Document 3.3 – 2010 Environmental Statement (2018 Addendum)

Wheelabrator Kemsley (K3 Generating Station) and Wheelabrator Kemsley North (WKN) Waste to Energy Facility DCO

September 2019 -Submission Version

PINS ref: EN010083

ENVIRONMENTAL STATEMENT – ADDENDUM

Client:	**Wheelabrator Technologies Inc.**
Site:	**Land north east of Kemsley Paper Mill, Sittingbourne**
Date:	**May 2018**
Reference:	**TS/13029**
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1 Introduction

1.1 Background

1.1.1 St Regis Paper Company Limited (a subsidiary of DS Smith) and E.ON Energy from Waste submitted a planning application to Kent County Council (given the reference: KCC/SW/10/444) for the development of a sustainable energy plant in 2010 on land north east of Kemsley Paper Mill, Sittingbourne which was approved subject to conditions on the 6th March 2012. This application was supported by an Environmental Statement (ES) in accordance with the Town and Country Planning Environmental Impact Assessment Regulations.

1.1.2 This application has been subject to a number of applications to amend or vary the permission as set out below:

- KCC/SW/14/506680 - Section 73 application to vary conditions 2 & 4 of planning permission SW/10/444 to allow a variation to the permitted hours of delivery to allow for 24 hours 7 days per week operation. Land at Kemsley Paper Mill, Kemsley, Sittingbourne, Kent, ME10 2TD. Approved April 2015.

- KCC/SW/17/502996 - Section 73 application to vary the wording of condition 16 of planning permission KCC/SW/10/444 (as amended by KCC/SW/10/506680) to allow an amended surface water management scheme at the Sustainable Energy Plant to serve Kemsley Paper Mill. Permitted August 2017.

1.1.3 It should be noted that no material changes to the original ES submitted as part of KCC/SW/10/444 have been made as a consequence of these applications. A supplementary Flood *Risk Assessment, Surface Water and Foul Drainage Philosophy* and *Chapter 10: Hydrology and Flood Risk Supplementary Report* were submitted as part of application KCC/SW/17/502996 and should be read along the original ES and this Addendum Report.

1.1.4 In summary the development will comprise:

- The capability to generate in excess of 50MWth per hour of steam to Kemsley paper mill.

- Power generation capability of 48.5 MW of net electricity per hour.

- Grid connection cables to supply generated electricity to the public supply network.

- Two line moving grate with thermal combustion capacity of 1OOMW per line.

- Two stacks with a height of 90 metres from ground level.

- Waste reception hall and waste storage bunker.

- Waste handling systems and feed hoppers.

- Dependent upon its calorific value, the import of feed stock of approximately 500,000 to 550,000 tonnes per annum of pre-treated waste comprising Solid Recovered Fuel waste, Commercial & Industrial waste and Municipal Solid Waste.
- The import of up to approximately 25,000 tonnes per annum of waste plastics from the paper mill (included in the above)
- Bottom ash handling
- Bottom ash storage
- Flue gas treatment
- Boiler, steam turbine and air cooled condenser
- Heat extraction system and infrastructure providing connectivity to adjacent paper mill.
- Weighbridge and access arrangements.
- Control room and administration building.
- Transformers
- Site landscaping

1.1.5 Wheelabrator Technologies Inc. as the developer and operator of the permitted energy plant are seeking to amend Condition 3 of permission KCC/SW/17/502996 (the amended KCC/SW/10/444) to allow an increase in the total number of daily HGV movements permitted to and from the application site from 258 to 348 (an increase of 90 HGV movements per day). This will allow flexibility in the size/type of vehicles being used to import the waste in accordance with the waste contracts secured to accommodate local refuse and industrial waste collection frequencies and vehicle types/size. There are no proposed changes to the throughput tonnage or operating capacity of the plant.

1.1.6 This report forms an Addendum to the Environmental Statement (ES) dated March 2010 pursuant to application KCC/SW/17/502996 (the amended KCC/SW/10/444) to reflect the proposed amendment to the permission.

1.1.7 This addendum should be read along the ES dated 2010 submitted as part of application KCC/SW/17/502996 (the amended KCC/SW/10/444) and any supplementary information submitted in support of all subsequent applications to KCC/SW/10/444.

2 Amendments to the Environmental Statement

2.1.1 This report hereafter identifies the necessary changes and/or amends to the ES to reflect the proposed change to the development as currently permitted and identify any additional likely significant effects alone and in-combination with other development as a result. As stated previously this Addendum Report should be read alongside the original ES and the documents should be cross referenced where relevant. This report follows the structure of the ES to assist the reader.

Non-technical summary

2.1.2 No amendments required.

Chapter 1 - Introduction

2.1.3 No amendments required.

Chapter 2 – The site and its setting

2.1.4 No amendments required.

Chapter 3 – Planning Policy Framework

2.1.5 Please see the Planning Statement submitted with this application for an updated policy framework for the development.

Chapter 4 – Description of development

2.1.6 No amendments required.

Chapter 5 – Need and alternatives

2.1.7 No amendments required.

Chapter 6 - Traffic and transport

2.1.8 The proposed amendment to permission KCC/SW/17/502996 (the amended KCC/SW/10/444) to increase the total number of permissible HGV vehicle movements to and from the site by 90 has the potential to result in effects on highways safety and junction capacity.

2.1.9 A supplementary Transport Assessment looking at the effect of the additional 90 daily HGV movements has been undertaken by RPS and is provided as Appendix A to this Addendum Report. No significant traffic and transport effects are envisaged.

Chapter 7 – Air and climate

2.1.10 The proposed amendment to permission KCC/SW/17/502996 has the potential to increase traffic generated pollutant levels with consequential effects on ambient air quality.

2.1.11 A supplementary Air Quality Assessment of the effect of the additional 90 daily HGV movements has been undertaken by RPS and is provided as Appendix B to the Addendum Report.

2.1.12 The assessment reports the effect of the proposed amendment in combination with other approved and permitted development and concludes that there will be a negligible effect on air quality and human health receptors that is not significant. The conclusions of the original air quality assessment therefore remain valid.

2.1.13 The Air Quality Assessment includes data quantifying the process contribution of the proposed amendment, in combination with other proposed or permitted developments, to annual mean critical levels of NO_x and nutrient nitrogen within the Swale Estuary Special Protection Area (SPA) and the Medway Estuary and Marshes SPA. The consequential ecological effects of this are discussed under Chapter 9 – Ecology and nature conservation below.

Chapter 8 – Landscape and visual impact

2.1.14 No amendments required.

Chapter 9 – Ecology and nature conservation

2.1.15 The cumulative process contribution of the proposed amendment with other proposed and permitted development is less than 1% of the annual critical level of NO_x for all modelled receptors which the exception of a single receptor at which a 1% increase is predicted (see Appendix B). Notwithstanding this the critical level in this location will remain below the 30µg NOx/m^3 level whereby likely significant effects can be discounted.

2.1.16 Similarly the cumulative process contribution of the proposed amendment with other proposed and permitted development is less than 1% of the annual critical load of nutrient nitrogen for all modelled receptors (see Appendix B).

2.1.17 Process contributions of less than 1% in accordance with EA guidance[1] are not considered significant:

[1] Environment Agency, 2007, Stage 1 and 2 Assessment of new PIR permissions under the Habitat Regulations.

> *"Where the concentration within the emission footprint in any part of the European site(s) is less than 1% of the relevant long-term benchmark (EAL, Critical Level or Critical Load), the emission is not likely to have a significant effect alone or in combination, irrespective of the background levels".*

2.1.18 No significant effects from the proposed amendment are therefore likely to occur. The conclusions of the original ecology assessment therefore remain valid.

Chapter 10 – Hydrology and flood risk

2.1.19 No amendments are required but this Chapter should be read alongside the *Flood Risk Assessment, Surface Water* and *Foul Drainage Philosophy* and *Chapter 10: Hydrology and Flood Risk Supplementary Report* submitted as part of application SW/17/502996.

Chapter 11 – Hydrogeology and ground conditions

2.1.20 No amendments required.

Chapter 12 – Noise and vibration

2.1.21 The proposed amendment to permission KCC/SW/17/502996 (the amended KCC/SW/10/444) to increase the total number of permissible HGV movements to and from the site by 90 has the potential to increase off site road traffic noise.

2.1.22 The perception of sound level is subjective, but as a general guide a 10dB(A) increase can be taken to represent a doubling of loudness, whilst a change in the order of 3dB(A) is generally considered to be just perceptible. Guidelines for the Environmental Assessment of Road Traffic (1993) state that: "typically, a halving or doubling of flow produces a 3dB(A) change in noise level."

2.1.23 With reference to the Transport Assessment referenced above and provided as Appendix A to this addendum the proposed increase in HGV vehicles both alone and cumulatively with other proposed or permitted development in the zone of influence of the facility will not increase the road traffic volumes by greater than 23% on any road link. Significant road traffic noise effects can thereby be screened out as not significant and the conclusions of the original ES assessment remain valid.

Chapter 13 – Archaeology and cultural heritage

2.1.24 No amendments required.

Chapter 15 – Amenity

2.1.25 No amendments required.

Chapter 16 – Summary

2.1.26 No amendments required.

2.2 Technical appendices

Appendix 1.1: Screening Request

2.2.1 No amendments required.

Appendix 1.2: Scoping Opinion

2.2.2 No amendments required.

Appendix 3.1: Development Plan Context

2.2.3 No amendments required.

Appendix 4.1: Outline General Construction programme

2.2.4 No amendments required.

Appendix 4.2: Environmental policies

2.2.5 No amendments required.

Appendix 4.3: Drainage Design Philosophy

2.2.6 Reference should be made to the *Surface Water and Foul Drainage Philosophy* submitted as part of application KCC/SW/17/502996.

Appendix 5.1: Alternative Site Report

2.2.7 No amendments required.

Appendix 5.2: Alternative Technology Assessment

2.2.8 No amendments required.

Appendix 6.1: Transport Assessment

2.2.9 This should be read alongside the Transport Assessment provided as Appendix A which assesses the additional effect of the proposed amendment.

Appendix 7.1: Air and Climate

2.2.10 No amendments required.

Appendix 8.1: Planning Policy

2.2.11 No amendments required.

Appendix 8.2: Lighting Assessment Reports

2.2.12 No amendments required.

Appendix 9.1: Citations of Ramsar, SPA, SAC and SSSI with 10 km

2.2.13 No amendments required.

Appendix 9.2: Kemsley Mill Air Quality assessment

2.2.14 This should be read alongside the Air Quality Assessment provided as Appendix B which assesses the additional effect of the proposed amendment.

Appendix 9.3: Kemsley Mill, Intertidal and breeding bird surveys 2009

2.2.15 No amendments required.

Appendix 10.1: Envirocheck Report

2.2.16 No amendments required.

Appendix 10.2: RPS Flood Risk Assessment

2.2.17 Reference should be made to the *Flood Risk Assessment* submitted as part of application KCC/SW/17/502996.

Appendix 10.3: Environment Agency Scoping Response

2.2.18 No amendments required.

Appendix 11.1: Legislation and Planning Context

2.2.19 No amendments required.

Appendix 11.2: Phase 1 Environmental Site Assessment - Kemsley Paper Mill, Sittingbourne, Kent (RPS, 2009a)

2.2.20 No amendments required.

Appendix 11.3: Phase 2 Intrusive Investigation- Kemsley Paper Mill, Sittingbourne (RPS 2009b)

2.2.21 No amendments required.

Appendix 12.1: Noise and Vibration Units, Standards and Guidance

2.2.22 No amendments required.

Appendix 12.2: Construction Noise Model Input Data

2.2.23 No amendments required.

Appendix 12.3: Construction Noise and Vibration

2.2.24 No amendments required.

Assessment Appendix 12.4: Operational Noise Model Input Data

2.2.25 No amendments required.

Appendix 12.5: Operational Noise Model Assessment

2.2.26 No amendments required.

Appendix 13.1: Desk Based Assessment

2.2.27 No amendments required.

Appendix 14.1: Population (Table UV01)

2.2.28 No amendments required.

Appendix 14.2: Migration Data (Table KS24)

2.2.29 No amendments required.

Appendix 14.3: General Health Data (Table UV20)

2.2.30 No amendments required.

Appendix 14.4: Long Term Limiting Illness Data (Table UV22) Appendix 14.5: Car Ownership Data (Table UV62)

2.2.31 No amendments required.

Appendix 14.6: Types of Industry Data (Table UV34)

2.2.32 No amendments required.

Appendix 14.7: Industrial Sector of Employment Data (Table KS11A) Appendix 14.8: Occupation (Table UV30)

2.2.33 No amendments required.

Appendix 14.9: Economic Activity Data (Table UV28)

2.2.34 No amendments required.

Appendix 14.10: Unemployment/ Worklessness Data (Summary Slats - 2007)

2.2.35 No amendments required.

Appendix 14.11: Qualifications Data (Table UV24)

2.2.36 No amendments required.

Appendix 14.12: Socio-Economic Classification Data (Table UV31)

2.2.37 No amendments required.

Appendix 14.13: Modes of Travel to Work Data (Table KS15)

2.2.38 No amendments required.

Appendix 14.14: Distance Travelled to Work Data (Table UV35)

2.2.39 No amendments required.

Appendix 14.15: Earnings Data (ASHE- 2009)

2.2.40 No amendments required.

Appendix 14.16: Job Density Data (Table 5.29- 2001)

2.2.41 No amendments required.

Appendix 14.17: Indices of Multiple Deprivation Data (IMD- 2007)

2.2.42 No amendments required.

Appendix 14.18: Stakeholder Engagement Report

2.2.43 No amendments required.

Appendix A – Supplementary Transport Assessment

KEMSLEY K3
SITTINGBOURNE
KENT

AMENDMENT TO CONDITION 3 OF PLANNING APPLICATION SW/17/502996

KEMSLEY K3
SITTINGBOURNE
KENT

AMENDMENT TO CONDITION 3 OF PLANNING APPLICATION SW/17/502996

Date: 29 May 2018

Our Ref: **DA/AW/CM/JNY9545-01a**

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QUALITY MANAGEMENT

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CONTENTS

1 INTRODUCTION 1
2 EXISTING SITUATION 2
3 POLICY CONSIDERATION 5
4 DEVELOPMENT PROPOSALS 9
5 FUTURE YEAR TRAFFIC FLOWS 10
6 TRIP GENERATION AND ASSIGNMENT 18
7 TRANSPORT ASSESSMENT 20
8 SUMMARY AND CONCLUSIONS 28

FIGURES
FIGURE 2.1: SITE LOCATION PLAN

APPENDICES
APPENDIX A: 2018 BASE TRAFFIC FLOWS
APPENDIX B: COMMITTED DEVELOPMENT TRAFFIC FLOWS
APPENDIX C: 2023 BASELINE TRAFFIC FLOWS
APPENDIX D: CUMULATIVE DEVELOPMENT TRAFFIC FLOWS
APPENDIX E: 2023 BASELINE PLUS CUMULATIVE DEVELOPMENT TRAFFIC FLOWS
APPENDIX F: DEVELOPMENT TRAFFIC DISTRIBUTION
APPENDIX G: DEVELOPMENT TRAFFIC FLOWS
APPENDIX H: 2023 BASELINE PLUS DEVELOPMENT TRAFFIC FLOWS
APPENDIX I: 2023 BASLINE PLUS CUMULATIVE DEVELOPMENT PLUS DEVELOPMENT TRAFFIC FLOWS
APPENDIX J: JUNCTIONS 9 OUTPUT REPORTS

1 INTRODUCTION

Context

1.1 This Transport Assessment (TA) has been prepared on behalf of Wheelabrator Technologies Inc. (WTI) to support a Section 73 Application to increase the maximum number of Heavy Goods Vehicle (HGV) movements to and from the permitted, and currently being constructed, K3 Sustainable Energy Plant (SEP) (planning ref: SW/17/502996), on land north east of Kemsley Paper Mill (KPM).

1.2 The existing consent permits 258 HGV movements per day; this calculation was based on fuel being delivered by articulated HGVs.

1.3 The increase in HGV movements is to accommodate local commercial and industrial waste being used as fuel; the fuel will arrive direct from collection in refuse collection vehicles (RCVs). RCVs have lower payloads than articulated HGVs and therefore, the number of vehicle movements generated will increase although the annual throughput will remain the same.

1.4 No additional staff will be employed at the plant as a result of this increase in HGV movements and there is no proposal to amend the vehicle access or routeing arrangements.

1.5 KCC's stated, in response to the Draft Environmental Statement submitted for the Kemsley Paper Mill (K4) CHP Plant, with reference to HGV movements:

> **"the principle of up to eight movements in a peak hour is unlikely to have a significant impact."**

1.6 This TA will show that KCCs judgement is correct and that the proposals will not have a significant impact on the existing highway network.

1.7 The scope of this TA has followed the agreed scoping for the K4 DCO application with the committed and cumulative development to be included in the assessment and the operational assessment of the junctions and links agreed separately with Kent County Council Highways. This scope of assessment for this application has been agreed with Kent County Council Highways.

Scope of the Transport Assessment

1.8 The TA considers the traffic effects associated with the increase in HGV movements at the SEP.

1.9 Section 2 of the TA sets out the existing situation and assesses the local and strategic highway network, road safety and existing traffic flows. Section 3 provides current local and national policies in respect to transport and full details of the proposals is set out in Section 4.

1.10 Future year traffic flows are set out in Section 5 and distribution and assignment of the additional HGV movements are set out in Section 6. An assessment of the likely transport impact is set out in Section 7.

1.11 A summary is provided in Section 8, where the TA's conclusion is that there are no highway related reasons for not granting consent.

2 EXISTING SITUATION

Site Location

2.1 The site is located north of Sittingbourne as shown in **Figure 2.1**; the site is bounded by Kemsley Paper Mill to the west, Ridham Avenue to the south, Barge Way to the north and the Swale Estuary to the east.

2.2 The SEP is accessed from the existing northern access which forms the southern arm of a three-arm roundabout on Barge Way; the roundabout has been constructed to have four arms but the north-western arm is not operational.

Highway Network

2.3 The site is located approximately 3km north-east of Sittingbourne and approximately 2km east of the A249. The local transport network surrounding the site is shown on **Figure 2.1**.

2.4 Barge Way is a 7.3m wide single carriageway road with street lighting; it is subject to a 40-mph speed restriction and there are no parking restrictions.

2.5 To the north, Barge Way accesses Ridham Docks and to the west it forms the eastern arm of a four-arm roundabout with Fleet End which provides access to a Morrison's distribution centre. Barge Way continues south from this roundabout to form the northern arm of the three-arm roundabout with Swale Way which again has been designed to be a 4-arm roundabout.

2.6 Swale Way forms part of the Sittingbourne Northern Perimeter Road, linking the A249 to the Eurolink Industrial Estate with a number of junctions along it providing access to the surrounding residential and industrial areas of Sittingbourne.

2.7 Swale Way is a 7.3m wide single carriageway road with street lighting; it is subject to a 40mph speed restriction and has no parking restrictions.

2.8 At its western end, Swale Way forms a grade separated dumbbell roundabout with the A429 and the B2005 Grovehurst Road. The eastern roundabout has five arms connecting Swale Way, Grovehurst Road (B2005), the A249 southbound on and off-slip roads and the A249 overbridge. The western roundabout has four arms connecting Grovehurst Road, the A249 northbound on and off-slip roads and the A249 overbridge.

2.9 The A249 is a dual carriageway road and forms part of the trunk road network. It routes broadly north to south between the Isle of Sheppey and Maidstone respectively. It forms grade separated junctions with the B2006, A2, M2 and M20 and provides access to London, the M25 and the wider strategic highway network.

Pedestrian / Cycling and Public Transport Infrastructure

2.10 As there will be no increase in staff and therefore, no increase in staff movements these elements of the transport infrastructure have not been assessed.

Traffic Flows

2.11 Base traffic flows on the local highway network have been taken from the following traffic surveys:

- June 2016 Automatic Traffic Counters (06/06 00:00 – 13/06 23:59):
  - Swale Way between the Grovehurst Roundabout and Barge Way;
  - Barge Way between Swale Way and Fleet End; and
  - Barge Way east of Fleet End.
- March 2017 Automatic Traffic Counters (24/03 00:00 – 30/03 23:59)
  - Swale Way between the B2005 Grovehurst Roundabout and Barge Way;
  - Barge Way between Swale Way and Fleet End; and
  - Barge Way east of Fleet End.
- 28th March 2017 Manual Classified Counts:
  - Swale Way / Barge Way Roundabout;
  - Fleet End / Barge Way Roundabout;
  - Barge Way, Northern Site Access roundabout; and
  - A249 Grade Separated Dumbbell Junction.

2.12 The ATC on Swale Way between the B2005 Grovehurst Roundabout and Barge Way had some incomplete data due to damage to the counter. This occurred on the Monday between 00:00 and 04:00 and on Sunday between 03:00 and 24:00. Traffic flows during these periods were therefore calculated using factors from the adjacent ATCs.

2.13 The ATC on Swale Way, south of Reams Way and north of the Ridham Avenue roundabout had some incomplete data due to damage to the counter. Traffic flows during these periods were therefore calculated using factors from the other ATCs.

2.14 The manual classified count identified the weekday AM and PM peak hours as 08:30 – 09:30 and 16:30 - 17:30 respectively.

2.15 In addition to the above local highway links adjacent to the development, 2017 data for the month of June (neutral month), was obtained from Highways England for the M2 links east and west of the A249.

2.16 The 2016 and 2017 surveyed traffic flows have been growthed to provide a baseline year of 2018 i.e. the year of submission of planning application, using DfT software TEMPRO. Growth factors have been obtained for the Swale zones 007, 009, 010, 011 and 012 and the Urban Minor, Rural Principal, Rural Trunk and Rural Motorway road types.

Table 2.1 – 2018 TEMPRO Growth Rates

Base Year	Road Type		
	Urban Principal	Urban Trunk	Rural Motorway
2016 AM	1.0239	-	-
2016 PM	1.0231	-	-
2016 Daily	1.0246	1.0252	1.0288
2017 AM	1.0118	-	-
2017 PM	1.0114	-	-
2017 Daily	1.0121	1.0125	1.0142

2.17 The estimated 2018 base traffic flows shown at **Appendix A**.

Road Safety

2.18 In order to assess road safety along the adjacent highway network, Personal Injury Accident (PIA) data has been obtained from Kent County Council for the three-year period to 30 September March 2017. The study area include includes the HGV route - Barge Way and Swale Way between the site access to the north and Swale Way between the B2005 Grovehurst Road grade-separated junction and the grade separated junction itself.

2.19 Of the 25 recorded PIAs, 18 have been discarded due to being outside the study area (Ridham Avenue, Reams Way, B2005 Grovehurst Road, Grovehurst Road and Sheppey Way); therefore, analysis of 13 accidents has been undertaken.

2.20 Of the 7 injury accidents, there were no fatalities, 1 accident resulted in serious injuries and 6 accidents resulted in slight injuries.

2.21 The serious PIA occurred on Swale Way at the junction of Lloyd Drive when a motorcyclist slowed down to allow a vehicle waiting to turn right out of Lloyd Drive to pull out; however, as the vehicle did not initially move the motorcyclist continued; the car moved off and hit the motorcyclist.

2.22 There are no clusters of accidents and the analysis of the injury accidents that occurred within the study area suggests that there are no common contributory factors amongst them and that driver error was the main reason for the incidences. It is therefore, considered that there are no existing road safety issues in the vicinity of the site.

3 POLICY CONSIDERATION

National Policy Guidance

3.1 The National Planning Policy Framework (NPPF), published in March 2012, sets out national policy for delivering sustainable growth and development. The NPPF aims to make the planning system less complex and more accessible, setting out the Government's planning policies for England and how these are expected to be applied.

3.2 In terms of transport, the objectives outlined in NPPF are:

> **"The transport system needs to be balanced in favour of sustainable transport modes, giving people a real choice about how they travel'. (Paragraph 29).**
>
> **Encouragement should be given to solutions which support reductions in greenhouse gas emissions and reduce congestion. In preparing Local Plans, local planning authorities should therefore support a pattern of development which, where reasonable to do so, facilitates the use of sustainable modes of transport'. (Paragraph 30)."**

3.3 When determining planning applications, Paragraph 32 of the NPPF states:

> **"All developments that generate significant amounts of movement should be supported by a Transport Statement or Transport Assessment. Plans and decisions should take account of whether:**
>
> **The opportunities for sustainable transport modes have been taken up depending on the nature and location of the HQ site, to reduce the need for major transport infrastructure;**
>
> **Safe and suitable access to the HQ site can be achieved for all people; and**
>
> **Improvements can be undertaken within the transport network that costs effectively limit the significant impacts of the development. Development should only be prevented or refused on transport grounds where the residual cumulative impacts of development are severe."**

3.4 Paragraph 35 of the NPPF emphasises the importance of protecting and exploiting opportunities for the use of sustainable transport modes for the movement of goods or people:

> **"Plans should protect and exploit opportunities for the use of sustainable transport modes for the movement of goods or people. Therefore, developments should be located and designed where practical to:**
> - **accommodate the efficient delivery of goods and supplies;**
> - **give priority to pedestrian and cycle movements, and have access to high quality public transport facilities;**
> - **create safe and secure layouts which minimise conflicts between traffic and cyclists or pedestrians, avoiding street clutter and where appropriate;**
> - **establishing home zones;**

- **incorporate facilities for charging plug-in and other ultra-low emission vehicles; and**
- **consider the needs of people with disabilities by all modes of transport."**

3.5 Having regard to the above objectives, the proposed development's access and movement has been demonstrated to be connected to the adjacent community and sustainable travel network through the consented SEP. The use of fuel, collected locally by RCVs, ensures that the refuse is not required to be transported long distances for disposal.

3.6 Planning Practice Guidance – Travel Plans, Transport Assessments and Statements in Decision-Taking (PPG) was published in March 2014 and provides a concise report on the use and importance of Transport Assessments / Statements and Travel Plans. With regard to whether to provide a Transport Assessment, Transport Statement or no assessment, the guidance states:

> **"Local planning authorities, developers, relevant transport authorities, and neighbourhood planning organisations should agree what evaluation is needed in each instance.**
> **The guidance states that Transport Assessments / Statements and Travel Plans can positively contribute to:**
>
> - **encouraging sustainable travel;**
> - **lessening traffic generation and its detrimental impacts;**
> - **reducing carbon emissions and climate impacts;**
> - **creating accessible, connected, inclusive communities;**
> - **improving health outcomes and quality of life;**
> - **improving road safety; and**
> - **reducing the need for new development to increase existing road capacity or provide new roads."**

3.7 The guidance states that Transport Assessments / Statements and Travel Plans should be proportionate to the size and scope of the proposed development, be tailored to particular local circumstances and be established at the earliest practicable possible stage of a development proposal.

3.8 The guidance continues by stating that these reports should be brought forward through collaborative ongoing working between the Local Planning Authority / Transport Authority, transport operators, Rail Network Operators, Highways Agency and other relevant bodies.

3.9 The proposed development will alter the volume of traffic on the adjacent road network by introducing an extra 90 daily two-way HGV movements and this Transport Assessment undertakes an assessment of the impact of these additional vehicles on the highway network.

Circular 02/2013: The Strategic Road Network and the Delivery of Sustainable Development

3.10 Circular 02/2013: The Strategic Road Network and the Delivery of Sustainable Development was published by the Department for Transport in September 2013. The Circular sets out the way in which the Highways Agency (now Highways England) will engage with communities and the development industry to deliver sustainable development and economic growth whilst safeguarding the primary function and purpose of the strategic road network.

3.11 Circular 02/2013 replaces Circular 02/2007 and 01/2008. Circular 02/2013 states that 'the Highways Agency supports the economy through the provision of a safe and reliable strategic road network, which allows for the efficient movement of people and goods'. Similarly, to the NPPF, Circular 02/2013 states that 'development should only be prevented or refused on transport grounds where the residual cumulative impacts of development are severe.

Swale Local Plan

3.12 The Swale Borough Local Plan is a key planning document for Swale, setting out the vision and overall strategy for the area and how it will be achieved for the period from 2014 to 2031. The Local Plan was adopted in July 2017.

3.13 The new Swale Borough Local Plan sets out the strategy for the Borough, including the achievement of sustainable development (Chapter 4). The chapter also includes a key diagram which indicates broad locations for growth, protection and enhancement:

- a series of core policies that take important issues for Swale and create the necessary linkages with the policy themes, set out in national planning policy and other local plan policies (Chapter 5);
- details of allocations, the identification of regeneration areas, a neighbourhood plan and an area of search (Chapter 6);
- a framework of development management policies to guide the determination of planning applications by setting out criteria for development proposals (Chapter 7); and
- a framework for implementation and monitoring of the Local Plan. Chapter 8 sets out the issues affecting the delivery of the Local Plan, whilst a separately published Implementation Delivery Schedule details the infrastructure necessary to support the Local Plan.

The Swale Transportation Strategy 2014-2031 Draft, Appendix

3.14 The following paragraphs summarise the current transport related policies applicable to this application.

3.15 Policy SP6 - Transport and Utilities: The wider importance to the Region of providing for new and improved infrastructure in Swale is stressed within the investment strategy for Thames Gateway. Thus, the Local Plan strategy for transport and utilities has two main aims. Firstly, to correct the historic lack of area-wide infrastructure provision, particularly in roads, resulting from low investment, and secondly, to ensure that new development takes place where infrastructure is available or can be provided. It also seeks to reduce car dependence by ensuring that options for walking, cycling, and public transport are provided within new developments with links to and from the wider surrounding network.

3.16 Policy T1 - Providing Safe Access to New Development: The Borough Council will not permit development proposals that:

> **"…generate volumes of traffic in excess of the capacity of the highway network, and/or result in a decrease in safety on the highway network, unless these issues can be addressed by environmentally acceptable improvements to the highway network**

that have been agreed by the Borough Council and the appropriate Highway Authority in accordance with Policy T2; and
lead to the formation of a new access, or the intensification of any existing access, onto a primary or secondary road or route, unless it can be created in a location that is acceptable to the Borough Council, or where an access can be improved to an acceptable standard and achieve a high standard of safety through design."

3.17 Policy T2 - Essential Improvements to the Highway Network: Where capacity and/or safety problems will arise on the highway network as a result of proposed development, but they can be overcome by environmentally acceptable off-site highway works and/or other transport initiatives, development will be permitted provided these works are undertaken, or a contribution is made towards them, by the developer, as agreed with the Borough Council and Highway Authority.

3.18 Any provision or financial contribution sought will be secured through a planning condition or appropriate legal agreement.

Policy Consideration

3.19 It is considered that the proposals are generally in accordance with policies relating to transport and highways. Additionally, the site is well located in respect to the strategic freight network.

4 DEVELOPMENT PROPOSALS

Introduction

4.1 The SEP was granted planning permission under planning ref: SW/17/502996 and is currently being constructed. It is an energy from waste facility with a throughput of 550,000 tonnes per annum and will produce up to 49.9 MW of electricity. The site will employ 50 full-time staff operating on a combination of daytime and shift working.

4.2 Condition 3 of the planning permission states:

> **"The maximum number of Heavy Goods Vehicle movements to and from the Application Site' shall not exceed a combined total of 258 movements per day save for movements in accordance with Condition (5) subject to any prior written variation as approved by the Waste Planning Authority.**
>
> **Reason: In the interest of highway safety pursuant to Policy W22 of the Kent Waste Local Plan."**

4.3 This application seeks to increase the total number of HGV movements by 90 vehicle movements per day to enable the delivery of commercial and industrial waste collected locally by RCVs.

4.4 These HGV movements will not be new to the wider highway network but dependent on the location of premises collected from, existing depositing locations and depots returning to, they may be new to the local highway network. The vehicles will reroute from their existing travel routes, a proportion of which may be along Swale Way and the A249, to divert to the SEP.

Access

4.5 All additional HGV movements will access the SEP via the northern access onto Barge Way. This access has been designed to accommodate large HGVs and therefore, there is no requirement to assess the access, in terms of geometry, for use by RCVs.

Delivery Times

4.6 The SEP applied for, and was granted permission (Planning ref: SW/14/506680), for the deletion of condition 4 of the planning permission, to allow HGV deliveries 24 hour, 7 days a week. However, due to the source of fuel for this application it is assumed that all RCV vehicles will arrive and depart between 07:00 and 19:00 hours on a weekday and 07:00 – 13:00 on a Saturday.

Timescales

4.7 The SEP is expected to be in full operation in August 2019.

5 FUTURE YEAR TRAFFIC FLOWS

Future Year Assessment

5.1 The SEP is expected to be at full operation in August 2019 including if consented, the additional 90 HGV movements that this TA assesses. The forecast year of 2023 has been used for assessment i.e. 5 years after the submission of the planning application.

Traffic Growth Rates

5.2 The surveyed traffic flows have been growthed to 2023 to provide a baseline using the DfT software TEMPRO. Growth factors have been obtained for the Swale zones 007, 009, 010, 011 and 012 and the Urban Principal, Urban Trunk and Rural Motorway road types.

5.3 The 2023 growth rates have been interrogated and include 1,096 households and 653 jobs. The household and job assumptions for the committed and cumulative development sites are shown in **Table 5.1.**

Table 5.1 – Household & Jobs Assumptions

Development Site	Households	Jobs
Committed Development		
K3	-	29
IBA	-	12
Recycling Depot	-	29
Gypsum Recycling	-	15
Fulcrum	-	317
Materials Recycling	-	124
Eurolink V	-	1,049
Kemsley Fields	-	17
Proposed Development		
SEP – additional 90 HGVs	-	-
Cumulative Development		
Wienerberger	-	29
South of Iwade	275	-
East of Iwade	440	-
Quinton Road	155	-
Plot N2c	-	-
Northwest Sittingbourne	1,100	-
TOTAL		
	1,970	1,621

5.4 The sites for inclusion in the committed and cumulative development have been agreed with Kent County Council Highways; further details of the sites can be found later in this section.

5.5 The TEMPRO growth rates have been adjusted using the households and job numbers shown in Table 5.1 and are listed in **Table 5.2**. Where the households and jobs, identified in Table 5.1, exceed the assumptions in Tempro, a growth rate of 1.0 has been applied (i.e. no background growth assumed as it is all assessed within the cumulative impact).

