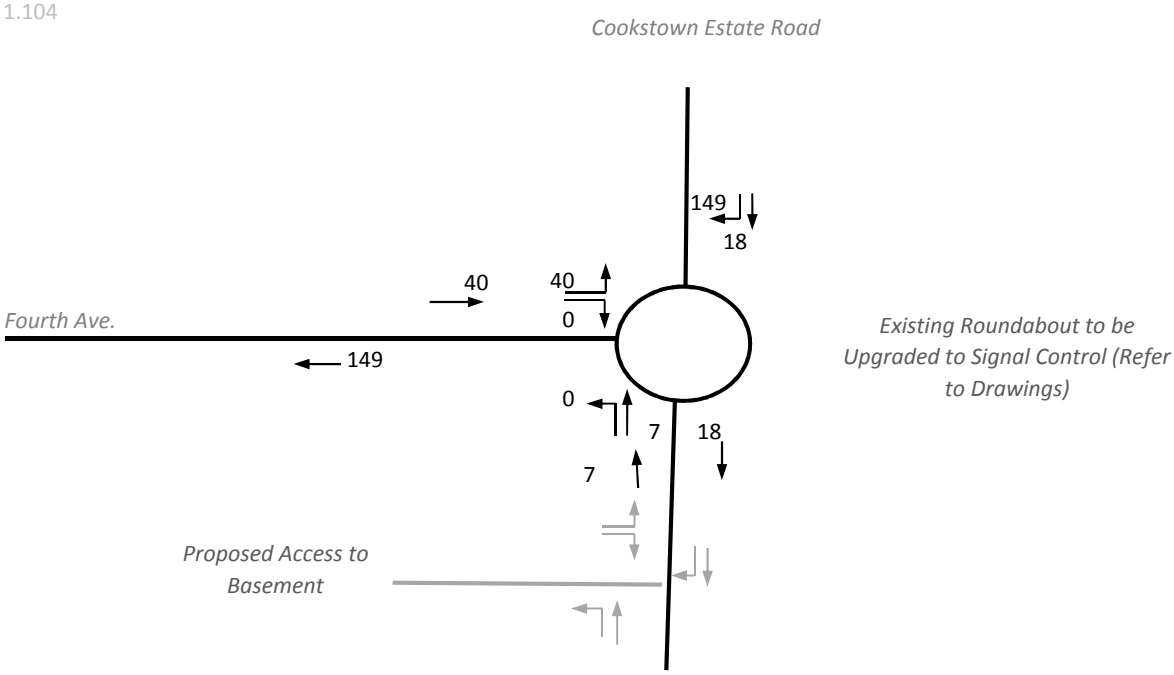


Projected Traffic Flows Opening Year 2021
Weekday AM Peak Hour 0800-0900H (PCUs)
W/O SITE DEVELOPMENT



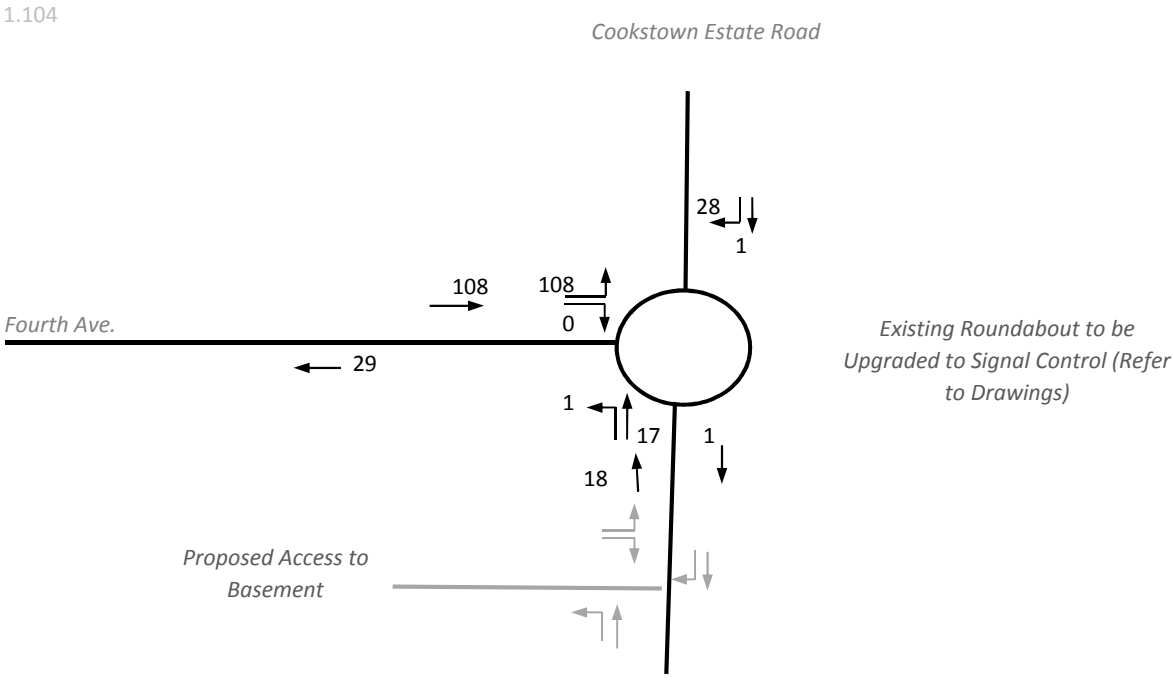
Projected Traffic Flows Opening Year 2021
Weekday PM Peak Hour 1700-1800H (PCUs)
W/O SITE DEVELOPMENT

1.104

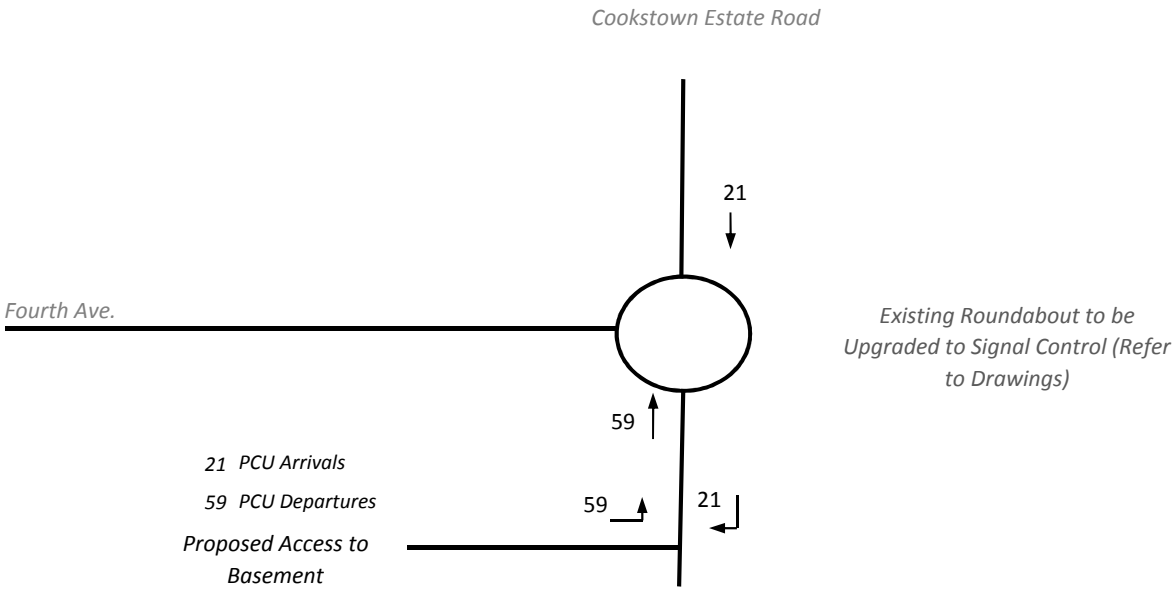


Projected Traffic Flows Design Year 2036
Weekday AM Peak Hour 0800-0900H (PCUs)
W/O SITE DEVELOPMENT

1.104

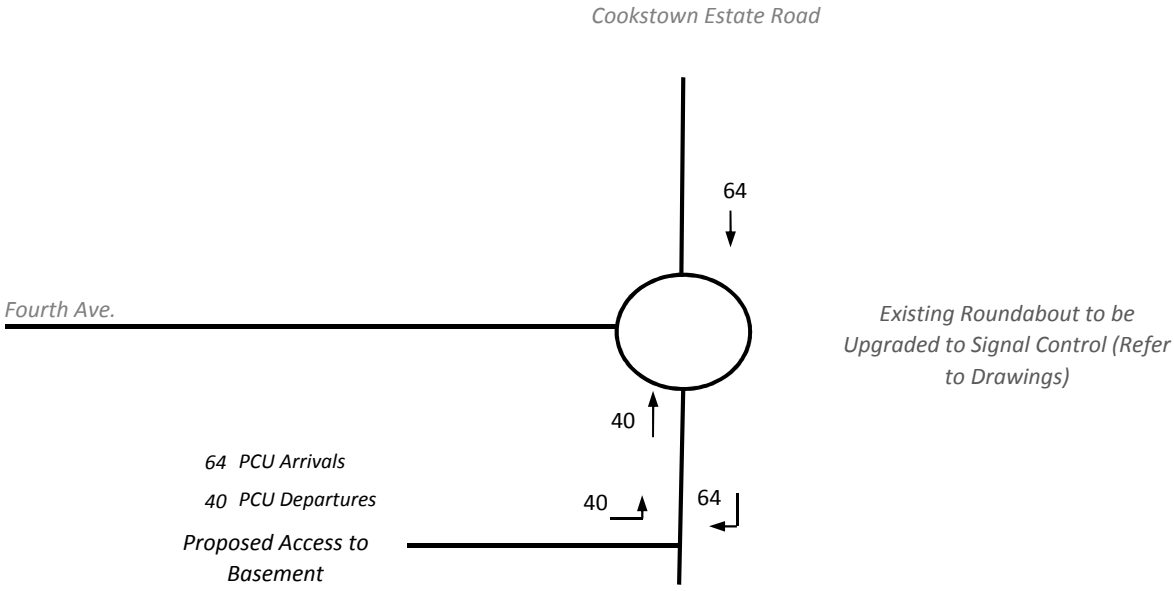


Projected Traffic Flows Design Year 2036
Weekday PM Peak Hour 1700-1800H (PCUs)
W/O SITE DEVELOPMENT



Assignment of Weekday AM Peak Hour Full Development Traffic Associated with Proposed Development Site

FOR TRICS TRAFFIC GENERATION CALCULATIONS REFER TO FOLLOWING PAGE
(For TRICS Rates see separate Appendix)



Assignment of Weekday PM Peak Hour Full Development Traffic Associated with Proposed Development Site

Trip Generation Calculations (TRICS)

Number of Apartments = **245**

Peak Hour Car Trips (TRICS Assessment)				
Apartmnts	Arrivals		Departures	
Period	Per	Total	Per	Total
AM Peak 8-9	0.057	14	0.229	56
PM Peak 5-6	0.209	51	0.105	26

GFA (m2) Commercial Space = **256**

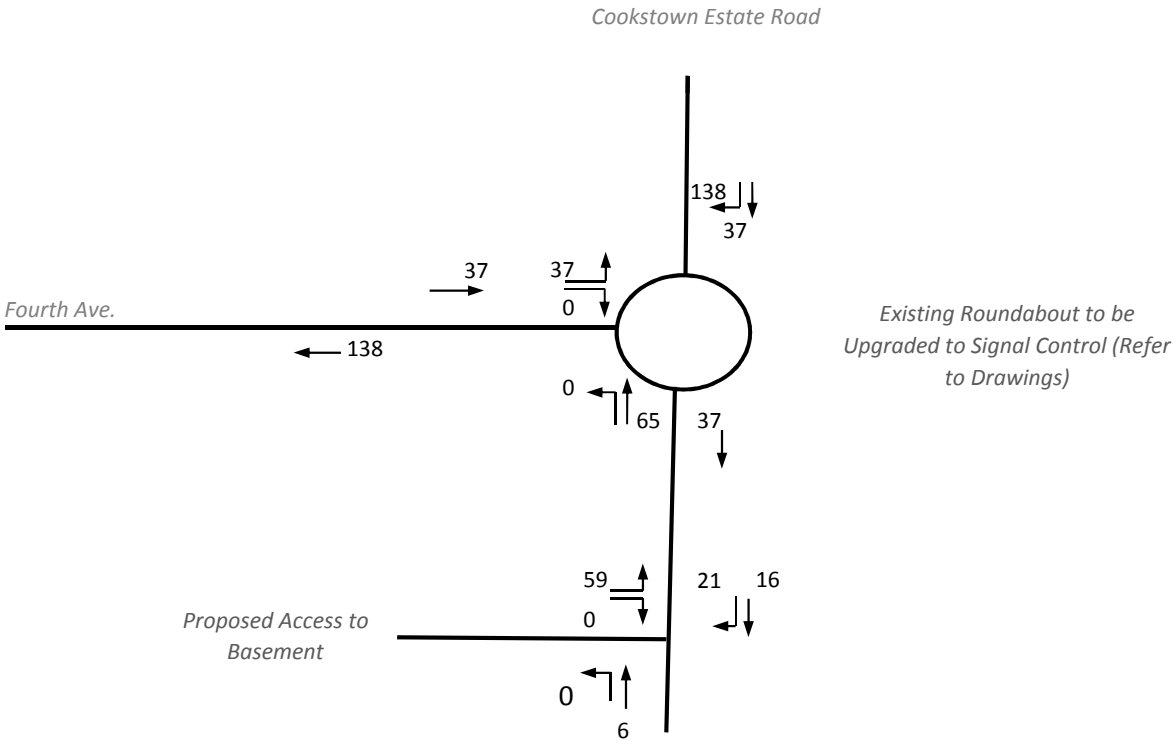
Peak Hour Car Trips (TRICS Assessment)				
RETAIL UNITS	Arrivals		Departures	
Period	Per	Total	Per	Total
AM Peak 8-9	2.776	7	1.157	3
PM Peak 5-6	4.881	12	5.516	14

Total Assigned Trips to Vehicular Access

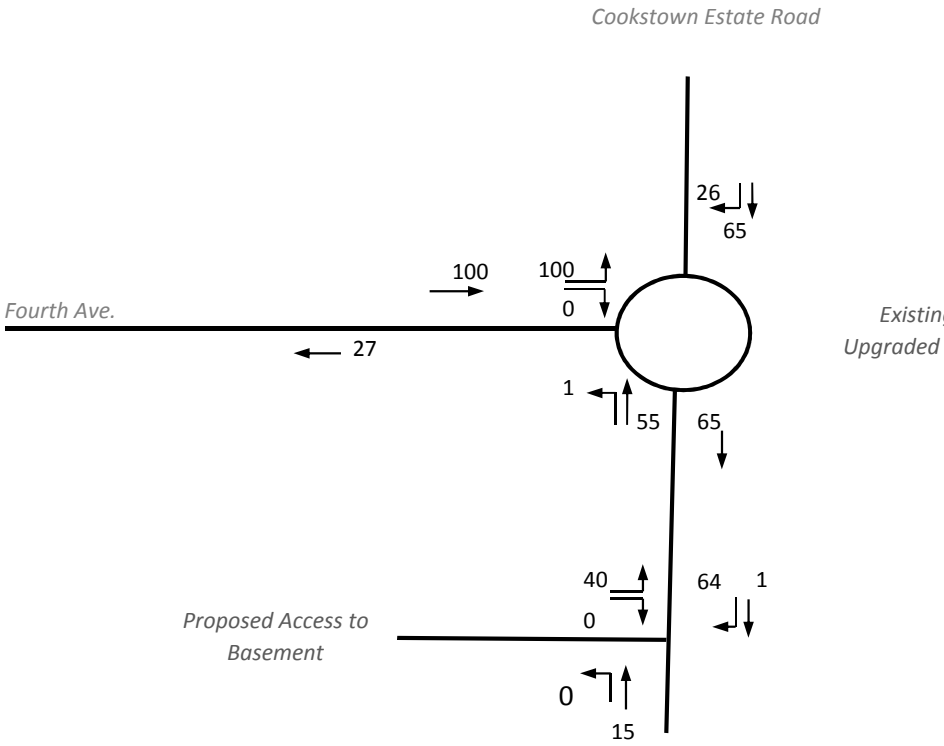
Peak Hour Car Trips (TRICS Assessment)		
TO ACCESS	Arrivals	Departures
Period	Per Dev	Per Dev
AM Peak 8-9	21	59
PM Peak 5-6	64	40

NB - This Traffic Generation Exercise is Robust and Onerous, with the Projected flow more than off set by the established permitted use of the site.