Table 5.2 – 2023 TEMPRO Growth Rates

Base Year	Road Type		
	Urban Principal	Urban Trunk	Rural Motorway
2016 AM	1.0	-	-
2016 PM	1.0	-	-
2016 Daily	1.0	1.0	1.0114
2017 AM	1.0	-	-
2017 PM	1.0	-	-
2017 Daily	1.0	1.0	1.0

Existing Permissions at the Mill

5.6 The transport effects of the proposed development in combination with other schemes that are operational / constructed, consented or for which planning permissions are currently being sought, will be assessed where appropriate and are described below.

K1/K4

5.7 The existing K1 plant, supplied in 1995, operates fully independently from the Mill, which supplies the plant with raw water and hot condensate return.

5.8 K1 is around 20 years old with the current operating contract ending in February 2019. The Applicant has assessed the condition of K1 and concluded that significant investment into the gas turbine, waste heat recovery boilers and steam turbine is necessary.

5.9 DS Smith have recently submitted a DCO application to replace the existing plant with a new plant, K4, which will integrate with the remaining supply equipment and be constructed on available land adjacent to the existing K1 plant. K4 is expected to provide an additional 20 years of reliable and efficient operation and sized to meet the projected energy demands of the site.

5.10 Although K1 is to be decommissioned, it does not form part of the K4 application. Notwithstanding this, K1 does not generate any regular traffic flows and so this does not affect the future year baseline scenario.

5.11 K4 also, due to fuel delivery being via pipeline, will not generate any regular traffic flows. The construction traffic flows are temporary and will be completed by the future assessment year of 2023 and therefore, the K4 development has not been included in the future year baseline scenario.

5.12 From a transport perspective, there will be no operational difference between K1 and K4 as there would be no change in traffic flows. Thus, the transport scenario created by the existing permission for K1 would be unchanged irrespective of the K4 DCO.

K3

Wheelabrator Kemsley Generating Station

5.13 Kent County Council granted planning permission for the development of the Wheelabrator Kemsley Generating Station in March 2012 (planning ref. SW/10/444). In addition, the following applications relevant to the facility have been submitted and granted planning permission:

- Application to Kent County Council for a non-material amendment to the site layout (planning ref. PAG/MC/SW/10/444/R) (granted September 2013);
- Application to Kent County Council to vary condition (2) and delete condition (4) of planning permission SW/10/444 to allow a variation to the permitted hours of delivery to allow for 24 hours 7 days per week operation (planning ref. SW/12/506680) (granted April 2015);
- Application to Kent County Council for a non-material amendment to the building footprint, elevation and site layout (planning ref. SW/10/444/RA) (granted December 2015); and
- Application to Kent County Council (planning ref. SW/17/502996). Section 73 to vary the wording of Condition 16 of planning permission SW/10/444 (as amended by SW/10/506680) to allow an amended surface water management scheme at the SEP to serve Kemsley Paper Mill.

5.14 The Wheelabrator Kemsley Generating Station has already been consented by Kent County Council and is currently under construction. Under the existing programme of construction, the consented scheme is due to be completed and operational by August 2019.

5.15 The estimated traffic generation of the Generating Station and its assignment to the adjacent highway network have been taken from the Transport Assessment that was prepared in support of its original planning application. Changes have been made to allow for 24 hour 7 days a week operation that has since been permitted. The assumptions used to calculate this are:

- 25% - 50% of HGV movements will occur between 18:00 and 07:00; and
- 50% - 75% of HGV traffic would occur between 07:00 and 18:00.

5.16 Therefore, to enable a robust assessment of the peak hour impact it has been assumed that 75% of the HGV movements will occur between 07:00 and 18:00 and that these will be spread evenly throughout the day.

5.17 The non-material amendments to the planning application did not affect the consented traffic flows at the Generating Station.

Access to Wheelabrator Kemsley Generating Station

5.18 The following applications have been made in relation to access provisions to serve the Kemsley Generating Station:

- Application to Kent County Council for the formation of an improved access road and associated development to serve the Wheelabrator Kemsley generating station (planning ref. SW/12/1001) (granted November 2012);
- Application to Kent County Council for a non-material amendment to provide for the repositioning and change to the capacity of the pond to accommodate surface water drainage from the access road (planning ref. PAG/SW/12/1001) (granted August 2013); and
- Application to Kent County Council for the variation of Condition 6 of planning permission SW/12/1001 to provide the formation of improved access road and associated development to serve Wheelabrator Kemsley Generating Station (planning ref. SW/13/1257) (granted February 2014).

5.19 These applications did not affect the consented traffic flows at the Generating Station.

Access Road to Serve the Mill

5.20 In addition, the following applications have been made in relation to the Mill:

- Application to Swale Borough Council for formation of new rear access road and extension to trailer park to serve the Mill, together with security cabin and drainage pond (planning ref. SW/12/1011) (granted October 2012); and
- Application to Swale Borough Council for non-material amendment to planning permission SW/12/1011 for formation of new rear access road and extension to trailer park, together with security cabin and drainage pond (planning ref. SW/12/1011/NMA) (granted May 2014).

5.21 These applications did not affect the consented traffic flows at the Mill.

Incineration Bottom Ash Building

5.22 Energy production from waste generates Incineration Bottom Ash (IBA), the cooled burnt-out residue from the combustion process. This material is commonly processed to recover metals for recycling and secondary aggregates products used in the construction industry.

5.23 The original permission for the Wheelabrator Kemsley Generating Station (SW/10/444) included an Incineration Bottom Ash (IBA) processing building. The non-material amendment application that was approved in September 2013 (planning ref. PAG/MC/SW/10/444/R) removed the IBA building from the consented scheme.

5.24 This application did not affect the consented traffic flows at the Generating Station.

IBA Facility

5.25 There is a separate planning consent for the construction of a standalone IBA facility adjacent to the Wheelabrator Kemsley Generating Station site (planning ref. KCC/SW/0265/2016).

5.26 The IBA permission allows for 84 daily HGV movements.

5.27 The estimated traffic flows generated by the IBA Facility and along the adjacent highway network have been taken from the Transport Assessment that was prepared in support of its original planning application.

Other Committed Developments

5.28 An assessment of 'committed' developments in the local area that have gained permission has been undertaken to determine whether they are operational, or when they are likely to be operational. This is to form a view of whether the traffic generated by the developments will already be present in the traffic surveys undertaken for the assessment of the proposed development, or whether they should be added as 'committed' developments within the Future Baseline 2023 traffic flows and assessments. The sites included in **Table 5.3** have been reviewed.

Table 5.3: Review of 'Committed' Developments

Site Number	Site Name	Application number	Status	Submitted / Decision Date	Status	Traffic Flows
1	KPM Sustainable Energy Plant (SEP) (K3)	SW/10/444	Granted	2010 / 2012	K3 currently under construction – new DCO proposal (Site 13)	Operational traffic flows included within committed flows.
2	KPM Recycling Depot	16/501228/FULL	Permitted	2016 / 2016	Not Built	Operational traffic flows included within committed flows.
3	KPM Incineration Bottom Ash Facility (IBA)	16/507687/COUNTY	Granted	2016 / 2016	Not Built	Operational traffic flows included within committed flows.
4	Gypsum Recycling Building (Ridham Docks)	16/501484/COUNTY	Granted	2016 / 2016	Not Built	Operational traffic flows included within committed flows.
5	KPM Anaerobic Digester	SW/11/1291	Permitted	2011 / 2012	Assumed Operational	Operational flows lower than previous site. Reduction in flows not included committed flows. Flows included in surveyed flows.
6	Fulcrum Business Park Development	14/500327/OUT	Permitted	2014 / 2016	Not Built	Operational traffic flows included within committed flows.
7	Nicholls Transport Depot	SW/12/0816	Granted	2012 / 2013	Operational	Flows included in surveyed traffic.
8	Materials Recycling Facility (Ridham Docks)	SW/12/1211	No objection	2012 / 2013	Not Built	Operational traffic flows included within committed flows.

Site Number	Site Name	Application number	Status	Submitted / Decision Date	Status	Traffic Flows
9	Eurolink V	15/510589/OUT	Permitted	2015 / 2016	Not Built	Operational traffic flows included within committed flows.
10	Tonge Corner Solar Park	SW/14/0224	Permitted	2014 / 2015	Partly built	Construction flows only – no operational flows. No flows onto local network, therefore not included within committed flows.
11	Steam Pipeline (Ridham Dock to KPM)	16/506935	Granted	2016 / 2016	Assumed not built	Minimal construction vehicles only, therefore not included within committed flows
12	Thermal Energy Facility Kemsley Field Business Park	15/500348/COUNTY	Granted	2015/2015	Not built	Operational traffic flows included within committed flows

*Note: Kemsley Paper Mill (KPM)

5.29 Based on the above, the following developments are considered as committed developments and will form part of the future year baseline scenario:

- 1 – KPM Sustainable Energy Plant (SEP) (K3);
- 2 – KPM Recycling Depot;
- 3 – KPM Incineration Bottom Ash Facility (IBA);
- 4 – Gypsum Recycling Building;
- 6 – Fulcrum Business Park;
- 8 – Materials Recycling Facility;
- 9 – Eurolink V; and
- 12 – Kemsley Field Thermal Energy Facility.

5.30 The traffic flows generated by these committed developments have been taken from their respective Transport Assessments that supported their planning applications. These are attached at **Appendix B**.

5.31 The committed development traffic flows attached at **Appendix B** have been added to the 2023 base traffic and the resultant 2023 baseline scenario is attached at **Appendix C**.

Cumulative Sites

5.32 KCC have requested that the following developments are considered in a cumulative assessment:

- 17/505073/FULL Erection of a tile factory including service yard, storage yard and car parking area;
- 16/506193/ENVSCR EIA Screening Opinion - Land South of Iwade - Outline application for proposed residential development of 275 dwellings including affordable housing with open spaces, appropriate landscaping and minor alterations to the surrounding highway network (access); and
- 17/503713/ENVSCR | EIA Screening Opinion | Land East of Iwade - Outline application for proposed residential development of 440 dwellings.

5.33 A full planning application has been submitted and is currently being decided for the tile factory meaning that if permission is granted these vehicles will be added to the highway network. The traffic flows generated by the tile factory have been based on the traffic generation set out in the Transport Statement that supported its planning application; the traffic has been assigned to the highway network using the distribution used for the K3/SEP development.

5.34 For the two Iwade residential developments, the trip generation rates agreed with KCC for use by the Northwest Sittingbourne development have been used; the trips have been assigned onto the network using 2011 Journey to Work Origin and Destination Census data along with observed traffic movements at the Swale Way and Barge Way roundabouts. Due to their current position in the planning process, it is unlikely that these two developments will be generating traffic at the maximum as assessed.

5.35 In addition, the following sites have been included in the cumulative assessment:

- 18/500257/EIFUL Proposed development of 155 dwellings on land adjacent to Quinton Farm House, Quinton Road, Sittingbourne;
- 15/500348/COUNTY Advance thermal conversion and energy facility at Kemsley Fields Business Park, Barge Way, Sittingbourne;
- 18/500393/FULL Erection of a natural gas fuelled reserve power plant at Plot N2c, Castle Road, Eurolink, Sittingbourne; and
- 16/506014/EIASCO – an EIA scoping for a sustainable urban extension comprising up to 1,100 new dwellings, a secondary and primary school on Land North of Quinton Road (also known as North West Sittingbourne).

5.36 The development traffic flows have been taken from the relevant TA/TS or in the case of Northwest Sittingbourne from the Technical Note submitted to the Swale Local Plan Examination. Where traffic flows have not been assigned, or not assigned to the whole of the network being considered in this assessment, professional judgement using 2011 Journey to Work Census and assignment used in the committed development assessment has been used.

5.37 In respect of the Northwest Sittingbourne, and its position in the planning process, it is unlikely that this development will be generating traffic at the maximum assessed in 2023.

5.38 A DCO application has been submitted for the construction of K4, a new gas-fired Combined Heat and Power (CHP) plant (K4) to supply steam and power to their Kemsley Paper Mill. Fuel will be supplied from gas pipeline and the CHP will have no operational traffic generation except for ad-hoc maintenance and therefore, only construction vehicle impact will be considered in its assessment of the highway impact. As construction of the CHP is expected to be finished in 2020, the vehicles associated with its construction have not been included in the cumulative assessment.

5.39 Finally, an application is to be submitted for a new road link within the Kemsley Paper Mill site; this scheme will be completed before K4 is commenced and therefore, the site will not be generating vehicle movements at the same time as the K4 development and has not been included in the cumulative assessment.

5.40 The cumulative development traffic flows attached at **Appendix D** have been added to the 2023 baseline traffic flows and the resultant 2023 cumulative baseline scenario is attached at **Appendix E.**

6 TRIP GENERATION AND ASSIGNMENT

Trip Generation

6.1 Due to the nature of the fuel being delivered i.e. from local commercial and industrial premises, directly from RCVs, it is assumed that all deliveries will occur between 07:00 – 19:00 hours on a weekday and 07:00 – 13:00 on a Saturday. It is assumed, as per calculations for the SEP, that the HGVs will be evenly spread throughout the day. Therefore, it is estimated that the increase of 90 HGV movements per day will give rise to an additional 7 - 8 HGVs per hour.

6.2 There will be no increase in staff at K3 as a result in the increase of HGV movements.

Assignment to the Highway Network

6.3 Some deliveries are expected from Countrystyle Recycling, whose depot is based at Ridham Docks. These vehicles would already be routing along Swale Way via the A249 grade separated junction and therefore, the only impact would be at the north site access on Barge Way where the vehicles would enter and exit the K3 site rather than just travelling along Barge Way. However, as sources of fuel from RCVs will alter over the life of the SEP then these trips have been included as new trips in order for the assessment to be robust.

6.4 Also, the existing SEP permission was based on HGV deliveries from a wide geographical area which would not be sustainable for RCVs and their smaller payload.

6.5 Therefore, the assignment of RCVs has been based on the assumptions that the RCVs will be delivering waste from within the boundaries of Kent and Medway unitary authority. Vehicle movements have been assigned equally to each of the districts with the exception of Thanet which has been included with Canterbury due to its size and nature. Therefore, each district / unitary generates one twelfth of the proposed development traffic and the assignment to the highway network is shown in **Appendix F**.

6.6 The development traffic has been assigned to the road network in accordance with the above, and the resultant traffic flows are shown in **Appendix G**.

6.7 These have been added to the 2023 baseline traffic flows and the 2023 cumulative baseline traffic flows. The resultant 2023 baseline plus development traffic and the 2023 plus cumulative development + development traffic is shown in **Appendix H** and **Appendix I**.

Assessment Scenarios

6.8 The scenarios assessed are:

- 2018 Base - existing 2016/2017 traffic flows growthed to 2018;
- 2023 Baseline - 2018 Base plus committed developments;
- 2023 Baseline plus potential development;
- 2023 Baseline plus cumulative sites; and

- 2023 Baseline plus cumulative sites plus potential development.

7 TRANSPORT ASSESSMENT

Introduction

7.1 The assessment assesses the effects of the additional traffic flows generated by K3, on the local highway network in 2023.

7.2 To consider the effects and consistent with the K4 agreed scope, two assessments have been undertaken of the peak network hours (07:30 – 08:30 and 16:30 -17:30). First, an assessment of traffic flow increases has been undertaken to provide a context of the impact on the local highway network between the sites and the M2. Second, an assessment of junction performance has been undertaken on the local junctions between the site and the A249 grade separated dumbbell junction.

7.3 Due to the assessed cumulative development containing both housing and employment there will be an element of double counting of generated traffic and therefore, this analysis provides a robust assessment.

Link Assessment

7.4 The traffic flows generated by the daily 90 HGV increase at K3 have been assessed against the 2023 baseline (2017 traffic flows growthed + committed development). The 2023 baseline plus cumulative plus the potential development has also been assessed against the 2023 baseline to show the impact of all expected development traffic. The impact percentages are shown in **Tables 7.1 – 7.6** below.

Table 7.1 – Link 1 Barge Way between Northern Access & Fleet End

Assessment Year	Scenario	Peak Hour			
		AM		PM	
		Totals	HGV	Total	HGV
2018	Base	218	64	213	34
2023	Baseline (includes committed)	273	107	293	76
	Baseline + Dev	280	114	300	84
	Dev % Impact	2.6%	6.5%	2.4%	10.5%
	Baseline + Cumulative	275	107	295	76
	Baseline + Cumulative + Dev	283	114	303	84
	Cum + Dev % Impact	3.7%	6.5%	3.4%	10.5%

Table 7.2 – Link 2 Barge Way between Fleet End & Swale Way

Assessment Year	Scenario	Peak Hour			
		AM		PM	
		Totals	HGV	Total	HGV
2018	Base	394	92	397	64
2023	Baseline (includes committed)	457	138	485	111
	Baseline + Dev	465	146	493	118
	Dev % Impact	1.8%	5.8%	1.6%	6.3%
	Baseline + Cumulative	461	138	489	111
	Baseline + Cumulative + Dev	468	146	497	118
	Cum + Dev % Impact	2.4%	5.8%	2.5%	6.3%

Table 7.3 – Link 3 Swale Way East of Grovehurst Dumbbell Junction

Assessment Year	Scenario	Peak Hour			
		AM		PM	
		Totals	HGV	Total	HGV
2018	Base	1773	110	1468	67
2023	Baseline (includes committed)	2125	177	1774	129
	Baseline + Dev	2132	184	1781	136
	Dev % Impact	0.3%	4.0%	0.4%	5.4%
	Baseline + Cumulative	2270	194	1960	146
	Baseline + Cumulative + Dev	2277	201	1967	153
	Cum + Dev % Impact	7.2%	13.6%	10.9%	18.6%

Table 7.4 – Link 4 A249 south of the Grovehurst Dumbbell Junction

Assessment Year	Scenario	Peak Hour			
		AM		PM	
		Totals	HGV	Total	HGV
2018	Base	2470	260	3351	196
2023	Baseline (includes committed)	2798	317	3635	249
	Baseline + Dev	2805	324	3642	256
	Dev % Impact	0.3%	2.2%	0.2%	2.8%
	Baseline + Cumulative	3410	331	4258	263
	Baseline + Cumulative + Dev	3417	338	4265	270
	Cum + Dev % Impact	22.1%	6.6%	17.3%	8.4%

Table 7.5 – Link 5 M2 West

Assessment Year	Scenario	Peak Hour			
		AM		PM	
		Totals	HGV	Total	HGV
2018	Base	5198	558	6649	382
2023	Baseline (includes committed)	5303	585	6742	408
	Baseline + Dev	5304	587	6743	409
	Dev % Impact	0.0%	0.3%	0.0%	0.2%
	Baseline + Cumulative	5435	591	6876	414
	Baseline + Cumulative + Dev	5436	593	6877	415
	Cum + Dev % Impact	2.5%	1.4%	2.0%	1.7%

Table 7.6 – Link 6 M2 East

Assessment Year	Scenario	Peak Hour			
		AM		PM	
		Totals	HGV	Total	HGV
2018	Base	4772	513	6105	351
2023	Baseline (includes committed)	4824	525	6150	363
	Baseline + Dev	4825	526	6151	364
	Dev % Impact	0.0%	0.2%	0.0%	0.3%
	Baseline + Cumulative	4850	530	6177	367
	Baseline + Cumulative + Dev	4851	531	6178	368
	Cum + Dev % Impact	0.6%	1.1%	0.5%	1.4%

7.5 To quantify the effects of the proposed development traffic flows on the local highway network, reference is made to the assessment standards set out in the Institute of Environmental Assessment's document 'Guidelines for the Environmental Assessment of Road Traffic 'The Environmental Assessment document states that day-to-day variations of traffic on a road is frequently at least + or - 10% and that therefore, projected changes in traffic of less than 10% create no discernible environmental impact.

7.6 The usual format for impact of development is that the largest impacts are seen nearest the development site. As traffic travels away from the site it will route to different destinations, lowering the impact on links at each subsequent junction / link.

7.7 The greatest impact of the additional HGVs is observed on Barge Way between the site access and the roundabout junction with Fleet Way with an increase in total traffic movements of 2.6% in the AM peak hour.

7.8 The greatest total traffic impact of the cumulative plus K3 development will be seen on the A249, south of the Grovehurst dumbbell junction with an increase of 22.1% and 17.3% in the AM and PM peak hours respectively. The K3 development itself is only expected to increase total traffic flows on this link by 0.3% and 0.2% in the AM and PM peak hours respectively. Therefore, it can be seen that the majority of the impact will be due to the assessed cumulative sites. The majority of the increase in traffic from the cumulative sites is expected to be generated by the three residential developments; due to their current position in the planning process it is unlikely that these developments will be generating fully built-out traffic flows and therefore, in reality, the impacts shown above will not be reached.

7.9 It should be noted, that in terms of environmental assessment, Swale Way and the A249 have low and negligible receptor sensitivity and would be assessed against Rule 1 which states:

- Include highway links where traffic flows will increase by more than 30% (or the number of heavy goods vehicles will increase by more than 30%).

7.10 Therefore, as the impacts of the cumulative plus K3 development are below 30%, the effect would be not significant.

7.11 KCC also stated in their response to the Draft Environmental Statement released under S42 consultation for the Kemsley Paper Mill (K4) CHP Plant, with reference to HGV movements:

'the principle of up to eight movements in a peak hour is unlikely to have a significant impact'

7.12 The additional HGV movements at K3 will be 7 – 8 movements per hour. Therefore, KCC's response to the HGV movements at K4 are also directly applicable to the additional HGV movements at K3. KCC's own advice indicates that an additional 7 – 8 movements is unlikely to have a significant impact.

7.13 The assessment shows, as predicted by KCC, that the proposed K3 development does not have a significant impact on the highway network links and the impact when included with the cumulative sites remains below industry thresholds.

7.14 The above assessment undertakes a review of the impact of the development traffic on the free-flowing links within the highway network. Whilst this assessment is necessary to highlight any significant increases, it is the junctions at either end of these links that mainly limit the performance of the network and this impact is considered in the next section.

Junction Assessment

7.15 It can be seen that once the development traffic reaches the Swale Way / A249 its effect on the highway network decreases and therefore, the junctions to the south of the A249 Dumbbell junction will not be assessed.

7.16 Operational assessments have been undertaken using the TRL Junctions 9 computer modelling suite at the following junctions:

- Barge Way / Northern Site Access roundabout;
- Barge Way / Fleet End roundabout;
- Barge Way / Swale Way roundabout; and
- A249 Dumbbell junction.

7.17 It is generally accepted that a ratio of flow to capacity (RFC) of 0.85 and below indicates a junction that is operating within its design capacity. An RFC over 0.85 but below 1.0 indicates that a junction's capacity is starting to be compromised but remains operating within its 'theoretical capacity' (RFC of 1.0). Above an RFC of 1.0 the junction can be referred to as being 'saturated' and operating 'over capacity'.

7.18 As agreed with KCC Highways, the modelling has been undertaken for the following future year traffic flow scenarios:

- 2023 baseline (2018 traffic flows + committed development); and
- 2023 baseline + potential development.

7.19 Due to the development generating only 7 – 8 HGVs in the peak network hours and the cumulative development being large residential sites that will generate many vehicles during the peak hours it was agreed with KCC Highways that operational assessment including cumulative traffic would not be undertaken.

7.20 A summary of the modelling results is presented in **Tables 7.7 – 7.10** below. The Junctions 9 output reports are attached at **Appendix J**.

7.21 The development will generate an additional 8 vehicle movements through the Barge Way / North Site Access junction during the AM and PM peak hours which represents an increase of 2.5% and 2.2% respectively.

Table 7.7: Barge Way / North Site Access Roundabout

2018 Base						
	AM			PM		
	Queue	Delay (s)	RFC	Queue	Delay (s)	RFC
East arm	0.0	4.83	0.04	0.1	3.57	0.05
Barge Way	0.2	3.74	0.14	0.1	3.40	0.10
Site Access	0.0	0.00	0.00	0.0	0.00	0.00
Private Road	0.1	4.78	0.10	0.1	3.10	0.09

2023 Baseline						
	AM			PM		
	Queue	Delay (s)	RFC	Queue	Delay (s)	RFC
East arm	0.1	5.00	0.06	0.1	3.77	0.08
Barge Way	0.2	4.04	0.18	0.2	3.74	0.14
Site Access	0.0	0.00	0.00	0.0	0.00	0.00
Private Road	0.1	4.70	0.12	0.1	3.33	0.12
2023 Baseline + Potential Development						
	AM			PM		
	Queue	Delay (s)	RFC	Queue	Delay (s)	RFC
East arm	0.1	5.04	0.06	0.1	3.89	0.08
Barge Way	0.2	4.11	0.18	0.2	3.81	0.15
Site Access	0.0	0.00	0.00	0.0	0.00	0.00
Private Road	0.1	4.72	0.12	0.1	3.34	0.12

7.22 **Table 7.7** above shows that the Barge Way / North Site Access roundabout is currently operating within capacity and will continue to do so in all scenarios. All increase in traffic flows at this junction are generated only by the proposed HGV increase.

7.23 The development will generate an additional 8 vehicles movements through the Barge Way / Fleet Road junction during the AM and PM peak hours which represents an increase of 2.2% and 1.6% respectively.

Table 7.8: Barge Way / Fleet Road Roundabout

2018 Base						
	AM			PM		
	Queue	Delay (s)	RFC	Queue	Delay (s)	RFC
Barge Way E	0.1	4.30	0.08	0.1	3.33	0.13
Barge Way S	0.2	3.53	0.17	0.2	3.02	0.14
Fleet End	0.0	4.11	0.04	0.1	4.16	0.08
Private Access	0.0	0.00	0.00	0.0	0.00	0.00
2023 Baseline						
	AM			PM		
	Queue	Delay (s)	RFC	Queue	Delay (s)	RFC
Barge Way E	0.1	4.28	0.11	0.2	3.59	0.18
Barge Way S	0.3	3.76	0.21	0.2	3.31	0.17
Fleet End	0.0	4.22	0.04	0.1	4.27	0.09
Private Access	0.0	0.00	0.00	0.0	0.00	0.00

2023 Baseline + Potential Development						
	AM			PM		
	Queue	Delay (s)	RFC	Queue	Delay (s)	RFC
Barge Way E	0.1	4.32	0.12	0.2	3.67	0.18
Barge Way S	0.3	3.79	0.21	0.2	3.35	0.18
Fleet End	0.0	4.23	0.04	`0.1	4.29	0.09
Private Access	0.0	0.00	0.00	0.0	0.00	0.00

7.24 **Table 7.8** above shows that the Barge Way / Fleet Way roundabout is currently operating within capacity and will continue to do so in all scenarios.

7.25 The development will generate an additional 8 vehicles movements through the Swale Way / Barge Way during the AM and PM peak hours which represents an increase of 0.4% in both peaks hours.

Table 7.9: Swale Way / Barge Way Roundabout

2018 Base						
	AM			PM		
	Queue	Delay (s)	RFC	Queue	Delay (s)	RFC
Barge Way	0.3	7.59	0.23	0.4	4.78	0.27
Swale Way South	0.5	3.92	0.33	1.8	6.95	0.64
Swale Way West	4.9	14.95	0.84	0.9	4.80	0.47
2023 Baseline						
	AM			PM		
	Queue	Delay (s)	RFC	Queue	Delay (s)	RFC
Barge Way	0.5	10.03	0.33	0.5	5.50	0.34
Swale Way South	0.7	4.47	0.40	4.1	13.33	0.81
Swale Way West	41.4	93.38	1.03	1.1	5.60	0.53
2023 Baseline + Potential Development						
	AM			PM		
	Queue	Delay (s)	RFC	Queue	Delay (s)	RFC
Barge Way	0.5	10.21	0.35	0.5	5.59	0.35
Swale Way South	0.7	4.50	0.40	4.2	13.59	0.81
Swale Way West	44.3	98.95	1.04	1.1	5.68	0.53

7.26 **Table 7.9** above shows that the Swale Way / Barge Way roundabout is currently operating within capacity in both the AM and PM peaks. With committed traffic added in 2023, the Swale Way West arm exceeds its design capacity in the AM peak hour (1.03 RFC). The traffic associated with the potential development has a negligible impact on the operation of the roundabout as it only effects the RFC by 0.02. This is not considered to be a severe impact (NPPF test).

7.27 The development will generate an additional 8 vehicles movements through the eastern roundabout of the grade separated junction during the AM and PM peak hours which represents an increase of 0.3% in both peak hours. At the western roundabout the development generates an additional 4 vehicles during the AM and PM peak hours which represents an increase of 0.2% and 0.4% respectively.

Table 7.10: A249 Grade Separated Dumbbell Junction Swale Way / Barge Way Roundabout

2018 Base						
	AM			PM		
	Queue	Delay (s)	RFC	Queue	Delay (s)	RFC
North A249 offslip (NB)	7.0	36.33	0.89	48.6	194.81	1.10
North Grovehurst Rd	7.4	64.89	0.92	0.9	12.83	0.47
North B2005 – Link	0.4	3.33	0.30	0.6	3.66	0.38
South B2005 – Link	1.5	5.04	0.61	0.8	3.55	0.44
South A249 offslip (SB)	28.7	164.76	1.09	1.5	11.82	0.61
South Swale Way	16.4	99.20	1.00	380.9	1913.79	1.76
South Grovehurst Rd	20.7	114.57	1.03	4.6	29.78	0.84
2023 Baseline						
	AM			PM		
	Queue	Delay (s)	RFC	Queue	Delay (s)	RFC
North A249 offslip (NB)	33.5	132.82	1.05	76.5	330.10	1.18
North Grovehurst Rd	36.9	284.57	1.15	0.9	13.43	0.49
North B2005 – Link	0.4	3.35	0.30	0.6	3.69	0.38
South B2005 – Link	1.9	5.94	0.66	0.8	3.68	0.45
South A249 offslip (SB)	120.8	823.96	1.45	1.7	13.04	0.64
South Swale Way	46.9	243.61	1.12	701.3	3532.84	2.16
South Grovehurst Rd	49.0	272.72	1.14	5.0	32.04	0.85
2023 Baseline + Potential Development						
	AM			PM		
	Queue	Delay (s)	RFC	Queue	Delay (s)	RFC
North A249 offslip (NB)	37.2	144.47	1.06	78.6	341.54	1.19
North Grovehurst Rd	38.3	298.94	1.16	0.9	13.52	0.49
North B2005 – Link	0.4	3.37	0.30	0.6	3.72	0.39
South B2005 – Link	1.9	5.97	0.66	0.8	3.70	0.45
South A249 offslip (SB)	121.9	846.25	1.45	1.7	13.11	0.64

2018 Base						
	AM			PM		
	Queue	Delay (s)	RFC	Queue	Delay (s)	RFC
South Swale Way	50.6	269.98	1.13	712.6	3608.84	2.18
South Grovehurst Rd	49.8	279.46	1.14	5.0	32.39	0.85

7.28 **Table 7.10** above shows that the Grovehurst Road dumbbell junction is currently operating over its design capacity with a RFC of 1.09 on the A249 southbound off slip in the AM peak hour and an RFC of 1.76 on Swale Way in the PM peak hour; there is significant vehicle queuing on Swale Way during the PM peak. When committed traffic is added then the RFCs increase to 1.45 and 2.16 respectively.

7.29 The potential development traffic of 7 – 8 vehicles during the peak hours has very little impact on the operation of the junction as RFC values are only increased by 0.02. This is not considered to be a severe impact (NPPF test) and accords with KCC's response to the K4 request for scope on an additional 8 HGV movements per hour.

7.30 In the Technical Note submitted to the Swale Local Plan Examination the Southwest Sittingbourne development put forward a mitigation scheme for the Grovehurst Road dumbbell junction and therefore, it is expected that when the future residential developments move forward, the operation of the junction will improve.

Summary

7.31 The Barge Way / Northern Site Access and Barge Way / Fleet End junctions are predicted to operate within their design capacity in 2023 when all traffic associated with committed developments and the proposed K3 intensification is considered.

7.32 The Barge Way / Swale Way junction is predicted to operate over capacity in all future scenarios. The traffic associated with the intensification of K3 does not have a significant impact on the operation of the junction.

7.33 The A249 Dumbbell junction is predicted to operate in excess of its capacity in all future scenarios. The traffic associated with the additional HGVs does not have a significant impact on the operation of the junction.

7.34 It has been shown that the percentage impact at all the junctions, of an additional 8 vehicles per hour, is small and the additional vehicles do not impact the operation of the local highway network.

7.35 The findings of the junction assessment accords with KCC's statement, in response to the Draft Environmental Statement submitted for the Kemsley Paper Mill (K4) CHP Plant, with reference to HGV movements:

> **"the principle of up to eight movements in a peak hour is unlikely to have a significant impact."**

8 SUMMARY AND CONCLUSIONS

Summary

8.1 This Transport Assessment has been prepared by RPS on behalf of Wheelabrator Technologies Inc. to increase the maximum number of daily Heavy Goods Vehicle movements to and from the permitted, and currently being constructed, Sustainable Energy Plant, on land north east of Kemsley Paper Mill.

8.2 The increase in daily HGV movements is to accommodate local commercial and industrial waste being used as fuel; the fuel will arrive direct from collection in refuse collection vehicles.

8.3 No additional staff will be employed at the plant as a result of this increase in HGV movements.

8.4 Access will be taken from the northern access that connects with Barge Way and HGVs will then route along Barge Way and Swale Way (distributor roads designed to carry industrial traffic) to access the A249.

8.5 It is estimated that the proposals will generate an average of 7 to 8 additional HGV movements per hour between 07:00 and 19:00 on a weekday and 07:00 and 13:00 on a Saturday.

8.6 KCC provided their view on traffic impact in this area within their response to the Preliminary Environmental Information submitted as part of the Kemsley Paper Mill (K4) CHP Plant DCO application. KCC stated:

> **"the principle of up to eight movements in a peak hour is unlikely to have a significant impact."**

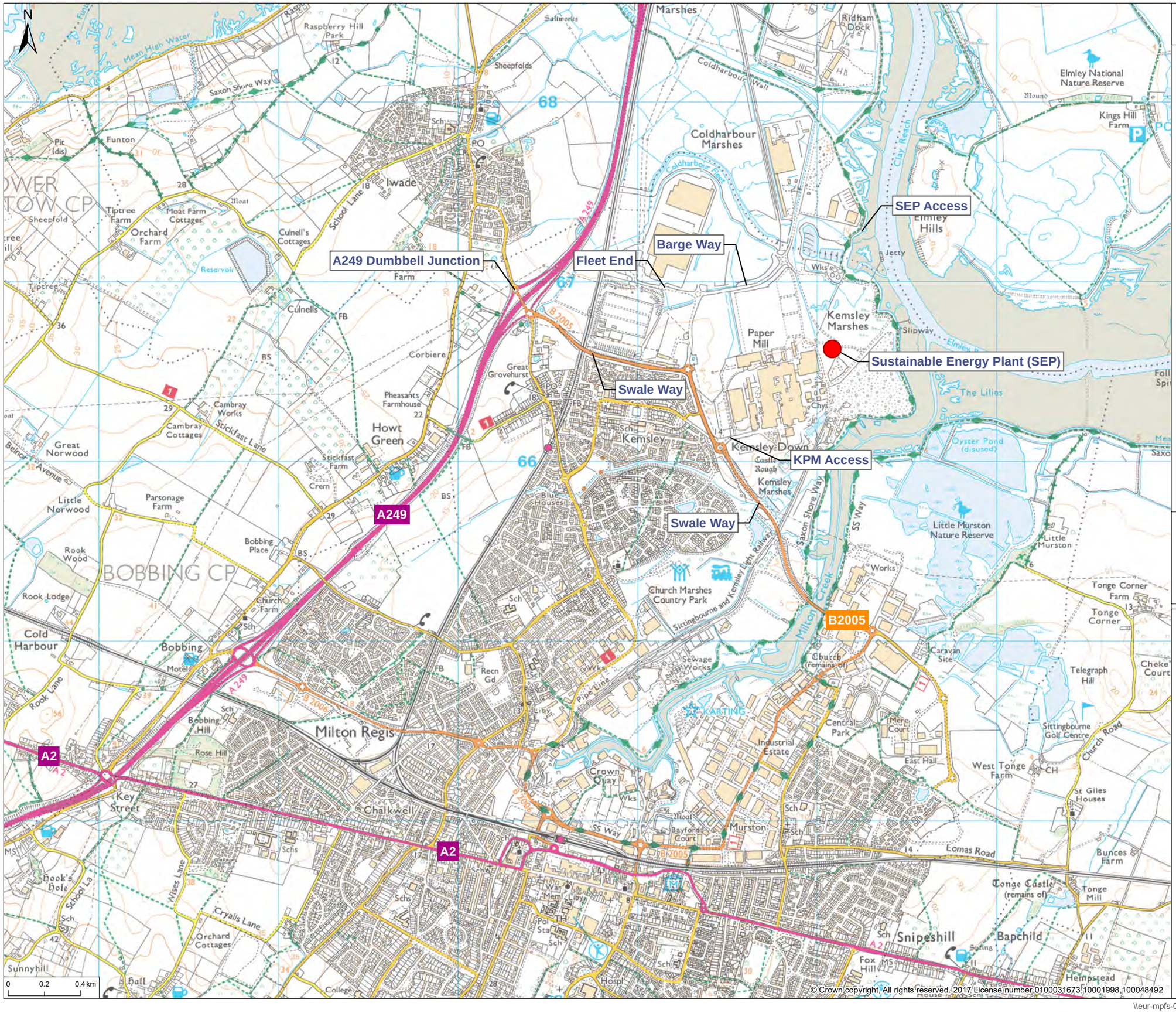
8.7 The assessment of the proposal against the future baseline position indicates that, in accordance with KCCs statement, the development will not have a severe impact upon the operation of the adjacent highway network.

8.8 It is therefore concluded that the impact of the development on the local highway network would be negligible and would not result in any severe impacts on the link or junction operation nor highway safety.

8.9 There are therefore, no transport or highways related reasons for not permitting the proposal.

FIGURES

Figure 2.1: Site Location Plan



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Transport Appraisal

Notes
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Client: Wheelabrator Technologies Inc.

Project: Kemsley K3

Title: Highway Network Plan

Status	Drawn By:	PM/Checked By
DRAFT	CR	AW
Job Ref	**Scale @ A3**	**Date Created**
JNY9545	1:20,000	MAR 2018

Figure Number
2.1

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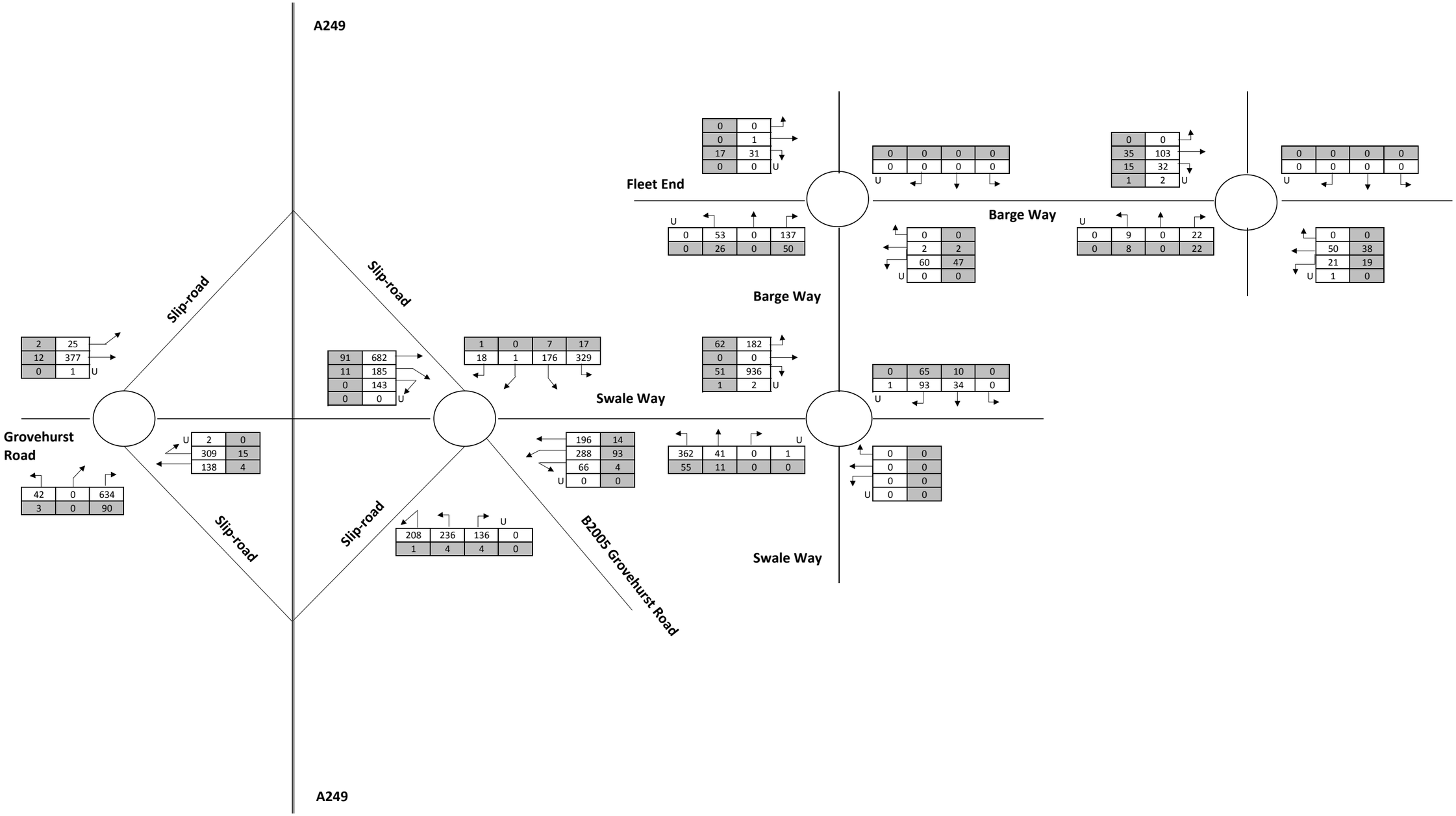
APPENDICES

APPENDIX A: 2018 BASE TRAFFIC FLOWS



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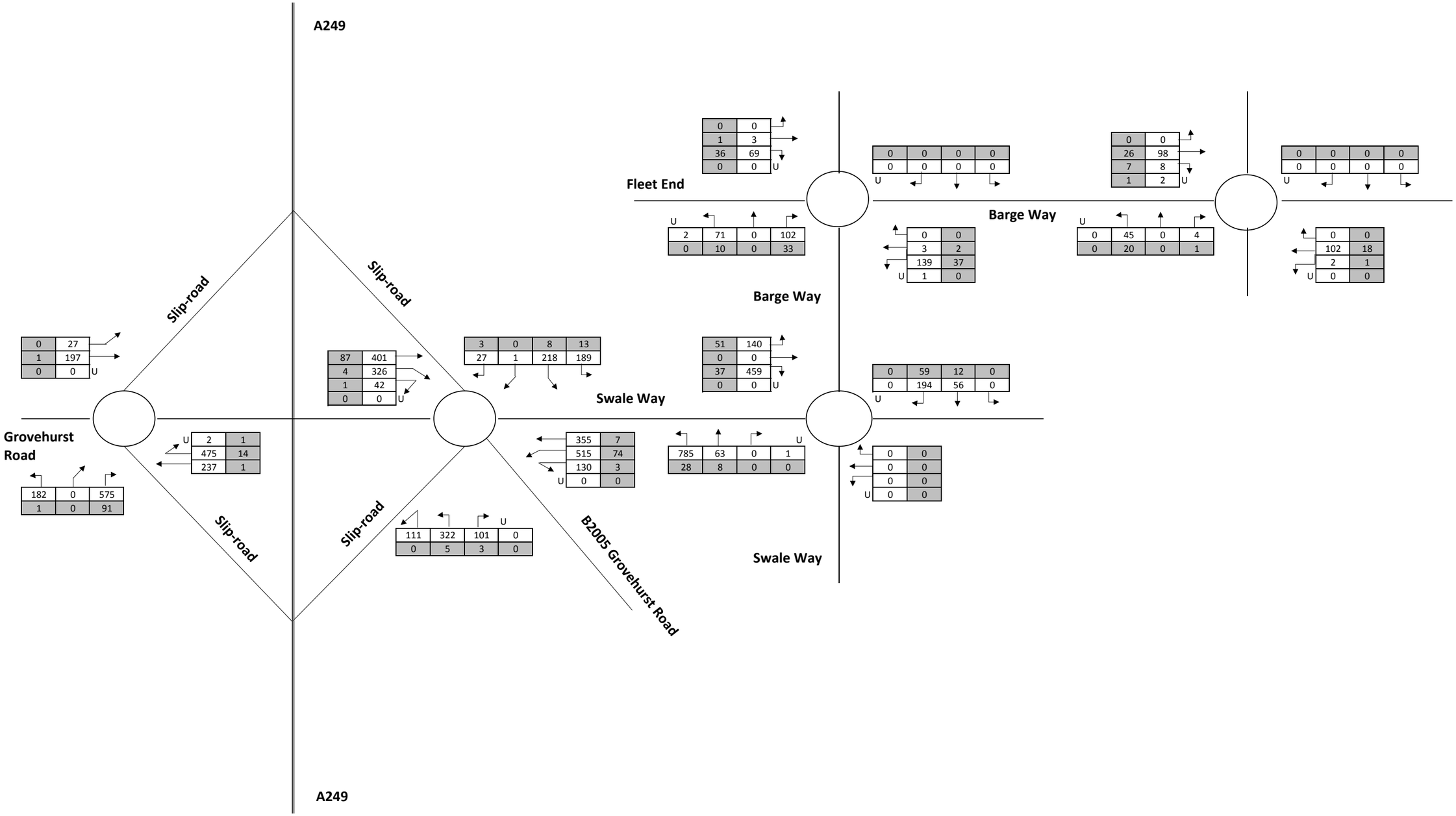
Vehicles
HGVs

Figure:

Client: Wheelabrator Technologies Inc
Project: Kemsley K3 Variation
Title: **2018 AM Peak Hour**



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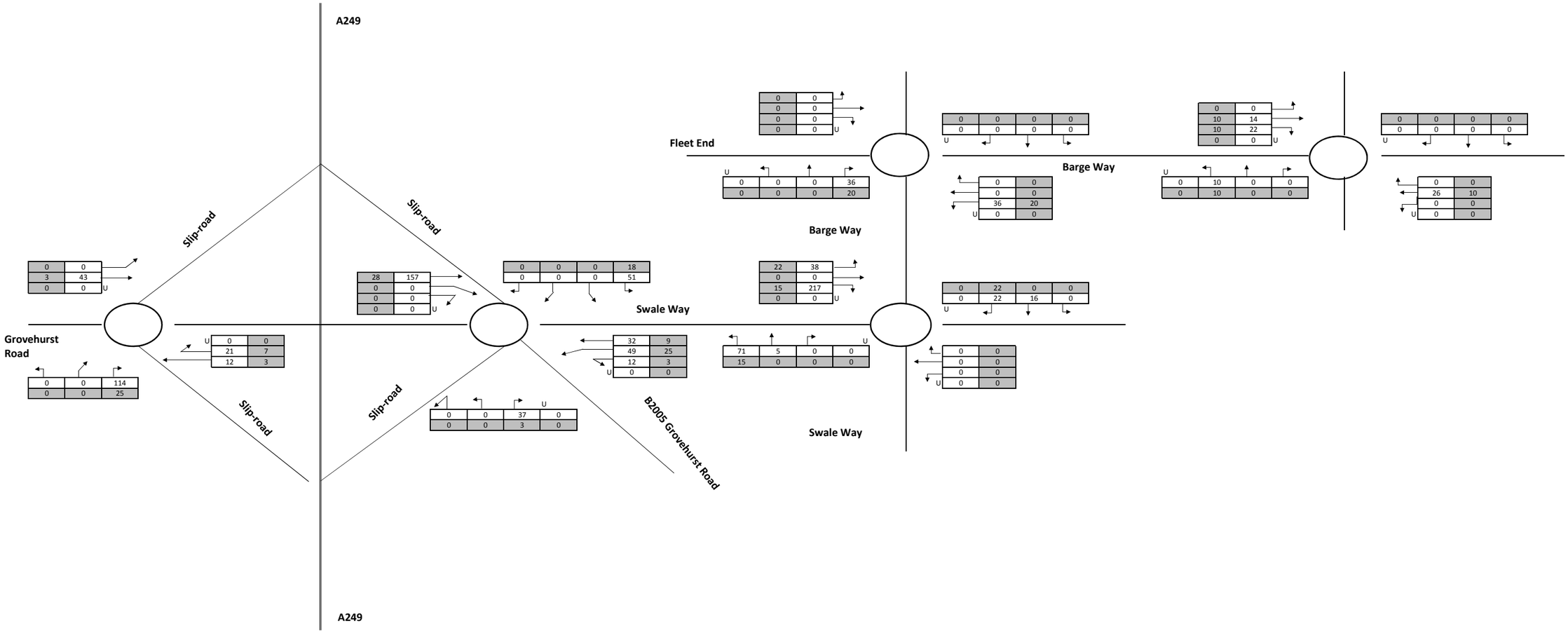
HGVs

Figure:

Client: Wheelabrator Technologies Inc
Project: Kemsley K3 Variation
Title: **2018 PM Peak Hour**

APPENDIX B: COMMITTED DEVELOPMENT TRAFFIC FLOWS



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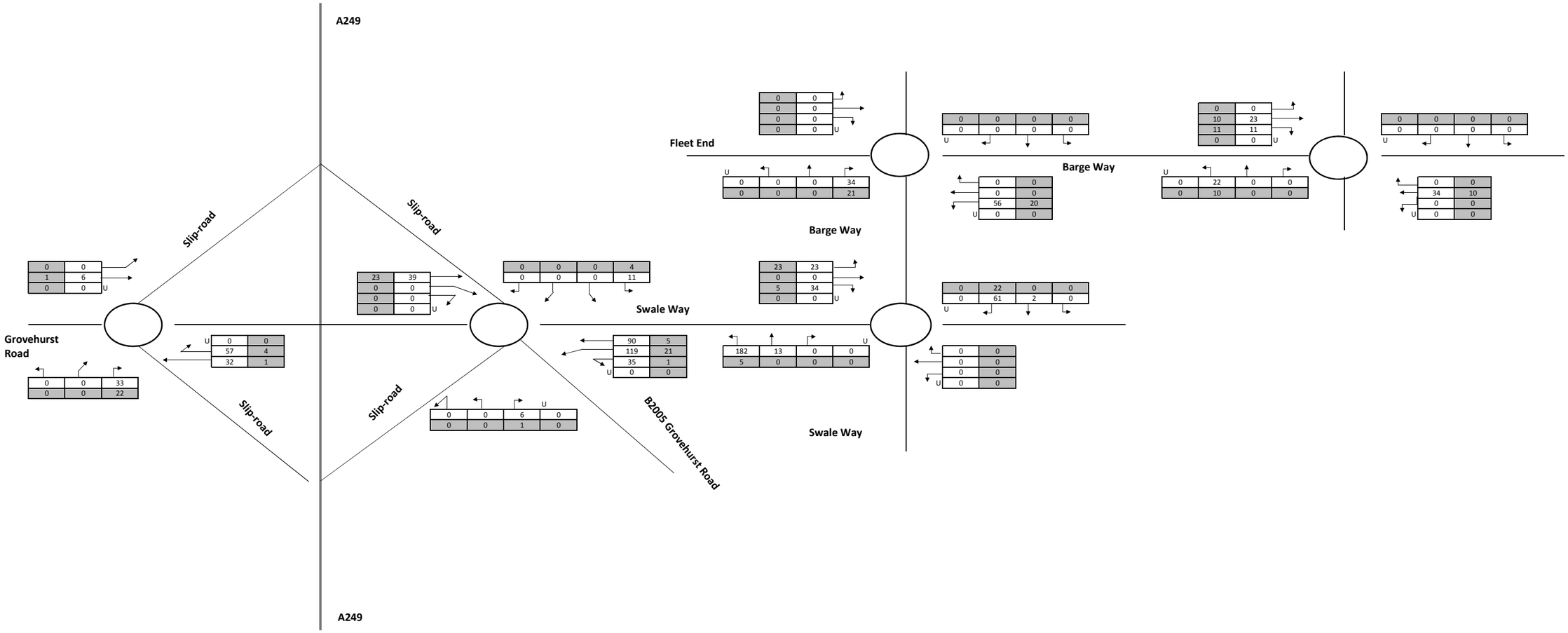
Vehicles
HGVs

Figure:
Client: Wheelabrator Technologies Inc
Project: Kemsley K3 Variation
Title: **Committed Development AM Peak Hour**



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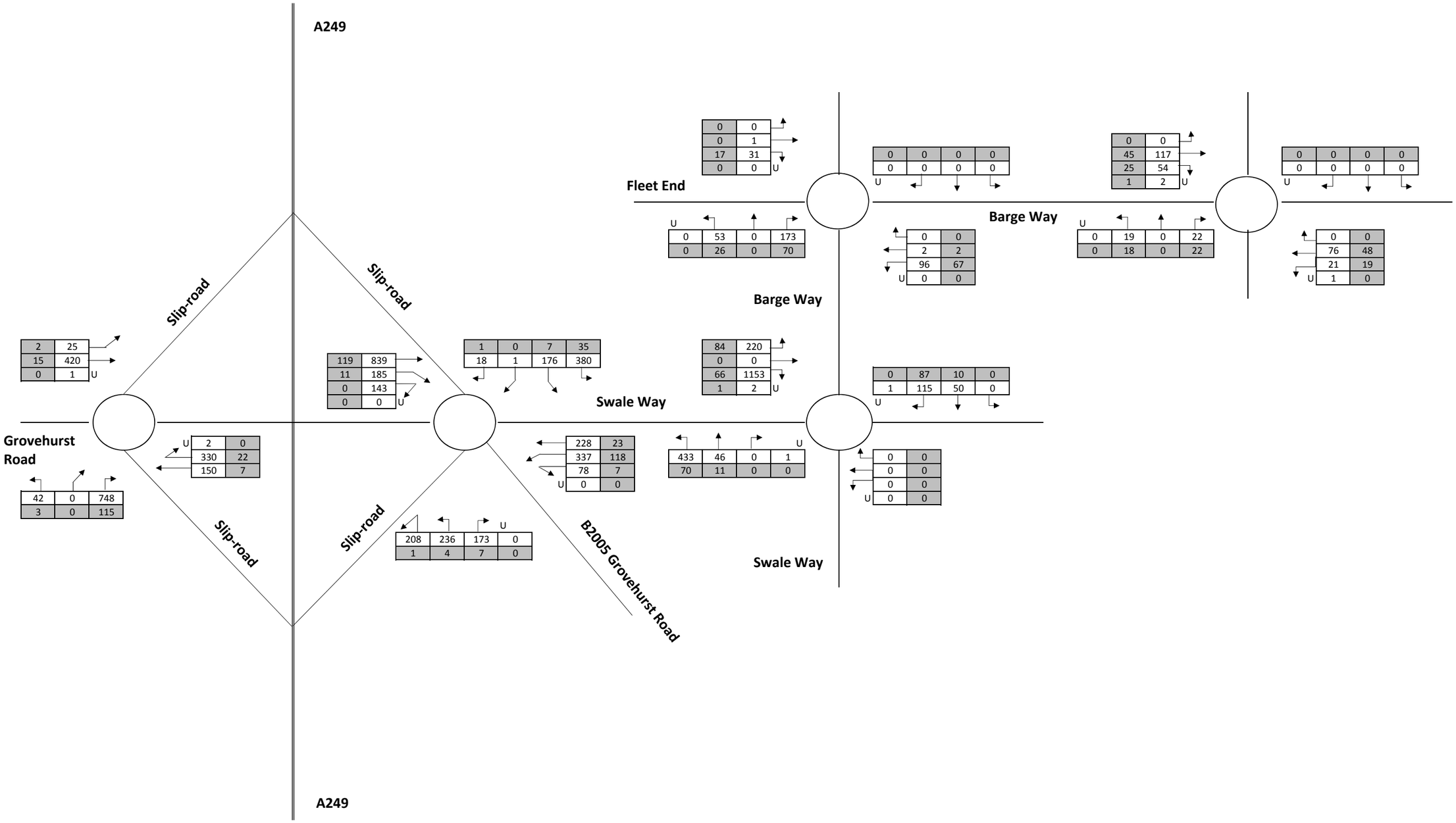
Vehicles
HGVs

Figure:

Client: Wheelabrator Technologies Inc
Project: Kemsley K3 Variation
Title: **Committed Development PM Peak Hour**

APPENDIX C: 2023 BASELINE TRAFFIC FLOWS



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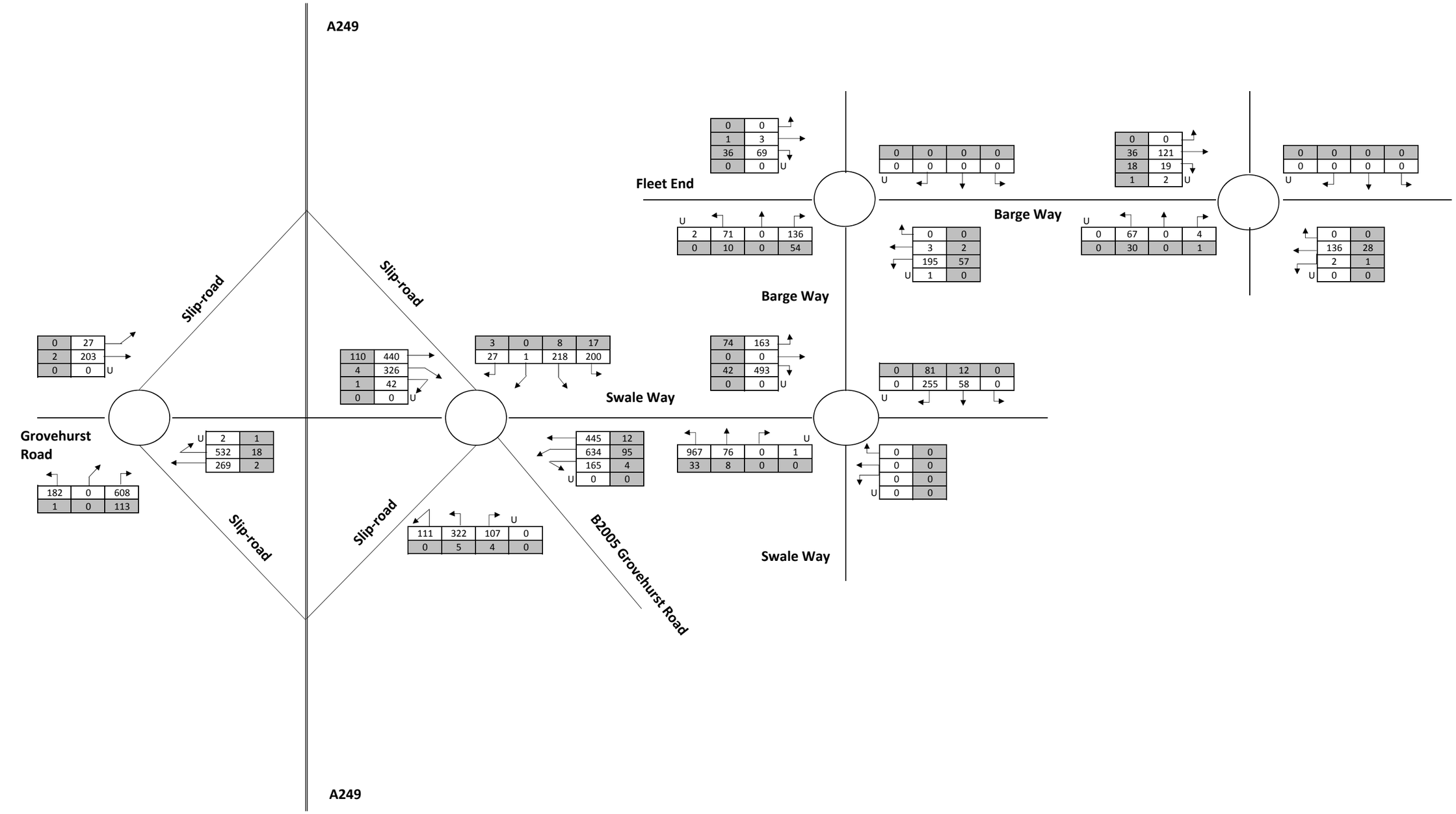
Vehicles
HGVs

Figure:

Client:	Wheelabrator Technologies Inc
Project:	Kemsley K3 Variation
Title:	**2023 Baseline AM Peak Hour**



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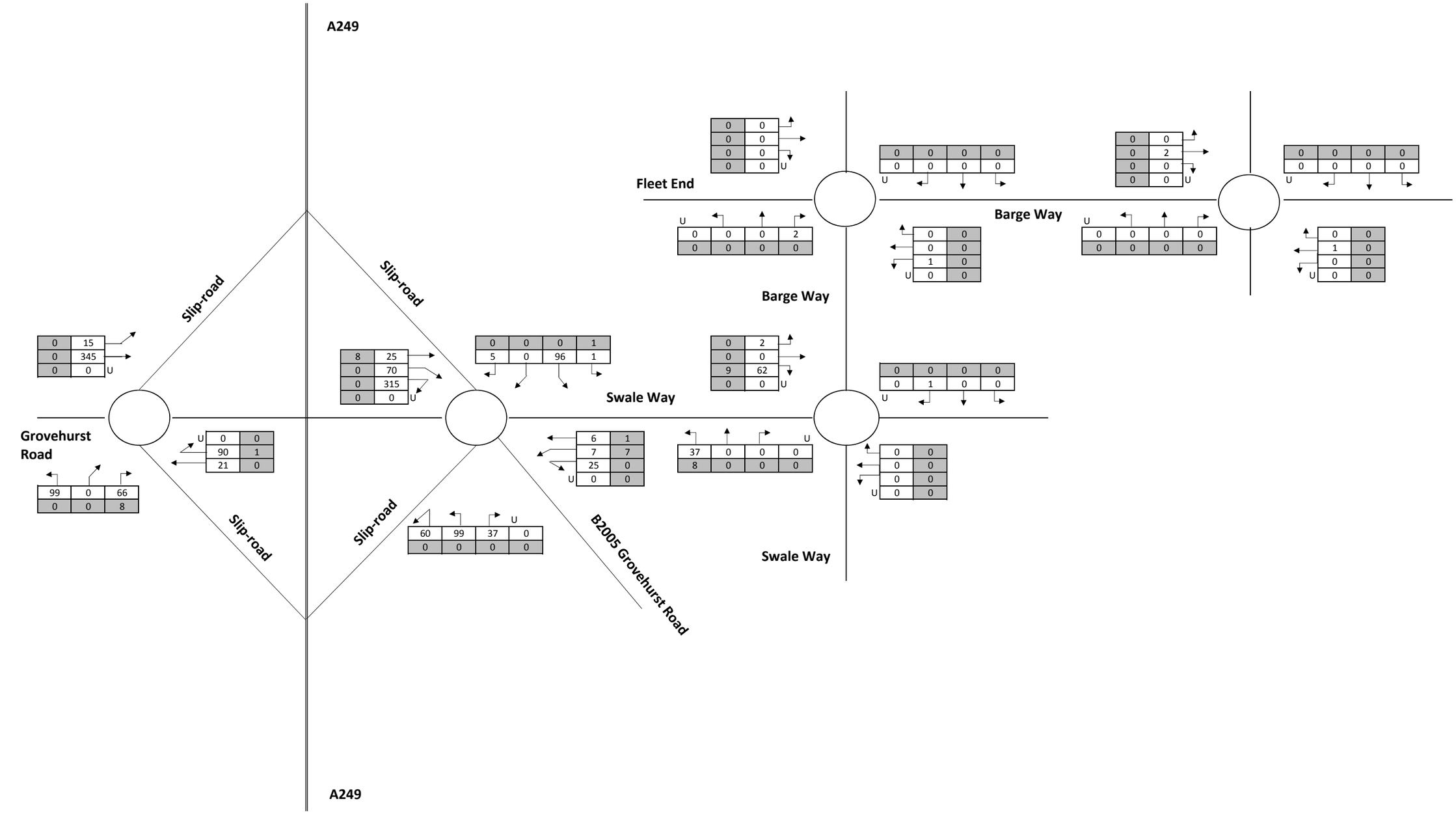
Vehicles
HGVs

Figure:

Client: Wheelabrator Technologies Inc
Project: Kemsley K3 Variation
Title: **2023 Baseline PM Peak Hour**

APPENDIX D: CUMULATIVE DEVELOPMENT TRAFFIC FLOWS



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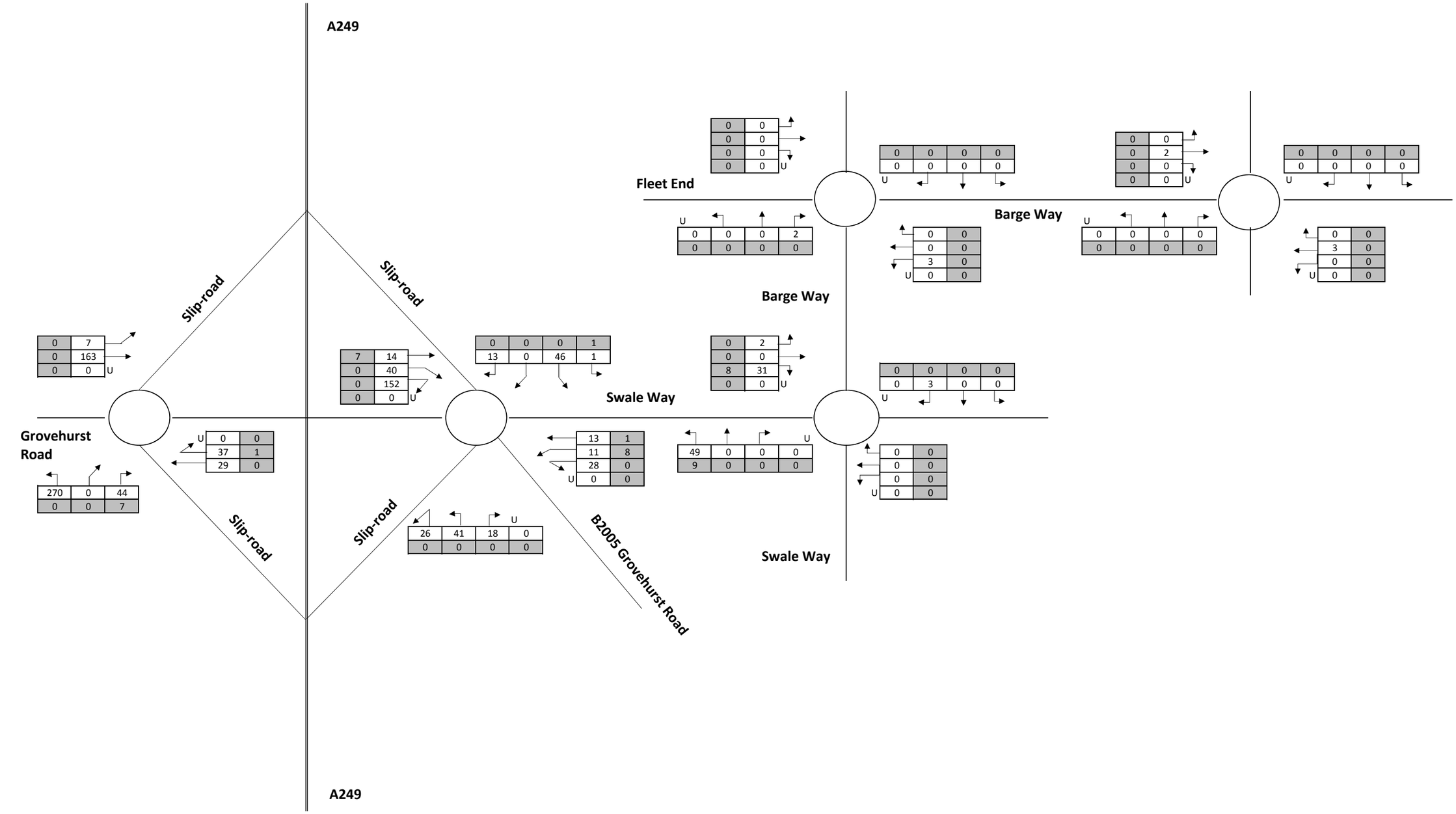
Vehicles
HGVs