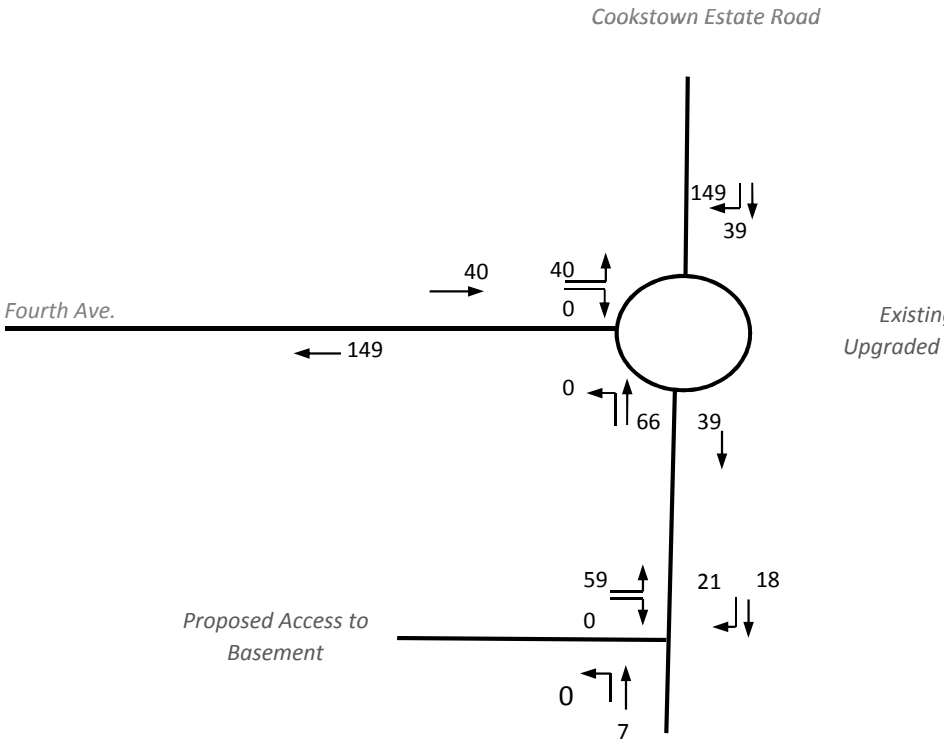
Traffic Generation Based on TRICS



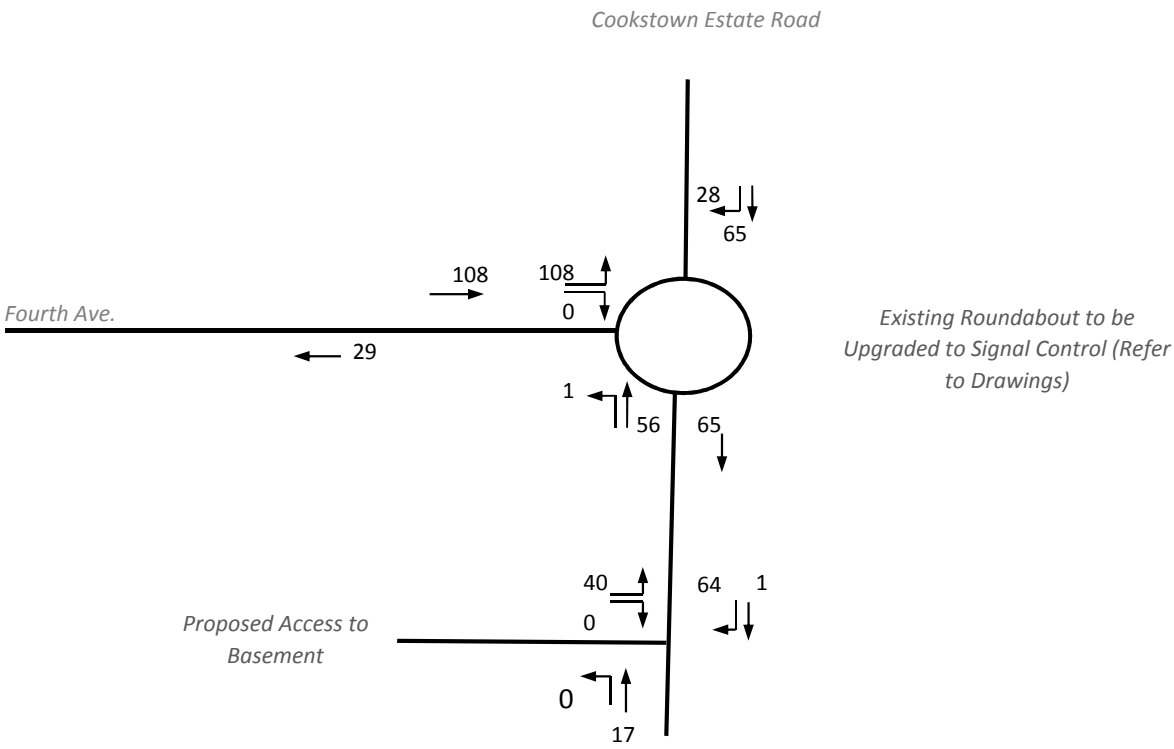
Projected Traffic Flows Opening Year 2021
Weekday AM Peak Hour 0800-0900H (PCUs)
WITH SITE DEVELOPED & OCCUPIED



Projected Traffic Flows Opening Year 2021
Weekday PM Peak Hour 1700-1800H (PCUs)
WITH SITE DEVELOPED & OCCUPIED



Projected Traffic Flows Design Year 2036
Weekday AM Peak Hour 0800-0900H (PCUs)
WITH SITE DEVELOPED & OCCUPIED



Projected Traffic Flows Design Year 2036
Weekday PM Peak Hour 1700-1800H (PCUs)
WITH SITE DEVELOPED & OCCUPIED

APPENDIX D

ARCADY Junction Simulation Model Output
Cookstown/4th Ave Roundabout

Existing Roundabout at Cookstown Estate Rd/Fourth Avenue
Summary ARCADY Results in Order as included herein
(Robust & Worst Case)

Modelled Scenario	Period Mean Max Q (PCUs)	Period Max RFC
2021 Opening Year AM Peak	<1	0.2
2021 Opening Year PM Peak	<1	0.12
2036 Design Year AM Peak	<1	0.21
2036 Design Year PM Peak	<1	0.13

All Results Above are well below the theoretical maximum RFC of 0.85, and therefore no problems whatsoever are anticipated at the Existing Roundabout in terms of Capacity or excessive vehicle Queues

NB *Any Small Changes to Selected Opening Year 2021 or Design Year 2036 will have no significant implications in terms of the conclusions of the Study.*

Junctions 9

ARCADY 9 - Roundabout Module

Filename: 2021 AM PM.j9
Path: N:\01 Projects\2016\16-040 Fourth Ave Cookstown\Calculations\July 2019 Arcadys
Report generation date: 30/07/2019 10:02:48

Summary of junction performance

	AM				PM			
	Q (PCU)	Delay (s)	RFC	LOS	Q (PCU)	Delay (s)	RFC	LOS
	2021							
Arm 1	0.1	4.46	0.09	A	0.1	4.03	0.07	A
Arm 2	0.0	4.05	0.04	A	0.1	4.34	0.12	A
Arm 3	0.2	4.60	0.20	A	0.1	4.14	0.11	A

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

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

File summary

File Description

Title	(untitled)
Location	
Site number	
Date	06/11/2018
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	NRB-004\Eoin
Description	

Units

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

Analysis Options

Mini-roundabout model	Calculate Q Percentiles	Calculate residual capacity	RFC Threshold	Av. Delay threshold (s)	Q threshold (PCU)
JUNCTIONS 9			0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2021	AM	ONE HOUR	07:45	09:15	15
D2	2021	PM	ONE HOUR	16:45	18:15	15

Analysis Set Details

ID	Network flow scaling factor (%)
A1	100.000

2021, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Mini-roundabout		Mini-roundabout appears to have unbalanced flows and may behave like a priority junction; treat results with caution. See User Guide for details.[Arms 1 and 3 have 87% of the total flow for the roundabout for one or more time segments]

Junction Network

Junctions

Junction	Name	Junction Type	Junction Delay (s)	Junction LOS
1	Cookstown Est Rd/Fourth Ave	Mini-roundabout	4.49	A

Junction Network Options

Driving side	Lighting	Road surface	In London
Left	Normal/unknown	Normal/unknown	

Arms

Arms

Arm	Name	Description
1	Cookstown Est Rd S	
2	Fourth Ave	
3	Cookstown Est Rd N	

Mini Roundabout Geometry

Arm	Approach road half-width (m)	Minimum approach road half-width (m)	Entry width (m)	Effective flare length (m)	Distance to next arm (m)	Entry corner kerb line distance (m)	Gradient over 50m (%)	Kerbed central island
1	3.00	3.00	3.00	0.0	5.00	2.00	0.0	
2	3.00	3.00	3.00	0.0	5.00	2.00	0.0	
3	3.00	3.00	3.00	0.0	5.00	2.00	0.0	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
1	0.590	985
2	0.590	985
3	0.590	985

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)
D1	2021	AM	ONE HOUR	07:45	09:15	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Av. Demand (PCU/hr)	Scaling Factor (%)
1		✓	72	100.000
2		✓	37	100.000
3		✓	177	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		1	2	3
From	1	0	0	72
	2	0	0	37
	3	39	138	0

Vehicle Mix

HV %s

		To		
		1	2	3
From	1	0	0	1
	2	0	0	1
	3	1	1	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Q (PCU)	Max LOS
1	0.09	4.46	0.1	A
2	0.04	4.05	0.0	A
3	0.20	4.60	0.2	A

Main Results for each time segment

07:45 - 08:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1	54	103	924	0.059	54	0.1	4.179	A
2	28	54	953	0.029	28	0.0	3.929	A
3	133	0	985	0.135	133	0.2	4.264	A

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1	65	124	912	0.071	65	0.1	4.292	A
2	33	65	947	0.035	33	0.0	3.980	A
3	159	0	985	0.162	159	0.2	4.402	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1	79	152	895	0.089	79	0.1	4.455	A
2	41	79	938	0.043	41	0.0	4.051	A
3	195	0	985	0.198	195	0.2	4.600	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1	79	152	895	0.089	79	0.1	4.455	A
2	41	79	938	0.043	41	0.0	4.051	A
3	195	0	985	0.198	195	0.2	4.602	A

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1	65	124	912	0.071	65	0.1	4.295	A
2	33	65	947	0.035	33	0.0	3.980	A
3	159	0	985	0.162	159	0.2	4.405	A

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1	54	104	923	0.059	54	0.1	4.184	A
2	28	54	953	0.029	28	0.0	3.930	A
3	133	0	985	0.135	133	0.2	4.270	A

2021, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Junction Delay (s)	Junction LOS
1	Cookstown Est Rd/Fourth Ave	Mini-roundabout	4.19	A

Junction Network Options

Driving side	Lighting	Road surface	In London
Left	Normal/unknown	Normal/unknown	

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D2	2021	PM	ONE HOUR	16:45	18:15	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Av. Demand (PCU/hr)	Scaling Factor (%)
1		✓	59	100.000
2		✓	100	100.000
3		✓	97	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		1	2	3
From	1	0	1	58
	2	0	0	100
	3	71	26	0

Vehicle Mix

HV %s

		To		
		1	2	3
From	1	0	1	1
	2	1	0	1
	3	1	1	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Q (PCU)	Max LOS
1	0.07	4.03	0.1	A
2	0.12	4.34	0.1	A
3	0.11	4.14	0.1	A

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1	44	19	973	0.046	44	0.0	3.912	A
2	75	43	959	0.078	75	0.1	4.112	A
3	73	0	985	0.074	73	0.1	3.985	A

17:00 - 17:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1	53	23	971	0.055	53	0.1	3.960	A
2	90	52	954	0.094	90	0.1	4.206	A
3	87	0	985	0.089	87	0.1	4.050	A

17:15 - 17:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1	65	29	968	0.067	65	0.1	4.026	A
2	110	64	947	0.116	110	0.1	4.343	A
3	107	0	985	0.108	107	0.1	4.140	A

17:30 - 17:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1	65	29	968	0.067	65	0.1	4.026	A
2	110	64	947	0.116	110	0.1	4.343	A
3	107	0	985	0.108	107	0.1	4.140	A

17:45 - 18:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1	53	23	971	0.055	53	0.1	3.960	A
2	90	52	954	0.094	90	0.1	4.209	A
3	87	0	985	0.089	87	0.1	4.051	A

18:00 - 18:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1	44	20	973	0.046	44	0.0	3.915	A
2	75	44	959	0.079	75	0.1	4.116	A
3	73	0	985	0.074	73	0.1	3.987	A

Junctions 9

ARCADY 9 - Roundabout Module

Filename: 2036 AM PM.j9
Path: N:\01 Projects\2016\16-040 Fourth Ave Cookstown\Calculations\July 2019 Arcadys
Report generation date: 30/07/2019 10:05:05

Summary of junction performance

	AM				PM			
	Q (PCU)	Delay (s)	RFC	LOS	Q (PCU)	Delay (s)	RFC	LOS
	2036							
Arm 1	0.1	4.50	0.09	A	0.1	4.04	0.07	A
Arm 2	0.0	4.07	0.05	A	0.1	4.39	0.13	A
Arm 3	0.3	4.68	0.21	A	0.1	4.15	0.11	A

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

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

File summary

File Description

Title	(untitled)
Location	
Site number	
Date	06/11/2018
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	NRB-004\Eoin
Description	

Units

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

Analysis Options

Mini-roundabout model	Calculate Q Percentiles	Calculate residual capacity	RFC Threshold	Av. Delay threshold (s)	Q threshold (PCU)
JUNCTIONS 9			0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2036	AM	ONE HOUR	07:45	09:15	15
D2	2036	PM	ONE HOUR	16:45	18:15	15

Analysis Set Details

ID	Network flow scaling factor (%)
A1	100.000

2036, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Mini-roundabout		Mini-roundabout appears to have unbalanced flows and may behave like a priority junction; treat results with caution. See User Guide for details.[Arms 1 and 3 have 86% of the total flow for the roundabout for one or more time segments]

Junction Network

Junctions

Junction	Name	Junction Type	Junction Delay (s)	Junction LOS
1	Cookstown Est Rd/Fourth Ave	Mini-roundabout	4.56	A

Junction Network Options

Driving side	Lighting	Road surface	In London
Left	Normal/unknown	Normal/unknown	

Arms

Arms

Arm	Name	Description
1	Cookstown Est Rd S	
2	Fourth Ave	
3	Cookstown Est Rd N	

Mini Roundabout Geometry

Arm	Approach road half-width (m)	Minimum approach road half-width (m)	Entry width (m)	Effective flare length (m)	Distance to next arm (m)	Entry corner kerb line distance (m)	Gradient over 50m (%)	Kerbed central island
1	3.00	3.00	3.00	0.0	5.00	2.00	0.0	
2	3.00	3.00	3.00	0.0	5.00	2.00	0.0	
3	3.00	3.00	3.00	0.0	5.00	2.00	0.0	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
1	0.590	985
2	0.590	985
3	0.590	985

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)
D1	2036	AM	ONE HOUR	07:45	09:15	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Av. Demand (PCU/hr)	Scaling Factor (%)
1		✓	73	100.000
2		✓	40	100.000
3		✓	189	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		1	2	3
From	1	0	0	73
	2	0	0	40
	3	40	149	0

Vehicle Mix

HV %s

		To		
		1	2	3
From	1	0	0	1
	2	0	0	1
	3	1	1	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Q (PCU)	Max LOS
1	0.09	4.50	0.1	A
2	0.05	4.07	0.0	A
3	0.21	4.68	0.3	A

Main Results for each time segment

07:45 - 08:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1	55	112	919	0.060	55	0.1	4.206	A
2	30	55	953	0.032	30	0.0	3.941	A
3	142	0	985	0.144	142	0.2	4.308	A

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1	66	134	906	0.072	66	0.1	4.326	A
2	36	66	946	0.038	36	0.0	3.994	A
3	170	0	985	0.173	170	0.2	4.459	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1	80	164	888	0.090	80	0.1	4.500	A
2	44	80	937	0.047	44	0.0	4.069	A
3	208	0	985	0.211	208	0.3	4.678	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1	80	164	888	0.091	80	0.1	4.501	A
2	44	80	937	0.047	44	0.0	4.069	A
3	208	0	985	0.211	208	0.3	4.680	A

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1	66	134	906	0.072	66	0.1	4.328	A
2	36	66	946	0.038	36	0.0	3.996	A
3	170	0	985	0.173	170	0.2	4.465	A

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1	55	112	919	0.060	55	0.1	4.210	A
2	30	55	952	0.032	30	0.0	3.943	A
3	142	0	985	0.144	142	0.2	4.318	A

2036, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Junction Delay (s)	Junction LOS
1	Cookstown Est Rd/Fourth Ave	Mini-roundabout	4.22	A

Junction Network Options

Driving side	Lighting	Road surface	In London
Left	Normal/unknown	Normal/unknown	

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D2	2036	PM	ONE HOUR	16:45	18:15	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Av. Demand (PCU/hr)	Scaling Factor (%)
1		✓	60	100.000
2		✓	108	100.000
3		✓	99	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		1	2	3
From	1	0	1	59
	2	0	0	108
	3	71	28	0

Vehicle Mix

HV %s

		To		
		1	2	3
From	1	0	1	1
	2	1	0	1
	3	1	1	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Q (PCU)	Max LOS
1	0.07	4.04	0.1	A
2	0.13	4.39	0.1	A
3	0.11	4.15	0.1	A

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1	45	21	972	0.046	45	0.0	3.919	A
2	81	44	959	0.085	81	0.1	4.140	A
3	75	0	985	0.076	74	0.1	3.992	A

17:00 - 17:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1	54	25	970	0.056	54	0.1	3.968	A
2	97	53	954	0.102	97	0.1	4.244	A
3	89	0	985	0.090	89	0.1	4.058	A

17:15 - 17:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1	66	31	967	0.068	66	0.1	4.036	A
2	119	65	947	0.126	119	0.1	4.392	A
3	109	0	985	0.111	109	0.1	4.151	A

17:30 - 17:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1	66	31	967	0.068	66	0.1	4.036	A
2	119	65	947	0.126	119	0.1	4.392	A
3	109	0	985	0.111	109	0.1	4.151	A

17:45 - 18:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1	54	25	970	0.056	54	0.1	3.969	A
2	97	53	954	0.102	97	0.1	4.246	A
3	89	0	985	0.090	89	0.1	4.060	A

18:00 - 18:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1	45	21	972	0.046	45	0.0	3.922	A
2	81	44	959	0.085	81	0.1	4.144	A
3	75	0	985	0.076	75	0.1	3.994	A

APPENDIX E

PiCADY Junction Model Output
Main Basement Vehicular Access

Proposed Site Vehicular Access from Fourth Avenue
Summary PiCADY Results in Order as included herein
(Robust & Worst Case)

Modelled Scenario	Period Mean Max Q (PCUs)	Period Max RFC
2021 Opening Year AM Peak	<1	0.11
2021 Opening Year PM Peak	<1	0.12
2036 Design Year AM Peak	<1	0.11
2036 Design Year PM Peak	<1	0.12

All Results Above are well below the theoretical maximum RFC of 0.85, and therefore no problems whatsoever are anticipated at the Proposed Site Access in terms of Capacity or excessive vehicle Queues - This is unsurprising in light of the very low volumes of anticipated traffic.