Figure:

Client:	Wheelabrator Technologies Inc
Project:	Kemsley K3 Variation
Title:	**Cumulative Development AM Peak Hour**



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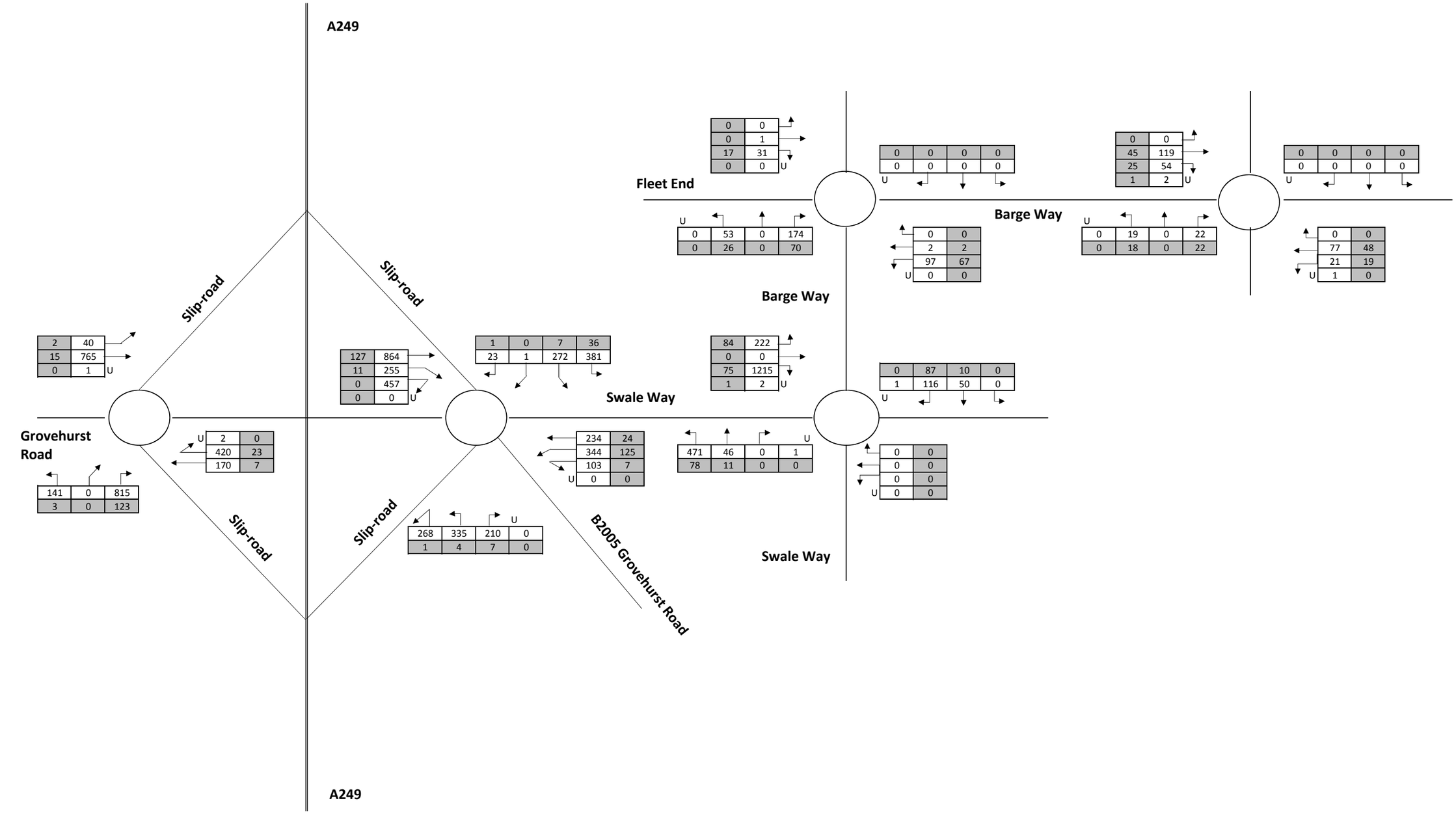
Vehicles
HGVs

Figure:

Client:	Wheelabrator Technologies Inc
Project:	Kemsley K3 Variation
Title:	**Cumulative Development PM Peak Hour**

APPENDIX E: 2023 BASELINE PLUS CUMULATIVE DEVELOPMENT TRAFFIC FLOWS



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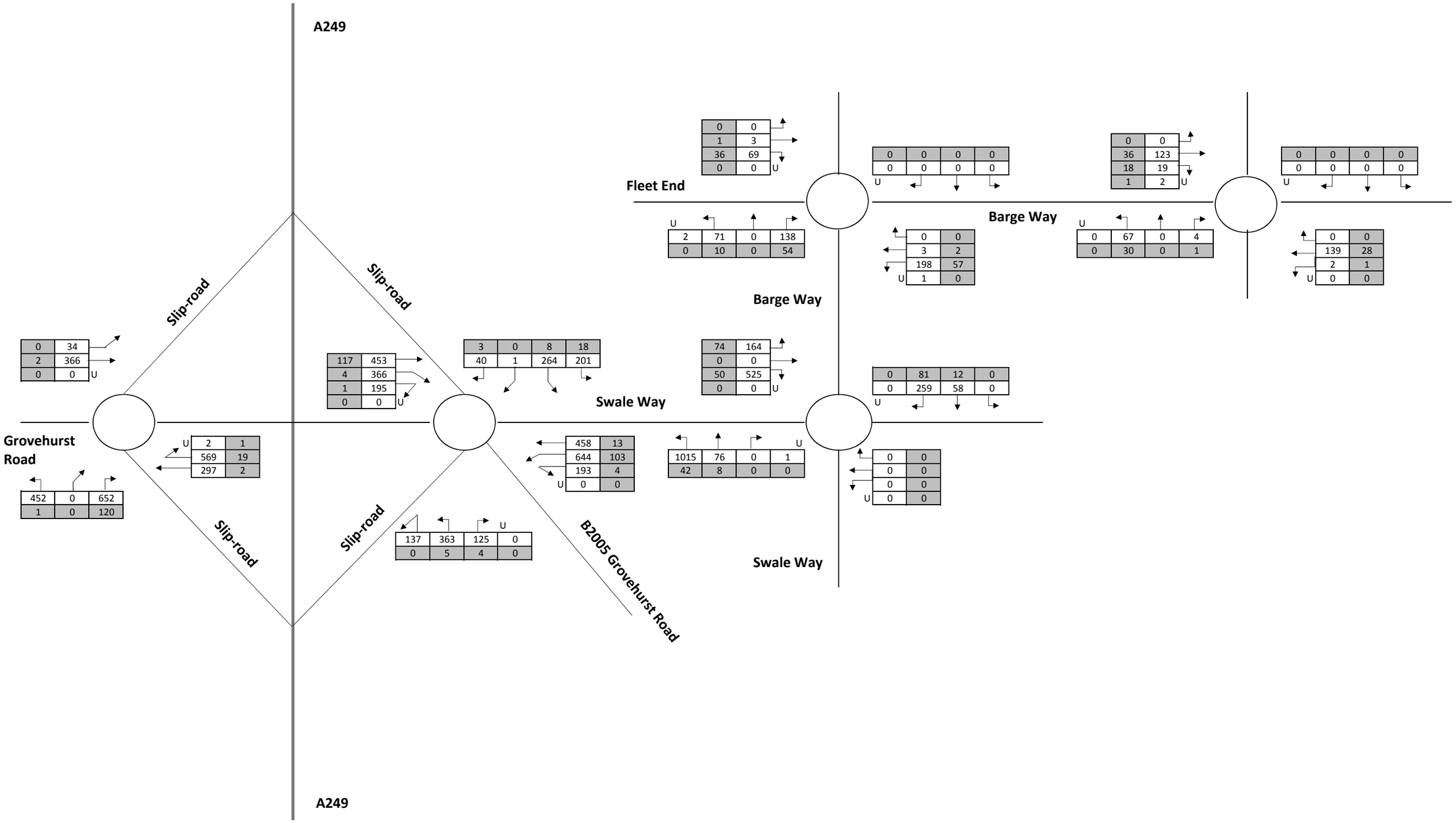
Vehicles
HGVs

Figure:

Client: Wheelabrator Technologies Inc
Project: Kemsley K3 Variation
Title: **2023 + Cumulative Development AM Peak Hour**



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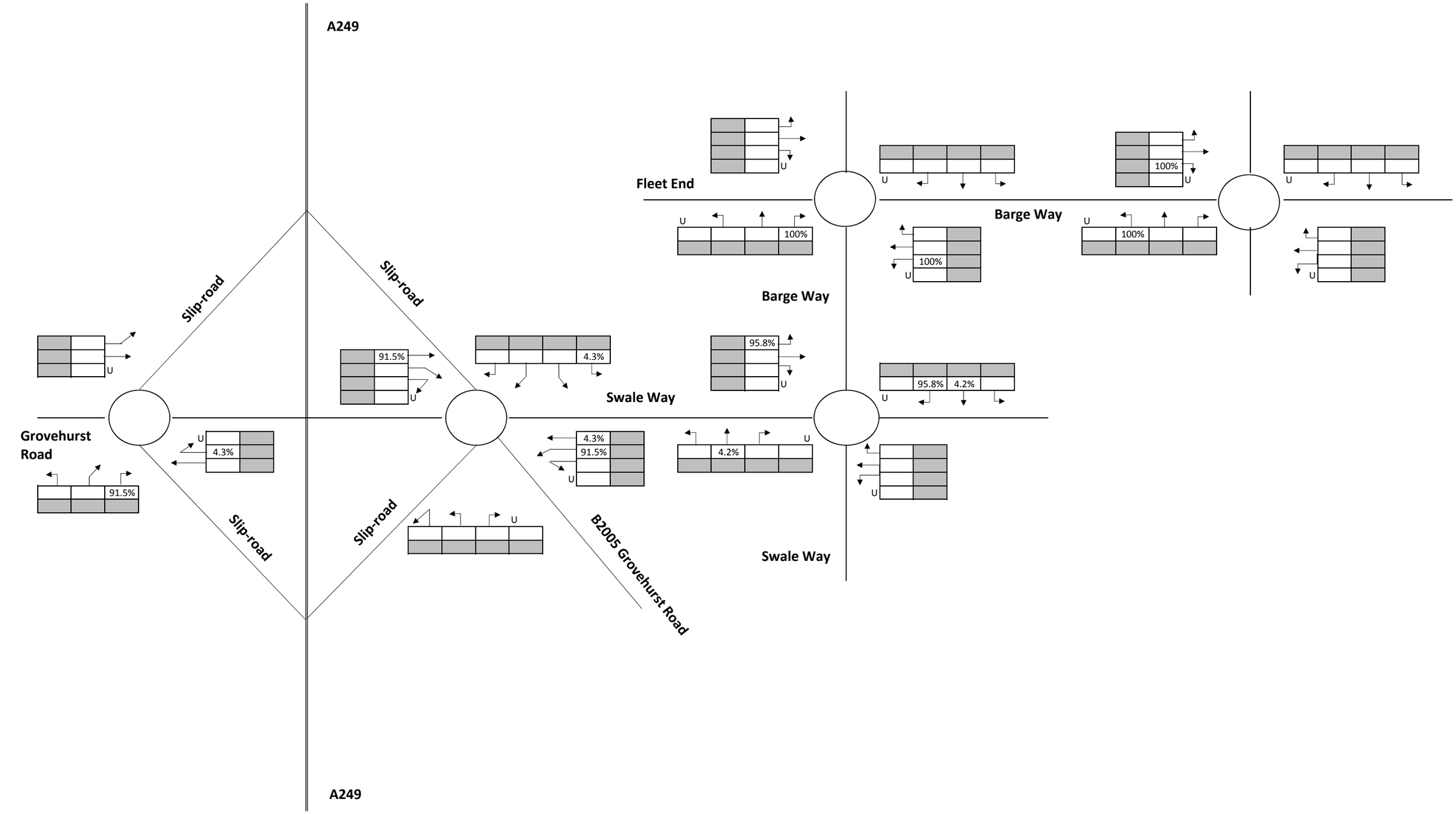
Vehicles
HGVs

Figure:

Client:	Wheelabrator Technologies Inc
Project:	Kemsley K3 Variation
Title:	**2023 + Cumulative Development PM Peak Hour**

APPENDIX F: DEVELOPMENT TRAFFIC DISTRIBUTION



RPS
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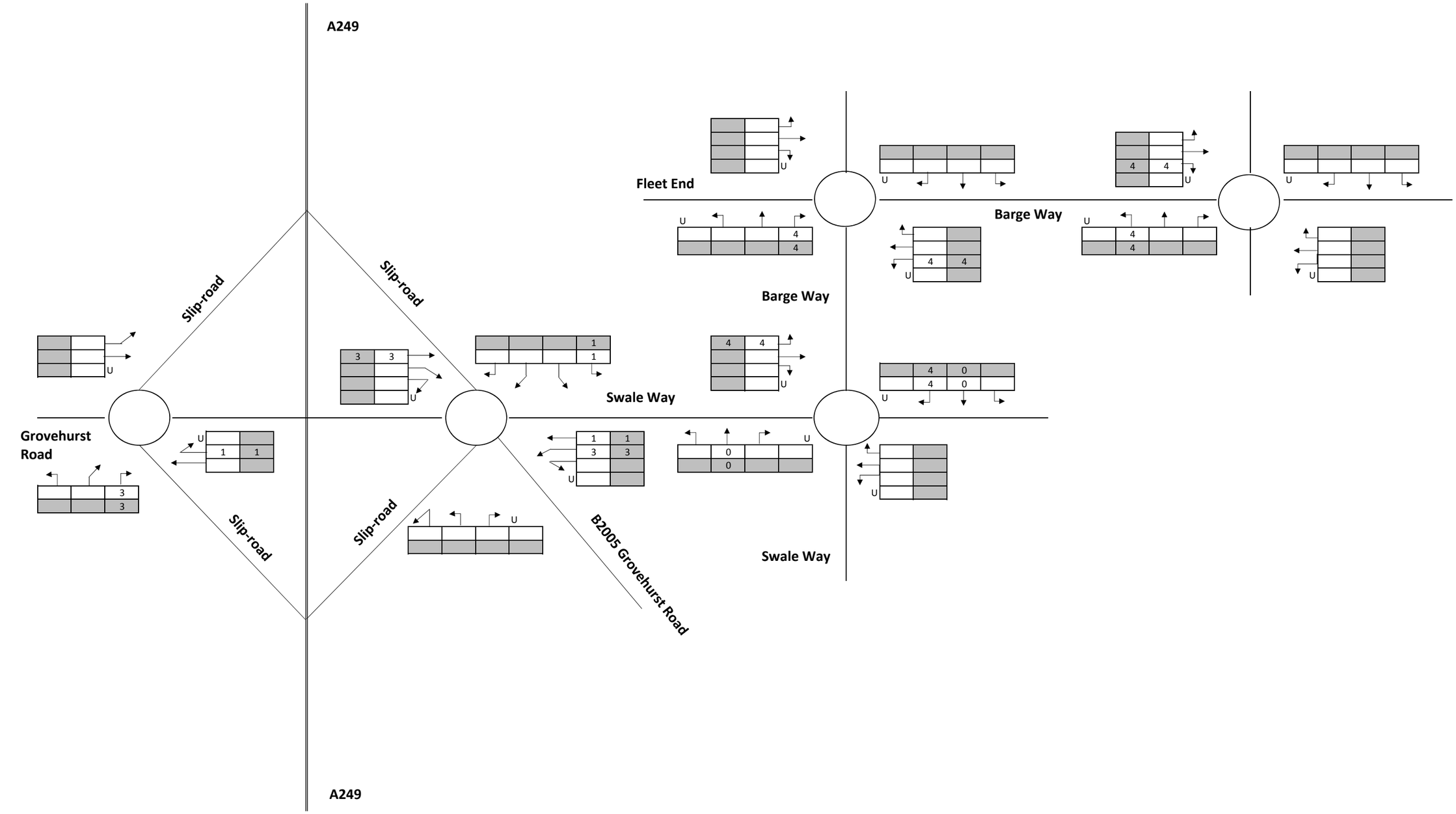
Vehicles
HGVs

Figure:

Client:	Wheelabrator Technologies Inc
Project:	Kemsley K3 Variation
Title:	**Distribution**

APPENDIX G: DEVELOPMENT TRAFFIC FLOWS



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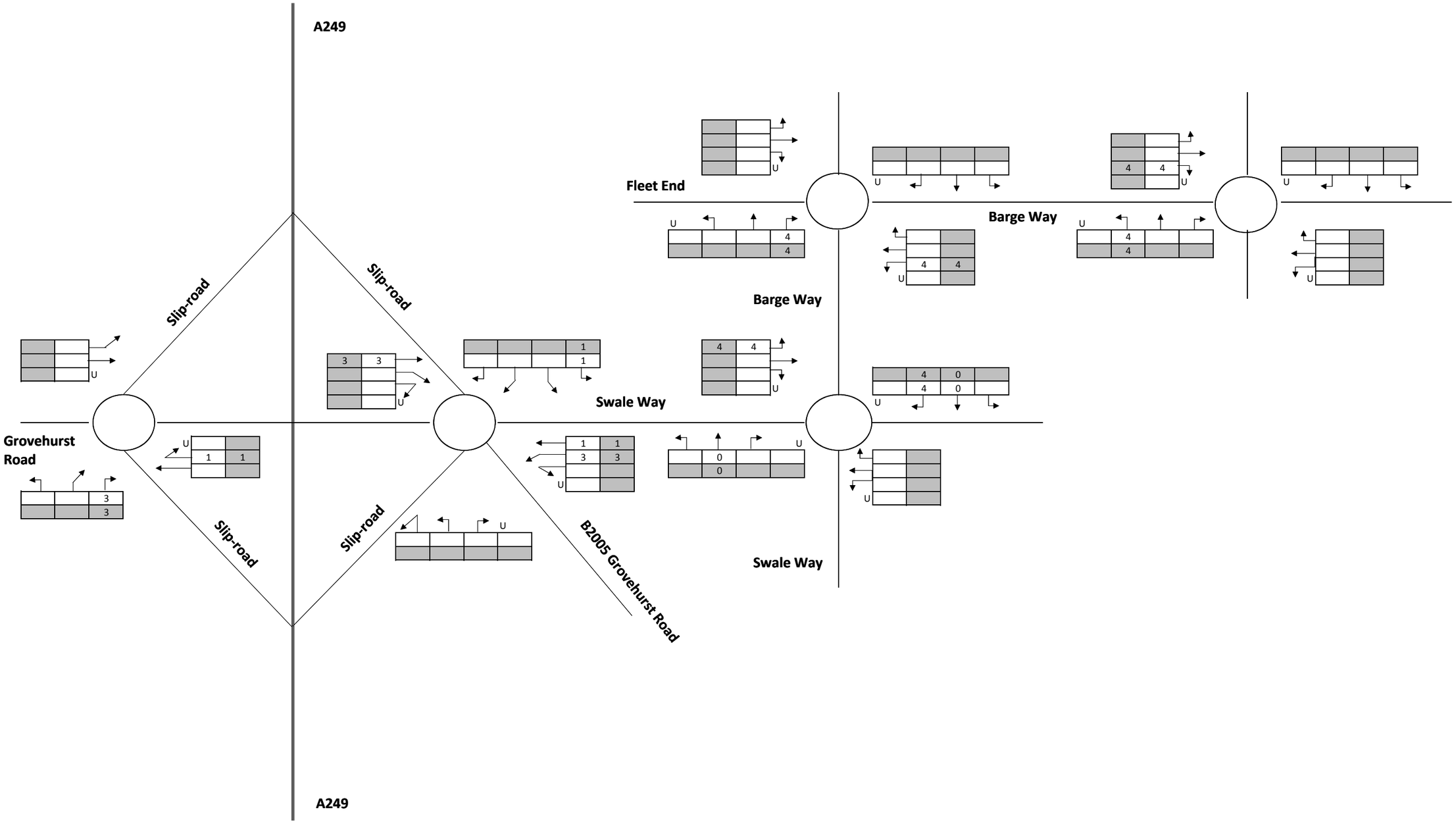
Vehicles
HGVs

Figure:

Client:	Wheelabrator Technologies Inc
Project:	Kemsley K3 variation
Title:	**Proposed Development AM Peak Hour**



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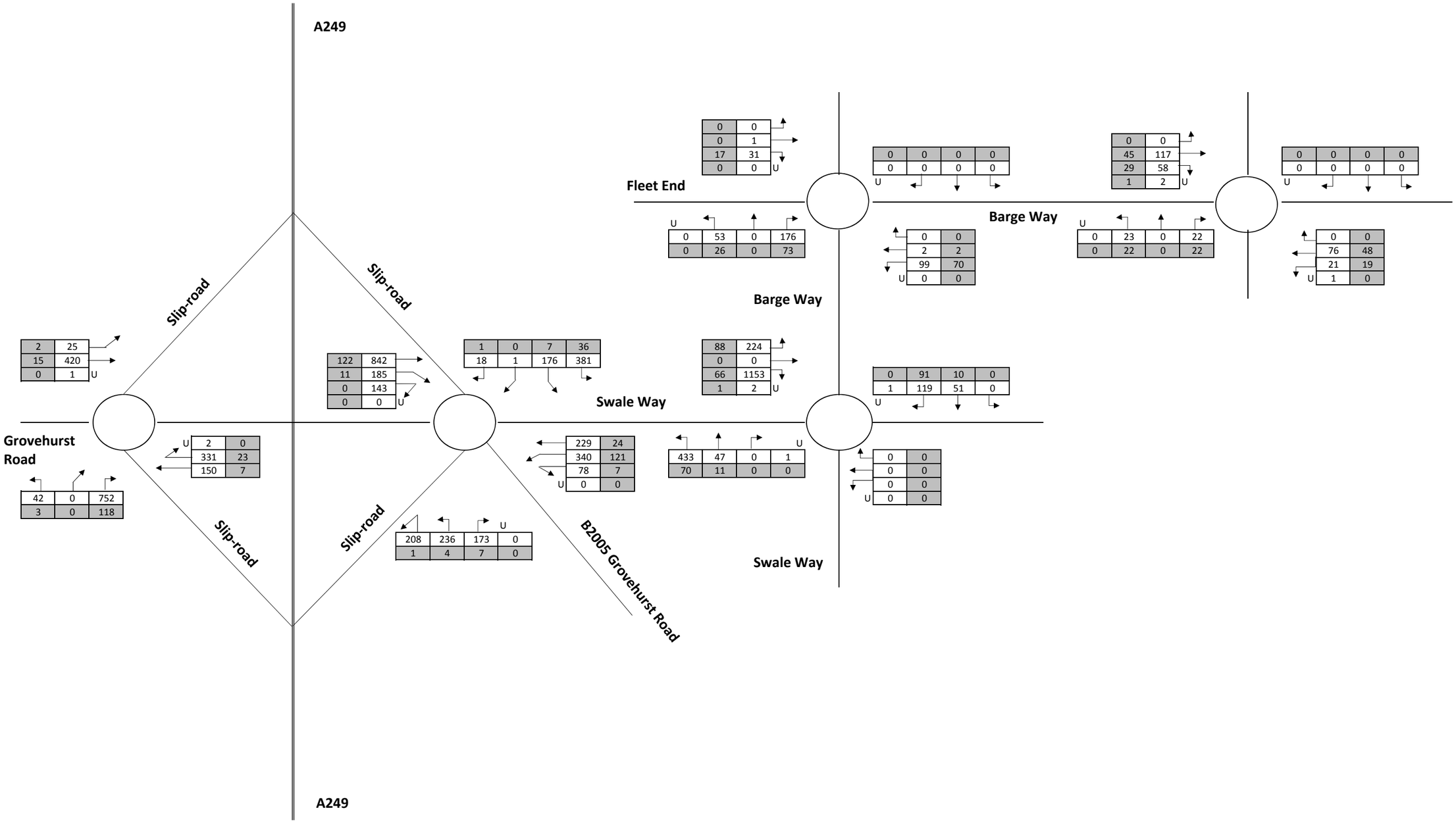
Vehicles
HGVs

Figure:

Client: Wheelabrator Technologies Inc
Project: Kemsley K3 Variation
Title: **Proposed Development PM Peak Hour**

APPENDIX H: 2023 BASELINE PLUS DEVELOPMENT TRAFFIC FLOWS



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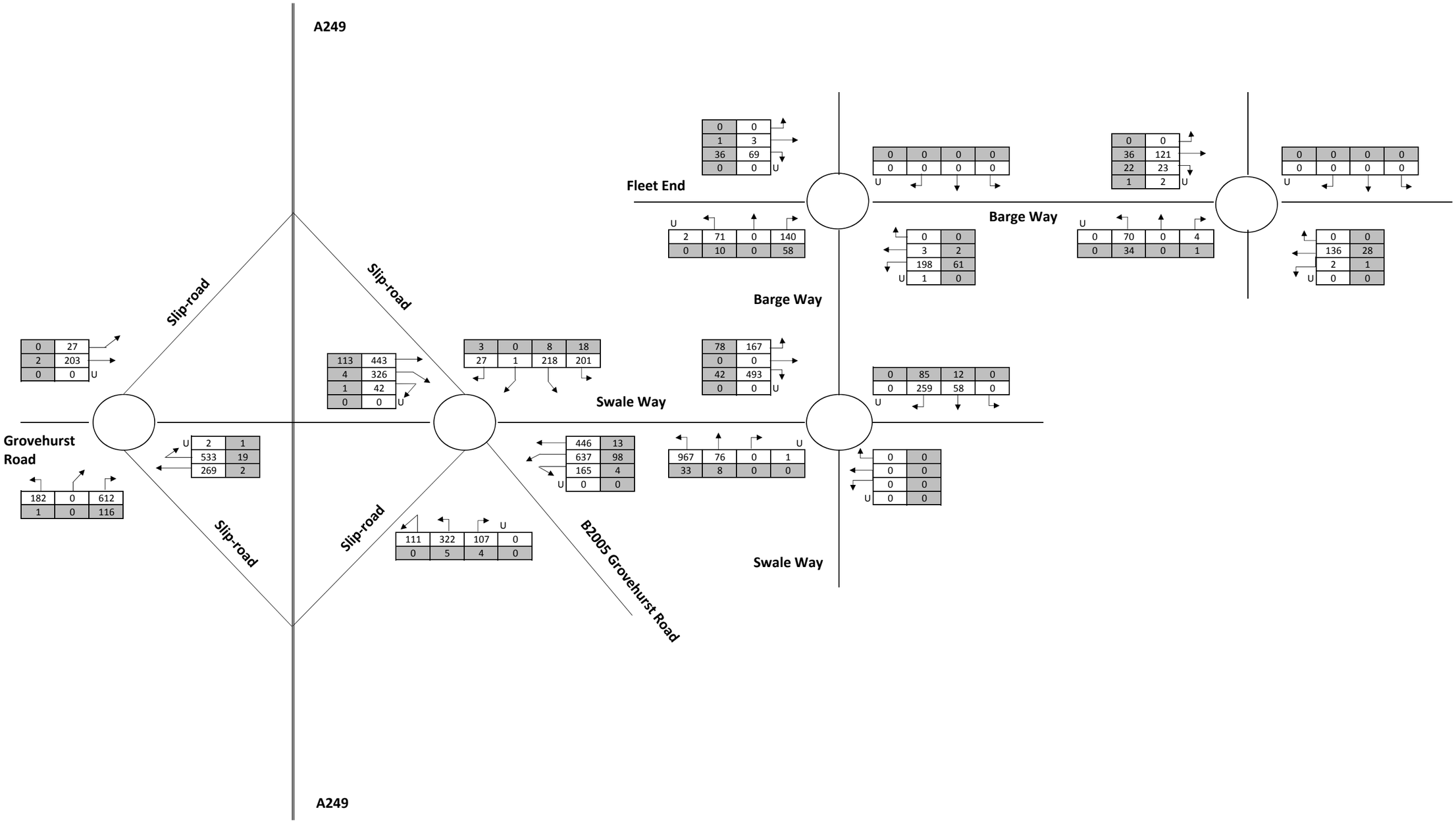
Vehicles
HGVs

Figure:

Client: Wheelabrator Technologies Inc
Project: Kemsley K3 Variation
Title: **2023 + Development AM Peak Hour**



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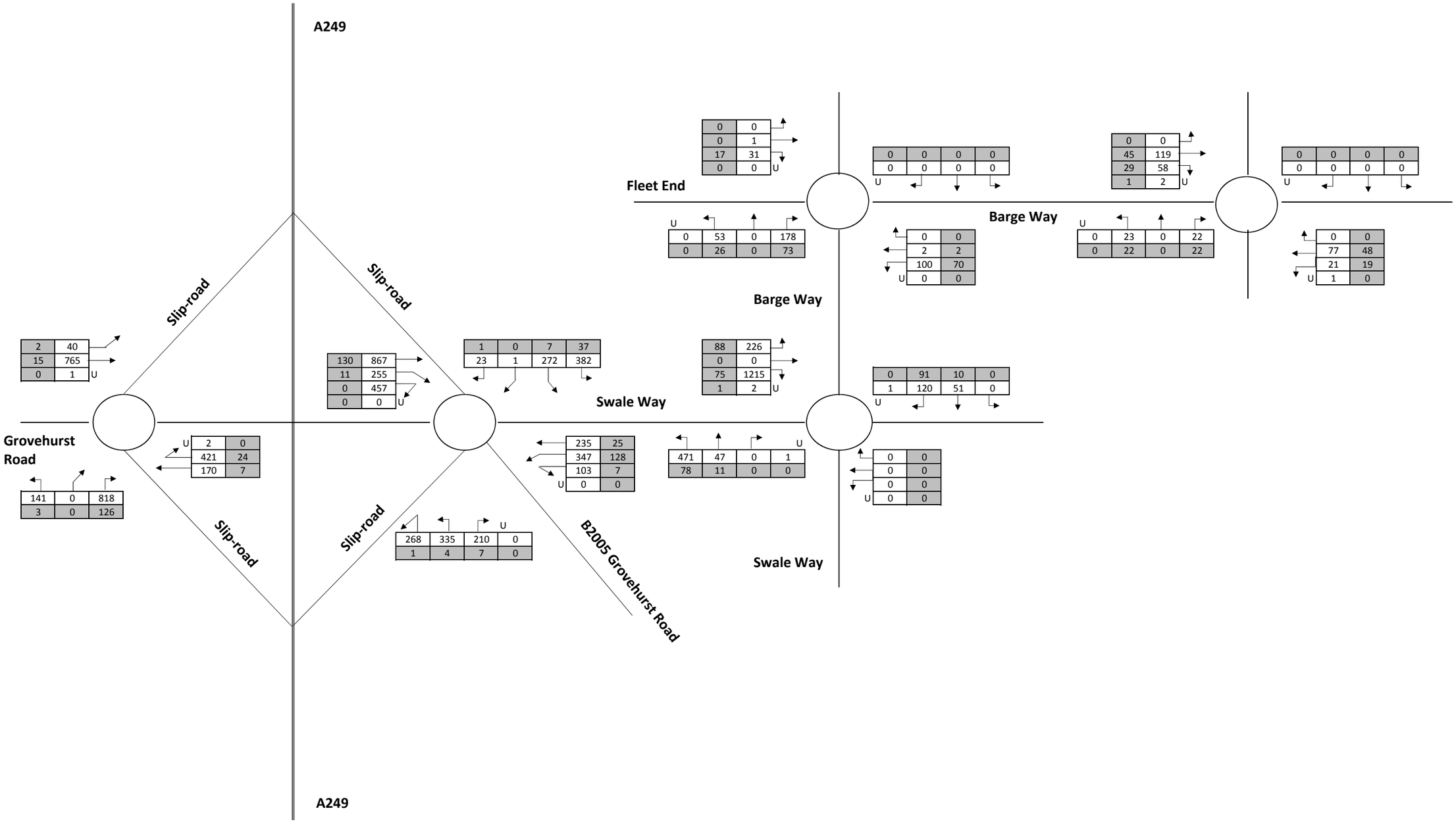
Vehicles
HGVs

Figure:

Client: Wheelabrator Technologies Inc
Project: Kemsley K3 Variation
Title: **2023 + Development PM Peak Hour**

APPENDIX I: 2023 BASLINE PLUS CUMULATIVE DEVELOPMENT PLUS DEVELOPMENT TRAFFIC FLOWS



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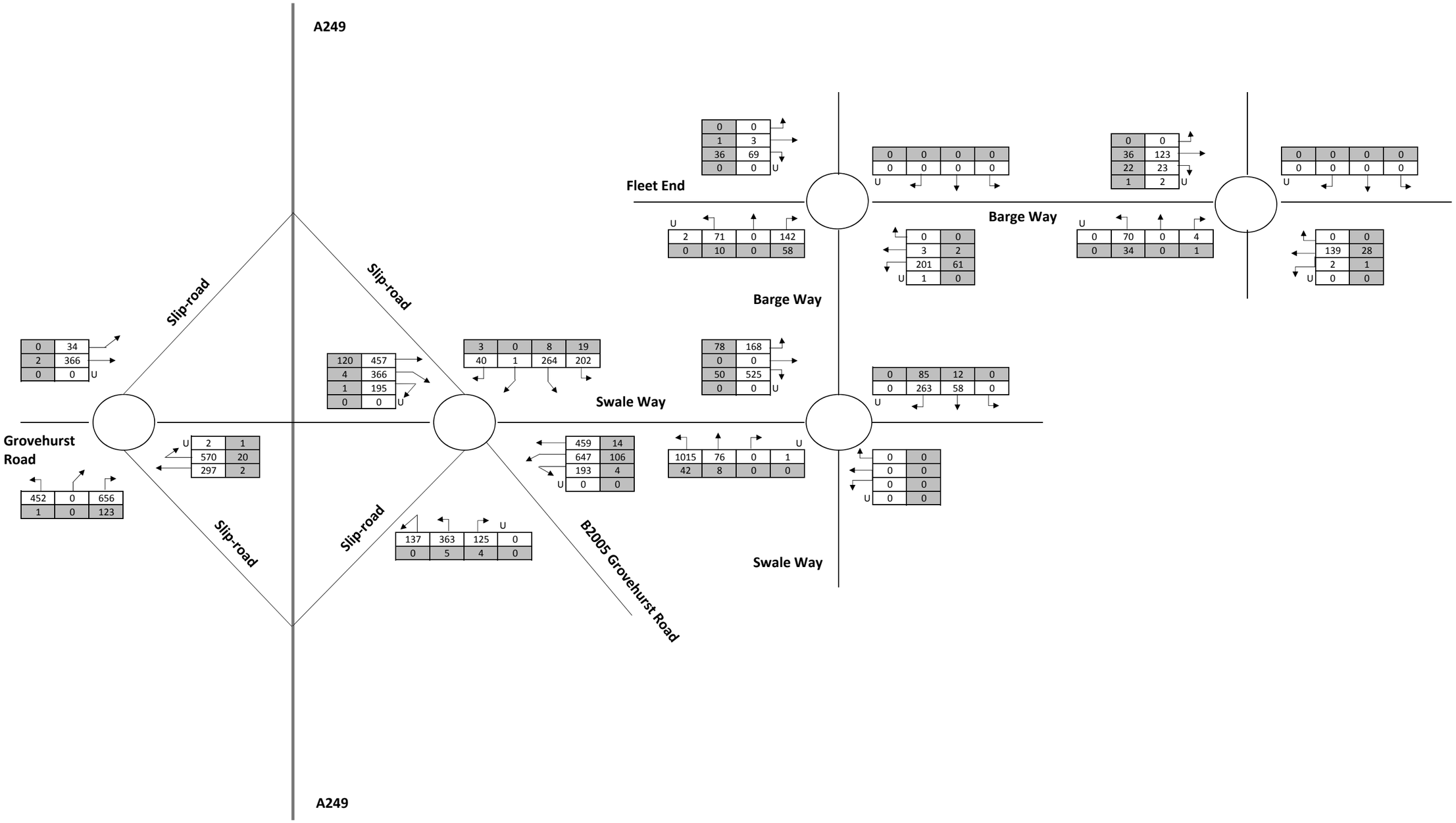
Vehicles
HGVs