NB *Any Small Changes to Selected Opening Year 2021 or Design Year 2036 will have no significant implications in terms of the conclusions of the Study.*

Junctions 9

PICADY 9 - Priority Intersection Module

Filename: 2021 AM PM.j9
Path: N:\01 Projects\2016\16-040 Fourth Ave Cookstown\Calculations\July 2019 Ph2 Access Picadys
Report generation date: 30/07/2019 09:55:58

Summary of junction performance

	AM				PM			
	Q (PCU)	Delay (s)	RFC	LOS	Q (PCU)	Delay (s)	RFC	LOS
	2021							
Stream B-AC	0.1	6.06	0.11	A	0.1	5.84	0.07	A
Stream C-AB	0.0	6.00	0.04	A	0.1	6.60	0.12	A

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

File summary

File Description

Title	(untitled)
Location	
Site number	
Date	06/11/2018
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	NRB-004\Eoin
Description	

Units

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

Analysis Options

Calculate Q Percentiles	Calculate residual capacity	RFC Threshold	Av. Delay threshold (s)	Q threshold (PCU)
		0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2021	AM	ONE HOUR	07:45	09:15	15
D2	2021	PM	ONE HOUR	16:45	18:15	15

Analysis Set Details

ID	Network flow scaling factor (%)
A1	100.000

2021, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Major road direction	Junction Delay (s)	Junction LOS
1	Main Vehicular Access	T-Junction	Two-way	4.85	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description	Arm type
A	Cookstown Estate Rd S		Major
B	Siet Access		Minor
C	Cookstown Est Rd N		Major

Major Arm Geometry

Arm	Width of carriageway (m)	Has kerbed central reserve	Has right turn bay	Visibility for right turn (m)	Blocks?	Blocking queue (PCU)
C	6.50			90.0	✓	1.00

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

Minor Arm Geometry

Arm	Minor arm type	Lane width (m)	Visibility to left (m)	Visibility to right (m)
B	One lane	3.00	70	70

Slope / Intercept / Capacity

Priority Intersection Slopes and Intercepts

Junction	Stream	Intercept (PCU/hr)	Slope for A-B	Slope for A-C	Slope for C-A	Slope for C-B
1	B-A	535	0.095	0.241	0.152	0.344
1	B-C	668	0.100	0.253	-	-
1	C-B	626	0.237	0.237	-	-

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

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

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

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2021	AM	ONE HOUR	07:45	09:15	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Av. Demand (PCU/hr)	Scaling Factor (%)
A		✓	6	100.000
B		✓	66	100.000
C		✓	39	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A	B	C
From	A	0	0	6
	B	0	0	66
	C	16	23	0

Vehicle Mix

HV %s

		To		
		A	B	C
From	A	0	0	2
	B	0	0	0
	C	2	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max delay (s)	Max Q (PCU)	Max LOS
B-AC	0.11	6.06	0.1	A
C-AB	0.04	6.00	0.0	A
C-A				
A-B				
A-C				

Main Results for each time segment

07:45 - 08:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	50	667	0.075	49	0.1	5.827	A
C-AB	17	625	0.028	17	0.0	5.920	A
C-A	12			12			
A-B	0			0			
A-C	5			5			

08:00 - 08:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	59	667	0.089	59	0.1	5.927	A
C-AB	21	625	0.033	21	0.0	5.953	A
C-A	14			14			
A-B	0			0			
A-C	5			5			

08:15 - 08:30

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	73	666	0.109	73	0.1	6.063	A
C-AB	25	625	0.041	25	0.0	6.000	A
C-A	18			18			
A-B	0			0			
A-C	7			7			

08:30 - 08:45

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	73	666	0.109	73	0.1	6.063	A
C-AB	25	625	0.041	25	0.0	6.000	A
C-A	18			18			
A-B	0			0			
A-C	7			7			

08:45 - 09:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	59	667	0.089	59	0.1	5.929	A
C-AB	21	625	0.033	21	0.0	5.954	A
C-A	14			14			
A-B	0			0			
A-C	5			5			

09:00 - 09:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	50	667	0.075	50	0.1	5.833	A
C-AB	17	625	0.028	17	0.0	5.920	A
C-A	12			12			
A-B	0			0			
A-C	5			5			

2021, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Major road direction	Junction Delay (s)	Junction LOS
1	Main Vehicular Access	T-Junction	Two-way	5.53	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D2	2021	PM	ONE HOUR	16:45	18:15	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Av. Demand (PCU/hr)	Scaling Factor (%)
A		✓	15	100.000
B		✓	43	100.000
C		✓	71	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A	B	C
From	A	0	0	15
	B	0	0	43
	C	1	70	0

Vehicle Mix

HV %s

		To		
		A	B	C
From	A	0	0	2
	B	0	0	0
	C	2	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max delay (s)	Max Q (PCU)	Max LOS
B-AC	0.07	5.84	0.1	A
C-AB	0.12	6.60	0.1	A
C-A				
A-B				
A-C				

Main Results for each time segment

16:45 - 17:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	32	665	0.049	32	0.1	5.686	A
C-AB	53	623	0.085	52	0.1	6.299	A
C-A	0.75			0.75			
A-B	0			0			
A-C	11			11			

17:00 - 17:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	39	665	0.058	39	0.1	5.750	A
C-AB	63	623	0.101	63	0.1	6.427	A
C-A	0.89			0.89			
A-B	0			0			
A-C	13			13			

17:15 - 17:30

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	47	664	0.071	47	0.1	5.838	A
C-AB	77	622	0.124	77	0.1	6.599	A
C-A	1			1			
A-B	0			0			
A-C	17			17			

17:30 - 17:45

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	47	664	0.071	47	0.1	5.838	A
C-AB	77	622	0.124	77	0.1	6.602	A
C-A	1			1			
A-B	0			0			
A-C	17			17			

17:45 - 18:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	39	665	0.058	39	0.1	5.754	A
C-AB	63	623	0.101	63	0.1	6.432	A
C-A	0.89			0.89			
A-B	0			0			
A-C	13			13			

18:00 - 18:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	32	665	0.049	32	0.1	5.691	A
C-AB	53	623	0.085	53	0.1	6.310	A
C-A	0.75			0.75			
A-B	0			0			
A-C	11			11			

Junctions 9

PICADY 9 - Priority Intersection Module

Filename: 2036 AM PM.j9
Path: N:\01 Projects\2016\16-040 Fourth Ave Cookstown\Calculations\July 2019 Ph2 Access Picadys
Report generation date: 30/07/2019 09:59:38

Summary of junction performance

	AM				PM			
	Q (PCU)	Delay (s)	RFC	LOS	Q (PCU)	Delay (s)	RFC	LOS
	2036							
Stream B-AC	0.1	6.07	0.11	A	0.1	5.84	0.07	A
Stream C-AB	0.0	6.00	0.04	A	0.1	6.61	0.12	A

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

File summary

File Description

Title	(untitled)
Location	
Site number	
Date	06/11/2018
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	NRB-004\Eoin
Description	

Units

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

Analysis Options

Calculate Q Percentiles	Calculate residual capacity	RFC Threshold	Av. Delay threshold (s)	Q threshold (PCU)
		0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2036	AM	ONE HOUR	07:45	09:15	15
D2	2036	PM	ONE HOUR	16:45	18:15	15

Analysis Set Details

ID	Network flow scaling factor (%)
A1	100.000

2036, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Major road direction	Junction Delay (s)	Junction LOS
1	Main Vehicular Access	T-Junction	Two-way	4.72	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description	Arm type
A	Cookstwn Est Rd S		Major
B	Siet Access		Minor
C	Cookstown Est Rd N		Major

Major Arm Geometry

Arm	Width of carriageway (m)	Has kerbed central reserve	Has right turn bay	Visibility for right turn (m)	Blocks?	Blocking queue (PCU)
C	6.50			90.0	✓	1.00

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

Minor Arm Geometry

Arm	Minor arm type	Lane width (m)	Visibility to left (m)	Visibility to right (m)
B	One lane	3.00	70	70

Slope / Intercept / Capacity

Priority Intersection Slopes and Intercepts

Junction	Stream	Intercept (PCU/hr)	Slope for A-B	Slope for A-C	Slope for C-A	Slope for C-B
1	B-A	535	0.095	0.241	0.152	0.344
1	B-C	668	0.100	0.253	-	-
1	C-B	626	0.237	0.237	-	-

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

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

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

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2036	AM	ONE HOUR	07:45	09:15	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Av. Demand (PCU/hr)	Scaling Factor (%)
A		✓	7	100.000
B		✓	66	100.000
C		✓	41	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A	B	C
From	A	0	0	7
	B	0	0	66
	C	18	23	0

Vehicle Mix

HV %s

		To		
		A	B	C
From	A	0	0	2
	B	0	0	0
	C	2	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max delay (s)	Max Q (PCU)	Max LOS
B-AC	0.11	6.07	0.1	A
C-AB	0.04	6.00	0.0	A
C-A				
A-B				
A-C				

Main Results for each time segment

07:45 - 08:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	50	667	0.075	49	0.1	5.829	A
C-AB	17	625	0.028	17	0.0	5.921	A
C-A	14			14			
A-B	0			0			
A-C	5			5			

08:00 - 08:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	59	666	0.089	59	0.1	5.929	A
C-AB	21	625	0.033	21	0.0	5.955	A
C-A	16			16			
A-B	0			0			
A-C	6			6			

08:15 - 08:30

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	73	666	0.109	73	0.1	6.066	A
C-AB	25	625	0.041	25	0.0	6.002	A
C-A	20			20			
A-B	0			0			
A-C	8			8			

08:30 - 08:45

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	73	666	0.109	73	0.1	6.066	A
C-AB	25	625	0.041	25	0.0	6.002	A
C-A	20			20			
A-B	0			0			
A-C	8			8			

08:45 - 09:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	59	666	0.089	59	0.1	5.931	A
C-AB	21	625	0.033	21	0.0	5.956	A
C-A	16			16			
A-B	0			0			
A-C	6			6			

09:00 - 09:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	50	667	0.075	50	0.1	5.837	A
C-AB	17	625	0.028	17	0.0	5.922	A
C-A	14			14			
A-B	0			0			
A-C	5			5			

2036, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Major road direction	Junction Delay (s)	Junction LOS
1	Main Vehicular Access	T-Junction	Two-way	5.45	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D2	2036	PM	ONE HOUR	16:45	18:15	15

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

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Av. Demand (PCU/hr)	Scaling Factor (%)
A		✓	17	100.000
B		✓	43	100.000
C		✓	71	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		A	B	C
From	A	0	0	17
	B	0	0	43
	C	1	70	0

Vehicle Mix

HV %s

		To		
		A	B	C
From	A	0	0	2
	B	0	0	0
	C	2	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max delay (s)	Max Q (PCU)	Max LOS
B-AC	0.07	5.84	0.1	A
C-AB	0.12	6.61	0.1	A
C-A				
A-B				
A-C				

Main Results for each time segment

16:45 - 17:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	32	665	0.049	32	0.1	5.689	A
C-AB	53	623	0.085	52	0.1	6.303	A
C-A	0.75			0.75			
A-B	0			0			
A-C	13			13			

17:00 - 17:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	39	664	0.058	39	0.1	5.754	A
C-AB	63	623	0.101	63	0.1	6.432	A
C-A	0.89			0.89			
A-B	0			0			
A-C	15			15			

17:15 - 17:30

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	47	663	0.071	47	0.1	5.844	A
C-AB	77	622	0.124	77	0.1	6.605	A
C-A	1			1			
A-B	0			0			
A-C	19			19			

17:30 - 17:45

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	47	663	0.071	47	0.1	5.844	A
C-AB	77	622	0.124	77	0.1	6.608	A
C-A	1			1			
A-B	0			0			
A-C	19			19			

17:45 - 18:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	39	664	0.058	39	0.1	5.756	A
C-AB	63	623	0.101	63	0.1	6.437	A
C-A	0.89			0.89			
A-B	0			0			
A-C	15			15			

18:00 - 18:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
B-AC	32	665	0.049	32	0.1	5.692	A
C-AB	53	623	0.085	53	0.1	6.312	A
C-A	0.75			0.75			
A-B	0			0			
A-C	13			13			

APPENDIX F

LiNSiG - 3 Arm Signal Controlled Junction Replacing Existing 3 Arm R'Abt

Summary LiNSiG Results in Order as included herein (Robust & Worst Case)

Modelled Scenario	Period Mean Max Q (PCUs)	Period Max RFC
2021 Opening Year AM Peak	<1	0.06
2021 Opening Year PM Peak	<1	0.04
2036 Design Year AM Peak	<1	0.07
2036 Design Year PM Peak	<1	0.05

All Results Above are well below the theoretical maximum RFC of 0.85, and therefore no problems whatsoever are anticipated at the Proposed Site Access in terms of Capacity or excessive vehicle Queues - This is unsurprising in light of the very low volumes of anticipated traffic.

NB *Any Small Changes to Selected Opening Year 2021 or Design Year 2036 will have no significant implications in terms of the conclusions of the Study.*

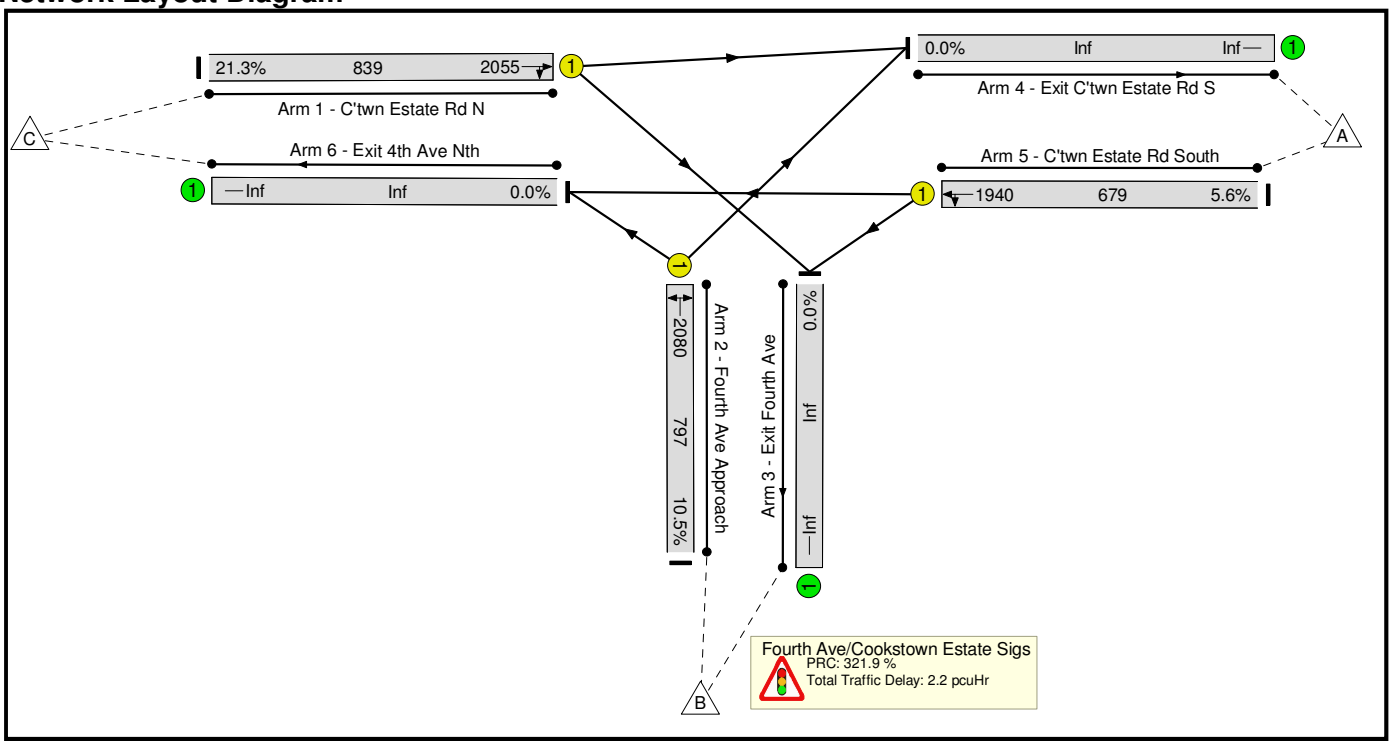
LiNSiG Output Results Summary (16/040 July 2019)

User and Project Details

Project:	**Cookstown Phase 2**
Title:	**Replacement Roundabout**
Location:	Calculations Folder
File name:	2021 AM.lsg3x
Author:	ER
Company:	NRB Consulting Engineers Ltd
Address:	***Unit 8 Leopardstown Business Centre Dublin D18TR24***
Notes:	

Scenario 1: '2021 AM Peak' (FG1: '2021 AM Peak with All Development', Plan 1: 'Signal Plan No. 1')

Network Layout Diagram



Basic Results Summary

Network Results 2021 AM Peak Hour - With All Development

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	-	-	-		-	-	-	-	-	-	**15.4%**	**0**	**0**	**0**	**1.7**	-	-
Fourth Ave/Cookstown Estate Sigs	-	-	-		-	-	-	-	-	-	**15.4%**	**0**	**0**	**0**	**1.7**	-	-
1/1	C'twn Estate Rd N Right Ahead	U	A		1	67	-	179	2055	1164	15.4%	-	-	-	0.7	14.2	2.9
2/1	Fourth Ave Approach Right Left	U	C		1	31	-	84	2080	555	15.1%	-	-	-	0.9	37.5	2.2
5/1	C'twn Estate Rd South Left Ahead	U	D		1	67	-	38	1940	1099	3.5%	-	-	-	0.1	13.2	0.6

C1 PRC for Signalled Lanes (%): 485.5 Total Delay for Signalled Lanes (pcuHr): 1.72 Cycle Time (s): 120
PRC Over All Lanes (%): 485.5 Total Delay Over All Lanes(pcuHr): 1.72

Basic Results Summary

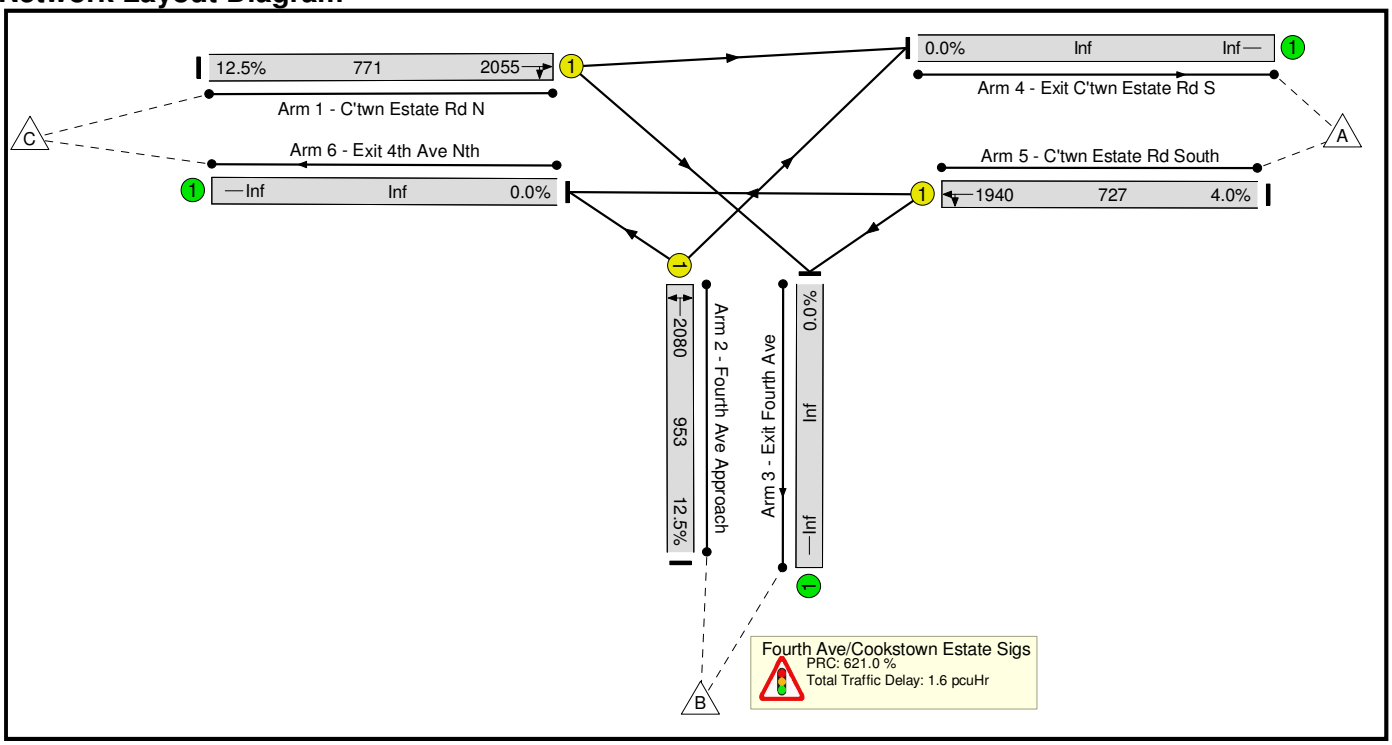
LiNSiG Output Results Summary (16/040 July 2019)

User and Project Details

Project:	**Cookstown Phase 2**
Title:	**Replacement Roundabout**
Location:	Calculations Folder
File name:	2021 PM.lsg3x
Author:	ER
Company:	NRB Consulting Engineers Ltd
Address:	***Unit 8 Leopardstown Business Centre Dublin D18TR24***
Notes:	

Scenario 1: '2021 PM Peak' (FG1: '2021 PM Peak with All Development', Plan 1: 'Signal Plan No. 1')

Network Layout Diagram



Network Results - 2021 PM Peak Hour WITH ENTIRE DEVELOPMENT

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	-	-	-		-	-	-	-	-	-	**12.5%**	**0**	**0**	**0**	**1.6**	-	-
Fourth Ave/Cookstown Estate Sigs	-	-	-		-	-	-	-	-	-	**12.5%**	**0**	**0**	**0**	**1.6**	-	-
1/1	C'twn Estate Rd N Right Ahead	U	A		1	44	-	96	2055	771	12.5%	-	-	-	0.7	27.3	2.2
2/1	Fourth Ave Approach Right Left	U	C		1	54	-	119	2080	953	12.5%	-	-	-	0.7	20.8	2.3
5/1	C'twn Estate Rd South Left Ahead	U	D		1	44	-	29	1940	727	4.0%	-	-	-	0.2	26.4	0.6

C1 PRC for Signalled Lanes (%): 621.0 Total Delay for Signalled Lanes (pcuHr): 1.63 Cycle Time (s): 120
PRC Over All Lanes (%): 621.0 Total Delay Over All Lanes(pcuHr): 1.63

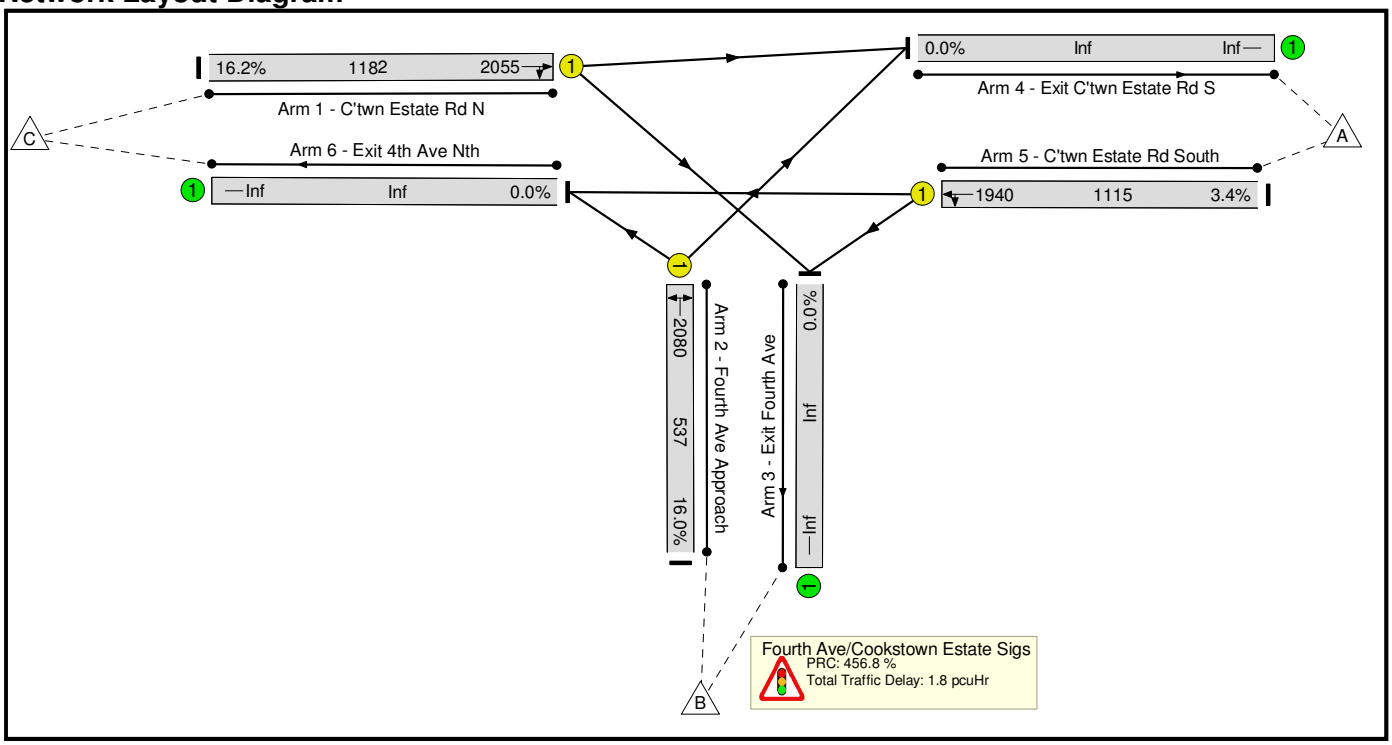
LiNSiG Output Results Summary (16/040 July 2019)

User and Project Details

Project:	**Cookstown Phase 2**
Title:	**Replacement Roundabout**
Location:	Calculations Folder
File name:	2036 AM.lsg3x
Author:	ER
Company:	NRB Consulting Engineers Ltd
Address:	***Unit 8 Leopardstown Business Centre Dublin D18TR24***
Notes:	

Scenario 1: '2036 AM Peak' (FG1: '2036 AM Peak with All Development', Plan 1: 'Signal Plan No. 1')

Network Layout Diagram



Network Results Weekday AM Peak Hour 2036 WITH ALL DEVELOPMENT

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	-	-	-		-	-	-	-	-	-	**16.2%**	**0**	**0**	**0**	**1.8**	-	-
Fourth Ave/Cookstown Estate Sigs	-	-	-		-	-	-	-	-	-	**16.2%**	**0**	**0**	**0**	**1.8**	-	-
1/1	C'twn Estate Rd N Right Ahead	U	A		1	68	-	191	2055	1182	16.2%	-	-	-	0.7	13.8	3.1
2/1	Fourth Ave Approach Right Left	U	C		1	30	-	86	2080	537	16.0%	-	-	-	0.9	38.4	2.3
5/1	C'twn Estate Rd South Left Ahead	U	D		1	68	-	38	1940	1115	3.4%	-	-	-	0.1	12.7	0.6

C1 PRC for Signalled Lanes (%): 456.8 Total Delay for Signalled Lanes (pcuHr): 1.78 Cycle Time (s): 120
PRC Over All Lanes (%): 456.8 Total Delay Over All Lanes(pcuHr): 1.78

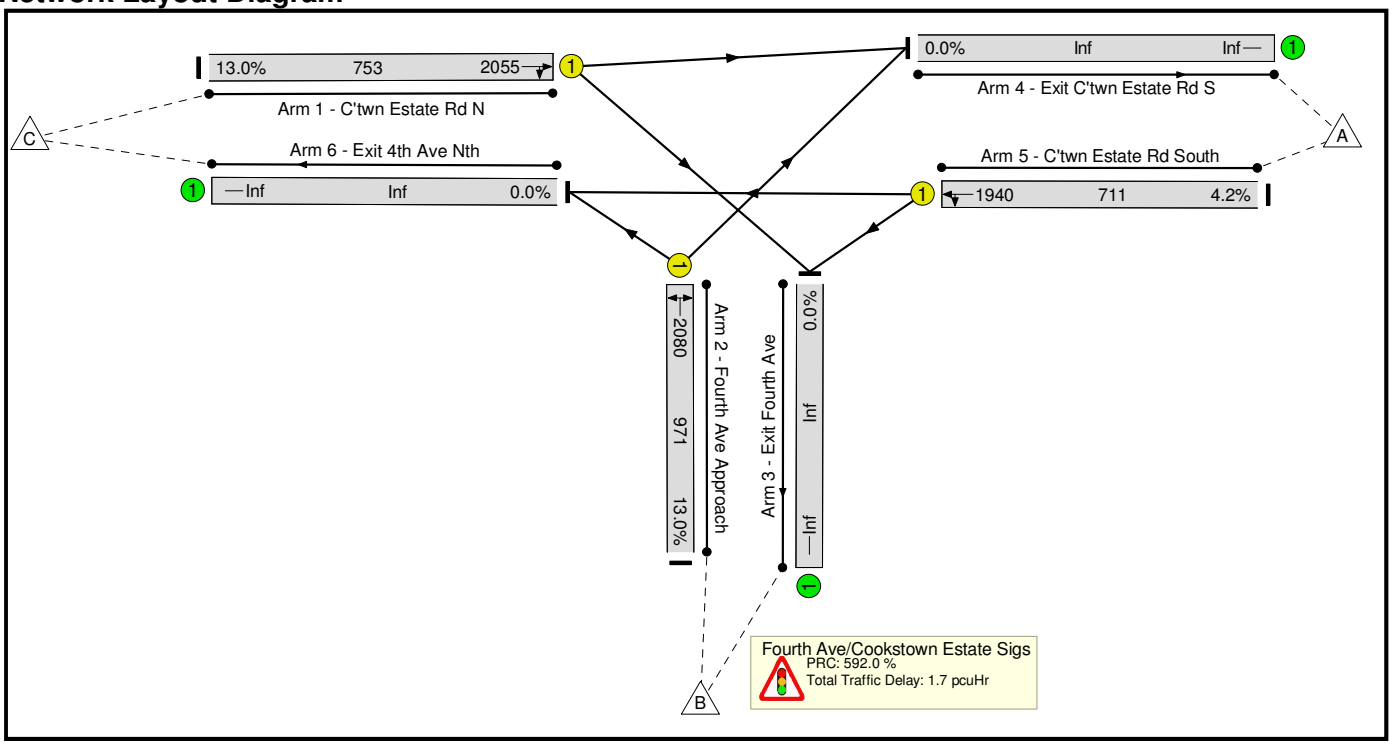
LiNSiG Output Results Summary (16/040 July 2019)

User and Project Details

Project:	**Cookstown Phase 2**
Title:	**Replacement Roundabout**
Location:	Calculations Folder
File name:	2036 PM.lsg3x
Author:	ER
Company:	NRB Consulting Engineers Ltd
Address:	***Unit 8 Leopardstown Business Centre Dublin D18TR24***
Notes:	

Scenario 1: '2036 PM Peak' (FG1: '2036 PM Peak with All Development', Plan 1: 'Signal Plan No. 1')

Network Layout Diagram



Basic Results Summary

Network Results Weekday PM Peak Hour 2036 WITH ENTIRE DEVELOPMENT

Item	Lane Description	Lane Type	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network	-	-	-		-	-	-	-	-	-	**13.0%**	**0**	**0**	**0**	**1.7**	-	-
Fourth Ave/Cookstown Estate Sigs	-	-	-		-	-	-	-	-	-	**13.0%**	**0**	**0**	**0**	**1.7**	-	-
1/1	C'twn Estate Rd N Right Ahead	U	A		1	43	-	98	2055	753	13.0%	-	-	-	0.8	28.0	2.2
2/1	Fourth Ave Approach Right Left	U	C		1	55	-	126	2080	971	13.0%	-	-	-	0.7	20.3	2.5
5/1	C'twn Estate Rd South Left Ahead	U	D		1	43	-	30	1940	711	4.2%	-	-	-	0.2	27.1	0.7

C1 PRC for Signalled Lanes (%): 592.0 Total Delay for Signalled Lanes (pcuHr): 1.70 Cycle Time (s): 120
PRC Over All Lanes (%): 592.0 Total Delay Over All Lanes(pcuHr): 1.70

APPENDIX G

Independent Stage 1 Road Safety Audit & Designer Feedback Form

Title: **STAGE 1 ROAD SAFETY AUDIT**

For;

Residential Development, Cookstown Industrial Estate (4th Avenue)

Client: **NRB Consulting Engineers.**

Date: **August 2019**

Report reference: **0519R01**

VERSION: **FINAL**

Prepared By:

Bruton Consulting Engineers Ltd

Glaspistol
Clogherhead
Drogheda
Co. Louth.