Figure:

Client: Wheelabrator Technologies Inc
Project: Kemsley K3 Variation
Title: **2023+Cumulative Development+Development AM Peak Hour**



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Vehicles
HGVs

Figure:

Client: Wheelabrator Technologies Inc
Project: Kemsley K3 Variation
Title:

2023+Cumulative Development+ Development PM Peak Hour

APPENDIX J: JUNCTIONS 9 OUTPUT REPORTS

Junctions 9

ARCADY 9 - Roundabout Module

Filename: Barge Way - Site Access (N).j9
Path: P:\JNY9545 - Kemsley K3 Variation\Transport\Arcady\Barge Way - Site Access (N)
Report generation date: 22/03/2018 16:07:14

«2023 + Cumulative + Development, PM
»Junction Network
»Arms
»Traffic Demand
»Origin-Destination Data
»Vehicle Mix
»Results

Summary of junction performance

	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
	2018					
1 - Access (S)	0.0	4.83	0.04	0.1	3.57	0.05
2 - Barge Way	0.2	3.74	0.14	0.1	3.40	0.10
3 - Access Road (N)	0.0	0.00	0.00	0.0	0.00	0.00
4 - Private Road	0.1	4.78	0.10	0.1	3.10	0.09
	2023					
1 - Access (S)	0.1	5.00	0.06	0.1	3.77	0.08
2 - Barge Way	0.2	4.04	0.18	0.2	3.74	0.14
3 - Access Road (N)	0.0	0.00	0.00	0.0	0.00	0.00
4 - Private Road	0.1	4.70	0.12	0.1	3.33	0.12
	2023 + Development					
1 - Access (S)	0.1	5.04	0.06	0.1	3.89	0.08
2 - Barge Way	0.2	4.11	0.18	0.2	3.81	0.15
3 - Access Road (N)	0.0	0.00	0.00	0.0	0.00	0.00
4 - Private Road	0.1	4.72	0.12	0.1	3.34	0.12

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

File summary

File Description

Title	(untitled)
Location	
Site number	
Date	08/11/2017
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	EUR\jack.clarke-williams
Description	

Units

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

Analysis Options

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

Analysis Set Details

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

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D10	2023 + Cumulative + Development	PM	ONE HOUR	16:15	17:45	15	✓

16:30 - 16:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
1 - Access (S)	67	17	127	1019	0.065	66	22	0.1	0.1	3.779	A
2 - Barge Way	133	33	4	1112	0.120	133	190	0.1	0.1	3.675	A
3 - Access Road (N)	0	0	137	1364	0.000	0	0	0.0	0.0	0.000	A
4 - Private Road	127	32	22	1245	0.102	127	114	0.1	0.1	3.219	A

16:45 - 17:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
1 - Access (S)	81	20	155	1005	0.081	81	28	0.1	0.1	3.898	A
2 - Barge Way	163	41	4	1112	0.147	163	232	0.1	0.2	3.792	A
3 - Access Road (N)	0	0	167	1340	0.000	0	0	0.0	0.0	0.000	A
4 - Private Road	155	39	28	1240	0.125	155	140	0.1	0.1	3.318	A

17:00 - 17:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
1 - Access (S)	81	20	155	1005	0.081	81	28	0.1	0.1	3.898	A
2 - Barge Way	163	41	4	1112	0.147	163	232	0.2	0.2	3.792	A
3 - Access Road (N)	0	0	167	1340	0.000	0	0	0.0	0.0	0.000	A
4 - Private Road	155	39	28	1240	0.125	155	140	0.1	0.1	3.318	A

17:15 - 17:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
1 - Access (S)	67	17	127	1019	0.065	67	22	0.1	0.1	3.780	A
2 - Barge Way	133	33	4	1112	0.120	133	190	0.2	0.1	3.679	A
3 - Access Road (N)	0	0	137	1364	0.000	0	0	0.0	0.0	0.000	A
4 - Private Road	127	32	22	1245	0.102	127	114	0.1	0.1	3.222	A

17:30 - 17:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
1 - Access (S)	56	14	106	1029	0.054	56	19	0.1	0.1	3.702	A
2 - Barge Way	111	28	3	1113	0.100	112	159	0.1	0.1	3.595	A
3 - Access Road (N)	0	0	115	1381	0.000	0	0	0.0	0.0	0.000	A
4 - Private Road	106	27	19	1248	0.085	106	96	0.1	0.1	3.154	A

Junctions 9

ARCADY 9 - Roundabout Module

Version: 9.0.2.5947

For sales and distribution information, program advice and maintenance, contact TRL:
+44 (0)1344 770558 software@trl.co.uk www.trlsoftware.co.uk

Filename: Fleet End - Barge Way.j9
Path: P:\JNY9545 - Kemsley K3 Variation\Transport\Arcady\Fleet End - Barge Way
Report generation date: 22/03/2018 16:32:16

»2018, AM
»2018, PM
»2023, AM
»2023, PM
»2023 + Development, AM
»2023 + Development, PM

Summary of junction performance

	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
	2018					
Arm Bar E	0.1	4.30	0.08	0.1	3.33	0.13
Arm Bar S	0.2	3.53	0.17	0.2	3.02	0.14
Arm Fleet	0.0	4.11	0.04	0.1	4.16	0.08
Arm Site	0.0	0.00	0.00	0.0	0.00	0.00
	2023					
Arm Bar E	0.1	4.28	0.11	0.2	3.59	0.18
Arm Bar S	0.3	3.76	0.21	0.2	3.31	0.17
Arm Fleet	0.0	4.22	0.04	0.1	4.27	0.09
Arm Site	0.0	0.00	0.00	0.0	0.00	0.00
	2023 + Development					
Arm Bar E	0.1	4.32	0.12	0.2	3.67	0.18
Arm Bar S	0.3	3.79	0.21	0.2	3.35	0.18
Arm Fleet	0.0	4.23	0.04	0.1	4.29	0.09
Arm Site	0.0	0.00	0.00	0.0	0.00	0.00

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

File summary

File Description

Title	(untitled)
Location	
Site number	
Date	08/11/2017
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	EUR\jack.clarke-williams
Description	

Units

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

Analysis Options

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

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	2018	AM	ONE HOUR	07:15	08:45	15	✓
D2	2018	PM	ONE HOUR	16:15	17:45	15	✓
D3	2023	AM	ONE HOUR	07:15	08:45	15	✓
D4	2023	PM	ONE HOUR	16:15	17:45	15	✓
D5	2023 + Development	AM	ONE HOUR	07:15	08:45	15	✓
D6	2023 + Development	PM	ONE HOUR	16:15	17:45	15	✓
D7	2023 + Cumulative	AM	ONE HOUR	07:15	08:45	15	✓
D8	2023 + Cumulative	PM	ONE HOUR	16:15	17:45	15	✓
D9	2023 + Cumulative + Development	AM	ONE HOUR	07:15	08:45	15	✓
D10	2023 + Cumulative + Development	PM	ONE HOUR	16:15	17:45	15	✓

Analysis Set Details

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

2018, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout	Bar E, Bar S, Fleet, Site	3.80	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
Bar E	untitled	
Bar S	untitled	
Fleet	untitled	
Site	untitled	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
Bar E	3.50	7.00	21.0	18.0	44.0	45.0	
Bar S	4.00	6.50	23.0	24.0	45.0	40.0	
Fleet	3.50	7.00	16.5	11.5	44.0	50.0	
Site	3.50	6.50	11.0	13.5	44.0	40.0	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
Bar E	0.604	1651
Bar S	0.625	1727
Fleet	0.563	1514
Site	0.566	1456

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

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	2018	AM	ONE HOUR	07:15	08:45	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
Bar E		ONE HOUR	✓	62	100.000
Bar S		ONE HOUR	✓	190	100.000
Fleet		ONE HOUR	✓	32	100.000
Site		ONE HOUR	✓	0	100.000

Origin-Destination Data

Demand (Veh/hr)

		To			
		Bar E	Bar S	Fleet	Site
From	Bar E	0	60	2	0
	Bar S	137	0	53	0
	Fleet	1	31	0	0
	Site	0	0	0	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		Bar E	Bar S	Fleet	Site
From	Bar E	0	78	100	0
	Bar S	37	0	49	0
	Fleet	0	55	0	0
	Site	0	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
Bar E	0.08	4.30	0.1	A	57	85
Bar S	0.17	3.53	0.2	A	174	262
Fleet	0.04	4.11	0.0	A	29	44
Site	0.00	0.00	0.0	A	0	0

Main Results for each time segment

07:15 - 07:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Bar E	47	12	23	912	0.051	46	104	0.0	0.1	4.158	A
Bar S	143	36	1	1229	0.116	143	68	0.0	0.1	3.311	A
Fleet	24	6	103	936	0.026	24	41	0.0	0.0	3.948	A
Site	0	0	127	1355	0.000	0	0	0.0	0.0	0.000	A

07:30 - 07:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Bar E	56	14	28	909	0.061	56	124	0.1	0.1	4.216	A
Bar S	171	43	2	1229	0.139	171	82	0.1	0.2	3.401	A
Fleet	29	7	123	926	0.031	29	49	0.0	0.0	4.014	A
Site	0	0	152	1336	0.000	0	0	0.0	0.0	0.000	A

07:45 - 08:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Bar E	68	17	34	906	0.075	68	152	0.1	0.1	4.295	A
Bar S	209	52	2	1229	0.170	209	100	0.2	0.2	3.530	A
Fleet	35	9	151	912	0.039	35	61	0.0	0.0	4.107	A
Site	0	0	186	1308	0.000	0	0	0.0	0.0	0.000	A

08:00 - 08:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Bar E	68	17	34	906	0.075	68	152	0.1	0.1	4.296	A
Bar S	209	52	2	1228	0.170	209	100	0.2	0.2	3.530	A
Fleet	35	9	151	912	0.039	35	61	0.0	0.0	4.107	A
Site	0	0	186	1308	0.000	0	0	0.0	0.0	0.000	A

08:15 - 08:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Bar E	56	14	28	909	0.061	56	124	0.1	0.1	4.218	A
Bar S	171	43	2	1229	0.139	171	82	0.2	0.2	3.405	A
Fleet	29	7	123	925	0.031	29	49	0.0	0.0	4.016	A
Site	0	0	152	1335	0.000	0	0	0.0	0.0	0.000	A

08:30 - 08:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Bar E	47	12	23	912	0.051	47	104	0.1	0.1	4.162	A
Bar S	143	36	2	1229	0.116	143	69	0.2	0.1	3.317	A
Fleet	24	6	103	936	0.026	24	41	0.0	0.0	3.951	A
Site	0	0	127	1355	0.000	0	0	0.0	0.0	0.000	A

2018, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout	Bar E, Bar S, Fleet, Site	3.37	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D2	2018	PM	ONE HOUR	16:15	17:45	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
Bar E		ONE HOUR	✓	143	100.000
Bar S		ONE HOUR	✓	175	100.000
Fleet		ONE HOUR	✓	72	100.000
Site		ONE HOUR	✓	0	100.000

Origin-Destination Data

Demand (Veh/hr)

		To			
		Bar E	Bar S	Fleet	Site
From	Bar E	1	139	3	0
	Bar S	102	2	71	0
	Fleet	3	69	0	0
	Site	0	0	0	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		Bar E	Bar S	Fleet	Site
From	Bar E	0	27	67	0
	Bar S	32	0	14	0
	Fleet	33	52	0	0
	Site	0	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
Bar E	0.13	3.33	0.1	A	131	197
Bar S	0.14	3.02	0.2	A	161	241
Fleet	0.08	4.16	0.1	A	66	99
Site	0.00	0.00	0.0	A	0	0

Main Results for each time segment

16:15 - 16:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Bar E	108	27	53	1256	0.086	107	80	0.0	0.1	3.134	A
Bar S	132	33	3	1387	0.095	131	158	0.0	0.1	2.868	A
Fleet	54	14	79	963	0.056	54	56	0.0	0.1	3.961	A
Site	0	0	133	1351	0.000	0	0	0.0	0.0	0.000	A

16:30 - 16:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Bar E	129	32	64	1248	0.103	128	95	0.1	0.1	3.214	A
Bar S	157	39	4	1386	0.113	157	189	0.1	0.1	2.928	A
Fleet	65	16	94	955	0.068	65	66	0.1	0.1	4.043	A
Site	0	0	159	1331	0.000	0	0	0.0	0.0	0.000	A

16:45 - 17:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Bar E	157	39	78	1238	0.127	157	117	0.1	0.1	3.330	A
Bar S	193	48	4	1386	0.139	193	231	0.1	0.2	3.017	A
Fleet	79	20	116	945	0.084	79	81	0.1	0.1	4.159	A
Site	0	0	195	1302	0.000	0	0	0.0	0.0	0.000	A

17:00 - 17:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Bar E	157	39	78	1238	0.127	157	117	0.1	0.1	3.330	A
Bar S	193	48	4	1386	0.139	193	231	0.2	0.2	3.017	A
Fleet	79	20	116	945	0.084	79	81	0.1	0.1	4.160	A
Site	0	0	195	1302	0.000	0	0	0.0	0.0	0.000	A

17:15 - 17:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Bar E	129	32	64	1248	0.103	129	95	0.1	0.1	3.217	A
Bar S	157	39	4	1386	0.113	157	189	0.2	0.1	2.929	A
Fleet	65	16	94	955	0.068	65	67	0.1	0.1	4.044	A
Site	0	0	159	1330	0.000	0	0	0.0	0.0	0.000	A

17:30 - 17:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Bar E	108	27	54	1256	0.086	108	80	0.1	0.1	3.138	A
Bar S	132	33	3	1387	0.095	132	158	0.1	0.1	2.868	A
Fleet	54	14	79	962	0.056	54	56	0.1	0.1	3.965	A
Site	0	0	133	1351	0.000	0	0	0.0	0.0	0.000	A

2023, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout	Bar E, Bar S, Fleet, Site	3.96	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D3	2023	AM	ONE HOUR	07:15	08:45	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
Bar E		ONE HOUR	✓	98	100.000
Bar S		ONE HOUR	✓	226	100.000
Fleet		ONE HOUR	✓	32	100.000
Site		ONE HOUR	✓	0	100.000

Origin-Destination Data

Demand (Veh/hr)

		To			
		Bar E	Bar S	Fleet	Site
From	Bar E	0	96	2	0
	Bar S	173	0	53	0
	Fleet	1	31	0	0
	Site	0	0	0	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		Bar E	Bar S	Fleet	Site
From	Bar E	0	70	100	0
	Bar S	41	0	49	0
	Fleet	0	55	0	0
	Site	0	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
Bar E	0.11	4.28	0.1	A	90	135
Bar S	0.21	3.76	0.3	A	207	311
Fleet	0.04	4.22	0.0	A	29	44
Site	0.00	0.00	0.0	A	0	0

Main Results for each time segment

07:15 - 07:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Bar E	74	18	23	955	0.077	73	130	0.0	0.1	4.082	A
Bar S	170	43	1	1207	0.141	169	95	0.0	0.2	3.467	A
Fleet	24	6	130	920	0.026	24	41	0.0	0.0	4.016	A
Site	0	0	154	1332	0.000	0	0	0.0	0.0	0.000	A

07:30 - 07:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Bar E	88	22	28	953	0.092	88	156	0.1	0.1	4.163	A
Bar S	203	51	2	1207	0.168	203	114	0.2	0.2	3.584	A
Fleet	29	7	155	907	0.032	29	49	0.0	0.0	4.098	A
Site	0	0	184	1307	0.000	0	0	0.0	0.0	0.000	A

07:45 - 08:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Bar E	108	27	34	949	0.114	108	191	0.1	0.1	4.278	A
Bar S	249	62	2	1207	0.206	249	140	0.2	0.3	3.757	A
Fleet	35	9	190	889	0.040	35	61	0.0	0.0	4.216	A
Site	0	0	226	1274	0.000	0	0	0.0	0.0	0.000	A

08:00 - 08:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Bar E	108	27	34	949	0.114	108	192	0.1	0.1	4.278	A
Bar S	249	62	2	1207	0.206	249	140	0.3	0.3	3.757	A
Fleet	35	9	190	889	0.040	35	61	0.0	0.0	4.217	A
Site	0	0	226	1273	0.000	0	0	0.0	0.0	0.000	A

08:15 - 08:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Bar E	88	22	28	953	0.092	88	157	0.1	0.1	4.166	A
Bar S	203	51	2	1207	0.168	203	114	0.3	0.2	3.589	A
Fleet	29	7	156	907	0.032	29	49	0.0	0.0	4.099	A
Site	0	0	184	1307	0.000	0	0	0.0	0.0	0.000	A

08:30 - 08:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Bar E	74	18	23	955	0.077	74	131	0.1	0.1	4.085	A
Bar S	170	43	2	1207	0.141	170	96	0.2	0.2	3.471	A
Fleet	24	6	130	920	0.026	24	41	0.0	0.0	4.020	A
Site	0	0	154	1331	0.000	0	0	0.0	0.0	0.000	A

2023, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout	Bar E, Bar S, Fleet, Site	3.59	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D4	2023	PM	ONE HOUR	16:15	17:45	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
Bar E		ONE HOUR	✓	199	100.000
Bar S		ONE HOUR	✓	209	100.000
Fleet		ONE HOUR	✓	72	100.000
Site		ONE HOUR	✓	0	100.000

Origin-Destination Data

Demand (Veh/hr)

		To			
		Bar E	Bar S	Fleet	Site
From	Bar E	1	195	3	0
	Bar S	136	2	71	0
	Fleet	3	69	0	0
	Site	0	0	0	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		Bar E	Bar S	Fleet	Site
From	Bar E	0	29	67	0
	Bar S	40	0	14	0
	Fleet	33	52	0	0
	Site	0	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
Bar E	0.18	3.59	0.2	A	183	274
Bar S	0.17	3.31	0.2	A	192	288
Fleet	0.09	4.27	0.1	A	66	99
Site	0.00	0.00	0.0	A	0	0

Main Results for each time segment

16:15 - 16:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Bar E	150	37	53	1239	0.121	149	105	0.0	0.1	3.303	A
Bar S	157	39	3	1318	0.119	157	199	0.0	0.1	3.097	A
Fleet	54	14	104	947	0.057	54	56	0.0	0.1	4.030	A
Site	0	0	158	1328	0.000	0	0	0.0	0.0	0.000	A

16:30 - 16:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Bar E	179	45	64	1231	0.145	179	126	0.1	0.2	3.420	A
Bar S	188	47	4	1318	0.143	188	239	0.1	0.2	3.185	A
Fleet	65	16	125	936	0.069	65	66	0.1	0.1	4.130	A
Site	0	0	190	1302	0.000	0	0	0.0	0.0	0.000	A

16:45 - 17:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Bar E	219	55	78	1221	0.179	219	154	0.2	0.2	3.592	A
Bar S	230	58	4	1317	0.175	230	293	0.2	0.2	3.310	A
Fleet	79	20	153	922	0.086	79	81	0.1	0.1	4.272	A
Site	0	0	232	1268	0.000	0	0	0.0	0.0	0.000	A

17:00 - 17:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Bar E	219	55	78	1221	0.179	219	154	0.2	0.2	3.592	A
Bar S	230	58	4	1317	0.175	230	293	0.2	0.2	3.310	A
Fleet	79	20	153	922	0.086	79	81	0.1	0.1	4.272	A
Site	0	0	232	1268	0.000	0	0	0.0	0.0	0.000	A

17:15 - 17:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Bar E	179	45	64	1231	0.145	179	126	0.2	0.2	3.422	A
Bar S	188	47	4	1318	0.143	188	239	0.2	0.2	3.186	A
Fleet	65	16	125	936	0.069	65	67	0.1	0.1	4.132	A
Site	0	0	190	1302	0.000	0	0	0.0	0.0	0.000	A

17:30 - 17:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Bar E	150	37	54	1238	0.121	150	105	0.2	0.1	3.307	A
Bar S	157	39	3	1318	0.119	157	200	0.2	0.1	3.103	A
Fleet	54	14	105	947	0.057	54	56	0.1	0.1	4.035	A
Site	0	0	159	1327	0.000	0	0	0.0	0.0	0.000	A

2023 + Development, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout	Bar E, Bar S, Fleet, Site	4.00	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D5	2023 + Development	AM	ONE HOUR	07:15	08:45	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
Bar E		ONE HOUR	✓	101	100.000
Bar S		ONE HOUR	✓	229	100.000
Fleet		ONE HOUR	✓	32	100.000
Site		ONE HOUR	✓	0	100.000

Origin-Destination Data

Demand (Veh/hr)

		To			
		Bar E	Bar S	Fleet	Site
From	Bar E	0	99	2	0
	Bar S	176	0	53	0
	Fleet	1	31	0	0
	Site	0	0	0	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		Bar E	Bar S	Fleet	Site
From	Bar E	0	71	100	0
	Bar S	42	0	49	0
	Fleet	0	55	0	0
	Site	0	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
Bar E	0.12	4.32	0.1	A	93	139
Bar S	0.21	3.79	0.3	A	210	315
Fleet	0.04	4.23	0.0	A	29	44
Site	0.00	0.00	0.0	A	0	0

Main Results for each time segment

07:15 - 07:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Bar E	76	19	23	950	0.080	76	133	0.0	0.1	4.115	A
Bar S	172	43	1	1201	0.144	172	97	0.0	0.2	3.495	A
Fleet	24	6	132	919	0.026	24	41	0.0	0.0	4.024	A
Site	0	0	156	1329	0.000	0	0	0.0	0.0	0.000	A

07:30 - 07:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Bar E	91	23	28	947	0.096	91	159	0.1	0.1	4.202	A
Bar S	206	51	2	1201	0.171	206	117	0.2	0.2	3.617	A
Fleet	29	7	158	905	0.032	29	49	0.0	0.0	4.108	A
Site	0	0	187	1304	0.000	0	0	0.0	0.0	0.000	A

07:45 - 08:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Bar E	111	28	34	944	0.118	111	195	0.1	0.1	4.323	A
Bar S	252	63	2	1201	0.210	252	143	0.2	0.3	3.795	A
Fleet	35	9	194	886	0.040	35	60	0.0	0.0	4.228	A
Site	0	0	229	1270	0.000	0	0	0.0	0.0	0.000	A

08:00 - 08:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Bar E	111	28	34	944	0.118	111	195	0.1	0.1	4.323	A
Bar S	252	63	2	1201	0.210	252	143	0.3	0.3	3.795	A
Fleet	35	9	194	886	0.040	35	61	0.0	0.0	4.229	A
Site	0	0	229	1270	0.000	0	0	0.0	0.0	0.000	A

08:15 - 08:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Bar E	91	23	28	947	0.096	91	159	0.1	0.1	4.204	A
Bar S	206	51	2	1201	0.171	206	117	0.3	0.2	3.621	A
Fleet	29	7	158	905	0.032	29	49	0.0	0.0	4.109	A
Site	0	0	187	1304	0.000	0	0	0.0	0.0	0.000	A

08:30 - 08:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Bar E	76	19	23	950	0.080	76	133	0.1	0.1	4.122	A
Bar S	172	43	2	1201	0.144	173	98	0.2	0.2	3.502	A
Fleet	24	6	133	918	0.026	24	41	0.0	0.0	4.025	A
Site	0	0	157	1328	0.000	0	0	0.0	0.0	0.000	A

2023 + Development, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout	Bar E, Bar S, Fleet, Site	3.64	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D6	2023 + Development	PM	ONE HOUR	16:15	17:45	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
Bar E		ONE HOUR	✓	202	100.000
Bar S		ONE HOUR	✓	213	100.000
Fleet		ONE HOUR	✓	72	100.000
Site		ONE HOUR	✓	0	100.000

Origin-Destination Data

Demand (Veh/hr)

		To			
		Bar E	Bar S	Fleet	Site
From	Bar E	1	198	3	0
	Bar S	140	2	71	0
	Fleet	3	69	0	0
	Site	0	0	0	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		Bar E	Bar S	Fleet	Site
From	Bar E	0	31	67	0
	Bar S	41	0	14	0
	Fleet	33	52	0	0
	Site	0	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
Bar E	0.18	3.67	0.2	A	185	278
Bar S	0.18	3.35	0.2	A	195	293
Fleet	0.09	4.29	0.1	A	66	99
Site	0.00	0.00	0.0	A	0	0

Main Results for each time segment

16:15 - 16:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Bar E	152	38	53	1220	0.125	152	108	0.0	0.1	3.367	A
Bar S	160	40	3	1310	0.122	160	202	0.0	0.1	3.128	A
Fleet	54	14	107	945	0.057	54	56	0.0	0.1	4.039	A
Site	0	0	161	1325	0.000	0	0	0.0	0.0	0.000	A

16:30 - 16:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Bar E	182	45	64	1213	0.150	181	129	0.1	0.2	3.490	A
Bar S	191	48	4	1310	0.146	191	242	0.1	0.2	3.219	A
Fleet	65	16	128	934	0.069	65	66	0.1	0.1	4.141	A
Site	0	0	193	1299	0.000	0	0	0.0	0.0	0.000	A

16:45 - 17:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Bar E	222	56	78	1203	0.185	222	158	0.2	0.2	3.670	A
Bar S	235	59	4	1309	0.179	234	296	0.2	0.2	3.349	A
Fleet	79	20	157	919	0.086	79	81	0.1	0.1	4.287	A
Site	0	0	237	1263	0.000	0	0	0.0	0.0	0.000	A

17:00 - 17:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Bar E	222	56	78	1203	0.185	222	159	0.2	0.2	3.670	A
Bar S	235	59	4	1309	0.179	235	296	0.2	0.2	3.349	A
Fleet	79	20	157	919	0.086	79	81	0.1	0.1	4.287	A
Site	0	0	237	1263	0.000	0	0	0.0	0.0	0.000	A

17:15 - 17:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Bar E	182	45	64	1213	0.150	182	130	0.2	0.2	3.491	A
Bar S	191	48	4	1310	0.146	192	242	0.2	0.2	3.222	A
Fleet	65	16	129	934	0.069	65	67	0.1	0.1	4.144	A
Site	0	0	193	1298	0.000	0	0	0.0	0.0	0.000	A

17:30 - 17:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Bar E	152	38	54	1220	0.125	152	108	0.2	0.1	3.371	A
Bar S	160	40	3	1310	0.122	160	203	0.2	0.1	3.133	A
Fleet	54	14	108	945	0.057	54	56	0.1	0.1	4.044	A
Site	0	0	162	1324	0.000	0	0	0.0	0.0	0.000	A

Junctions 9

ARCADY 9 - Roundabout Module

Filename: Swale Way - Barge Way.j9
Path: P:\JNY9545 - Kemsley K3 Variation\Transport\Arcady\Swale Way - Barge Way
Report generation date: 22/03/2018 17:04:59

»2018, AM
»2018, PM
»2023, AM
»2023, PM
»2023 + Development, AM
»2023 + Development, PM

Summary of junction performance

	AM			PM		
	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)	RFC
	2018					
Arm Barge	0.3	7.59	0.23	0.4	4.78	0.27
Arm Swa S	0.5	3.92	0.33	1.8	6.95	0.64
Arm Swa W	4.9	14.95	0.84	0.9	4.80	0.47
	2023					
Arm Barge	0.5	10.03	0.33	0.5	5.50	0.34
Arm Swa S	0.7	4.47	0.40	4.1	13.33	0.81
Arm Swa W	41.4	93.38	1.03	1.1	5.60	0.53
	2023 + Development					
Arm Barge	0.5	10.21	0.35	0.5	5.59	0.35
Arm Swa S	0.7	4.50	0.40	4.2	13.59	0.81
Arm Swa W	44.3	98.95	1.04	1.1	5.68	0.53

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

File summary

File Description

Title	(untitled)
Location	
Site number	
Date	08/11/2017
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	EUR\jack.clarke-williams
Description	

Units

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

Analysis Options

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

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	2018	AM	ONE HOUR	07:15	08:45	15	✓
D2	2018	PM	ONE HOUR	16:15	17:45	15	✓
D3	2023	AM	ONE HOUR	07:15	08:45	15	✓
D4	2023	PM	ONE HOUR	16:15	17:45	15	✓
D5	2023 + Development	AM	ONE HOUR	07:15	08:45	15	✓
D6	2023 + Development	PM	ONE HOUR	16:15	17:45	15	✓
D7	2023 + Cumulative	AM	ONE HOUR	07:15	08:45	15	✓
D8	2023 + Cumulative	PM	ONE HOUR	16:15	17:45	15	✓
D9	2023 + Cumulative + Development	AM	ONE HOUR	07:15	08:45	15	✓
D10	2023 + Cumulative + Development	PM	ONE HOUR	16:15	17:45	15	✓

Analysis Set Details

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

2018, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout	Barge, Swa S, Swa W	11.46	B

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
Barge	Barge Way	
Swa S	Swale Way South	
Swa W	Swale Way West	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
Barge	3.50	6.50	16.5	23.0	45.5	28.0	
Swa S	3.75	7.00	13.0	23.0	45.5	30.0	
Swa W	3.75	7.00	10.0	47.5	45.5	30.0	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
Barge	0.622	1657
Swa S	0.627	1694
Swa W	0.628	1665

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

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	2018	AM	ONE HOUR	07:15	08:45	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
Barge		ONE HOUR	✓	128	100.000
Swa S		ONE HOUR	✓	404	100.000
Swa W		ONE HOUR	✓	1120	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		Barge	Swa S	Swa W
From	Barge	1	34	93
	Swa S	41	1	362
	Swa W	182	936	2

Vehicle Mix

Heavy Vehicle Percentages

		To		
		Barge	Swa S	Swa W
From	Barge	0	29	70
	Swa S	27	0	15
	Swa W	34	6	50

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
Barge	0.23	7.59	0.3	A	117	176
Swa S	0.33	3.92	0.5	A	371	556
Swa W	0.84	14.95	4.9	B	1028	1542

Main Results for each time segment

07:15 - 07:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Barge	96	24	703	753	0.128	96	168	0.0	0.1	5.475	A
Swa S	304	76	72	1393	0.218	303	727	0.0	0.3	3.301	A
Swa W	843	211	32	1482	0.569	838	343	0.0	1.3	5.548	A

07:30 - 07:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Barge	115	29	842	695	0.166	115	201	0.1	0.2	6.204	A
Swa S	363	91	86	1380	0.263	363	870	0.3	0.4	3.540	A
Swa W	1007	252	39	1477	0.682	1004	410	1.3	2.1	7.549	A

07:45 - 08:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Barge	141	35	1025	619	0.228	141	245	0.2	0.3	7.523	A
Swa S	445	111	105	1362	0.327	444	1060	0.4	0.5	3.921	A
Swa W	1233	308	47	1471	0.838	1223	502	2.1	4.7	13.911	B

08:00 - 08:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Barge	141	35	1033	615	0.229	141	246	0.3	0.3	7.589	A
Swa S	445	111	106	1362	0.327	445	1068	0.5	0.5	3.925	A
Swa W	1233	308	47	1471	0.838	1232	503	4.7	4.9	14.945	B

08:15 - 08:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Barge	115	29	853	690	0.167	115	203	0.3	0.2	6.271	A
Swa S	363	91	87	1379	0.263	364	882	0.5	0.4	3.548	A
Swa W	1007	252	39	1477	0.682	1018	412	4.9	2.2	8.015	A

08:30 - 08:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Barge	96	24	710	750	0.129	97	169	0.2	0.1	5.515	A
Swa S	304	76	72	1392	0.218	304	734	0.4	0.3	3.312	A
Swa W	843	211	32	1482	0.569	847	344	2.2	1.3	5.697	A

2018, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout	Barge, Swa S, Swa W	5.80	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D2	2018	PM	ONE HOUR	16:15	17:45	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
Barge		ONE HOUR	✓	250	100.000
Swa S		ONE HOUR	✓	849	100.000
Swa W		ONE HOUR	✓	599	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		Barge	Swa S	Swa W
From	Barge	0	56	194
	Swa S	63	1	785
	Swa W	140	459	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		Barge	Swa S	Swa W
From	Barge	0	21	30
	Swa S	13	0	4
	Swa W	36	8	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
Barge	0.27	4.78	0.4	A	229	344
Swa S	0.64	6.95	1.8	A	779	1169
Swa W	0.47	4.80	0.9	A	550	824

Main Results for each time segment

16:15 - 16:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Barge	188	47	345	1114	0.169	187	152	0.0	0.2	3.883	A
Swa S	639	160	145	1505	0.425	636	387	0.0	0.7	4.128	A
Swa W	451	113	48	1424	0.317	449	734	0.0	0.5	3.688	A