Tel: 041 9881456
Mob: 086 8067075
E: admin@brutonceng.ie
W: www.brutonceng.ie

BRUTON CONSULTING ENGINEERS

CONTENTS SHEET

Contents

1.0 Introduction

This report was prepared in response to a request from Mr. Paul Burke, NRB Consulting Engineers, for a Stage 1 Road Safety Audit of the proposed mixed-use apartment development at No. 66 & 67 Fourth Avenue, Cookstown Industrial Estate.

The Road Safety Audit Team comprised of;

Team Leader: **Norman Bruton**, BE CEng FIEI, Cert Comp RSA.

TII Auditor Approval no. NB 168446

Team Member: **Owen O'Reilly,** B.SC. Eng Dip Struct. Eng NCEA Civil Dip Civil. Eng CEng MIEI

TII approval number: OO 1291756

The Road Safety Audit comprised an examination of the drawings provided and a site visit by the Audit Team, together, on the 11th December 2018 and again on the 6th August 2019.

The weather at the time of both daytime site visits was dry and the road surface was also dry.

This Stage 1 Road Safety Audit has been carried out in accordance with the requirements of TII, Publication Number GE-STY-01024, dated December 2017.

The scheme has been examined and this report compiled in respect of the consideration of those matters that have an adverse effect on road safety. It has not been examined or verified for compliance with any other standards or criteria.

The problems identified in this report are considered to require action in order to improve the safety of the scheme for road users.

If any of the recommendations within this safety audit report are not accepted, a written response is required, stating reasons for non-acceptance. Comments made within the report under the heading of Observation are intended to be for information only. Written responses to Observations are not required.

A location map showing where each problem occurs is provided in **Appendix A.**

A list of the documents provided to the Audit Team is provided in **Appendix B.**

The feedback form to be completed by the Design Team Leader is provided in **Appendix C.**

2.0 Background

It is proposed to develop No. 66 and 67 Cookstown Industrial estate into an apartment complex (275 no. apartments) with some ancillary commercial use at ground floor.

Vehicular access to a basement car park (89 spaces) will be via a priority junction on Cookstown Estate Road.

There is an existing roundabout at the junction of Cookstown Estate Road and Fourth Avenue.

South Dublin County Council intend to construct a Cookstown Estate Road connection route from Belgard Square North and that scheme is currently going through the planning process. There is also a plan for a third party to construct an East-West road to Belgard Road.

The drawings to be audited do not include conversion of the roundabout to a signalised junction but the Transportation Assessment issued to the Audit Team as background material includes an assessment and preliminary layout of such an upgrade.

The speed limit on the surrounding road network is 50km/hr. It is proposed that the access to the basement car park will be posted as 30km/hr.

The site location is shown below.

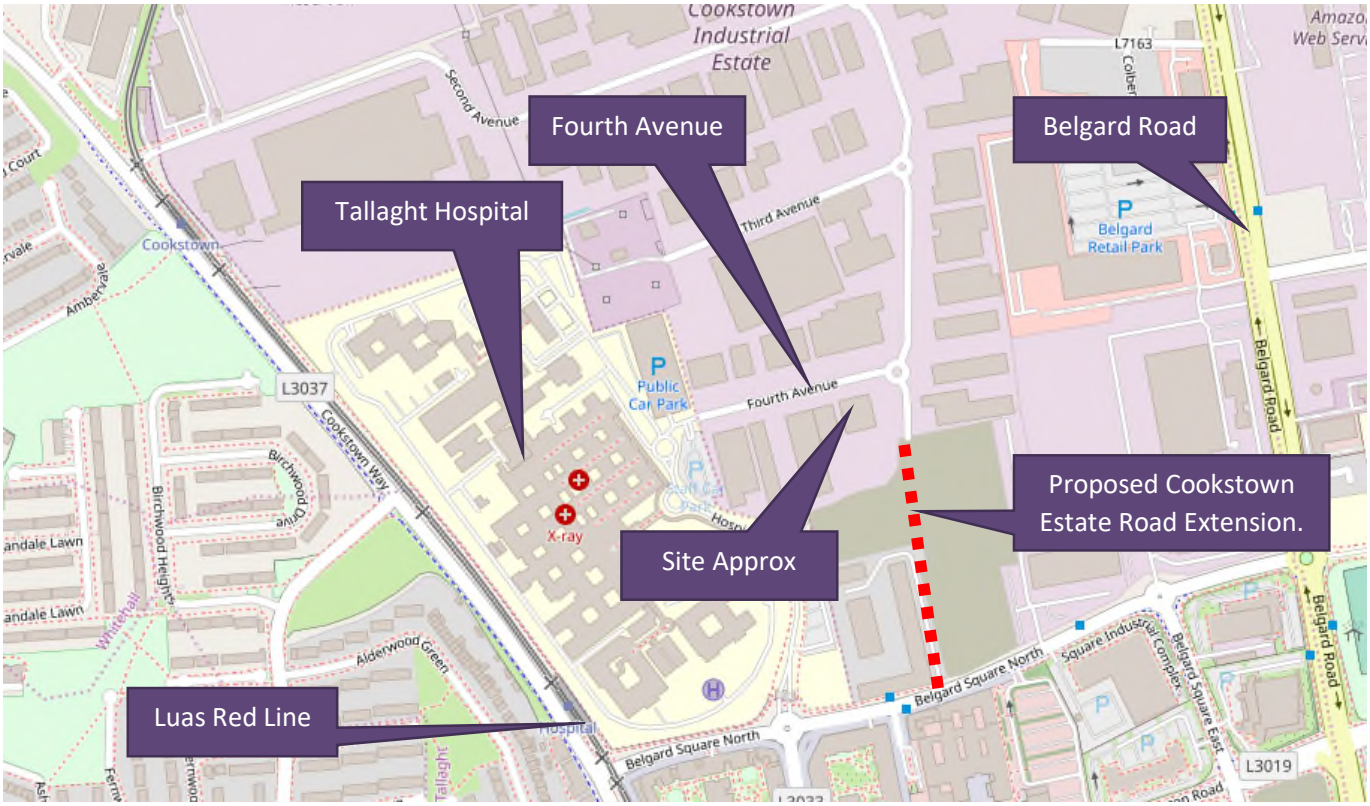
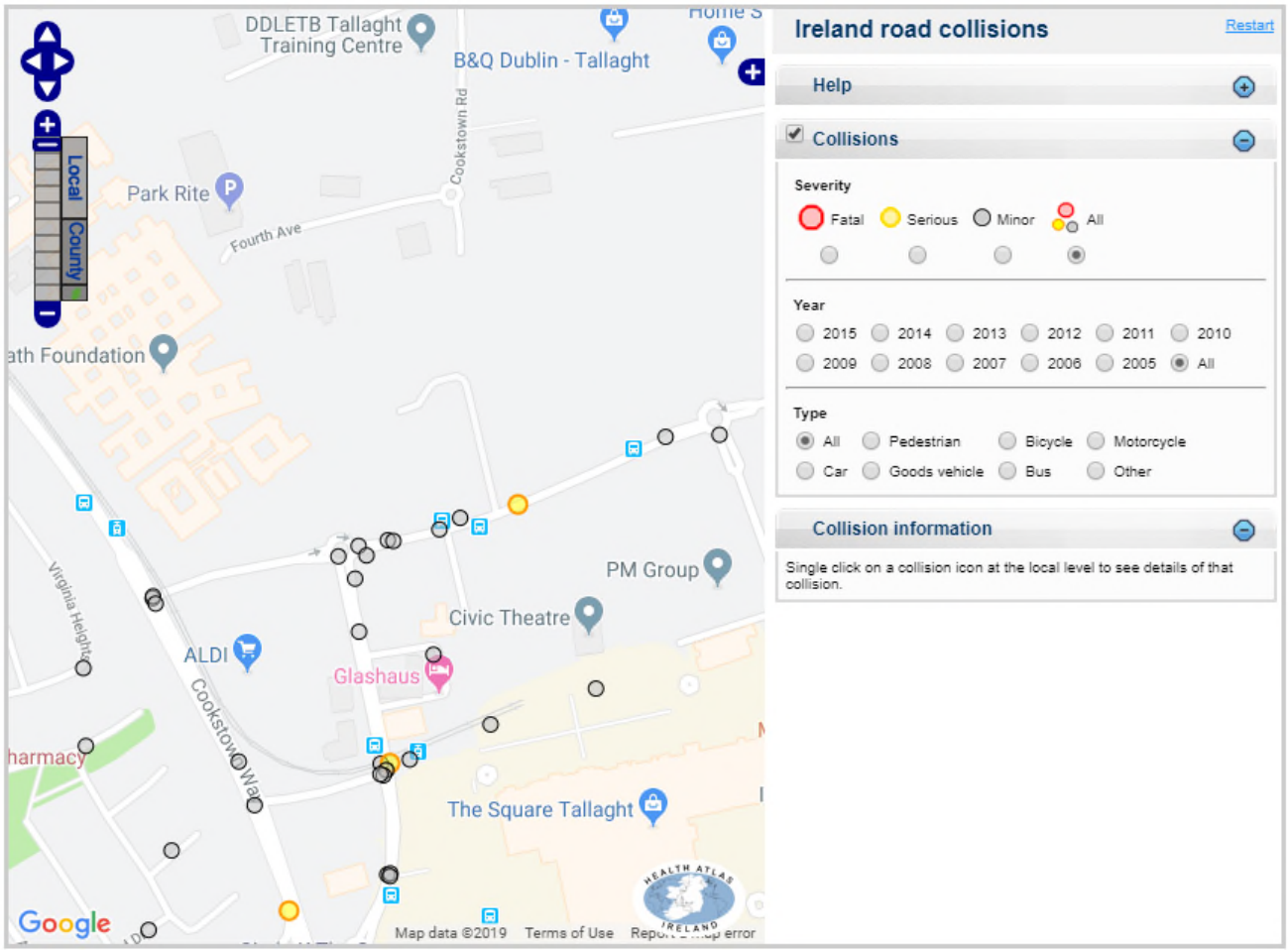


Image courtesy of Openstreetmaps.org

The Road Safety Authority's website www.rsa.ie shows that there have been no recorded injury collisions in the vicinity of the development between the years 2005 and 2015.



3.0 Main Report

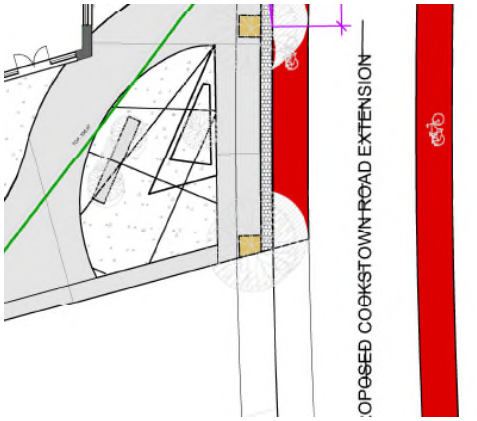
3.1 Problem

LOCATION

Drawing NRB-TA-001 Rev B & site observation

PROBLEM

There is a risk that if the development is constructed prior to the Cookstown Estate Connector road to Belgard Square North that pedestrians will climb over the existing boundary wall to gain access to the centre of Tallaght via the most direct route. This could result in falls and personal injury.



RECOMMENDATION

It is recommended that the development be completed after the link road is constructed by SDCC or that a temporary pedestrian link be provided in the interim period.

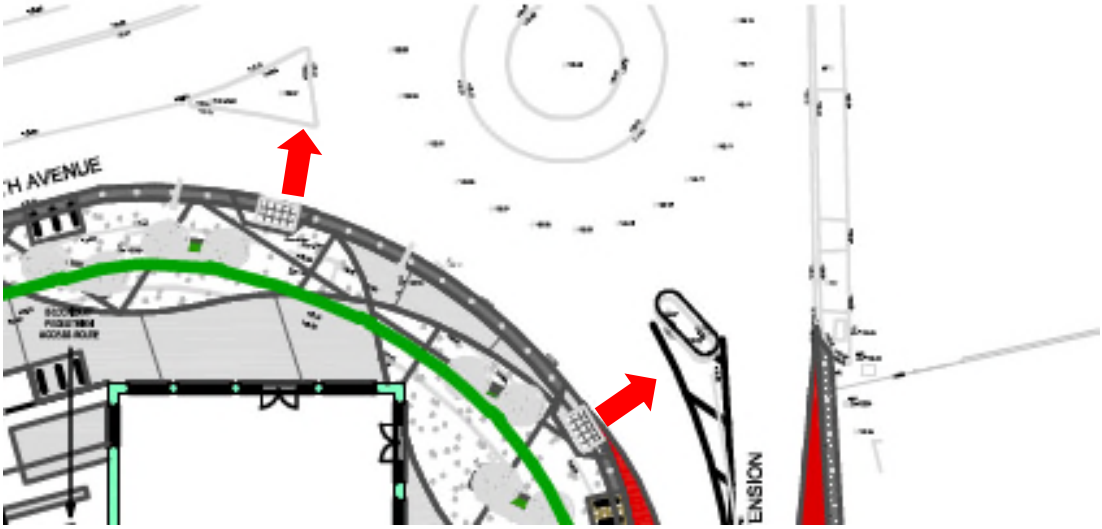
3.2 Problem

LOCATION

Drawing NRB- TA-001 Rev B

PROBLEM

There are a number of informal pedestrian crossings points shown on the drawing. There are no corresponding points on the opposite side of the carriageway which could lead to trips and falls for the mobility impaired or inability to cross for buggy pushers or wheelchair users. The high “trief” type kerbs are used throughout the industrial estate which are higher to mount than ordinary kerbs and could even be treated as height hazards.



RECOMMENDATION

It is recommended that crossing points are provided on the opposite side of the carriageway. Where the traffic islands for the roundabout are to be used as a refuge they should have dropped kerbs and tactile paving and should be at least two meters wide to provide sufficient refuge from passing vehicles.

3.3 Problem

LOCATION

Drawing NRB- TA-001 Rev B & Site Observation.

PROBLEM

It was observed during the site visit that the keep left signs at the splitter island of the roundabout and the central island chevron signs have been struck/removed (possibly due to the swept path of HGVs especially those performing u-turns at the roundabout) and are no longer present. There is a risk that new residents associated with the new development may not be fully aware of the roundabouts presence and they may enter the wrong side of the splitter islands and possibly have head-on collisions with circulating traffic.

RECOMMENDATION

It is recommended that the signs and road markings associated with the roundabout are provided in the interim until the signalised junction is provided as part of the proposed third party E-W link to Belgard Road.

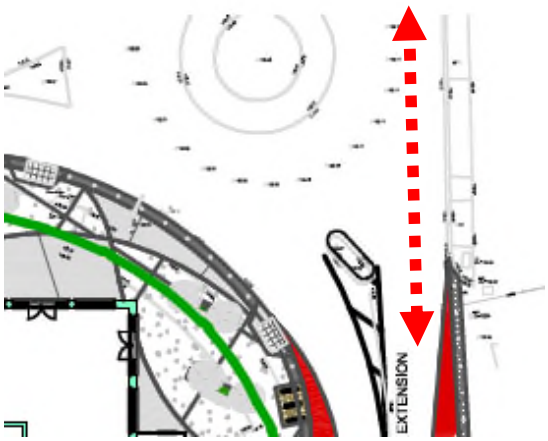
3.4 Problem

LOCATION

Drawing NRB- TA-001 Rev B & Site Observation.

PROBLEM

There is no deflection at the roundabout for southbound traffic. This could lead to excessive speed through the roundabout and further south on Cookstown Estate Road. As a result, the severity of injury with pedestrians or cyclists would be greater should a driver lose control of their vehicle.



RECOMMENDATION
It is recommended that some traffic calming be provided for southbound drivers.

4.0 Observations

4.1 Observation

There is a difference in the cross section of the proposed SDCC link road and the cross section on Cookstown Estate Road outside the development. There are trees and cycle parking areas between the cycle track and the footway. It is important that at the detailed design stage the transition between one cross section and the other takes place over a suitable distance and that the effective width of both the footpath and cycle track are not reduced. Alternatively both cross sections could be made the same.

4.2 Observation

The tactile paving at the main vehicular access is shown as two tiles deep (800mm) which may not be sufficient for an in-line crossing.

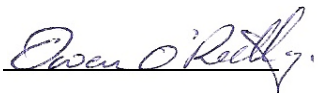
5.0 Audit Statement

We certify that we have examined the site on the 11th December 2018 and 6th August 2019. The examination has been carried out with the sole purpose of identifying any aspects of the design which could be added, removed or modified in order to improve the safety of the scheme.

The problems identified have been noted in this report together with associated safety improvement suggestions which we would recommend should be studied for implementation. The audit has been carried out by the persons named below who have not been involved in any design work on this scheme as a member of the Design Team.

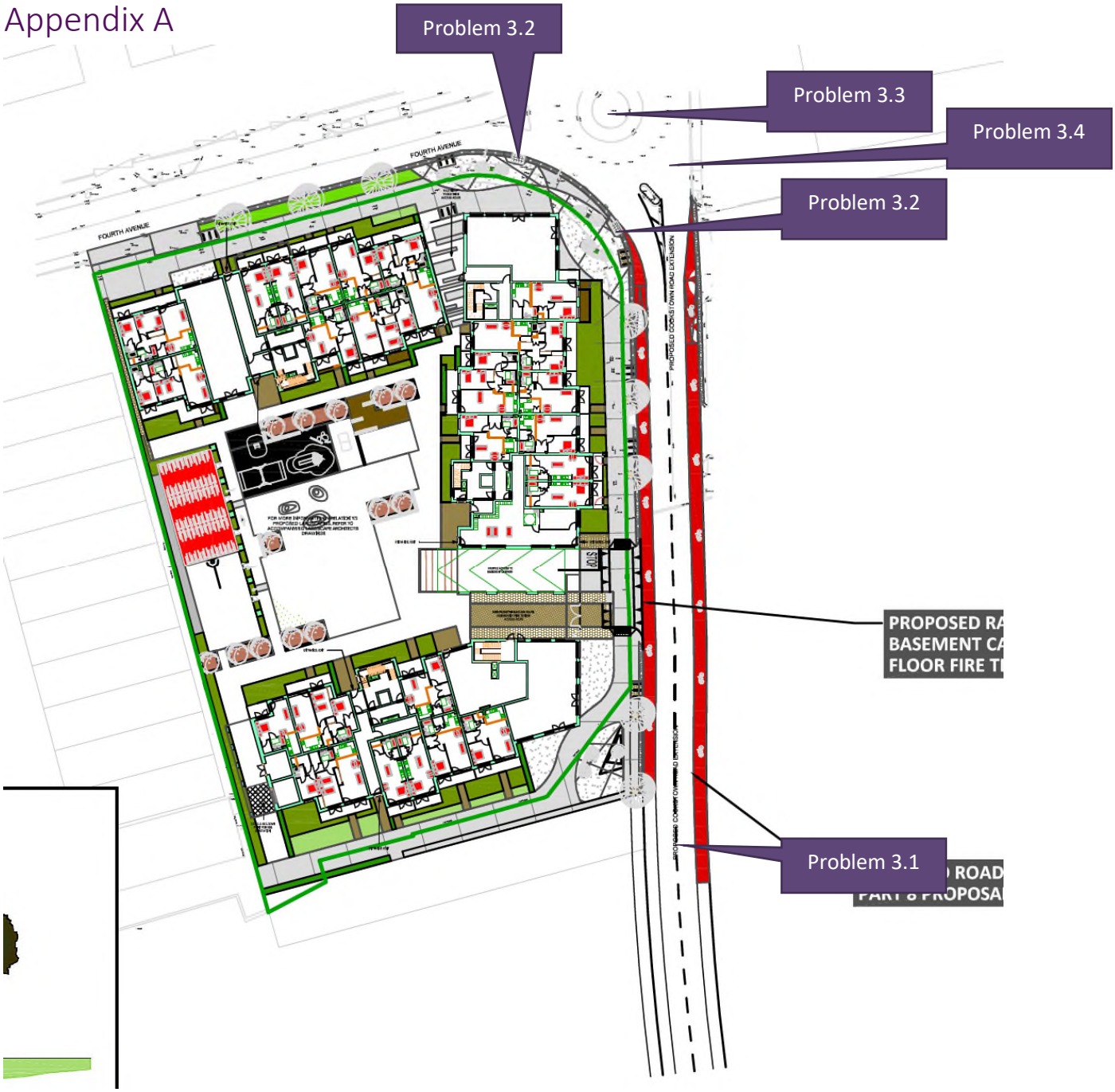
Norman Bruton **Signed:** 

(Audit Team Leader) **Dated: 16/8/0219**

Owen O'Reilly **Signed:** 

(Audit Team Member) **Dated: _16/8/2019**

Appendix A


Problem 3.2
Problem 3.3
Problem 3.4
Problem 3.2
FOURTH AVENUE
FOURTH AVENUE
PROPOSED COOKSTOWN ROAD EXTENSION
PROPOSED RA
BASEMENT CA
FLOOR FIRE TU
Problem 3.1
ROAD
PART 8 PROPOSA

Appendix B

Information Supplied to the Audit Team

- Drawing NRB-TA-001 Rev B
- Drawing NRB--TA-002 Rev B

Information Supplied for Background Information

- Transportation Assessment, NRB, July 2019.

Appendix C

Feedback Form

SAFETY AUDIT FORM – FEEDBACK ON AUDIT REPORT

Scheme: Mixed Use Residential apartments, Cookstown Industrial Estate
Stage: 1 Road Safety Audit
Date Audit (Site Visit) Completed: 6th August 2019

Paragraph No. in Safety Audit Report	Problem accepted (yes/no)	Recommended measure accepted (yes/no)	Alternative measures (describe)	Alternative measures accepted by Auditors (Yes/No)
3.1	Y	Y - The development is currently only at planning stage with the link road far more advanced (post tender we understand) therefore the link road will be complete by SDCC in advance of the development.		Yes
3.2	Y	Y - Uncontrolled crossing points to be provided to line up appropriately with those indicated. Exact details to be confirmed at detailed design stage.		Yes
3.3	Y	Y - Appropriate road markings and traffic signs will be detailed and provided.		Yes
3.4	Y	Y - Traffic calming measures such as build-outs to provide some deflection and/or speed reduction ramps will be provided at detailed design stage.		Yes

Observations:

4.1 Cross sections at tie-ins between existing and proposed roads will be progressed further at detailed design stage.

4.2 Tactile paving will be indicated in accordance with current standards and best practice.

Signed……… **Date**: 15/08/19
Design Team Leader

Signed…… **Date**……16/8/2019…
Audit Team Leader

APPENDIX H

Preliminary Planning Stage Mobility Management Plan (Travel Plan)

consulting engineers

NRB

Preliminary

Travel Plan

(Mobility Management Plan)

For

Residential Development

at

Unit 66 & 67, Fourth Ave.,

Cookstown Ind Est.

FINAL ISSUE

8 Leopardstown Business Centre, Ballyogan Avenue, Leopardstown, Dublin 18
Tel/fax: +353 1 292 1941, E-mail: info@nrb.ie, Web: www.nrb.ie

Registered in Ireland No. 491679

Contents

Appendices

8 Leopardstown Business Centre, Ballyogan Avenue, Leopardstown, Dublin 18
Tel/fax: +353 1 292 1941, E-mail: info@nrb.ie, Web: www.nrb.ie

Registered in Ireland No. 491679

1.0 INTRODUCTION

1.1 NRB Consulting Engineers have been commissioned to prepare a Preliminary Travel Plan in support of an application for the redevelopment of lands at Unit 666/67 Fourth Ave, Cookstown Industrial Estate, Tallaght, in order to explain the applicants commitment to the promotion of more sustainable and cost effective travel habits among the end occupiers/residents of the scheme.

What is a Travel Plan?

1.2 Originally and elsewhere called Mobility Management Plans (MMPs), they originated in the United States and the Netherlands in the late 1980s. In the US, employers over a certain size (generally over 100 employees) were required to implement 'Trip Reduction Plans' in order to reduce single-occupancy car commuting trips, and to increase car occupancy.

1.3 A MMP or Travel Plan (TP) consists of a package of measures put in place by an organisation to encourage and support more sustainable travel patterns among staff and other visitors. Such a plan usually concentrates on staff commuting patterns. In essence, a TP is useful not only to reduce the attractiveness of private car use, but also for the ability to promote and support the use of more sustainable transport modes such as walking, cycling, shared transport and mass transit such as buses and trains.

Aims and Objectives of this Travel Plan

1.4 The package generally includes measures to promote and improve the attractiveness of using public transport, cycling, walking, car sharing, flexible working or a combination of these as alternatives to single-occupancy car journeys to work. A TP can consider all travel associated with the residential or work site, including business travel, fleet management, customer access and deliveries. It should be considered as a dynamic process where a package of measures and campaigns are identified, piloted and monitored on an on-going basis. This MMP recognises the fact that, for some people, car use is often essential as part of the home to work commute, as the work commute is often combined with other important trips, for example having to drop children to school or crèche on the way.

1.5 The changes which are being sought as part of any plan may be as simple as car sharing one-day per week, or walking on Wednesdays, or taking the bus on days which do not conflict with other commitments, leisure or work activities.

1.6 It is envisaged that once in place, the Travel Plan will enable the following benefits to be realised for the Development:

- Reduced residential car parking demand and reduced congestion on the local road network due to lower demand for private transport and/or more efficient use of

private motor vehicles,

- Improved safety for cyclists and pedestrians,
- Direct financial savings for those taking part in the developed initiatives, through higher than average vehicle occupancy rates,
- A reduction in car parking and car set-down demand, resulting in improved operational efficiency and safety for all,
- Improved social networking between all those participating in the shared initiatives,
- Improved environmental consideration and performance,
- Improved public image for the development, which sets an example to the broader community and may lead to residents making better travel decisions in the future,
- Improved health and well-being for those using active non-car transport modes,
- On-going liaison with the Local Authority and public transport providers to maintain, improve, and support transportation services to and from the site,
- Improved attractiveness of the development to prospective residents,
- Optimal levels of safety for all staff and visitors.

Methodology

1.7 As part of this Travel Plan, reference has been made to the following documents:

- Your Step By Step Guide To Travel Plans (NTA 2012);
- Achieving Effective Workplace Travel Plans (NTA 2011);
- Traffic and Transport Assessment Guidelines (TII);
- Traffic Management Guidelines (DoELG, 2003);
- Mobility Management Plans – DTO Advice Note (DTO, 2002);
- The Route to Sustainable Commuting (DTO 2001);
- Smarter Travel: A Sustainable Transport Future (DOT)

1.8 Consultation with key stakeholders is an essential part of any Travel plan. As discussed below, as part of the operational phase of this development, a Travel Plan Coordinator Role will be appointed from with the Management Company. Following on, once occupied, Residents will be asked to complete detailed questionnaires on essential data in relation to their existing travel patterns. This information will be used to inform the ongoing implementation, monitoring and review of the plan for this development.

1.9 This information has been used herein as the basis for the assessment, conclusions and recommendations.

2.0 ACCESS TO THE SITE - BY MODE

2.1 The development consists of the construction of 245 apartments, together with an ancillary small Commercial element on an appropriately zoned site at Unit 66/67, Fourth Ave, Cookstown Industrial Estate, Dublin 24. A location plan is shown below as Figure 2.1.

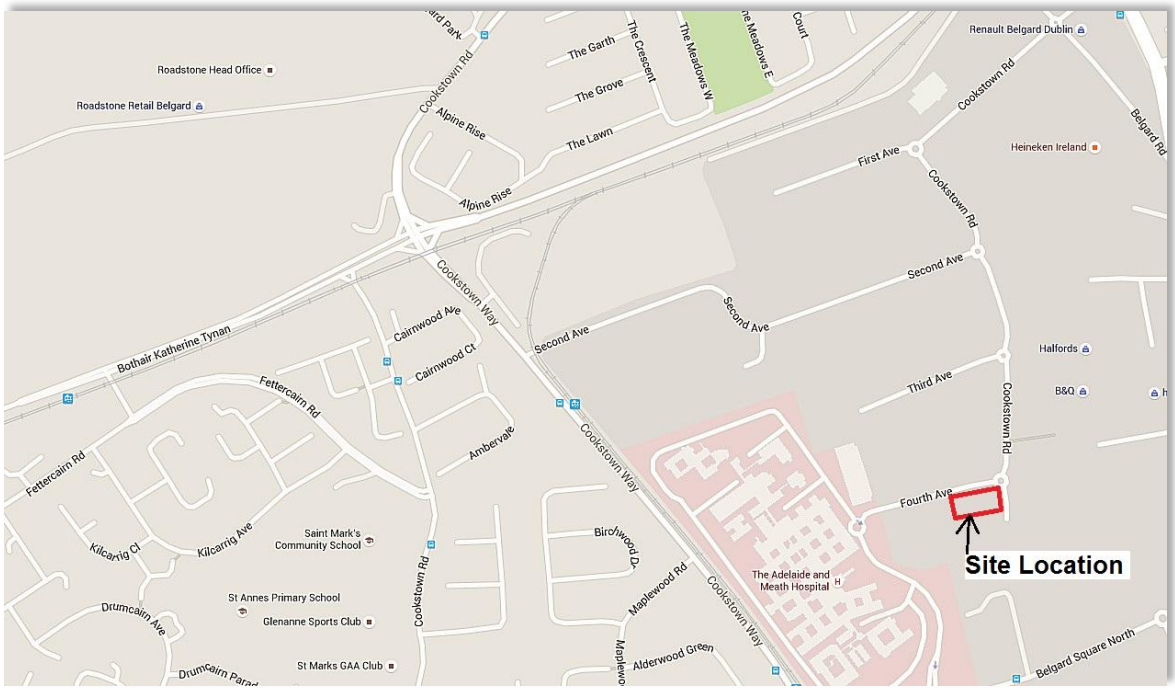


Figure 2.1 – Site Location Map

2.2 The proposed Residential Development is of the highest quality with attractive living and leisure spaces incorporated into the Masterplan.

2.3 It is essential for the successful Travel Planning to concentrate on journeys associated with work and school commuting patterns. These are the groups which can most practically be encouraged to use modes of transport other than the car.

2.4 Notwithstanding this, the development is located in the heart of Tallaght and is in very close proximity to the range of public and alternative transport services in Tallaght, and in particular is immediately adjacent the LUAS.

Pedestrian and Cycling Facilities

2.5 The National Transport Authority (NTA) has surveyed the cycle facilities for the Greater Dublin Area (GDA) as part of the GDA Cycle Network Plan. An extract from this plan showing the facilities is included herein as ***Appendix A***.

2.6 The use and viability of the local services will be enhanced through the encouragement of the use

of bicycles and through the demand measurement control of car parking provision.

2.7 Dockless Bicycles, known locally as 'Bleeper Bikes' have been operating in South Dublin County Council since 2017. Similar to the popular Dublin Bikes scheme, the Dockless Bikes initiative provides an accessible, short term bike rental scheme across the area which will help to encourage and facilitate a positive shift to cycling as an alternative to the private car.

2.8 The basis for these schemes is that they have access to rental bikes stored on public cycle parking stands and can return them to other approved public locations for a small fee. This has an advantage over the Dublin bike scheme as it does not require dedicated docking stations to be constructed. It also avoids the frustration and queues which can occur when waiting for a bike to become available and being returned to an empty docking station.

2.9 There are a number of locations permitted to drop off and collect dockless bikes in Tallaght, including many within a short walking distance of the subject site.

2.10 The key to cycle accessibility is convenient safe links, with secure and carefully sited cycle parking. Cycling is ideal for shorter journeys. A significant amount of work has been carried out in the provision of facilities for Cyclists in SDCC (more that 200km of cycle facilities have been provided to date, and work is ongoing on the N81 and along the Dodder Riverbank to provide improved cycling access to Tallaght generally).