16:30 - 16:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Barge	225	56	413	1078	0.208	225	182	0.2	0.3	4.217	A
Swa S	763	191	174	1483	0.515	762	463	0.7	1.0	4.983	A
Swa W	538	135	57	1418	0.380	538	879	0.5	0.6	4.088	A

16:45 - 17:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Barge	275	69	506	1029	0.267	275	223	0.3	0.4	4.769	A
Swa S	935	234	213	1453	0.644	932	567	1.0	1.8	6.876	A
Swa W	660	165	70	1410	0.468	658	1075	0.6	0.9	4.783	A

17:00 - 17:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Barge	275	69	506	1029	0.268	275	223	0.4	0.4	4.775	A
Swa S	935	234	214	1452	0.644	935	568	1.8	1.8	6.952	A
Swa W	660	165	70	1410	0.468	659	1078	0.9	0.9	4.797	A

17:15 - 17:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Barge	225	56	414	1077	0.209	225	183	0.4	0.3	4.227	A
Swa S	763	191	175	1483	0.515	766	465	1.8	1.1	5.043	A
Swa W	538	135	58	1418	0.380	540	883	0.9	0.6	4.103	A

17:30 - 17:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Barge	188	47	347	1113	0.169	188	153	0.3	0.2	3.897	A
Swa S	639	160	146	1505	0.425	640	389	1.1	0.7	4.171	A
Swa W	451	113	48	1424	0.317	452	738	0.6	0.5	3.707	A

2023, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout	Barge, Swa S, Swa W	62.90	F

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D3	2023	AM	ONE HOUR	07:15	08:45	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
Barge		ONE HOUR	✓	164	100.000
Swa S		ONE HOUR	✓	479	100.000
Swa W		ONE HOUR	✓	1368	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		Barge	Swa S	Swa W
From	Barge	1	50	113
	Swa S	46	1	432
	Swa W	213	1153	2

Vehicle Mix

Heavy Vehicle Percentages

		To		
		Barge	Swa S	Swa W
From	Barge	0	20	75
	Swa S	24	0	16
	Swa W	39	6	50

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
Barge	0.33	10.03	0.5	B	150	226
Swa S	0.40	4.47	0.7	A	440	659
Swa W	1.03	93.38	41.4	F	1255	1883

Main Results for each time segment

07:15 - 07:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Barge	123	31	863	690	0.179	123	194	0.0	0.2	6.340	A
Swa S	361	90	87	1370	0.263	359	899	0.0	0.4	3.556	A
Swa W	1030	257	36	1472	0.700	1021	410	0.0	2.3	7.829	A

07:30 - 07:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Barge	147	37	1031	619	0.238	147	232	0.2	0.3	7.615	A
Swa S	431	108	104	1354	0.318	430	1074	0.4	0.5	3.895	A
Swa W	1230	307	43	1467	0.838	1220	491	2.3	4.7	14.010	B

07:45 - 08:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Barge	181	45	1200	549	0.329	180	273	0.3	0.5	9.741	A
Swa S	527	132	127	1332	0.396	527	1253	0.5	0.6	4.464	A
Swa W	1506	377	53	1460	1.031	1420	601	4.7	26.4	50.299	F

08:00 - 08:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Barge	181	45	1222	539	0.335	181	277	0.5	0.5	10.026	B
Swa S	527	132	128	1332	0.396	527	1275	0.6	0.7	4.473	A
Swa W	1506	377	53	1460	1.031	1446	602	26.4	41.4	93.375	F

08:15 - 08:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Barge	147	37	1158	566	0.260	148	256	0.5	0.4	8.623	A
Swa S	431	108	105	1353	0.318	431	1201	0.7	0.5	3.907	A
Swa W	1230	307	43	1467	0.838	1371	493	41.4	6.1	52.321	F

08:30 - 08:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Barge	123	31	883	681	0.181	124	198	0.4	0.2	6.466	A
Swa S	361	90	88	1369	0.263	361	919	0.5	0.4	3.574	A
Swa W	1030	257	36	1472	0.700	1045	413	6.1	2.4	8.707	A

2023, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout	Barge, Swa S, Swa W	9.30	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D4	2023	PM	ONE HOUR	16:15	17:45	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
Barge		ONE HOUR	✓	306	100.000
Swa S		ONE HOUR	✓	1044	100.000
Swa W		ONE HOUR	✓	654	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		Barge	Swa S	Swa W
From	Barge	0	58	248
	Swa S	76	1	967
	Swa W	161	493	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		Barge	Swa S	Swa W
From	Barge	0	21	32
	Swa S	11	0	3
	Swa W	45	9	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
Barge	0.34	5.50	0.5	A	281	421
Swa S	0.81	13.33	4.1	B	958	1437
Swa W	0.53	5.60	1.1	A	600	900

Main Results for each time segment

16:15 - 16:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Barge	230	58	370	1082	0.213	229	178	0.0	0.3	4.215	A
Swa S	786	196	186	1487	0.529	782	414	0.0	1.1	5.072	A
Swa W	492	123	58	1378	0.357	490	910	0.0	0.6	4.043	A

16:30 - 16:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Barge	275	69	444	1044	0.263	275	213	0.3	0.4	4.677	A
Swa S	939	235	223	1458	0.644	936	496	1.1	1.8	6.863	A
Swa W	588	147	69	1372	0.429	587	1090	0.6	0.7	4.583	A

16:45 - 17:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Barge	337	84	543	992	0.340	336	260	0.4	0.5	5.483	A
Swa S	1149	287	273	1418	0.811	1141	607	1.8	4.0	12.595	B
Swa W	720	180	84	1363	0.528	719	1329	0.7	1.1	5.576	A

17:00 - 17:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Barge	337	84	544	992	0.340	337	261	0.5	0.5	5.496	A
Swa S	1149	287	273	1417	0.811	1149	608	4.0	4.1	13.335	B
Swa W	720	180	85	1362	0.529	720	1337	1.1	1.1	5.603	A

17:15 - 17:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Barge	275	69	445	1043	0.264	276	214	0.5	0.4	4.695	A
Swa S	939	235	223	1457	0.644	948	497	4.1	1.8	7.191	A
Swa W	588	147	70	1371	0.429	589	1101	1.1	0.8	4.614	A

17:30 - 17:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Barge	230	58	373	1081	0.213	231	179	0.4	0.3	4.234	A
Swa S	786	196	187	1486	0.529	789	416	1.8	1.1	5.185	A
Swa W	492	123	58	1378	0.357	493	918	0.8	0.6	4.072	A

2023 + Development, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout	Barge, Swa S, Swa W	66.42	F

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D5	2023 + Development	AM	ONE HOUR	07:15	08:45	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
Barge		ONE HOUR	✓	169	100.000
Swa S		ONE HOUR	✓	480	100.000
Swa W		ONE HOUR	✓	1372	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		Barge	Swa S	Swa W
From	Barge	1	51	117
	Swa S	47	1	432
	Swa W	217	1153	2

Vehicle Mix

Heavy Vehicle Percentages

		To		
		Barge	Swa S	Swa W
From	Barge	0	20	76
	Swa S	23	0	16
	Swa W	40	6	50

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
Barge	0.35	10.21	0.5	B	155	233
Swa S	0.40	4.50	0.7	A	440	661
Swa W	1.04	98.95	44.3	F	1259	1888

Main Results for each time segment

07:15 - 07:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Barge	127	32	863	686	0.186	126	198	0.0	0.2	6.423	A
Swa S	361	90	90	1368	0.264	360	899	0.0	0.4	3.567	A
Swa W	1033	258	37	1469	0.703	1024	413	0.0	2.3	7.936	A

07:30 - 07:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Barge	152	38	1031	616	0.247	152	237	0.2	0.3	7.744	A
Swa S	432	108	108	1351	0.319	431	1074	0.4	0.5	3.911	A
Swa W	1233	308	44	1464	0.843	1223	495	2.3	4.9	14.368	B

07:45 - 08:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Barge	186	47	1196	547	0.340	185	277	0.3	0.5	9.923	A
Swa S	528	132	131	1329	0.398	528	1250	0.5	0.7	4.491	A
Swa W	1511	378	54	1457	1.037	1419	605	4.9	27.8	52.368	F

08:00 - 08:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Barge	186	47	1217	539	0.346	186	281	0.5	0.5	10.208	B
Swa S	528	132	132	1328	0.398	528	1271	0.7	0.7	4.501	A
Swa W	1511	378	54	1457	1.037	1444	607	27.8	44.3	98.945	F

08:15 - 08:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Barge	152	38	1167	560	0.272	153	262	0.5	0.4	8.856	A
Swa S	432	108	109	1350	0.320	432	1211	0.7	0.5	3.925	A
Swa W	1233	308	44	1464	0.843	1385	497	44.3	6.5	59.410	F

08:30 - 08:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Barge	127	32	884	677	0.188	128	202	0.4	0.2	6.564	A
Swa S	361	90	91	1367	0.264	362	921	0.5	0.4	3.582	A
Swa W	1033	258	37	1468	0.703	1049	416	6.5	2.4	8.902	A

2023 + Development, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout	Barge, Swa S, Swa W	9.44	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D6	2023 + Development	PM	ONE HOUR	16:15	17:45	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
Barge		ONE HOUR	✓	310	100.000
Swa S		ONE HOUR	✓	1044	100.000
Swa W		ONE HOUR	✓	658	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		Barge	Swa S	Swa W
From	Barge	0	58	252
	Swa S	76	1	967
	Swa W	165	493	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		Barge	Swa S	Swa W
From	Barge	0	21	33
	Swa S	11	0	3
	Swa W	46	9	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
Barge	0.35	5.59	0.5	A	284	427
Swa S	0.81	13.59	4.2	B	958	1437
Swa W	0.53	5.68	1.1	A	604	906

Main Results for each time segment

16:15 - 16:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Barge	233	58	370	1075	0.217	232	181	0.0	0.3	4.265	A
Swa S	786	196	189	1484	0.530	782	414	0.0	1.1	5.097	A
Swa W	495	124	58	1374	0.361	493	913	0.0	0.6	4.079	A

16:30 - 16:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Barge	279	70	444	1037	0.269	278	216	0.3	0.4	4.740	A
Swa S	939	235	226	1453	0.646	936	496	1.1	1.8	6.920	A
Swa W	592	148	69	1367	0.433	591	1093	0.6	0.8	4.633	A

16:45 - 17:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Barge	341	85	543	986	0.346	341	264	0.4	0.5	5.572	A
Swa S	1149	287	277	1413	0.814	1140	607	1.8	4.1	12.808	B
Swa W	724	181	84	1358	0.533	723	1333	0.8	1.1	5.654	A

17:00 - 17:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Barge	341	85	544	985	0.346	341	265	0.5	0.5	5.588	A
Swa S	1149	287	277	1412	0.814	1149	608	4.1	4.2	13.591	B
Swa W	724	181	85	1358	0.534	724	1342	1.1	1.1	5.684	A

17:15 - 17:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Barge	279	70	445	1037	0.269	279	218	0.5	0.4	4.759	A
Swa S	939	235	227	1453	0.646	948	497	4.2	1.9	7.257	A
Swa W	592	148	70	1366	0.433	593	1105	1.1	0.8	4.663	A

17:30 - 17:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Barge	233	58	373	1074	0.217	234	182	0.4	0.3	4.286	A
Swa S	786	196	190	1483	0.530	789	416	1.9	1.1	5.210	A
Swa W	495	124	58	1373	0.361	496	921	0.8	0.6	4.109	A

17:30 - 17:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
Barge	242	60	397	1066	0.227	242	184	0.4	0.3	4.372	A
Swa S	822	206	198	1464	0.561	826	440	2.2	1.3	5.672	A
Swa W	522	130	58	1368	0.381	523	966	0.9	0.6	4.264	A

Junctions 9

ARCADY 9 - Roundabout Module

Version: 9.0.2.5947

Filename: North and South Dumbbell Roundabouts_Existing Geometry Revised PW 04-04-18.j9
Path: P:\JNY9545 - Kemsley K3 Variation\Transport\Arcady\North and South Dumbell Roundabouts
Report generation date: 04/04/2018 15:57:35

»2018, AM
»2018, PM
»2023, AM
»2023, PM
»2023 + Development, AM
»2023 + Development, PM

Summary of junction performance

	AM			PM		
	Q (Veh)	Delay (s)	RFC	Q (Veh)	Delay (s)	RFC
	2018					
1 - North - 1 - A249 offslip (NB)	7.0	36.33	0.89	48.6	194.81	1.10
1 - North - 2 - Grovehurst Road	7.4	64.89	0.92	0.9	12.83	0.47
1 - North - 4 - B2005 - link	0.4	3.33	0.30	0.6	3.66	0.38
2 - South - 2 - B2005 - link	1.5	5.04	0.61	0.8	3.55	0.44
2 - South - 3 - A249 offslip (SB)	28.7	164.76	1.09	1.5	11.82	0.61
2 - South - 4 - Swale Way	16.4	99.20	1.00	380.9	1913.79	1.76
2 - South - 5 - Grovehurst Road	20.7	114.57	1.03	4.6	29.78	0.84
	2023					
1 - North - 1 - A249 offslip (NB)	33.5	132.82	1.05	76.5	330.10	1.18
1 - North - 2 - Grovehurst Road	36.9	284.57	1.15	0.9	13.43	0.49
1 - North - 4 - B2005 - link	0.4	3.35	0.30	0.6	3.69	0.38
2 - South - 2 - B2005 - link	1.9	5.94	0.66	0.8	3.68	0.45
2 - South - 3 - A249 offslip (SB)	120.8	823.96	1.45	1.7	13.04	0.64
2 - South - 4 - Swale Way	46.9	243.61	1.12	701.3	3532.84	2.16
2 - South - 5 - Grovehurst Road	49.0	272.72	1.14	5.0	32.04	0.85
	2023 + Development					
1 - North - 1 - A249 offslip (NB)	37.2	144.47	1.06	78.6	341.54	1.19
1 - North - 2 - Grovehurst Road	38.3	298.94	1.16	0.9	13.52	0.49
1 - North - 4 - B2005 - link	0.4	3.37	0.30	0.6	3.72	0.39
2 - South - 2 - B2005 - link	1.9	5.97	0.66	0.8	3.70	0.45
2 - South - 3 - A249 offslip (SB)	121.9	846.25	1.45	1.7	13.11	0.64
2 - South - 4 - Swale Way	50.6	269.98	1.13	712.6	3608.84	2.18
2 - South - 5 - Grovehurst Road	49.8	279.46	1.14	5.0	32.39	0.85

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	26/01/2018
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	EUR\Ben.Dance
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	Veh	Veh	perHour	s	-Min	perMin

Analysis Options

Vehicle length (m)	Calculate Q Percentiles	Calculate detailed queueing delay	Calculate residual capacity	RFC Threshold	Av. Delay threshold (s)	Q threshold (PCU)
5.75	✓			0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	2018	AM	ONE HOUR	07:15	08:45	15	✓
D2	2018	PM	ONE HOUR	16:15	17:45	15	✓
D3	2023	AM	ONE HOUR	07:15	08:45	15	✓
D4	2023	PM	ONE HOUR	16:15	17:45	15	✓
D5	2023 + Development	AM	ONE HOUR	07:15	08:45	15	✓
D6	2023 + Development	PM	ONE HOUR	16:15	17:45	15	✓
D7	2023 + Cumulative	AM	ONE HOUR	07:15	08:45	15	✓
D8	2023 + Cumulative	PM	ONE HOUR	16:15	17:45	15	✓
D9	2023 + Cumulative + Development	AM	ONE HOUR	07:15	08:45	15	✓
D10	2023 + Cumulative + Development	PM	ONE HOUR	16:15	17:45	15	✓

Analysis Set Details

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

2018, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Queue variations	Analysis Options	Q percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	North	Standard Roundabout	1, 2, 3, 4	34.15	D
2	South	Standard Roundabout	1, 2, 3, 4, 5	78.77	F

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Junction	Arm	Name	Description
1 - North	1	A249 offslip (NB)	
	2	Grovehurst Road	
	3	A249 onslip (NB)	
	4	B2005 - link	
2 - South	1	A249 onslip (SB)	
	2	B2005 - link	
	3	A249 offslip (SB)	
	4	Swale Way	
	5	Grovehurst Road	

Roundabout Geometry

Junction	Arm	V (m)	E (m)	l' (m)	R (m)	D (m)	PHI (deg)	Exit only
1 - North	1 - A249 offslip (NB)	7.90	8.10	5.8	14.0	37.0	32.0	
	2 - Grovehurst Road	3.71	6.74	20.2	10.1	37.0	45.0	
	3 - A249 onslip (NB)							✓
	4 - B2005 - link	3.75	7.64	13.4	11.9	37.0	41.0	
2 - South	1 - A249 onslip (SB)							✓
	2 - B2005 - link	3.66	6.17	14.7	27.2	36.3	36.0	
	3 - A249 offslip (SB)	8.03	8.04	0.1	10.1	39.2	32.0	
	4 - Swale Way	3.50	7.96	21.2	12.1	39.2	55.0	
	5 - Grovehurst Road	3.73	7.17	15.3	19.5	44.6	39.0	

Slope / Intercept / Capacity

Arm Intercept Adjustments

Junction	Arm	Type	Reason	Direct intercept adjustment (PCU/hr)
1 - North	1 - A249 offslip (NB)	Direct		-1050
	2 - Grovehurst Road	Direct		-400
	3 - A249 onslip (NB)			
	4 - B2005 - link	None		
2 - South	1 - A249 onslip (SB)			
	2 - B2005 - link	Direct		500
	3 - A249 offslip (SB)	Direct		-730
	4 - Swale Way	Direct		-575
	5 - Grovehurst Road	Direct		-550

Roundabout Slope and Intercept used in model

Junction	Arm	Final slope	Final intercept (PCU/hr)
1 - North	1 - A249 offslip (NB)	0.777	1330
	2 - Grovehurst Road	0.591	1170
	3 - A249 onslip (NB)		
	4 - B2005 - link	0.611	1622
2 - South	1 - A249 onslip (SB)		
	2 - B2005 - link	0.624	2088
	3 - A249 offslip (SB)	0.748	1572
	4 - Swale Way	0.597	1071
	5 - Grovehurst Road	0.616	1130

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

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	2018	AM	ONE HOUR	07:15	08:45	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Linked Arm Data

Junction	Arm	Feeding Junction	Feeding Arm	Link Type	Flow source	Uniform flow (Veh/hr)	Flow multiplier (%)	Internal storage space (PCU)
1 - North	4 - B2005 - link	2	2	Q limited	Normal	0	100.00	20.00
2 - South	2 - B2005 - link	1	4	Q limited	Normal	0	100.00	20.00

Demand overview (Traffic)

Junction	Arm	Linked arm	Profile type	Use O-D data	Av. Demand (Veh/hr)	Scaling Factor (%)
1 - North	1 - A249 offslip (NB)		ONE HOUR	✓	676	100.000
	2 - Grovehurst Road		ONE HOUR	✓	402	100.000
	3 - A249 onslip (NB)					
	4 - B2005 - link	✓				
2 - South	1 - A249 onslip (SB)					
	2 - B2005 - link	✓				
	3 - A249 offslip (SB)		ONE HOUR	✓	524	100.000
	4 - Swale Way		ONE HOUR	✓	550	100.000
	5 - Grovehurst Road		ONE HOUR	✓	580	100.000

Origin-Destination Data

1 - North

Demand (Veh/hr)

		To			
		1 - A249 offslip (NB)	2 - Grovehurst Road	3 - A249 onslip (NB)	4 - B2005 - link
From	1 - A249 offslip (NB)	0	42	0	634
	2 - Grovehurst Road	0	0	25	377
	3 - A249 onslip (NB)	Exit-only	Exit-only	Exit-only	Exit-only
	4 - B2005 - link	0	138	309	0

2 - South

Demand (Veh/hr)

		To				
		1 - A249 onslip (SB)	2 - B2005 - link	3 - A249 offslip (SB)	4 - Swale Way	5 - Grovehurst Road
From	1 - A249 onslip (SB)	Exit-only	Exit-only	Exit-only	Exit-only	Exit-only
	2 - B2005 - link	143	0	0	682	185
	3 - A249 offslip (SB)	1	18	0	329	176
	4 - Swale Way	288	196	0	0	66
	5 - Grovehurst Road	208	236	0	136	0

Vehicle Mix

1 - North

HV %s

		To			
		1 - A249 offslip (NB)	2 - Grovehurst Road	3 - A249 onslip (NB)	4 - B2005 - link
From	1 - A249 offslip (NB)	0	7	0	14
	2 - Grovehurst Road	0	0	8	3
	3 - A249 onslip (NB)	Exit-only	Exit-only	Exit-only	Exit-only
	4 - B2005 - link	0	3	5	0

2 - South

HV %s

		To				
		1 - A249 onslip (SB)	2 - B2005 - link	3 - A249 offslip (SB)	4 - Swale Way	5 - Grovehurst Road
From	1 - A249 onslip (SB)	Exit-only	Exit-only	Exit-only	Exit-only	Exit-only
	2 - B2005 - link	0	0	0	13	6
	3 - A249 offslip (SB)	0	6	0	5	4
	4 - Swale Way	32	7	0	0	6
	5 - Grovehurst Road	1	2	0	3	0

Results

Results Summary for whole modelled period

Junction	Arm	Max RFC	Max delay (s)	Max Q (Veh)	Max Q95 (Veh)	Max LOS	Av. Demand (Veh/hr)	Total Junction Arrivals (Veh)
1 - North	1 - A249 offslip (NB)	0.89	36.33	7.0	38.4	E	620	930
	2 - Grovehurst Road	0.92	64.89	7.4	36.6	F	369	553
	3 - A249 onslip (NB)							
	4 - B2005 - link	0.30	3.33	0.4	1.8	A	412	618
2 - South	1 - A249 onslip (SB)							
	2 - B2005 - link	0.61	5.04	1.5	2.1	A	927	1390
	3 - A249 offslip (SB)	1.09	164.76	28.7	67.8	F	481	721
	4 - Swale Way	1.00	99.20	16.4	58.0	F	505	757
	5 - Grovehurst Road	1.03	114.57	20.7	63.4	F	532	798

Main Results for each time segment

07:15 - 07:30

Junction	Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
1 - North	1 - A249 offslip (NB)	509	127	333	933	0.545	504	0	0.0	1.2	8.306	A
	2 - Grovehurst Road	303	76	703	685	0.442	300	134	0.0	0.8	9.257	A
	3 - A249 onslip (NB)			754				249				
	4 - B2005 - link	334	84	0	1554	0.215	333	754	0.0	0.3	2.945	A
2 - South	1 - A249 onslip (SB)			436				476				
	2 - B2005 - link	754	188	101	1841	0.409	751	335	0.0	0.7	3.294	A
	3 - A249 offslip (SB)	394	99	852	838	0.471	391	0	0.0	0.9	8.001	A
	4 - Swale Way	414	104	389	692	0.598	408	854	0.0	1.4	12.446	B
	5 - Grovehurst Road	437	109	480	771	0.566	432	318	0.0	1.3	10.450	B

07:30 - 07:45

Junction	Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
1 - North	1 - A249 offslip (NB)	608	152	400	886	0.686	604	0	1.2	2.1	12.609	B
	2 - Grovehurst Road	361	90	843	597	0.606	359	161	0.8	1.5	14.937	B
	3 - A249 onslip (NB)			903				299				

	4 - B2005 - link	400	100	0	1554	0.257	400	903	0.3	0.3	3.117	A
2 - South	1 - A249 onslip (SB)			521				570				
	2 - B2005 - link	903	226	121	1830	0.494	902	400	0.7	1.0	3.875	A
	3 - A249 offslip (SB)	471	118	1023	705	0.668	467	0	0.9	1.9	14.877	B
	4 - Swale Way	494	124	467	652	0.758	489	1023	1.4	2.9	21.271	C
	5 - Grovehurst Road	521	130	575	704	0.740	516	381	1.3	2.6	18.561	C

07:45 - 08:00

Junction	Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
1 - North	1 - A249 offslip (NB)	744	186	464	840	0.886	728	0	2.1	6.1	28.857	D
	2 - Grovehurst Road	443	111	1004	494	0.896	426	188	1.5	5.7	44.668	E
	3 - A249 onslip (NB)			1082				347				
	4 - B2005 - link	464	116	0	1554	0.299	464	1082	0.3	0.4	3.301	A
2 - South	1 - A249 onslip (SB)			604				667				
	2 - B2005 - link	1083	271	140	1819	0.595	1081	464	1.0	1.5	4.868	A
	3 - A249 offslip (SB)	577	144	1221	550	1.048	523	0	1.9	15.5	78.688	F
	4 - Swale Way	606	151	545	612	0.990	571	1198	2.9	11.5	61.395	F
	5 - Grovehurst Road	639	160	674	635	1.006	597	442	2.6	13.0	63.728	F

08:00 - 08:15

Junction	Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
1 - North	1 - A249 offslip (NB)	744	186	474	833	0.894	740	0	6.1	7.0	36.329	E
	2 - Grovehurst Road	443	111	1022	482	0.918	436	192	5.7	7.4	64.888	F
	3 - A249 onslip (NB)			1103				355				
	4 - B2005 - link	474	119	0	1554	0.305	474	1103	0.4	0.4	3.331	A
2 - South	1 - A249 onslip (SB)			617				682				
	2 - B2005 - link	1104	276	143	1817	0.607	1103	474	1.5	1.5	5.041	A
	3 - A249 offslip (SB)	577	144	1246	531	1.087	524	0	15.5	28.7	164.763	F
	4 - Swale Way	606	151	553	608	0.997	586	1217	11.5	16.4	99.201	F
	5 - Grovehurst Road	639	160	691	623	1.025	608	449	13.0	20.7	114.567	F

08:15 - 08:30

Junction	Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
1 - North	1 - A249 offslip (NB)	608	152	452	849	0.716	625	0	7.0	2.7	17.203	C
	2 - Grovehurst Road	361	90	898	562	0.643	384	178	7.4	1.9	22.329	C
	3 - A249 onslip (NB)			946				336				
	4 - B2005 - link	451	113	0	1554	0.290	452	946	0.4	0.4	3.266	A
2 - South	1 - A249 onslip (SB)			589				630				
	2 - B2005 - link	946	236	138	1820	0.520	947	452	1.5	1.1	4.133	A
	3 - A249 offslip (SB)	471	118	1085	657	0.717	574	0	28.7	2.9	70.417	F
	4 - Swale Way	494	124	521	624	0.792	542	1138	16.4	4.5	54.417	F
	5 - Grovehurst Road	521	130	632	664	0.786	587	431	20.7	4.3	61.359	F

08:30 - 08:45

Junction	Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
1 - North	1 - A249 offslip (NB)	509	127	348	922	0.552	515	0	2.7	1.3	8.943	A
	2 - Grovehurst Road	303	76	723	673	0.450	307	139	1.9	0.8	9.946	A
	3 - A249 onslip (NB)			770				260				
	4 - B2005 - link	348	87	0	1554	0.224	348	770	0.4	0.3	2.985	A
2 - South	1 - A249 onslip (SB)			453				494				
	2 - B2005 - link	771	193	105	1839	0.419	772	348	1.1	0.7	3.380	A
	3 - A249 offslip (SB)	394	99	877	818	0.482	402	0	2.9	0.9	8.808	A
	4 - Swale Way	414	104	400	687	0.603	426	879	4.5	1.6	14.364	B
	5 - Grovehurst Road	437	109	498	758	0.576	448	328	4.3	1.4	12.041	B

Q Variation Results for each time segment

07:15 - 07:30

		Mean	Q05	Q50	Q90	Q95	Percentile	Marker	Probability of	Probability of

Junction	Arm	(Veh)	(Veh)	(Veh)	(Veh)	(Veh)	message	message	reaching or exceeding marker	exactly reaching marker
1 - North	1 - A249 offslip (NB)	1.18	0.56	1.04	1.18	1.52			N/A	N/A
	2 - Grovehurst Road	0.78	0.55	1.00	1.40	1.45			N/A	N/A
	3 - A249 onslip (NB)									
	4 - B2005 - link	0.27	0.00	0.00	0.27	0.27			N/A	N/A
2 - South	1 - A249 onslip (SB)									
	2 - B2005 - link	0.69	0.55	1.00	1.40	1.45			N/A	N/A
	3 - A249 offslip (SB)	0.88	0.11	0.91	1.01	1.53			N/A	N/A
	4 - Swale Way	1.44	0.55	1.34	1.86	2.02			N/A	N/A
	5 - Grovehurst Road	1.27	0.46	1.19	1.76	1.94			N/A	N/A

07:30 - 07:45

Junction	Arm	Mean (Veh)	Q05 (Veh)	Q50 (Veh)	Q90 (Veh)	Q95 (Veh)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
1 - North	1 - A249 offslip (NB)	2.10	0.06	0.95	5.30	7.84			N/A	N/A
	2 - Grovehurst Road	1.48	0.06	0.80	3.47	4.98			N/A	N/A
	3 - A249 onslip (NB)									
	4 - B2005 - link	0.34	0.00	0.00	0.34	0.34			N/A	N/A
2 - South	1 - A249 onslip (SB)									
	2 - B2005 - link	0.97	0.07	0.85	1.69	2.11			N/A	N/A
	3 - A249 offslip (SB)	1.92	0.05	0.47	5.15	8.35			N/A	N/A
	4 - Swale Way	2.86	0.08	1.38	7.20	10.37			N/A	N/A
	5 - Grovehurst Road	2.65	0.07	1.11	6.88	10.24			N/A	N/A

07:45 - 08:00

Junction	Arm	Mean (Veh)	Q05 (Veh)	Q50 (Veh)	Q90 (Veh)	Q95 (Veh)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
1 - North	1 - A249 offslip (NB)	6.07	0.05	0.50	17.46	30.47			N/A	N/A
	2 - Grovehurst Road	5.73	0.07	1.43	16.20	25.23			N/A	N/A
	3 - A249 onslip (NB)									
	4 - B2005 - link	0.42	0.03	0.25	0.45	0.48			N/A	N/A
2 - South	1 - A249 onslip (SB)									
	2 - B2005 - link	1.45	0.03	0.26	1.45	1.45			N/A	N/A
	3 - A249 offslip (SB)	15.53	1.22	11.66	32.12	40.41			N/A	N/A
	4 - Swale Way	11.50	0.31	6.55	27.81	37.50			N/A	N/A
	5 - Grovehurst Road	13.04	0.54	8.24	30.19	39.81			N/A	N/A

08:00 - 08:15

Junction	Arm	Mean (Veh)	Q05 (Veh)	Q50 (Veh)	Q90 (Veh)	Q95 (Veh)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
1 - North	1 - A249 offslip (NB)	7.02	0.04	0.38	17.26	38.37			N/A	N/A
	2 - Grovehurst Road	7.45	0.06	0.91	21.60	36.64			N/A	N/A
	3 - A249 onslip (NB)									
	4 - B2005 - link	0.44	0.03	0.31	1.36	1.80			N/A	N/A
2 - South	1 - A249 onslip (SB)									
	2 - B2005 - link	1.53	0.03	0.26	1.53	1.53			N/A	N/A
	3 - A249 offslip (SB)	28.68	4.51	23.53	55.47	67.85			N/A	N/A
	4 - Swale Way	16.37	0.26	8.25	41.88	57.97			N/A	N/A
	5 - Grovehurst Road	20.74	0.89	13.45	48.20	63.41			N/A	N/A

08:15 - 08:30

Junction	Arm	Mean (Veh)	Q05 (Veh)	Q50 (Veh)	Q90 (Veh)	Q95 (Veh)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
1 - North	1 - A249 offslip (NB)	2.66	0.05	0.48	7.38	12.19			N/A	N/A
	2 - Grovehurst Road	1.90	0.04	0.43	5.13	8.83			N/A	N/A
	3 - A249 onslip (NB)									
	4 - B2005 - link	0.41	0.00	0.00	0.41	0.41			N/A	N/A
2 - South	1 - A249 onslip (SB)									
	2 - B2005 - link	1.09	0.52	1.07	1.29	1.65			N/A	N/A
	3 - A249 offslip (SB)	2.89	0.04	0.41	7.86	14.65			N/A	N/A
	4 - Swale Way	4.46	0.05	0.80	12.72	20.83			N/A	N/A
	5 - Grovehurst Road	4.32	0.05	0.82	12.28	19.99			N/A	N/A

08:30 - 08:45

Junction	Arm	Mean (Veh)	Q05 (Veh)	Q50 (Veh)	Q90 (Veh)	Q95 (Veh)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
1 - North	1 - A249 offslip (NB)	1.26	0.03	0.31	2.35	6.44			N/A	N/A
	2 - Grovehurst Road	0.83	0.03	0.29	1.40	3.81			N/A	N/A
	3 - A249 onslip (NB)									
	4 - B2005 - link	0.29	0.00	0.00	0.29	0.29			N/A	N/A
2 - South	1 - A249 onslip (SB)									
	2 - B2005 - link	0.73	0.09	0.82	1.40	1.47			N/A	N/A
	3 - A249 offslip (SB)	0.95	0.03	0.27	0.95	1.86			N/A	N/A
	4 - Swale Way	1.57	0.03	0.30	1.76	7.30			N/A	N/A
	5 - Grovehurst Road	1.40	0.03	0.29	1.40	5.73			N/A	N/A

2018, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Queue variations	Analysis Options	Q percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	North	Standard Roundabout	1, 2, 3, 4	100.75	F
2	South	Standard Roundabout	1, 2, 3, 4, 5	710.34	F

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D2	2018	PM	ONE HOUR	16:15	17:45	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Linked Arm Data

Junction	Arm	Feeding Junction	Feeding Arm	Link Type	Flow source	Uniform flow (Veh/hr)	Flow multiplier (%)	Internal storage space (PCU)
1 - North	4 - B2005 - link	2	2	Q limited	Normal	0	100.00	20.00
2 - South	2 - B2005 - link	1	4	Q limited	Normal	0	100.00	20.00

Demand overview (Traffic)

Junction	Arm	Linked arm	Profile type	Use O-D data	Av. Demand (Veh/hr)	Scaling Factor (%)
1 - North	1 - A249 offslip (NB)		ONE HOUR	✓	757	100.000
	2 - Grovehurst Road		ONE HOUR	✓	224	100.000
	3 - A249 onslip (NB)					
	4 - B2005 - link	✓				
2 - South	1 - A249 onslip (SB)					
	2 - B2005 - link	✓				
	3 - A249 offslip (SB)		ONE HOUR	✓	435	100.000
	4 - Swale Way		ONE HOUR	✓	1000	100.000
	5 - Grovehurst Road		ONE HOUR	✓	534	100.000

Origin-Destination Data

Demand (Veh/hr)

1 - North

		To			
		1 - A249 offslip (NB)	2 - Grovehurst Road	3 - A249 onslip (NB)	4 - B2005 - link
From	1 - A249 offslip (NB)	0	182	0	575
	2 - Grovehurst Road	0	0	27	197
	3 - A249 onslip (NB)	Exit-only	Exit-only	Exit-only	Exit-only
	4 - B2005 - link	0	237	475	0

2 - South

Demand (Veh/hr)

		To				
		1 - A249 onslip (SB)	2 - B2005 - link	3 - A249 offslip (SB)	4 - Swale Way	5 - Grovehurst Road
From	1 - A249 onslip (SB)	Exit-only	Exit-only	Exit-only	Exit-only	Exit-only
	2 - B2005 - link	42	0	0	401	326
	3 - A249 offslip (SB)	1	27	0	189	218
	4 - Swale Way	515	355	0	0	130
	5 - Grovehurst Road	111	322	0	101	0

Vehicle Mix

1 - North

HV %s

		To			
		1 - A249 offslip (NB)	2 - Grovehurst Road	3 - A249 onslip (NB)	4 - B2005 - link
From	1 - A249 offslip (NB)	0	1	0	16
	2 - Grovehurst Road	0	0	0	1
	3 - A249 onslip (NB)	Exit-only	Exit-only	Exit-only	Exit-only
	4 - B2005 - link	0	0	3	0

2 - South

HV %s

		To				
		1 - A249 onslip (SB)	2 - B2005 - link	3 - A249 offslip (SB)	4 - Swale Way	5 - Grovehurst Road
From	1 - A249 onslip (SB)	Exit-only	Exit-only	Exit-only	Exit-only	Exit-only
	2 - B2005 - link	2	0	0	22	1
	3 - A249 offslip (SB)	0	11	0	7	4
	4 - Swale Way	14	2	0	0	2
	5 - Grovehurst Road	0	2	0	3	0

Results

Results Summary for whole modelled period

Junction	Arm	Max RFC	Max delay (s)	Max Q (Veh)	Max Q95 (Veh)	Max LOS	Av. Demand (Veh/hr)	Total Junction Arrivals (Veh)
1 - North	1 - A249 offslip (NB)	1.10	194.81	48.6	96.7	F	695	1042
	2 - Grovehurst Road	0.47	12.83	0.9	3.7	B	206	308
	3 - A249 onslip (NB)							
	4 - B2005 - link	0.38	3.66	0.6	2.0	A	557	836
2 - South	1 - A249 onslip (SB)							
	2 - B2005 - link	0.44	3.55	0.8	1.6	A	708	1062
	3 - A249 offslip (SB)	0.61	11.82	1.5	4.0	B	399	599
	4 - Swale Way	1.76	1913.79	380.9	184.9	F	918	1376
	5 - Grovehurst Road	0.84	29.78	4.6	23.5	D	490	735

Main Results for each time segment

16:15 - 16:30

Junction	Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
1 - North	1 - A249 offslip (NB)	570	142	504	828	0.688	561	0	0.0	2.1	13.112	B
	2 - Grovehurst Road	169	42	762	667	0.253	167	303	0.0	0.3	7.187	A
	3 - A249 onslip (NB)			574				356				
	4 - B2005 - link	505	126	0	1591	0.318	504	574	0.0	0.5	3.306	A
	1 - A249 onslip (SB)			579				469				
	2 - B2005 - link	574	144	75	1821	0.315	573	504	0.0	0.5	2.879	A

2 - South	3 - A249 offslip (SB)	327	82	648	979	0.335	325	0	0.0	0.5	5.496	A
	4 - Swale Way	753	188	458	731	1.030	688	515	0.0	16.1	57.360	F
	5 - Grovehurst Road	402	101	651	682	0.590	396	495	0.0	1.4	12.394	B

16:30 - 16:45

Junction	Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
1 - North	1 - A249 offslip (NB)	681	170	554	793	0.859	669	0	2.1	5.0	26.778	D
	2 - Grovehurst Road	201	50	878	591	0.341	201	345	0.3	0.5	9.204	A
	3 - A249 onslip (NB)			684				394				
	4 - B2005 - link	555	139	0	1591	0.349	554	684	0.5	0.5	3.473	A
2 - South	1 - A249 onslip (SB)			643				487				
	2 - B2005 - link	685	171	90	1813	0.378	685	552	0.5	0.6	3.190	A
	3 - A249 offslip (SB)	391	98	775	879	0.445	390	0	0.5	0.8	7.346	A
	4 - Swale Way	899	225	548	680	1.322	678	617	16.1	71.3	250.425	F
	5 - Grovehurst Road	480	120	653	681	0.705	477	574	1.4	2.3	17.306	C

16:45 - 17:00

Junction	Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
1 - North	1 - A249 offslip (NB)	833	208	604	758	1.100	741	0	5.0	28.0	96.090	F
	2 - Grovehurst Road	247	62	966	534	0.462	245	379	0.5	0.8	12.431	B
	3 - A249 onslip (NB)			779				432				
	4 - B2005 - link	604	151	0	1591	0.380	604	779	0.5	0.6	3.648	A
2 - South	1 - A249 onslip (SB)			711				487				
	2 - B2005 - link	778	194	110	1801	0.432	777	602	0.6	0.8	3.513	A
	3 - A249 offslip (SB)	479	120	887	791	0.605	476	0	0.8	1.5	11.322	B
	4 - Swale Way	1101	275	641	627	1.755	627	722	71.3	189.8	759.551	F
	5 - Grovehurst Road	588	147	619	704	0.836	580	650	2.3	4.3	27.240	D

17:00 - 17:15

Junction	Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
1 - North	1 - A249 offslip (NB)	833	208	608	755	1.104	751	0	28.0	48.6	194.807	F
	2 - Grovehurst Road	247	62	976	527	0.468	247	383	0.8	0.9	12.829	B
	3 - A249 onslip (NB)			787				435				
	4 - B2005 - link	608	152	0	1591	0.382	608	787	0.6	0.6	3.661	A
2 - South	1 - A249 onslip (SB)			716				487				
	2 - B2005 - link	787	197	111	1801	0.437	786	605	0.8	0.8	3.549	A
	3 - A249 offslip (SB)	479	120	897	783	0.612	479	0	1.5	1.5	11.817	B
	4 - Swale Way	1101	275	647	624	1.765	624	729	189.8	309.0	1446.549	F
	5 - Grovehurst Road	588	147	617	705	0.834	587	654	4.3	4.6	29.778	D

17:15 - 17:30

Junction	Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
1 - North	1 - A249 offslip (NB)	681	170	554	792	0.859	776	0	48.6	24.6	173.225	F
	2 - Grovehurst Road	201	50	960	535	0.376	202	371	0.9	0.6	10.843	B
	3 - A249 onslip (NB)			768				394				
	4 - B2005 - link	554	139	0	1591	0.348	554	768	0.6	0.5	3.474	A
2 - South	1 - A249 onslip (SB)			645				482				
	2 - B2005 - link	771	193	92	1811	0.426	771	552	0.8	0.7	3.464	A
	3 - A249 offslip (SB)	391	98	864	808	0.484	393	0	1.5	1.0	8.724	A
	4 - Swale Way	899	225	592	656	1.371	656	666	309.0	369.8	1798.025	F
	5 - Grovehurst Road	480	120	638	691	0.695	489	609	4.6	2.4	18.529	C

17:30 - 17:45

Junction	Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
1 - North	1 - A249 offslip (NB)	570	142	518	818	0.697	658	0	24.6	2.5	34.177	D
	2 - Grovehurst Road	169	42	846	611	0.276	170	331	0.6	0.4	8.174	A
	3 - A249 onslip (NB)			649				366				
	4 - B2005 - link	518	130	0	1591	0.326	518	649	0.5	0.5	3.357	A
	1 - A249 onslip (SB)			593				486				

2 - South	2 - B2005 - link	652	163	77	1820	0.358	653	516	0.7	0.6	3.088	A
	3 - A249 offslip (SB)	327	82	730	913	0.359	329	0	1.0	0.6	6.177	A
	4 - Swale Way	753	188	499	708	1.063	708	560	369.8	380.9	1913.787	F
	5 - Grovehurst Road	402	101	673	667	0.602	405	534	2.4	1.6	13.911	B

Q Variation Results for each time segment

16:15 - 16:30

Junction	Arm	Mean (Veh)	Q05 (Veh)	Q50 (Veh)	Q90 (Veh)	Q95 (Veh)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
1 - North	1 - A249 offslip (NB)	2.10	0.24	1.26	3.78	4.77			N/A	N/A
	2 - Grovehurst Road	0.33	0.00	0.00	0.33	0.33			N/A	N/A
	3 - A249 onslip (NB)									
	4 - B2005 - link	0.46	0.00	0.00	0.46	0.46			N/A	N/A
2 - South	1 - A249 onslip (SB)									
	2 - B2005 - link	0.46	0.00	0.00	0.46	0.46			N/A	N/A
	3 - A249 offslip (SB)	0.50	0.00	0.00	0.50	0.50			N/A	N/A
	4 - Swale Way	16.11	>199	>199	>199	>199			N/A	N/A
	5 - Grovehurst Road	1.39	0.55	1.00	1.40	1.45			N/A	N/A

16:30 - 16:45

Junction	Arm	Mean (Veh)	Q05 (Veh)	Q50 (Veh)	Q90 (Veh)	Q95 (Veh)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
1 - North	1 - A249 offslip (NB)	5.04	0.12	2.07	12.77	17.96			N/A	N/A
	2 - Grovehurst Road	0.51	0.51	1.00	1.40	1.45			N/A	N/A
	3 - A249 onslip (NB)									
	4 - B2005 - link	0.53	0.53	1.00	1.40	1.45			N/A	N/A
2 - South	1 - A249 onslip (SB)									
	2 - B2005 - link	0.60	0.13	0.88	1.38	1.44			N/A	N/A
	3 - A249 offslip (SB)	0.79	0.09	0.85	1.25	1.25			N/A	N/A
	4 - Swale Way	71.28	>199	>199	>199	>199			N/A	N/A
	5 - Grovehurst Road	2.25	0.09	1.40	5.06	6.97			N/A	N/A

16:45 - 17:00

Junction	Arm	Mean (Veh)	Q05 (Veh)	Q50 (Veh)	Q90 (Veh)	Q95 (Veh)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
1 - North	1 - A249 offslip (NB)	28.05	6.57	24.25	50.20	59.85			N/A	N/A
	2 - Grovehurst Road	0.84	0.03	0.26	0.84	0.84			N/A	N/A
	3 - A249 onslip (NB)									
	4 - B2005 - link	0.61	0.03	0.25	0.61	0.61			N/A	N/A
2 - South	1 - A249 onslip (SB)									
	2 - B2005 - link	0.75	0.03	0.25	0.75	0.75			N/A	N/A
	3 - A249 offslip (SB)	1.49	0.03	0.27	1.49	2.52			N/A	N/A
	4 - Swale Way	189.75	>199	>199	>199	>199			N/A	N/A
	5 - Grovehurst Road	4.35	0.04	0.40	11.66	23.14			N/A	N/A

17:00 - 17:15

Junction	Arm	Mean (Veh)	Q05 (Veh)	Q50 (Veh)	Q90 (Veh)	Q95 (Veh)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
1 - North	1 - A249 offslip (NB)	48.59	14.77	43.64	82.63	96.72			N/A	N/A
	2 - Grovehurst Road	0.86	0.03	0.29	1.20	3.68			N/A	N/A
	3 - A249 onslip (NB)									
	4 - B2005 - link	0.62	0.03	0.28	0.62	1.99			N/A	N/A
2 - South	1 - A249 onslip (SB)									
	2 - B2005 - link	0.77	0.03	0.27	0.77	1.56			N/A	N/A
	3 - A249 offslip (SB)	1.54	0.03	0.28	1.54	3.99			N/A	N/A
	4 - Swale Way	309.04	>199	>199	>199	>199			N/A	N/A
	5 - Grovehurst Road	4.62	0.03	0.32	7.07	23.45			N/A	N/A

17:15 - 17:30

Junction	Arm	Mean (Veh)	Q05 (Veh)	Q50 (Veh)	Q90 (Veh)	Q95 (Veh)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker

1 - North	1 - A249 offslip (NB)	24.60	4.71	20.70	45.73	55.24			N/A	N/A
	2 - Grovehurst Road	0.61	0.10	0.82	1.36	1.43			N/A	N/A
	3 - A249 onslip (NB)									
	4 - B2005 - link	0.54	0.54	1.00	1.40	1.45			N/A	N/A
2 - South	1 - A249 onslip (SB)									
	2 - B2005 - link	0.75	0.55	1.00	1.40	1.45			N/A	N/A
	3 - A249 offslip (SB)	0.95	0.12	0.95	1.38	1.75			N/A	N/A
	4 - Swale Way	369.83	>199	>199	>199	>199			N/A	N/A
	5 - Grovehurst Road	2.41	0.04	0.42	6.60	11.79			N/A	N/A

17:30 - 17:45

Junction	Arm	Mean (Veh)	Q05 (Veh)	Q50 (Veh)	Q90 (Veh)	Q95 (Veh)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
1 - North	1 - A249 offslip (NB)	2.47	0.03	0.30	2.47	11.14			N/A	N/A
	2 - Grovehurst Road	0.39	0.03	0.31	1.00	1.25			N/A	N/A
	3 - A249 onslip (NB)									
	4 - B2005 - link	0.49	0.00	0.00	0.49	0.49			N/A	N/A
2 - South	1 - A249 onslip (SB)									
	2 - B2005 - link	0.56	0.55	1.00	1.40	1.45			N/A	N/A
	3 - A249 offslip (SB)	0.56	0.04	0.44	1.09	1.09			N/A	N/A
	4 - Swale Way	380.95	>199	>199	>199	>199			N/A	N/A
	5 - Grovehurst Road	1.57	0.04	0.36	3.95	7.85			N/A	N/A

2023, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Queue variations	Analysis Options	Q percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	North	Standard Roundabout	1, 2, 3, 4	135.76	F
2	South	Standard Roundabout	1, 2, 3, 4, 5	263.62	F

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D3	2023	AM	ONE HOUR	07:15	08:45	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Linked Arm Data

Junction	Arm	Feeding Junction	Feeding Arm	Link Type	Flow source	Uniform flow (Veh/hr)	Flow multiplier (%)	Internal storage space (PCU)
1 - North	4 - B2005 - link	2	2	Q limited	Normal	0	100.00	20.00
2 - South	2 - B2005 - link	1	4	Q limited	Normal	0	100.00	20.00

Demand overview (Traffic)

Junction	Arm	Linked arm	Profile type	Use O-D data	Av. Demand (Veh/hr)	Scaling Factor (%)
1 - North	1 - A249 offslip (NB)		ONE HOUR	✓	786	100.000
	2 - Grovehurst Road		ONE HOUR	✓	445	100.000
	3 - A249 onslip (NB)					
	4 - B2005 - link	✓				
2 - South	1 - A249 onslip (SB)					
	2 - B2005 - link	✓				
	3 - A249 offslip (SB)		ONE HOUR	✓	572	100.000
	4 - Swale Way		ONE HOUR	✓	641	100.000
	5 - Grovehurst Road		ONE HOUR	✓	616	100.000

Origin-Destination Data

Demand (Veh/hr)

1 - North

		To			
		1 - A249 offslip (NB)	2 - Grovehurst Road	3 - A249 onslip (NB)	4 - B2005 - link
From	1 - A249 offslip (NB)	0	42	0	744
	2 - Grovehurst Road	0	0	25	420
	3 - A249 onslip (NB)	Exit-only	Exit-only	Exit-only	Exit-only
	4 - B2005 - link	0	150	327	0

2 - South

Demand (Veh/hr)

		To				
		1 - A249 onslip (SB)	2 - B2005 - link	3 - A249 offslip (SB)	4 - Swale Way	5 - Grovehurst Road
From	1 - A249 onslip (SB)	Exit-only	Exit-only	Exit-only	Exit-only	Exit-only
	2 - B2005 - link	143	0	0	835	185
	3 - A249 offslip (SB)	1	18	0	377	176
	4 - Swale Way	338	226	0	0	77
	5 - Grovehurst Road	208	236	0	172	0

Vehicle Mix

1 - North

HV %s

		To			
		1 - A249 offslip (NB)	2 - Grovehurst Road	3 - A249 onslip (NB)	4 - B2005 - link
From	1 - A249 offslip (NB)	0	7	0	16
	2 - Grovehurst Road	0	0	8	4
	3 - A249 onslip (NB)	Exit-only	Exit-only	Exit-only	Exit-only
	4 - B2005 - link	0	5	6	0

2 - South

HV %s

		To				
		1 - A249 onslip (SB)	2 - B2005 - link	3 - A249 offslip (SB)	4 - Swale Way	5 - Grovehurst Road
From	1 - A249 onslip (SB)	Exit-only	Exit-only	Exit-only	Exit-only	Exit-only
	2 - B2005 - link	0	0	0	14	6
	3 - A249 offslip (SB)	0	6	0	9	4
	4 - Swale Way	35	9	0	0	8
	5 - Grovehurst Road	1	2	0	4	0

Results

Results Summary for whole modelled period

Junction	Arm	Max RFC	Max delay (s)	Max Q (Veh)	Max Q95 (Veh)	Max LOS	Av. Demand (Veh/hr)	Total Junction Arrivals (Veh)
1 - North	1 - A249 offslip (NB)	1.05	132.82	33.5	84.1	F	721	1082
	2 - Grovehurst Road	1.15	284.57	36.9	72.3	F	408	613
	3 - A249 onslip (NB)							
	4 - B2005 - link	0.30	3.35	0.4	1.9	A	435	653
2 - South	1 - A249 onslip (SB)							
	2 - B2005 - link	0.66	5.94	1.9	4.0	A	1072	1608
	3 - A249 offslip (SB)	1.45	823.96	120.8	174.2	F	525	787
	4 - Swale Way	1.12	243.61	46.9	91.1	F	588	882
	5 - Grovehurst Road	1.14	272.72	49.0	91.9	F	565	848

Main Results for each time segment

07:15 - 07:30

Junction	Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
1 - North	1 - A249 offslip (NB)	592	148	353	900	0.657	584	0	0.0	1.8	11.151	B
	2 - Grovehurst Road	335	84	795	613	0.547	330	142	0.0	1.2	12.545	B
	3 - A249 onslip (NB)			865				261				
	4 - B2005 - link	354	89	0	1535	0.231	353	865	0.0	0.3	3.043	A
	1 - A249 onslip (SB)			483				511				
	2 - B2005 - link	870	218	128	1807	0.482	866	355	0.0	0.9	3.815	A

2 - South	3 - A249 offslip (SB)	431	108	994	702	0.613	425	0	0.0	1.5	12.713	B
	4 - Swale Way	483	121	389	678	0.712	473	1029	0.0	2.3	16.941	C
	5 - Grovehurst Road	464	116	537	720	0.644	457	325	0.0	1.7	13.359	B

07:30 - 07:45

Junction	Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
1 - North	1 - A249 offslip (NB)	707	177	419	853	0.828	697	0	1.8	4.2	21.789	C
	2 - Grovehurst Road	400	100	947	515	0.776	393	169	1.2	3.1	27.746	D
	3 - A249 onslip (NB)			1030				310				
	4 - B2005 - link	420	105	0	1535	0.273	419	1030	0.3	0.4	3.226	A
2 - South	1 - A249 onslip (SB)			572				607				
	2 - B2005 - link	1037	259	151	1793	0.578	1035	421	0.9	1.4	4.740	A
	3 - A249 offslip (SB)	514	129	1186	555	0.927	492	0	1.5	7.1	46.468	E
	4 - Swale Way	576	144	459	642	0.898	561	1218	2.3	6.2	38.325	E
	5 - Grovehurst Road	554	138	637	648	0.854	542	383	1.7	4.8	30.774	D

07:45 - 08:00

Junction	Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
1 - North	1 - A249 offslip (NB)	865	216	457	827	1.047	799	0	4.2	20.8	71.367	F
	2 - Grovehurst Road	490	122	1070	436	1.123	422	186	3.1	20.0	120.158	F
	3 - A249 onslip (NB)			1155				337				
	4 - B2005 - link	457	114	0	1535	0.298	457	1155	0.4	0.4	3.338	A
2 - South	1 - A249 onslip (SB)			622				669				
	2 - B2005 - link	1164	291	164	1785	0.652	1162	458	1.4	1.8	5.757	A
	3 - A249 offslip (SB)	630	157	1326	447	1.409	445	0	7.1	53.5	265.695	F
	4 - Swale Way	706	176	479	632	1.116	620	1291	6.2	27.6	115.641	F
	5 - Grovehurst Road	678	170	703	601	1.129	588	396	4.8	27.3	116.089	F

08:00 - 08:15

Junction	Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
1 - North	1 - A249 offslip (NB)	865	216	461	824	1.051	814	0	20.8	33.5	132.825	F
	2 - Grovehurst Road	490	122	1087	425	1.153	422	188	20.0	36.9	260.174	F
	3 - A249 onslip (NB)			1170				340				
	4 - B2005 - link	461	115	0	1535	0.300	461	1170	0.4	0.4	3.350	A
2 - South	1 - A249 onslip (SB)			627				677				
	2 - B2005 - link	1179	295	165	1785	0.661	1179	462	1.8	1.9	5.938	A
	3 - A249 offslip (SB)	630	157	1344	433	1.453	433	0	53.5	102.6	656.710	F
	4 - Swale Way	706	176	480	632	1.117	629	1297	27.6	46.9	227.041	F
	5 - Grovehurst Road	678	170	713	594	1.142	591	396	27.3	49.0	245.864	F

08:15 - 08:30

Junction	Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
1 - North	1 - A249 offslip (NB)	707	177	457	827	0.855	804	0	33.5	9.2	103.885	F
	2 - Grovehurst Road	400	100	1074	433	0.923	422	187	36.9	31.5	284.575	F
	3 - A249 onslip (NB)			1159				337				
	4 - B2005 - link	457	114	0	1535	0.298	457	1159	0.4	0.4	3.337	A
2 - South	1 - A249 onslip (SB)			622				670				
	2 - B2005 - link	1168	292	165	1785	0.655	1168	458	1.9	1.9	5.840	A
	3 - A249 offslip (SB)	514	129	1333	442	1.164	442	0	102.6	120.8	823.958	F
	4 - Swale Way	576	144	480	632	0.912	619	1294	46.9	36.3	243.610	F
	5 - Grovehurst Road	554	138	703	601	0.921	589	396	49.0	40.1	272.716	F

08:30 - 08:45

Junction	Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
1 - North	1 - A249 offslip (NB)	592	148	462	823	0.719	618	0	9.2	2.7	19.401	C
	2 - Grovehurst Road	335	84	901	547	0.612	454	178	31.5	1.7	77.182	F
	3 - A249 onslip (NB)			1013				342				
	4 - B2005 - link	462	115	0	1535	0.301	462	1013	0.4	0.4	3.353	A
	1 - A249 onslip (SB)			631				651				

2 - South	2 - B2005 - link	1012	253	168	1783	0.568	1015	463	1.9	1.3	4.699	A
	3 - A249 offslip (SB)	431	108	1183	558	0.772	554	0	120.8	90.1	687.136	F
	4 - Swale Way	483	121	475	634	0.761	610	1261	36.3	4.5	124.539	F
	5 - Grovehurst Road	464	116	680	616	0.753	602	405	40.1	5.5	146.916	F

Q Variation Results for each time segment

07:15 - 07:30

Junction	Arm	Mean (Veh)	Q05 (Veh)	Q50 (Veh)	Q90 (Veh)	Q95 (Veh)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
1 - North	1 - A249 offslip (NB)	1.85	0.27	1.09	3.05	3.86			N/A	N/A
	2 - Grovehurst Road	1.17	0.09	1.01	1.97	2.69			N/A	N/A
	3 - A249 onslip (NB)									
	4 - B2005 - link	0.30	0.00	0.00	0.30	0.30			N/A	N/A
2 - South	1 - A249 onslip (SB)									
	2 - B2005 - link	0.92	0.55	1.00	1.40	1.45			N/A	N/A
	3 - A249 offslip (SB)	1.53	0.03	0.28	1.53	4.21			N/A	N/A
	4 - Swale Way	2.32	0.19	1.32	4.52	5.80			N/A	N/A
	5 - Grovehurst Road	1.74	0.09	1.23	3.65	4.90			N/A	N/A

07:30 - 07:45

Junction	Arm	Mean (Veh)	Q05 (Veh)	Q50 (Veh)	Q90 (Veh)	Q95 (Veh)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
1 - North	1 - A249 offslip (NB)	4.24	0.09	1.41	11.03	15.95			N/A	N/A
	2 - Grovehurst Road	3.05	0.07	1.31	7.91	11.61			N/A	N/A
	3 - A249 onslip (NB)									
	4 - B2005 - link	0.37	0.00	0.00	0.37	0.37			N/A	N/A
2 - South	1 - A249 onslip (SB)									
	2 - B2005 - link	1.35	0.07	0.92	2.87	3.98			N/A	N/A
	3 - A249 offslip (SB)	7.15	0.06	1.15	20.74	34.14			N/A	N/A
	4 - Swale Way	6.22	0.22	3.44	14.59	19.60			N/A	N/A
	5 - Grovehurst Road	4.75	0.10	1.80	12.21	17.39			N/A	N/A

07:45 - 08:00

Junction	Arm	Mean (Veh)	Q05 (Veh)	Q50 (Veh)	Q90 (Veh)	Q95 (Veh)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
1 - North	1 - A249 offslip (NB)	20.81	2.04	16.02	42.62	53.29			N/A	N/A
	2 - Grovehurst Road	20.00	4.30	17.04	36.07	43.20			N/A	N/A
	3 - A249 onslip (NB)									
	4 - B2005 - link	0.42	0.03	0.25	0.45	0.48			N/A	N/A
2 - South	1 - A249 onslip (SB)									
	2 - B2005 - link	1.84	0.03	0.26	1.84	1.84			N/A	N/A
	3 - A249 offslip (SB)	53.46	24.03	50.32	80.66	91.00			N/A	N/A
	4 - Swale Way	27.61	7.16	24.18	48.31	57.20			N/A	N/A
	5 - Grovehurst Road	27.29	7.31	24.00	47.36	55.91			N/A	N/A

08:00 - 08:15

Junction	Arm	Mean (Veh)	Q05 (Veh)	Q50 (Veh)	Q90 (Veh)	Q95 (Veh)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
1 - North	1 - A249 offslip (NB)	33.54	4.09	26.58	67.78	84.13			N/A	N/A
	2 - Grovehurst Road	36.91	11.54	33.19	61.96	72.29			N/A	N/A
	3 - A249 onslip (NB)									
	4 - B2005 - link	0.43	0.03	0.30	1.29	1.85			N/A	N/A
2 - South	1 - A249 onslip (SB)									
	2 - B2005 - link	1.92	0.03	0.26	1.92	1.92			N/A	N/A
	3 - A249 offslip (SB)	102.64	63.04	99.91	137.00	148.97			N/A	N/A
	4 - Swale Way	46.86	15.18	42.42	78.25	91.08			N/A	N/A
	5 - Grovehurst Road	48.98	17.43	44.86	79.65	91.95			N/A	N/A

08:15 - 08:30

Junction	Arm	Mean (Veh)	Q05 (Veh)	Q50 (Veh)	Q90 (Veh)	Q95 (Veh)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker

1 - North	1 - A249 offslip (NB)	9.17	0.09	2.53	25.65	38.45			N/A	N/A
	2 - Grovehurst Road	31.46	14.50	29.54	46.56	52.33			N/A	N/A
	3 - A249 onslip (NB)									
	4 - B2005 - link	0.42	0.00	0.00	0.42	0.42			N/A	N/A
2 - South	1 - A249 onslip (SB)									
	2 - B2005 - link	1.91	0.55	1.28	2.86	3.48			N/A	N/A
	3 - A249 offslip (SB)	120.81	75.08	117.78	160.51	174.24			N/A	N/A
	4 - Swale Way	36.28	9.89	32.07	63.14	74.54			N/A	N/A
	5 - Grovehurst Road	40.12	13.53	36.45	66.05	76.59			N/A	N/A

08:30 - 08:45

Junction	Arm	Mean (Veh)	Q05 (Veh)	Q50 (Veh)	Q90 (Veh)	Q95 (Veh)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
1 - North	1 - A249 offslip (NB)	2.72	0.03	0.33	5.10	14.35			N/A	N/A
	2 - Grovehurst Road	1.73	0.03	0.29	1.73	6.87			N/A	N/A
	3 - A249 onslip (NB)									
	4 - B2005 - link	0.43	0.00	0.00	0.43	0.43			N/A	N/A
2 - South	1 - A249 onslip (SB)									
	2 - B2005 - link	1.33	0.18	1.20	1.98	2.63			N/A	N/A
	3 - A249 offslip (SB)	90.08	44.32	85.86	132.05	147.56			N/A	N/A
	4 - Swale Way	4.48	0.04	0.40	11.91	23.93			N/A	N/A
	5 - Grovehurst Road	5.55	0.05	0.73	15.97	26.93			N/A	N/A

2023, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Queue variations	Analysis Options	Q percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	North	Standard Roundabout	1, 2, 3, 4	173.09	F
2	South	Standard Roundabout	1, 2, 3, 4, 5	1454.42	F

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D4	2023	PM	ONE HOUR	16:15	17:45	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Linked Arm Data

Junction	Arm	Feeding Junction	Feeding Arm	Link Type	Flow source	Uniform flow (Veh/hr)	Flow multiplier (%)	Internal storage space (PCU)
1 - North	4 - B2005 - link	2	2	Q limited	Normal	0	100.00	20.00
2 - South	2 - B2005 - link	1	4	Q limited	Normal	0	100.00	20.00

Demand overview (Traffic)

Junction	Arm	Linked arm	Profile type	Use O-D data	Av. Demand (Veh/hr)	Scaling Factor (%)
1 - North	1 - A249 offslip (NB)		ONE HOUR	✓	791	100.000
	2 - Grovehurst Road		ONE HOUR	✓	230	100.000
	3 - A249 onslip (NB)					
	4 - B2005 - link	✓				
2 - South	1 - A249 onslip (SB)					
	2 - B2005 - link	✓				
	3 - A249 offslip (SB)		ONE HOUR	✓	443	100.000
	4 - Swale Way		ONE HOUR	✓	1237	100.000
	5 - Grovehurst Road		ONE HOUR	✓	539	100.000

Origin-Destination Data

Demand (Veh/hr)

1 - North

		To			
		1 - A249 offslip (NB)	2 - Grovehurst Road	3 - A249 onslip (NB)	4 - B2005 - link
From	1 - A249 offslip (NB)	0	182	0	609
	2 - Grovehurst Road	0	0	27	203
	3 - A249 onslip (NB)	Exit-only	Exit-only	Exit-only	Exit-only
	4 - B2005 - link	0	269	529	0

2 - South

Demand (Veh/hr)

		To				
		1 - A249 onslip (SB)	2 - B2005 - link	3 - A249 offslip (SB)	4 - Swale Way	5 - Grovehurst Road
From	1 - A249 onslip (SB)	Exit-only	Exit-only	Exit-only	Exit-only	Exit-only
	2 - B2005 - link	42	0	0	441	326
	3 - A249 offslip (SB)	1	27	0	197	218
	4 - Swale Way	630	443	0	0	164
	5 - Grovehurst Road	111	322	0	106	0

Vehicle Mix

1 - North

HV %s

		To			
		1 - A249 offslip (NB)	2 - Grovehurst Road	3 - A249 onslip (NB)	4 - B2005 - link
From	1 - A249 offslip (NB)	0	1	0	19
	2 - Grovehurst Road	0	0	0	1
	3 - A249 onslip (NB)	Exit-only	Exit-only	Exit-only	Exit-only
	4 - B2005 - link	0	1	3	0

2 - South

HV %s

		To				
		1 - A249 onslip (SB)	2 - B2005 - link	3 - A249 offslip (SB)	4 - Swale Way	5 - Grovehurst Road
From	1 - A249 onslip (SB)	Exit-only	Exit-only	Exit-only	Exit-only	Exit-only
	2 - B2005 - link	2	0	0	25	1
	3 - A249 offslip (SB)	0	11	0	8	4
	4 - Swale Way	15	2	0	0	2
	5 - Grovehurst Road	0	2	0	3	0

Results

Results Summary for whole modelled period

Junction	Arm	Max RFC	Max delay (s)	Max Q (Veh)	Max Q95 (Veh)	Max LOS	Av. Demand (Veh/hr)	Total Junction Arrivals (Veh)
1 - North	1 - A249 offslip (NB)	1.18	330.10	76.5	125.3	F	726	1089
	2 - Grovehurst Road	0.49	13.43	0.9	3.6	B	211	317
	3 - A249 onslip (NB)							
	4 - B2005 - link	0.38	3.69	0.6	2.0	A	559	839
2 - South	1 - A249 onslip (SB)							
	2 - B2005 - link	0.45	3.68	0.8	1.4	A	739	1109
	3 - A249 offslip (SB)	0.64	13.04	1.7	4.6	B	407	610
	4 - Swale Way	2.16	3532.84	701.3	184.1	F	1135	1703
	5 - Grovehurst Road	0.85	32.04	5.0	26.4	D	495	742

Main Results for each time segment

16:15 - 16:30

Junction	Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
1 - North	1 - A249 offslip (NB)	596	149	513	803	0.742	585	0	0.0	2.7	15.829	C
	2 - Grovehurst Road	173	43	791	640	0.270	172	308	0.0	0.4	7.660	A
	3 - A249 onslip (NB)			602				360				
	4 - B2005 - link	515	129	0	1586	0.325	513	602	0.0	0.5	3.352	A
	1 - A249 onslip (SB)			594				479				
	2 - B2005 - link	604	151	79	1785	0.338	601	515	0.0	0.5	3.036	A