2.11 The existing Cycle Infrastructure, which is being continually improved is identified in ***Figure 2.2*** below:

Figure 2.2 Existing Cycle Infrastructure

2.12 The enclosed GDA Cycle Network Plan sets out the proposals for improvements to the existing Cycle Network Plan locally. These are highlighted in ***Figure 2.3*** below

Figure 2.3 - Future Cycle Network

2.13 It is clear that it is proposed that the site will be bounded by primary, secondary and feeder routes bordering the development site directly, thereby creating a high quality network of cycle routes throughout the local area, which will in turn connect to a comprehensive plan for the GDA outside Tallaght.

2.14 The introduction of Toucan crossing facilities for cyclists at all Traffic Signal Controlled junctions within Tallaght, a scheme which is being rolled out, will further enhance cyclist accessibility and permeability.

2.15 At present, pedestrian/cycle traffic at/to the existing site is served by an extensive network of high quality footpaths and cycle lanes. The development includes sensible and simple at grade links to these facilities which are immediately adjacent the development.

2.16 The location of the proposed development is ideal in terms of encouraging walking. The proximity to Tallaght IT and Tallaght University Hospital means that walking will be an attractive alternative option for the vast majority of residents. In addition, being located in the heart of Tallaght a short distance from every day services such as Tallaght Town Centre ("The Square") reduces the need to travel and will assist in encouraging walking.

2.17 The SDCC and national objective is to cultivate a walking and cycling culture, through the

implementation of appropriate infrastructure and promotional measures, which positively encourages all members of the community to walk or cycle at all life stages and abilities, as modes of sustainable transport that delivers environmental, health and economic benefits to both the individual and the community.

2.18 To help meet the target set in Ireland's first National Cycle Policy Framework launched in April 2009 (that 10% of all journeys will be by bike by 2020), the following will assist:

- Improve cycling conditions on primary cycle routes in the area as per the enclosed details,
- Develop new cycle route/ greenways through parks and open spaces,
- Improve connectivity/permeability from cycle routes to key destinations,
- Provide 30kph zones within residential areas and other suitable locations,
- Provide new secure cycle parking,
- Continue cycle training in schools,
- Ensure that cycling is a key element of all development and
- Monitor trends in cycle numbers using cycle counter data.

2.19 The local infrastructure plans support the 19 specific objectives in the National Cycle Policy Framework. The proposed residential development on the subject site, through good design, will assist in the promotion of cycling as a primary mode of travel.

2.20 For journeys greater than 8km, it is recognised that a modal shift to cycling could be achievable for some, but not all, and options such as public transport and car sharing should be considered. Journeys up to 8km could be undertaken by bicycle and journeys up to 3-4km could be undertaken by walking or cycling.

Cycle Parking

2.21 The residential apartment guidelines recommends a significantly higher cycle parking requirement that that contained in the SDCC Development Plan. The Guidelines recommend 1 cycle parking stand per Bed-Space, and therefore it is proposed to provide a total of 388 secure basement cycle parking spaces within the development including in the underground Car Park.

2.22 It is expected that a very significant number of residents will be willing to cycle to work or school, if safe links and secure parking are in place, and that is reflected in the provision of large number of dedicated cycle parking spaces over and above the SDCC Cycle Policy requirements and in line with new national Design Standards for Apartments. Once occupied, advice can be provided on routes by the appointed Travel Plan Coordinator, possibly with the help of a bicycle user group. This can be further facilitated in consultation with SDCC, as the ongoing provision of cycle facilities as set out above is fully implemented.

2.23 It is acknowledged that cyclists need to be confident that their cycles will not be tampered with while they are in storage. With this in mind, it is proposed to install the cycle parking with racks which allow both frame and wheels to be secured. These cycle racks are located in an active, well lit & security monitored place or where they can be seen by a security guard, either directly, or by closed circuit television. Within the basement, the arriving and departing cyclists will be required to dismount and walk to the cycle racks with their cycles in a safe manner (something which occurs without any difficulty at similar facilities in cities throughout the world).

Bus Provision

2.24 There are a number of Dublin Bus Stops operating locally, with the closest main stops (or Terminus Points) being located on Belgard square North and Belgard Road. There are several main routes within a 10 minute walk distance of the site and these are detailed in ***Figure 2.4*** below.

Route	***Description***
27	Clare Hall – Jobstown
49	Pearse Street – Tallaght (The Square)
54a	Pearse St. – Ellensborough / Kiltipper Way
56a	Ringsend Rd. – Tallaght (The Square)
65	Poolbeg St. – Blessington / Ballymore
75	The Square Tallaght – Dun Laoghaire
76	Chapelizod – Tallaght (The Square)
76a	Blanchardstown Centre – Tallaght (The Square)
77a	Ringsend Rd. – Citywest

Figure 2.4 - Bus Services within a 10 Minute Walk

2.25 All of the Dublin Bus routes currently passing the development are operated using new low-floor wheelchair accessible city buses. Detail of routes, timetables and fares are provided on www.dublinbus.ie, on the Dublin Bus App, and on the Transport for Ireland National Journey Planner App.

2.26 An additional Map showing the core Dublin Bus routes is included herein as an Appendix.

2.27 The proposed improved CORE Radial Routes which affect the subject development site are as follows:

- Tallaght-Walkinstown-Crumlin (Radial),
- Tallaght-Rathfarnham-Terenure (Radial),
- Dundrum/UCD - Tallaght (Orbital)

Mainline Bus Services Linking Tallaght

2.28 Bus Éireann also has a stop on Belgard Square which is served by Route No 132, linking Dublin Connolly with Bunclody in Co Wexford. Busarus is also accessible via the LUAS Red Line. The site is therefore highly accessible to a wide range of national mainline rail services serving all destinations around Ireland, and of course linking to Dublin Airport.

2.29 The ***Airport Hopper*** Tallaght Mini Bus Service operates between The Square Tallaght Town Centre and Dublin Airport, on an approximate hourly basis over the course of the working day.

2.30 Maps and Tables showing Bus Services are included herein and all are easily accessible via Service Provider Apps.

LUAS

2.31 The LUAS Red Line stop of Cookstown is immediately beside the site. LUAS has become a highly successful travel mode linking Tallaght with local areas and onwards to the city centre. It is a semi-segregated light rail tram service operating at street level but generally gets priority over motorised vehicles at junctions. A map extract from the LUAS website, showing the complete network, is included below as ***Figure 2.5***

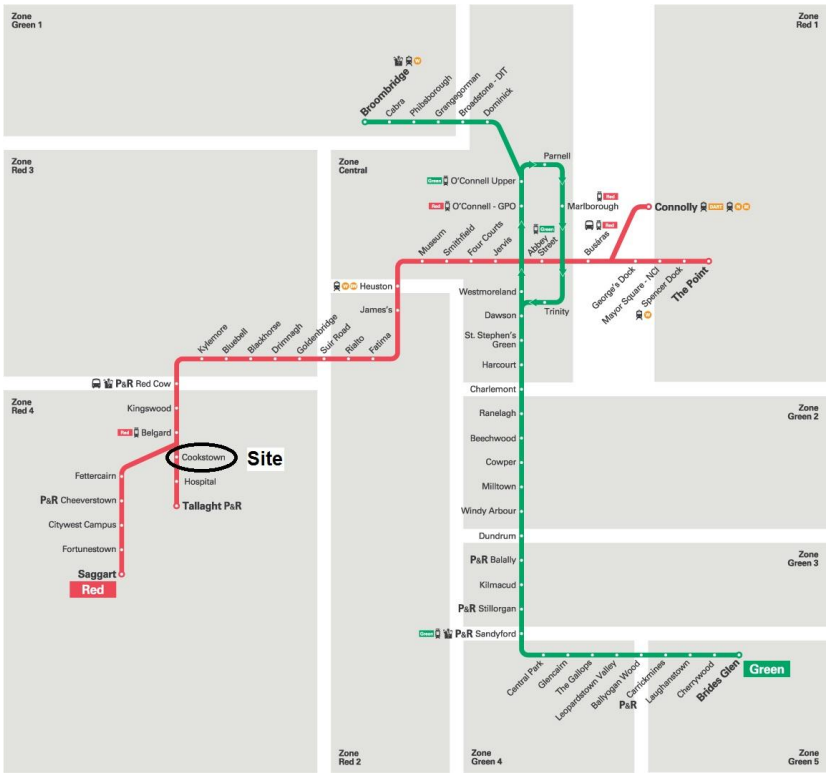


Figure 2.5 - LUAS Services

2.32 The Red Line serving the site provides a regular service between the 3 Arena/Connolly Station and Tallaght/Saggart with intermediate stops at key locations including Busarus, Heuston Station,

Red Cow and City West. The normal day to day operating times are 05:30-24:00

2.33 The recently extended Green Line now provides a good degree of connectivity with the Red Line and their respective stops intersecting at O'Connell Street and Abbey Street. The Green Line provides a service between Sandyford and Broombridge with intermediate stops at St Stephens Green, Westmoreland, Cabra, Phibsborough and Broadstone DIT.

2.34 LUAS runs on a frequency of service which changes depending upon the time of day to adequately cater for demand. The service frequencies for the Local Services are detailed below as ***Figure 2.6***:

Tallaght - Eastbound Towards Connolly or The Point

Monday - Friday			
	Min	Avg	Max
05:30-07:00	10	14	20
07:00-10:00	3	8	10
10:00-16:00	9	9	10
16:00-19:00	9	9	10
19:00-00:00	6	10	15

Saturday			
	Min	Avg	Max
06:30-10:00	12	15	20
10:00-16:00	12	12	13
16:00-19:00	10	11	13
19:00-00:00	3	11	15

Sunday & Bank Holidays			
	Min	Avg	Max
07:00-12:00	10	13	20
12:00-19:00	10	10	11
19:00-23:00	10	11	12

Figure 2.6 - LUAS Service Frequencies

2.35 The LUAS provides excellent connectivity with other rail and DART services including both intercity, commuter and DART services operating out of Heuston Station and Connolly Station - both of which are served by the Red Line LUAS.

2.36 LUAS has the ability to deliver significant increased capacity through a combination of longer carriages/trains and increased frequency of service.

2.37 In terms of number of transport alternatives easily available to Residents, it is considered that the proposed development is very highly sustainable in terms of public and alternative transport accessibility. The proximity of the development to existing public transport services means that all residents will have viable alternatives to the private car for accessing the site and will not be reliant upon the car as a primary mode of travel.

2.38 Direct and high quality pedestrian linkages are provided between the site and the existing pedestrian facilities on the surrounding road network. The entrances to the site will be well lit, so that people can feel secure in using the facilities.

2.39 Public transport maps and timetables can be provided in prominent locations on site and the information will be kept up to date by the appointed Travel Plan Coordinator, a role for the Management Company.

2.40 Working Residents are generally now offered the opportunity to purchase public transport commuter tickets under the current ‘Employer Pass’ and ‘TaxSaver’ programmes, by individual Employers. Under these schemes the employer applies to Iarnród Éireann / Bus Éireann for tax free public transport tickets for their employees as an incentive for them to use public transport to travel to work.

2.41 With this in mind, the main focus of this Travel Plan will be to promote and support the use of alternative modes to the private car.

Car Parking

2.42 There are a total of 79 private car parking spaces provided within the basement area, including Go Car, Residential Spaces, mobility impaired and visitor parking. This is considered appropriate in light of the location of the proposed development immediately adjacent high quality public transport, the inclusion of on-site services, and in consideration of the provisions of the SDCC Development Plan being "Maximum" standards. The development is also not a traditional residential apartment development, and in this regard the Car Parking requirements are fundamentally different, with anticipated lower car ownership and dependency for this nature of scheme. Given the low number of spaces provided (effectively solely visitor/mobility impaired parking, Go-Car and set down), the entire scheme will be actively marketed and promoted as a "Reduced Car Dependency" scheme and this will be communicated from the outset as part of sales and marketing. The development will also be managed on an on-going basis to ensure that the reduced car dependency nature of the development is continually promoted and enhanced.

2.43 Details of the justification of the parking provision are set out in the main body of the Transportation Assessment Report. However, it is clear that the lower provision of car parking will act as a demand management measure, ensuring that the development is occupied in the most sustainable manner, being almost predominantly reliant on non car modes of travel.

2.44 If considered appropriate, as part of a working MMP, additional priority spaces will in future be allocated to car-sharing workers when they travel together, with 10 'Go-Car' currently planned. These are some of the most accessible spaces and are clearly visible to other car park users. It is acknowledged that this may require some level of ‘policing’.

Electric Vehicle Charging

2.45 These car parking spaces within the basement area have been designed so that they can easily be upgraded to allow conversion for Electric Vehicles. The entire basement car park of the subject scheme will be ducted to accept cabling to serve a charging point for every car space. Conduits will be run on the walls where charging points can also be mounted. Where residents request a charging point to be installed, the relevant charging point will be pre-wired back to their home electricity meter in the designated meter location. The socket point will have a lockable

cover on it so that only that resident may use the power point. This provision around the parking area allows future charging points to be installed at any of the car parking spaces with minimum works as and when required.

3.0 COLLECTION OF BASELINE INFORMATION

Possible Travel Pattern Questionnaires

3.1 The Redevelopment is a proposed high quality Build to Rent residential development in the centre of Tallaght. The development has capacity for in excess of 500 people when fully occupied.

3.2 Once occupied, and when the Travel Plan Coordinator is appointed, the occupiers of the proposed development will be encouraged to continually monitor the Travel Plan initiatives in order to maximise on their success.

3.3 Shortly after occupation of the new development, a detailed travel-questionnaire will likely be complied and distributed to Residents for completion. The aim of the travel questionnaire will be to establish travel patterns between work and home and school travel demand. The information gathered from this survey will be used to inform the further development of the Travel Plan.

3.4 The Baseline Survey information will also allow the Travel Plan Coordinator for the development to set realistic modal-split targets for the development.

3.5 It is anticipated that, given the very-much town centre location and good transport links at this development, combined with the lack of car parking on site, there will be a high percentage of use via public and alternative transport. The Travel Plan will need to maintain this positive modal split and improve it, where possible. It is informative to note that the "Smarter Travel: A Sustainable Transport Future" (DOT) Objective for 2020 is to achieve a reduced work related commuting by car modal share of 65% to 45%.

3.6 The Travel Plan is not seeking a radical change in terms of a modal shift; it is recognised that the use of the car is often essential for many users. Instead, the Plan seeks small but consistent increments of change in our approach to, and the use of, alternatives to the car.

4.0 THE TRAVEL PLAN

4.1 The successful implementation of a Travel Plan will ensure that, in-so-far-as-possible, the impacts of this traffic are reduced and minimised where practical, while providing a number of environmental and economic advantages detailed below.

4.2 The following sub-sections detail the available initiatives which will serve to better manage travel demand, and therefore the traffic impact of work-related journeys, focused on the movement of residents during peak times.

Walking

Walking - Key Information	
Approx Zone of Influence	3.5km
Percentage of Residents working in area of influence	TBC in each survey when occupied
Percentage of Residents interested in Walking	TBC in each survey when occupied

Table 4.1 – Key Information: Walking

4.4 There are many local, global, and personal benefits to walking to work, a few of which are listed following:

- **W** - Wake Up! - Studies have shown that people who walk to work are more awake and find it easier to concentrate.
- **A** - Always one step ahead - Walking makes people more aware of road safety issues and helps them develop stronger personal safety skills.
- **L** - Less congestion - If you leave the car at home and walk, there are fewer cars on the road which makes it safer for those who walk and cycle.
- **K** - Kinder to the environment - By leaving the car at home you are reducing the amount of CO 2 produced and helping to reduce the effects of climate change and air pollution.
- **I** - Interpersonal skills - Walking to work or school can be a great way to meet other walkers, share the experience, and develop personal skills.
- **N** - New adventures - Walking to work or school is a great way to learn about your local environment and community. It's also a fun way to learn about the weather, landscape, and local ecosystems.
- **G** - Get fit and stay active - Walking to and from work or school helps people incorporate physical activity into their daily routines. Research shows that regular physical activity can benefit your body and mind.

4.5 Most adults will consider walking a maximum of 3.5 km (Approx 30/40 minutes) to work. Residents working within a 3.5 km radius of the site will be encouraged to walk to work as often as their schedule permits. Similarly school trips can be encouraged on foot.

4.6 The following initiatives and incentives can be used to encourage walking to work or school:

- Take part in a 'Pedometer Challenge' which is organised through the Irish Heart Foundation or Smarter Travel Workplaces;
- Organise special events such as a 'Walk to work/school on Wednesdays' where participants are rewarded for their participation;;
- Keep umbrellas in public areas on a deposit system for use when raining;
- Display Smarter Travel Workplaces Accessibility Walking maps on notice boards areas so Residents can plan journeys;
- Organise lunch time or afternoon walks as part of a health and well-being programme;
- Highlight the direct savings gained due to reduced use of private vehicles.

Cycling

Cycling – Key Information	
Approx. zone of influence	10km
Percentage of Residents Surveyed known to Work within the area of influence	TBC in each survey when occupied
Percentage of Residents interested in cycling	TBC in each survey when occupied

Table 4.2 : Key Information - Cycling

4.7 Research suggests that cycling is a viable mode of transport for people who live up to 10 km from work or school.

4.8 Cycling is a great way to travel. It helps foster independence, raises awareness of road safety, and helps the environment.

4.9 Some positive aspects of cycling to work or school are listed following:

- **C** - Cycling is fun! - Cycling is a great form of transport but it's also a great recreational activity. Cycling is a skill that stays with you for life and it's a fantastic way to explore your local community.
- **Y** - You save time & money - cycling to work reduces the need to travel by car thus reducing fuel costs and freeing up road space for more cyclists;
- **C** - Confidence building - travelling to work as an independent cyclist can give

people increased confidence proving beneficial in all aspects of life;

- **L** - Less congestion - If you leave the car at home and cycle to work there are fewer cars on the road which makes it safer for those who cycle and walk to work or school;
- **I** - Interpersonal skills - Cycling to work or to school can be a great way to meet other cyclists and share the experience;
- **N** - New adventures - Cycling to work or school is a great way to learn about your local environment and community. It helps people to understand where they live and how their actions affect their local environment;
- **G** - Get fit and stay active - cycling to and from work or school helps people incorporate physical activity into their daily routines. Research shows that regular physical activity can benefit your body and mind.

4.10 The provision of enhanced and attractive cycle parking facilities at the site will clearly play a critical role in promoting journeys by bicycle.

4.11 The following initiatives and incentives can be used to encourage cycling to work and school:

- New cycle parking installed within the development, secure and well lit;
- It will publicise cycle parking availability by way of signage and on notice boards;
- It will display maps on notice boards areas so people can plan journeys;
- The development can provide free cycle accessories (panniers, lights, visi-vests, helmets) in periodic draws for cyclists,
- The Travel Plan Coordinator can organise cycle training sessions on site on the rules of the road and the specific risks associated with the locality;
- The Travel Plan Coordinator can invite bike suppliers on site for a 'Green Day' or 'Green Week' so that people can try bikes before buying;
- The Travel Plan Coordinator can set up a Bicycle User Group (BUG) to promote cycling;
- The Travel Plan Coordinator can highlight the direct savings gained due to reduced use of private vehicles;
- The Travel Plan Coordinator can encourage residents to take part in National Bike Week, see www.bikeweek.ie.

Public Transport

Public Transport – Key Information	
Approx. zone of influence	All Residents
Percentage of Residents in area of influence	100%
Percentage of Residents using Public Transport	TBC in each survey when occupied

Table 4.3: Key Information: Public Transport

4.12 There are many benefits to taking public transport, some of which include:

- Personal Opportunities – Public transportation provides personal mobility and freedom;
- Saving fuel – Every full standard bus can take more than 50 cars off the road, resulting in fuel savings from reduced congestion;
- Reducing congestion – The more people who travel to work or to school on public transport, especially during peak periods, the less people travelling by private car;
- Saving money – Taking public transport to and from work or school is a lot cheaper than travelling by car and saves the cost of buying, maintaining and running a vehicle;
- Reducing fuel consumption – A full standard bus uses significantly less fuel per passenger than the average car;
- Reducing carbon footprint – Public transport is at least twice as energy efficient as private cars. Buses produce less than half the CO2 emissions per passenger kilometre compared to cars and a full bus produces 377 times less carbon monoxide than a full car;
- Get fit and stay active - Walking to and from work or school to public transport helps people incorporate physical activity into their daily routines. Research shows that regular physical activity can benefit your body and mind.
- Less stress – Using public transport can be less stressful than driving yourself, allowing you to relax, read, or listen to music.

4.13 The following initiatives and incentives can be used to encourage people to take public transport:

- Publicise Employee Tax Saver Commuter tickets, which offer savings to employers in PSRI per ticket sold and significant savings to employees in marginal tax rate and levies on the price of their ticket;
- Encourage public transport use for travel by promoting smart cards, advertising the availability of these tickets to Residents;
- Publicise the availability of Real Time Information. Real Time Information shows when your bus is due to arrive at your bus stop so you can plan your journey more accurately;
- Provide maps of local bus routes and the nearest bus stops, LUAS Timetables and Frequencies, and the length of time it takes to walk to them;
- Contact local providers about issues such as location of existing and new bus stops, timing of routes, or where you have market information about a potential new route.

Go-Car/Car Sharing

Car Sharing – Key Information	
Approx. zone of influence	All Residents
Percentage of Residents in area of influence	100%
Percentage of Residents Car Sharing	TBC in each survey when occupied

Table 4.4: Key Information - Go-Car/Car Sharing

4.14 Every day thousands of commuters drive to work or to school on the same routes to the same destinations, at the same time as their colleagues. By car sharing just once a week, a commuter's fuel costs can be reduced by 20%, and in a similar fashion, the demand for work place parking can be reduced by 20%. If every single-occupancy driver carried another driver, there would be 50% less cars on the road at peak times.

4.15 Although use of the car to get to work or to school is essential for a large proportion of people, car sharing schemes have the potential to deliver a significant reduction in private vehicle trips by promoting higher than average occupancy rates for each vehicle.

4.16 A locally run car sharing scheme relies on a database containing workplace information, working hours, and peoples preferences such as gender/driver/passenger and their preferred route to and from work.

4.17 The car-sharing database can be a map showing where Residents work, a database of car-sharers' details hosted on an organisations intranet site, or an on map-based matching website.

4.18 Car sharing often happens informally, however some participants often prefer a formal scheme such as a go Car facility which will normally generate a higher take-up for car sharing, and more efficiency in terms of increased occupancy rates. Car sharing is much easier promoted within a community such as is proposed here.

4.19 Encouraging more Residents to share car journeys to work rather than driving alone as well as encouraging more to set up and take part in car sharing/pooling would prove a very effective means of reducing daily car trips to and from the site.

4.20 The following initiatives and incentives can be used to encourage car sharing:

- Provide incentives to sign up to a car sharing scheme with preferential parking spaces in the most convenient location;
- Draw up a car-sharing policy for how the scheme will operate, and issue car-

sharing permits to those qualifying to use the car-sharing spaces;

- Highlight to drivers that they do not have to share with a person that doesn't suit them – allow choice based on gender, route, smoking or non-smoking;
- Clarify the financial implications of the scheme – those accepting a lift could contribute towards fuel costs.
- Use existing online databases for car sharing. For example, the development could set up its own private car sharing site using www.carsharing.ie.
- Allocate parking spaces for use solely by car sharers, for example near to building entrances.

Action Plan Summary Table

4.25 The Summary Action Plan is described in the Table below. Modal Split Targets will be determined following on from the first Residential survey shortly after full occupation, typically within the first six months. This will be part of the role of the Travel Plan Coordinator. This will show existing travel patterns with realistic targets set to improve the modal split of Residents.

	Initiative	Impact on Delivery	Difficulty Delivering	Current Modal Split	Target MS
Residents Initiatives	Walking	Medium	Low	TBC	TBC
	Cycling	Medium	Medium	TBC	TBC
	Public Transport	High	Low	TBC	TBC
	Other	Medium	Medium	TBC	TBC
	Car - Sharing	Medium	Medium	TBC	TBC
	Cars - 1 Passenger Only	High - Negative	High	TBC	TBC
Promoting the TP	Marketing the Plan	High	Low	Driven By TP Coordinator	
	Measuring Success	High	Medium	Annual Surveys	

Action Plan Summary Table

5.0 IMPLEMENTING THE PLAN

Background

5.1 Setting realistic targets and a sustained approach to the promotion of the Travel Plan is important if the measures are to be successful. The objectives and benefits of the Plan will be made clear and broadcast during the full lifecycle of the Plan.

5.2 The implementation of a successful Travel plan will require the upfront investment of resources. As well as reviewing objectives and initiatives regularly, it is equally important to measure results. This provides an indication of any Plan's success, and ensures that the targets remain realistic.

The Travel Plan Coordinator

5.4 The key objective of this Travel Plan is to ensure that the traffic impacts and car usage associated with the operation of Redevelopment are minimised. Achieving this objective will result in a wide array of benefits for the development and its stakeholders.

5.5 To ensure the plan is effective it is essential for a Travel Plan Coordinator to be appointed for the Development upon 100% occupation.

5.6 It is envisaged that the Coordinator will work closely with residents to enthusiastically promote and market the Travel Plan. As Residents will be the focus of the plan; their involvement must be sought from the outset.

5.7 To support the Travel Plan Coordinator's efforts, the Management Company must ensure that they have sufficient time to carry out their duties. In addition, it is essential that the powers of decision making are bestowed upon him/her, along with a suitable budget and programme for implementation.

Promoting the Travel Plan

5.9 Active promotion and marketing is needed if the Travel Plan is to have a positive impact on stakeholder travel patterns to and from the site.

5.10 All marketing initiatives should be focused on areas where there is willingness to change. Such information has been extracted from the questionnaires and has been described in Section 3 of this Plan.

- **Identify the Aim** – e.g. to reduce low occupancy car commuting, school, and business travel & to promote active travel, public transport & alternatives to travelling by car.

- **Brand the Plan** – as part of communicating the Travel Plan, visually brand all

work relating to it with a consistent look, slogan, identity or logo.

- **Identify the Target Audience** – 'segment the audience' (e.g. shift workers, school travel, sedentary workers, people travelling long/ short distances, mode used, members of a walking club or green team) so you can target the message and events towards these different groups.

5.11 As part of the marketing process, the Travel Plan coordinator can personalise a plan for the Development, drawing attention to the benefits of participation and support for its implementation.

5.12 The Coordinator can identify communication tools and networks used by the different audiences in the Residences, and use these to communicate about travel.

5.13 Promotional material regardless of its quality is only as good as its distribution network; material incentives assist greatly in introducing people to alternative modes of commuting.

5.14 The plan should not be anti-car - it should be about promoting equity among modes and offering choice and accessibility.

5.15 The Coordinator can promote positive messages associated with a plan, for example, reduced tax/PRSI payments, getting fit and active, reducing congestion, reducing CO2 emissions and so on, and encourage people to start small – changing one day per week for example, to explore their options.

5.16 Marketing drives which feature individual Residents who have reduced their car use can carry a strong message. This will serve to raise not only the profile of the Plan, but also send a clear message in relation to the Residents commitment to the Plan.

6.0 CONCLUSIONS

6.1 The development forming the subject of this application accords with the principles of sustainable development, being located within an established town centre within clear and easy access to alternative modes of travel, and with very little car parking provided acting as a demand management measure . The Management Company, once the development is occupied, will utilise pragmatic measures that encourage safe and viable alternatives to the private car for accessing the development.

6.2 Good Travel Planning is not a one-off event, it is instead an on-going iterative process requiring continued effort. This Preliminary report assists these efforts by forming an outline framework and providing guidance for its success. Monitoring and reviewing the initiatives set out within the plan will form a far greater part of the Final Travel Plan itself.

6.3 The key to the Plans success will be the appointment of a ***Travel Plan Coordinator*** for the development, once occupied. They will be vested with total responsibility for implementing the plan. They should be granted the authority and time to execute the Plan, and be provided with sufficient resources to realise the Plans success.

6.4 As Residents are the focus of the plan; their involvement should be sought from the outset following occupation. To this end, the Plan Coordinator should be assisted and supported by the Management Company and Residents. This will serve to spread the work load, and also give the Residents a valuable input into the operation of the Plan.

6.5 Successful Travel Plans require extensive marketing **and** regular review. The measures set out in the Action Plan Summary Table (Chapter 4) should form the basis of a sound, realistic Plan and should be clearly set out and be fully transparent to all users.

6.6 Residents also have an essential responsibility in terms of co-operating with, and taking an active part in the plan. They are, after all, the plan's primary focus.

6.7 It is recommended that the Final Travel Plan be set in motion at full occupation. The plan should evolve and develop with the development, taking into account changing Residents and their travel preferences and needs.

6.8 Annual reviews of the Plan should include a full stakeholder survey, providing valuable information for target setting and marketing target groups. It is emphasised that failing to meet initial targets should not be seen as failure, as the preliminary 12 to 18 months of the plan should be viewed as a calibration exercise for target setting.

APPENDIX I

DMURS
Statement of Consistency

consulting engineers

NRB

DMURS "Statement of Consistency"

for

For

Proposed Residential Development on Lands

At

66/67 Fourth Ave, Cookstown Ind Est

ABP APPLIC ISSUE

8 Leopardstown Business Centre, Ballyogan Avenue, Leopardstown, Dublin 18
Tel/fax: +353 1 292 1941, E-mail: info@nrb.ie, Web: www.nrb.ie

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1.0 INTRODUCTION

1.1 It is NRB's opinion that the proposed residential development is consistent with both the principles and guidance outlined within the *Design Manual for Urban Roads and Streets* (DMURS) 2013. The scheme proposals are the outcome of an integrated design approach. This approach seeks to implement a sustainable community connected by well-designed links, layout and accesses - which combined deliver attractive, convenient and safe access in addition to promoting modal shift and viable alternatives to car based journeys.

1.2 The following section discusses design features which are incorporated within the proposed residential scheme with the objective of delivering a design that is consistent with the principles of DMURS.

2.0 DESIGN ATTRIBUTES

2.1 The proposed layout strategy seeks to maximise connectivity between key local destinations through the provision of a high level of permeability and legibility for all journeys, particularly for sustainable forms of travel (cycling and walking). The proposed residential scheme delivers greater mode and route choices along direct, attractive and safe linkages to local amenities and schools/service destinations.

2.2 High Quality Connections between the proposed development and the employment areas and facilities within Tallaght Town Centre, are provided. The layout itself has been designed to deliver a hierarchy which provide safe access within / across the proposed new residential community, linking the site and community with the established network. Vehicular access to the car parking is separate from the pedestrian accesses to the development and has been designed with safety in mind, conscious that an independent Road Safety Audit was undertaken.

2.3 As part of the development, the movement function is designed to respect the different levels of motorised traffic whilst optimising access to/from alternative transport and catering for higher number of pedestrians and cyclists. In parallel the adopted design philosophy has sought to consider the context / place status of the scheme in terms of level of connectivity provided, quality of the proposed design, level of pedestrian / cyclists activity and vulnerable users requirements whilst identifying appropriate 'transition' solutions particularly at street junctions.

2.4 The layout of the proposed development seeks to maximise permeability and enhances legibility, and the design of appropriately sized blocks actively contributes to a highly permeable and accessible community for both pedestrians and cyclists.

2.5 The proposed layout seeks to successfully create an appropriate balance between the functional requirements of different network users whilst enhancing the 'sense of place'. Design attributes of the proposed layout which contribute to achieving this ***DMURS objective*** include:

a) Vehicular access to the development is separate from the pedestrian accesses to the development and the open space.

b) Through the provision of a separate vehicle access onto the local streets, the plan offers a well-connected but permeable network,

c) Under ***Section 3.4.1 Vehicle Permeability***, DMURS states that 'Permeable layouts provide more frequent junctions which have a traffic-calming effect as drivers slow and show greater levels of caution' - in these terms the form of streets and road layout in the developing estate will itself conform with DMURS.

d) DMURS also goes on to state that 'Designers may be concerned that more permeable street layouts will result in a higher rate of collisions. However, research has shown that there is no significant difference in the collision risk attributable to more permeable street layouts in urban areas and that more frequent and less busy junctions need not lead to higher numbers of accidents.'

e) The proposed design deliberately seeks to specify minimal signage and line markings along the internal layout, with such treatments used sensitively throughout and predominately at key nodes and ‘transition’ areas.

f) Footpaths no less than 1.8m (generally 2.0m or wider) will be provided throughout the scheme with connections and tie-ins to existing external pedestrian networks.

g) Appropriate clear unobstructed visibility splays, as per DMURS requirements, will be maintained at the site access junction to the external road network.

h) Well designed and frequent pedestrian crossing facilities will be provided along key travel desire lines throughout the emerging Area in addition to those located at street nodes. All courtesy crossings will be provided with either dropped kerbs thereby allowing pedestrians to informally assert a degree of priority. The separation of vehicular access to the development from the pedestrian accesses to the development aid in this aspect of the layout.

i) At the more heavily trafficked routes, formal signalised controlled crossings are provided for the benefit of both pedestrians and cyclists. These connect with the Pedestrian, Cyclists and Bus Stop facilities running in proximity to the subject site.

j) All informal pedestrian crossing facilities will be at least 2.0m wide, whilst all controlled pedestrian crossings will be a minimum of 2.4m wide.

k) With the objective of encouraging low vehicle speeds and maximising pedestrian safety and convenience, corner radii will be 6m where swept path analysis permits and will be of further reduced radii where feasible in line with DMURS guidance.

l) Internally within the development, where carriageway kerb are required, heights will be typically 75-80mm in accordance with the objectives of DMURS.

m) The emerging cycle lane provision is set out within the Mobility Management Plan. Within the development, as required, cyclists will share the carriageway with other street users as per the NCM guidance for such situations and best practice.

n) Any required street signage and road markings will be in accordance with the Department of Transport Traffic Signs Manual, and the location and form will be agreed in advance with South Dublin County Council.