2 - South	3 - A249 offslip (SB)	334	83	680	940	0.355	331	0	0.0	0.5	5.895	A
	4 - Swale Way	931	233	458	728	1.278	715	554	0.0	54.0	147.832	F
	5 - Grovehurst Road	406	101	673	666	0.610	400	500	0.0	1.5	13.265	B

16:30 - 16:45

Junction	Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
1 - North	1 - A249 offslip (NB)	711	178	555	774	0.919	692	0	2.7	7.5	37.045	E
	2 - Grovehurst Road	207	52	900	566	0.365	206	346	0.4	0.6	9.973	A
	3 - A249 onslip (NB)			714				392				
	4 - B2005 - link	555	139	0	1586	0.350	555	714	0.5	0.5	3.492	A
2 - South	1 - A249 onslip (SB)			649				483				
	2 - B2005 - link	716	179	95	1776	0.403	716	555	0.5	0.7	3.392	A
	3 - A249 offslip (SB)	398	100	810	837	0.476	397	0	0.5	0.9	8.162	A
	4 - Swale Way	1112	278	546	679	1.639	678	661	54.0	162.4	601.601	F
	5 - Grovehurst Road	485	121	651	680	0.712	481	574	1.5	2.3	17.775	C

16:45 - 17:00

Junction	Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
1 - North	1 - A249 offslip (NB)	871	218	606	739	1.179	731	0	7.5	42.4	137.956	F
	2 - Grovehurst Road	253	63	965	525	0.483	252	372	0.6	0.9	13.129	B
	3 - A249 onslip (NB)			785				431				
	4 - B2005 - link	606	152	0	1586	0.382	606	785	0.5	0.6	3.674	A
2 - South	1 - A249 onslip (SB)			720				485				
	2 - B2005 - link	784	196	115	1765	0.444	783	605	0.7	0.8	3.665	A
	3 - A249 offslip (SB)	488	122	898	767	0.636	485	0	0.9	1.7	12.587	B
	4 - Swale Way	1362	340	625	633	2.150	633	757	162.4	344.5	1447.823	F
	5 - Grovehurst Road	593	148	621	700	0.847	584	638	2.3	4.7	28.801	D

17:00 - 17:15

Junction	Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
1 - North	1 - A249 offslip (NB)	871	218	610	736	1.184	734	0	42.4	76.5	299.135	F
	2 - Grovehurst Road	253	63	970	521	0.486	253	375	0.9	0.9	13.428	B
	3 - A249 onslip (NB)			789				434				
	4 - B2005 - link	610	153	0	1586	0.385	610	789	0.6	0.6	3.690	A
2 - South	1 - A249 onslip (SB)			726				486				
	2 - B2005 - link	787	197	116	1764	0.446	787	610	0.8	0.8	3.685	A
	3 - A249 offslip (SB)	488	122	904	763	0.639	488	0	1.7	1.7	13.043	B
	4 - Swale Way	1362	340	629	632	2.157	632	762	344.5	527.2	2397.255	F
	5 - Grovehurst Road	593	148	619	701	0.846	592	641	4.7	5.0	32.038	D

17:15 - 17:30

Junction	Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
1 - North	1 - A249 offslip (NB)	711	178	558	772	0.921	762	0	76.5	63.8	330.103	F
	2 - Grovehurst Road	207	52	956	527	0.392	208	363	0.9	0.7	11.309	B
	3 - A249 onslip (NB)			770				394				
	4 - B2005 - link	557	139	0	1586	0.352	558	770	0.6	0.5	3.505	A
2 - South	1 - A249 onslip (SB)			654				480				
	2 - B2005 - link	774	194	97	1775	0.436	774	557	0.8	0.8	3.600	A
	3 - A249 offslip (SB)	398	100	871	788	0.506	401	0	1.7	1.0	9.377	A
	4 - Swale Way	1112	278	575	663	1.679	663	698	527.2	639.5	3103.570	F
	5 - Grovehurst Road	485	121	640	687	0.705	494	597	5.0	2.5	19.495	C

17:30 - 17:45

Junction	Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
1 - North	1 - A249 offslip (NB)	596	149	511	805	0.740	792	0	63.8	14.6	183.881	F
	2 - Grovehurst Road	173	43	948	530	0.327	174	354	0.7	0.5	10.127	B
	3 - A249 onslip (NB)			763				359				
	4 - B2005 - link	510	128	0	1586	0.322	511	763	0.5	0.5	3.351	A
	1 - A249 onslip (SB)			591				474				

2 - South	2 - B2005 - link	772	193	81	1784	0.432	772	510	0.8	0.8	3.554	A
	3 - A249 offslip (SB)	334	83	852	802	0.416	335	0	1.0	0.7	7.732	A
	4 - Swale Way	931	233	537	684	1.361	684	650	639.5	701.3	3532.844	F
	5 - Grovehurst Road	406	101	655	678	0.599	410	566	2.5	1.5	13.625	B

Q Variation Results for each time segment

16:15 - 16:30

Junction	Arm	Mean (Veh)	Q05 (Veh)	Q50 (Veh)	Q90 (Veh)	Q95 (Veh)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
1 - North	1 - A249 offslip (NB)	2.68	0.12	1.29	5.92	7.98			N/A	N/A
	2 - Grovehurst Road	0.37	0.00	0.00	0.37	0.37			N/A	N/A
	3 - A249 onslip (NB)									
	4 - B2005 - link	0.48	0.00	0.00	0.48	0.48			N/A	N/A
2 - South	1 - A249 onslip (SB)									
	2 - B2005 - link	0.51	0.51	1.00	1.40	1.45			N/A	N/A
	3 - A249 offslip (SB)	0.54	0.54	1.00	1.40	1.45			N/A	N/A
	4 - Swale Way	54.02	>199	>199	>199	>199			N/A	N/A
	5 - Grovehurst Road	1.50	1.05	1.50	1.90	1.95			N/A	N/A

16:30 - 16:45

Junction	Arm	Mean (Veh)	Q05 (Veh)	Q50 (Veh)	Q90 (Veh)	Q95 (Veh)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
1 - North	1 - A249 offslip (NB)	7.51	0.22	4.03	18.10	24.54			N/A	N/A
	2 - Grovehurst Road	0.57	0.55	1.00	1.40	1.45			N/A	N/A
	3 - A249 onslip (NB)									
	4 - B2005 - link	0.54	0.54	1.00	1.40	1.45			N/A	N/A
2 - South	1 - A249 onslip (SB)									
	2 - B2005 - link	0.67	0.18	0.92	1.38	1.44			N/A	N/A
	3 - A249 offslip (SB)	0.89	0.09	0.88	1.32	1.73			N/A	N/A
	4 - Swale Way	162.41	>199	>199	>199	>199			N/A	N/A
	5 - Grovehurst Road	2.33	0.09	1.42	5.32	7.34			N/A	N/A

16:45 - 17:00

Junction	Arm	Mean (Veh)	Q05 (Veh)	Q50 (Veh)	Q90 (Veh)	Q95 (Veh)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
1 - North	1 - A249 offslip (NB)	42.40	16.82	39.29	66.54	76.01			N/A	N/A
	2 - Grovehurst Road	0.91	0.03	0.26	0.91	0.91			N/A	N/A
	3 - A249 onslip (NB)									
	4 - B2005 - link	0.61	0.03	0.25	0.61	0.61			N/A	N/A
2 - South	1 - A249 onslip (SB)									
	2 - B2005 - link	0.79	0.03	0.25	0.79	0.79			N/A	N/A
	3 - A249 offslip (SB)	1.68	0.03	0.28	1.68	4.57			N/A	N/A
	4 - Swale Way	344.54	>199	>199	>199	>199			N/A	N/A
	5 - Grovehurst Road	4.65	0.04	0.42	12.80	24.31			N/A	N/A

17:00 - 17:15

Junction	Arm	Mean (Veh)	Q05 (Veh)	Q50 (Veh)	Q90 (Veh)	Q95 (Veh)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
1 - North	1 - A249 offslip (NB)	76.51	37.55	72.85	112.12	125.33			N/A	N/A
	2 - Grovehurst Road	0.93	0.03	0.28	0.97	3.58			N/A	N/A
	3 - A249 onslip (NB)									
	4 - B2005 - link	0.62	0.03	0.28	0.62	1.99			N/A	N/A
2 - South	1 - A249 onslip (SB)									
	2 - B2005 - link	0.80	0.03	0.27	0.80	1.31			N/A	N/A
	3 - A249 offslip (SB)	1.73	0.03	0.28	1.73	4.25			N/A	N/A
	4 - Swale Way	527.15	>199	>199	>199	>199			N/A	N/A
	5 - Grovehurst Road	4.99	0.03	0.33	8.95	26.38			N/A	N/A

17:15 - 17:30

Junction	Arm	Mean (Veh)	Q05 (Veh)	Q50 (Veh)	Q90 (Veh)	Q95 (Veh)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker

1 - North	1 - A249 offslip (NB)	63.78	28.27	60.01	96.89	109.50			N/A	N/A
	2 - Grovehurst Road	0.66	0.09	0.81	1.37	1.44			N/A	N/A
	3 - A249 onslip (NB)									
	4 - B2005 - link	0.55	0.55	1.00	1.40	1.45			N/A	N/A
2 - South	1 - A249 onslip (SB)									
	2 - B2005 - link	0.78	0.55	1.00	1.40	1.45			N/A	N/A
	3 - A249 offslip (SB)	1.04	0.09	0.93	1.78	2.28			N/A	N/A
	4 - Swale Way	639.54	>199	>199	>199	>199			N/A	N/A
	5 - Grovehurst Road	2.53	0.04	0.43	6.96	12.38			N/A	N/A

17:30 - 17:45

Junction	Arm	Mean (Veh)	Q05 (Veh)	Q50 (Veh)	Q90 (Veh)	Q95 (Veh)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
1 - North	1 - A249 offslip (NB)	14.62	0.56	9.17	34.13	45.13			N/A	N/A
	2 - Grovehurst Road	0.49	0.04	0.44	1.27	1.39			N/A	N/A
	3 - A249 onslip (NB)									
	4 - B2005 - link	0.48	0.00	0.00	0.48	0.48			N/A	N/A
2 - South	1 - A249 onslip (SB)									
	2 - B2005 - link	0.77	0.55	1.00	1.40	1.45			N/A	N/A
	3 - A249 offslip (SB)	0.72	0.05	0.52	1.25	1.78			N/A	N/A
	4 - Swale Way	701.28	>199	>199	>199	>199			N/A	N/A
	5 - Grovehurst Road	1.54	0.04	0.35	3.77	7.89			N/A	N/A

2023 + Development, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Queue variations	Analysis Options	Q percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	North	Standard Roundabout	1, 2, 3, 4	144.89	F
2	South	Standard Roundabout	1, 2, 3, 4, 5	274.70	F

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D5	2023 + Development	AM	ONE HOUR	07:15	08:45	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Linked Arm Data

Junction	Arm	Feeding Junction	Feeding Arm	Link Type	Flow source	Uniform flow (Veh/hr)	Flow multiplier (%)	Internal storage space (PCU)
1 - North	4 - B2005 - link	2	2	Q limited	Normal	0	100.00	20.00
2 - South	2 - B2005 - link	1	4	Q limited	Normal	0	100.00	20.00

Demand overview (Traffic)

Junction	Arm	Linked arm	Profile type	Use O-D data	Av. Demand (Veh/hr)	Scaling Factor (%)
1 - North	1 - A249 offslip (NB)		ONE HOUR	✓	794	100.000
	2 - Grovehurst Road		ONE HOUR	✓	445	100.000
	3 - A249 onslip (NB)					
	4 - B2005 - link	✓				
2 - South	1 - A249 onslip (SB)					
	2 - B2005 - link	✓				
	3 - A249 offslip (SB)		ONE HOUR	✓	573	100.000
	4 - Swale Way		ONE HOUR	✓	645	100.000
	5 - Grovehurst Road		ONE HOUR	✓	616	100.000

Origin-Destination Data

Demand (Veh/hr)

1 - North

		To			
		1 - A249 offslip (NB)	2 - Grovehurst Road	3 - A249 onslip (NB)	4 - B2005 - link
From	1 - A249 offslip (NB)	0	42	0	752
	2 - Grovehurst Road	0	0	25	420
	3 - A249 onslip (NB)	Exit-only	Exit-only	Exit-only	Exit-only
	4 - B2005 - link	0	150	331	0

2 - South

Demand (Veh/hr)

		To				
		1 - A249 onslip (SB)	2 - B2005 - link	3 - A249 offslip (SB)	4 - Swale Way	5 - Grovehurst Road
From	1 - A249 onslip (SB)	Exit-only	Exit-only	Exit-only	Exit-only	Exit-only
	2 - B2005 - link	143	0	0	838	185
	3 - A249 offslip (SB)	1	18	0	378	176
	4 - Swale Way	341	227	0	0	77
	5 - Grovehurst Road	208	236	0	172	0

Vehicle Mix

1 - North

HV %s

		To			
		1 - A249 offslip (NB)	2 - Grovehurst Road	3 - A249 onslip (NB)	4 - B2005 - link
From	1 - A249 offslip (NB)	0	7	0	16
	2 - Grovehurst Road	0	0	8	4
	3 - A249 onslip (NB)	Exit-only	Exit-only	Exit-only	Exit-only
	4 - B2005 - link	0	5	7	0

2 - South

HV %s

		To				
		1 - A249 onslip (SB)	2 - B2005 - link	3 - A249 offslip (SB)	4 - Swale Way	5 - Grovehurst Road
From	1 - A249 onslip (SB)	Exit-only	Exit-only	Exit-only	Exit-only	Exit-only
	2 - B2005 - link	0	0	0	15	6
	3 - A249 offslip (SB)	0	6	0	9	4
	4 - Swale Way	36	10	0	0	8
	5 - Grovehurst Road	1	2	0	4	0

Results

Results Summary for whole modelled period

Junction	Arm	Max RFC	Max delay (s)	Max Q (Veh)	Max Q95 (Veh)	Max LOS	Av. Demand (Veh/hr)	Total Junction Arrivals (Veh)
1 - North	1 - A249 offslip (NB)	1.06	144.47	37.2	87.7	F	729	1093
	2 - Grovehurst Road	1.16	298.94	38.3	73.7	F	408	613
	3 - A249 onslip (NB)							
	4 - B2005 - link	0.30	3.37	0.4	1.9	A	433	650
2 - South	1 - A249 onslip (SB)							
	2 - B2005 - link	0.66	5.97	1.9	4.0	A	1072	1608
	3 - A249 offslip (SB)	1.45	846.25	121.9	178.0	F	526	789
	4 - Swale Way	1.13	269.98	50.6	95.1	F	592	888
	5 - Grovehurst Road	1.14	279.46	49.8	93.0	F	565	848

Main Results for each time segment

07:15 - 07:30

Junction	Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
1 - North	1 - A249 offslip (NB)	598	149	353	899	0.665	590	0	0.0	1.9	11.402	B
	2 - Grovehurst Road	335	84	802	607	0.552	330	141	0.0	1.2	12.791	B
	3 - A249 onslip (NB)			871				262				
	4 - B2005 - link	354	89	0	1525	0.232	353	871	0.0	0.3	3.069	A
	1 - A249 onslip (SB)			483				513				
	2 - B2005 - link	870	218	128	1795	0.485	867	356	0.0	0.9	3.863	A

2 - South	3 - A249 offslip (SB)	431	108	994	697	0.619	425	0	0.0	1.6	12.943	B
	4 - Swale Way	486	121	388	673	0.722	476	1031	0.0	2.4	17.521	C
	5 - Grovehurst Road	464	116	539	715	0.648	457	325	0.0	1.8	13.571	B

07:30 - 07:45

Junction	Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
1 - North	1 - A249 offslip (NB)	714	178	419	852	0.838	703	0	1.9	4.5	22.801	C
	2 - Grovehurst Road	400	100	954	509	0.786	392	168	1.2	3.2	28.960	D
	3 - A249 onslip (NB)			1036				310				
	4 - B2005 - link	419	105	0	1525	0.275	419	1036	0.3	0.4	3.253	A
2 - South	1 - A249 onslip (SB)			572				608				
	2 - B2005 - link	1036	259	151	1781	0.582	1034	421	0.9	1.4	4.809	A
	3 - A249 offslip (SB)	515	129	1185	550	0.937	491	0	1.6	7.6	48.754	E
	4 - Swale Way	580	145	458	638	0.909	563	1218	2.4	6.7	40.685	E
	5 - Grovehurst Road	554	138	639	644	0.860	541	382	1.8	4.9	31.763	D

07:45 - 08:00

Junction	Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
1 - North	1 - A249 offslip (NB)	874	219	454	826	1.058	802	0	4.5	22.6	75.879	F
	2 - Grovehurst Road	490	122	1072	433	1.132	420	184	3.2	20.8	124.657	F
	3 - A249 onslip (NB)			1155				336				
	4 - B2005 - link	455	114	0	1525	0.298	454	1155	0.4	0.4	3.361	A
2 - South	1 - A249 onslip (SB)			620				668				
	2 - B2005 - link	1157	289	164	1774	0.652	1155	456	1.4	1.8	5.820	A
	3 - A249 offslip (SB)	631	158	1319	447	1.412	444	0	7.6	54.2	270.693	F
	4 - Swale Way	710	178	476	629	1.129	619	1287	6.7	29.6	122.987	F
	5 - Grovehurst Road	678	170	701	599	1.133	587	394	4.9	27.8	118.390	F

08:00 - 08:15

Junction	Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
1 - North	1 - A249 offslip (NB)	874	219	458	823	1.062	816	0	22.6	37.2	144.474	F
	2 - Grovehurst Road	490	122	1088	422	1.160	420	186	20.8	38.3	270.299	F
	3 - A249 onslip (NB)			1169				339				
	4 - B2005 - link	458	115	0	1525	0.301	458	1169	0.4	0.4	3.373	A
2 - South	1 - A249 onslip (SB)			625				675				
	2 - B2005 - link	1171	293	165	1773	0.661	1171	460	1.8	1.9	5.973	A
	3 - A249 offslip (SB)	631	158	1336	434	1.455	433	0	54.2	103.6	663.235	F
	4 - Swale Way	710	178	477	629	1.130	626	1292	29.6	50.6	244.118	F
	5 - Grovehurst Road	678	170	709	593	1.144	590	394	27.8	49.8	250.225	F

08:15 - 08:30

Junction	Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
1 - North	1 - A249 offslip (NB)	714	178	454	826	0.864	805	0	37.2	14.4	121.134	F
	2 - Grovehurst Road	400	100	1075	431	0.928	420	184	38.3	33.2	298.936	F
	3 - A249 onslip (NB)			1159				336				
	4 - B2005 - link	454	114	0	1525	0.298	454	1159	0.4	0.4	3.363	A
2 - South	1 - A249 onslip (SB)			620				668				
	2 - B2005 - link	1160	290	164	1774	0.654	1160	456	1.9	1.9	5.873	A
	3 - A249 offslip (SB)	515	129	1325	442	1.165	442	0	103.6	121.9	846.251	F
	4 - Swale Way	580	145	477	629	0.922	616	1290	50.6	41.4	269.982	F
	5 - Grovehurst Road	554	138	700	600	0.923	588	393	49.8	41.2	279.455	F

08:30 - 08:45

Junction	Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
1 - North	1 - A249 offslip (NB)	598	149	458	823	0.726	644	0	14.4	2.8	24.492	C
	2 - Grovehurst Road	335	84	926	530	0.633	460	177	33.2	2.0	98.476	F
	3 - A249 onslip (NB)			1044				341				
	4 - B2005 - link	458	115	0	1525	0.301	458	1044	0.4	0.4	3.374	A
	1 - A249 onslip (SB)			626				654				

2 - South	2 - B2005 - link	1038	259	166	1773	0.585	1039	461	1.9	1.4	4.924	A
	3 - A249 offslip (SB)	431	108	1205	535	0.806	531	0	121.9	97.0	742.812	F
	4 - Swale Way	486	121	473	630	0.770	616	1263	41.4	9.0	155.518	F
	5 - Grovehurst Road	464	116	687	607	0.764	593	402	41.2	8.9	160.495	F

Q Variation Results for each time segment

07:15 - 07:30

Junction	Arm	Mean (Veh)	Q05 (Veh)	Q50 (Veh)	Q90 (Veh)	Q95 (Veh)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
1 - North	1 - A249 offslip (NB)	1.91	0.24	1.12	3.33	4.13			N/A	N/A
	2 - Grovehurst Road	1.19	0.09	1.00	2.11	2.84			N/A	N/A
	3 - A249 onslip (NB)									
	4 - B2005 - link	0.30	0.00	0.00	0.30	0.30			N/A	N/A
2 - South	1 - A249 onslip (SB)									
	2 - B2005 - link	0.93	0.55	1.00	1.40	1.45			N/A	N/A
	3 - A249 offslip (SB)	1.56	0.03	0.27	1.56	1.94			N/A	N/A
	4 - Swale Way	2.42	0.14	1.25	4.99	6.66			N/A	N/A
	5 - Grovehurst Road	1.77	0.08	1.15	3.88	5.39			N/A	N/A

07:30 - 07:45

Junction	Arm	Mean (Veh)	Q05 (Veh)	Q50 (Veh)	Q90 (Veh)	Q95 (Veh)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
1 - North	1 - A249 offslip (NB)	4.49	0.10	1.58	11.63	16.69			N/A	N/A
	2 - Grovehurst Road	3.19	0.08	1.38	8.27	12.07			N/A	N/A
	3 - A249 onslip (NB)									
	4 - B2005 - link	0.38	0.00	0.00	0.38	0.38			N/A	N/A
2 - South	1 - A249 onslip (SB)									
	2 - B2005 - link	1.37	0.07	0.93	2.91	4.04			N/A	N/A
	3 - A249 offslip (SB)	7.58	0.05	0.83	21.96	37.67			N/A	N/A
	4 - Swale Way	6.69	0.24	3.75	15.71	21.07			N/A	N/A
	5 - Grovehurst Road	4.92	0.10	1.83	12.71	18.13			N/A	N/A

07:45 - 08:00

Junction	Arm	Mean (Veh)	Q05 (Veh)	Q50 (Veh)	Q90 (Veh)	Q95 (Veh)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
1 - North	1 - A249 offslip (NB)	22.61	2.91	18.03	44.79	55.33			N/A	N/A
	2 - Grovehurst Road	20.76	4.79	17.84	36.92	43.99			N/A	N/A
	3 - A249 onslip (NB)									
	4 - B2005 - link	0.42	0.03	0.25	0.45	0.48			N/A	N/A
2 - South	1 - A249 onslip (SB)									
	2 - B2005 - link	1.84	0.03	0.26	1.84	1.84			N/A	N/A
	3 - A249 offslip (SB)	54.25	22.68	50.67	83.93	95.41			N/A	N/A
	4 - Swale Way	29.60	8.42	26.25	50.68	59.56			N/A	N/A
	5 - Grovehurst Road	27.80	7.59	24.51	48.00	56.58			N/A	N/A

08:00 - 08:15

Junction	Arm	Mean (Veh)	Q05 (Veh)	Q50 (Veh)	Q90 (Veh)	Q95 (Veh)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
1 - North	1 - A249 offslip (NB)	37.17	6.09	30.69	71.83	87.74			N/A	N/A
	2 - Grovehurst Road	38.26	12.58	34.64	63.42	73.72			N/A	N/A
	3 - A249 onslip (NB)									
	4 - B2005 - link	0.43	0.03	0.30	1.28	1.86			N/A	N/A
2 - South	1 - A249 onslip (SB)									
	2 - B2005 - link	1.92	0.03	0.26	1.92	1.92			N/A	N/A
	3 - A249 offslip (SB)	103.61	62.11	100.66	139.89	152.60			N/A	N/A
	4 - Swale Way	50.59	18.01	46.35	82.36	95.10			N/A	N/A
	5 - Grovehurst Road	49.77	17.98	45.67	80.63	92.97			N/A	N/A

08:15 - 08:30

Junction	Arm	Mean (Veh)	Q05 (Veh)	Q50 (Veh)	Q90 (Veh)	Q95 (Veh)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker

1 - North	1 - A249 offslip (NB)	14.42	0.44	8.65	34.43	46.00			N/A	N/A
	2 - Grovehurst Road	33.23	15.25	31.20	49.34	55.50			N/A	N/A
	3 - A249 onslip (NB)									
	4 - B2005 - link	0.43	0.00	0.00	0.43	0.43			N/A	N/A
2 - South	1 - A249 onslip (SB)									
	2 - B2005 - link	1.91	0.53	1.26	2.90	3.58			N/A	N/A
	3 - A249 offslip (SB)	121.87	74.23	118.64	163.50	177.99			N/A	N/A
	4 - Swale Way	41.44	11.71	36.84	71.61	84.28			N/A	N/A
	5 - Grovehurst Road	41.23	12.64	37.03	69.75	81.55			N/A	N/A

08:30 - 08:45

Junction	Arm	Mean (Veh)	Q05 (Veh)	Q50 (Veh)	Q90 (Veh)	Q95 (Veh)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
1 - North	1 - A249 offslip (NB)	2.84	0.03	0.33	5.36	15.03			N/A	N/A
	2 - Grovehurst Road	1.95	0.03	0.30	1.95	8.66			N/A	N/A
	3 - A249 onslip (NB)									
	4 - B2005 - link	0.43	0.00	0.00	0.43	0.43			N/A	N/A
2 - South	1 - A249 onslip (SB)									
	2 - B2005 - link	1.43	0.23	1.28	2.18	2.76			N/A	N/A
	3 - A249 offslip (SB)	96.96	48.12	92.53	141.74	158.25			N/A	N/A
	4 - Swale Way	8.95	0.11	3.13	24.25	35.25			N/A	N/A
	5 - Grovehurst Road	8.91	0.14	3.66	23.49	33.42			N/A	N/A

2023 + Development, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Queue variations	Analysis Options	Q percentiles may be unreliable if the mean queue in any time segment is very low or very high.

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	North	Standard Roundabout	1, 2, 3, 4	179.25	F
2	South	Standard Roundabout	1, 2, 3, 4, 5	1494.35	F

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D6	2023 + Development	PM	ONE HOUR	16:15	17:45	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Linked Arm Data

Junction	Arm	Feeding Junction	Feeding Arm	Link Type	Flow source	Uniform flow (Veh/hr)	Flow multiplier (%)	Internal storage space (PCU)
1 - North	4 - B2005 - link	2	2	Q limited	Normal	0	100.00	20.00
2 - South	2 - B2005 - link	1	4	Q limited	Normal	0	100.00	20.00

Demand overview (Traffic)

Junction	Arm	Linked arm	Profile type	Use O-D data	Av. Demand (Veh/hr)	Scaling Factor (%)
1 - North	1 - A249 offslip (NB)		ONE HOUR	✓	794	100.000
	2 - Grovehurst Road		ONE HOUR	✓	230	100.000
	3 - A249 onslip (NB)					
	4 - B2005 - link	✓				
2 - South	1 - A249 onslip (SB)					
	2 - B2005 - link	✓				
	3 - A249 offslip (SB)		ONE HOUR	✓	444	100.000
	4 - Swale Way		ONE HOUR	✓	1241	100.000
	5 - Grovehurst Road		ONE HOUR	✓	539	100.000

Origin-Destination Data

Demand (Veh/hr)

1 - North

		To			
		1 - A249 offslip (NB)	2 - Grovehurst Road	3 - A249 onslip (NB)	4 - B2005 - link
From	1 - A249 offslip (NB)	0	182	0	612
	2 - Grovehurst Road	0	0	27	203
	3 - A249 onslip (NB)	Exit-only	Exit-only	Exit-only	Exit-only
	4 - B2005 - link	0	269	533	0

2 - South

Demand (Veh/hr)

		To				
		1 - A249 onslip (SB)	2 - B2005 - link	3 - A249 offslip (SB)	4 - Swale Way	5 - Grovehurst Road
From	1 - A249 onslip (SB)	Exit-only	Exit-only	Exit-only	Exit-only	Exit-only
	2 - B2005 - link	42	0	0	444	326
	3 - A249 offslip (SB)	1	27	0	198	218
	4 - Swale Way	633	444	0	0	164
	5 - Grovehurst Road	111	322	0	106	0

Vehicle Mix

1 - North

HV %s

		To			
		1 - A249 offslip (NB)	2 - Grovehurst Road	3 - A249 onslip (NB)	4 - B2005 - link
From	1 - A249 offslip (NB)	0	1	0	19
	2 - Grovehurst Road	0	0	0	1
	3 - A249 onslip (NB)	Exit-only	Exit-only	Exit-only	Exit-only
	4 - B2005 - link	0	1	4	0

2 - South

HV %s

		To				
		1 - A249 onslip (SB)	2 - B2005 - link	3 - A249 offslip (SB)	4 - Swale Way	5 - Grovehurst Road
From	1 - A249 onslip (SB)	Exit-only	Exit-only	Exit-only	Exit-only	Exit-only
	2 - B2005 - link	2	0	0	26	1
	3 - A249 offslip (SB)	0	11	0	8	4
	4 - Swale Way	16	3	0	0	2
	5 - Grovehurst Road	0	2	0	3	0

Results

Results Summary for whole modelled period

Junction	Arm	Max RFC	Max delay (s)	Max Q (Veh)	Max Q95 (Veh)	Max LOS	Av. Demand (Veh/hr)	Total Junction Arrivals (Veh)
1 - North	1 - A249 offslip (NB)	1.19	341.54	78.6	127.7	F	729	1093
	2 - Grovehurst Road	0.49	13.52	0.9	3.6	B	211	317
	3 - A249 onslip (NB)							
	4 - B2005 - link	0.39	3.72	0.6	2.0	A	556	834
2 - South	1 - A249 onslip (SB)							
	2 - B2005 - link	0.45	3.70	0.8	1.4	A	737	1105
	3 - A249 offslip (SB)	0.64	13.11	1.7	4.7	B	407	611
	4 - Swale Way	2.18	3608.84	712.6	182.7	F	1139	1708
	5 - Grovehurst Road	0.85	32.39	5.0	26.8	D	495	742

Main Results for each time segment

16:15 - 16:30

Junction	Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
1 - North	1 - A249 offslip (NB)	598	149	511	802	0.745	587	0	0.0	2.7	16.005	C
	2 - Grovehurst Road	173	43	792	637	0.272	172	306	0.0	0.4	7.731	A
	3 - A249 onslip (NB)			604				360				
	4 - B2005 - link	513	128	0	1575	0.325	511	604	0.0	0.5	3.376	A
	1 - A249 onslip (SB)			592				477				
	2 - B2005 - link	603	151	79	1776	0.339	601	513	0.0	0.5	3.057	A

2 - South	3 - A249 offslip (SB)	334	84	679	938	0.356	332	0	0.0	0.5	5.920	A
	4 - Swale Way	934	234	456	723	1.292	711	555	0.0	55.9	153.464	F
	5 - Grovehurst Road	406	101	669	664	0.611	400	498	0.0	1.5	13.324	B

16:30 - 16:45

Junction	Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
1 - North	1 - A249 offslip (NB)	714	178	552	774	0.923	694	0	2.7	7.7	37.875	E
	2 - Grovehurst Road	207	52	901	563	0.367	206	344	0.4	0.6	10.054	B
	3 - A249 onslip (NB)			717				391				
	4 - B2005 - link	552	138	0	1575	0.350	552	717	0.5	0.5	3.517	A
2 - South	1 - A249 onslip (SB)			647				481				
	2 - B2005 - link	715	179	95	1767	0.404	714	553	0.5	0.7	3.417	A
	3 - A249 offslip (SB)	399	100	809	835	0.478	398	0	0.5	0.9	8.211	A
	4 - Swale Way	1116	279	544	674	1.655	674	662	55.9	166.3	621.332	F
	5 - Grovehurst Road	485	121	647	679	0.713	481	571	1.5	2.3	17.868	C

16:45 - 17:00

Junction	Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
1 - North	1 - A249 offslip (NB)	874	219	602	738	1.184	731	0	7.7	43.5	141.148	F
	2 - Grovehurst Road	253	63	964	523	0.485	252	370	0.6	0.9	13.231	B
	3 - A249 onslip (NB)			786				430				
	4 - B2005 - link	603	151	0	1575	0.383	602	786	0.5	0.6	3.700	A
2 - South	1 - A249 onslip (SB)			719				483				
	2 - B2005 - link	780	195	115	1756	0.444	780	604	0.7	0.8	3.686	A
	3 - A249 offslip (SB)	489	122	895	767	0.637	486	0	0.9	1.7	12.654	B
	4 - Swale Way	1366	342	623	630	2.169	630	758	166.3	350.4	1483.482	F
	5 - Grovehurst Road	593	148	618	699	0.849	584	635	2.3	4.7	29.054	D

17:00 - 17:15

Junction	Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
1 - North	1 - A249 offslip (NB)	874	219	607	735	1.189	734	0	43.5	78.6	306.797	F
	2 - Grovehurst Road	253	63	969	519	0.488	253	372	0.9	0.9	13.521	B
	3 - A249 onslip (NB)			789				433				
	4 - B2005 - link	607	152	0	1575	0.385	607	789	0.6	0.6	3.717	A
2 - South	1 - A249 onslip (SB)			725				484				
	2 - B2005 - link	784	196	116	1755	0.446	783	608	0.8	0.8	3.704	A
	3 - A249 offslip (SB)	489	122	900	763	0.641	489	0	1.7	1.7	13.106	B
	4 - Swale Way	1366	342	626	628	2.175	628	763	350.4	535.0	2446.190	F
	5 - Grovehurst Road	593	148	616	700	0.848	592	637	4.7	5.0	32.390	D

17:15 - 17:30

Junction	Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
1 - North	1 - A249 offslip (NB)	714	178	555	771	0.925	762	0	78.6	66.6	341.542	F
	2 - Grovehurst Road	207	52	956	525	0.394	208	361	0.9	0.7	11.375	B
	3 - A249 onslip (NB)			770				393				
	4 - B2005 - link	555	139	0	1575	0.352	555	770	0.6	0.5	3.528	A
2 - South	1 - A249 onslip (SB)			653				479				
	2 - B2005 - link	770	193	97	1766	0.436	771	556	0.8	0.8	3.619	A
	3 - A249 offslip (SB)	399	100	868	787	0.507	402	0	1.7	1.0	9.409	A
	4 - Swale Way	1116	279	572	659	1.693	659	698	535.0	649.2	3167.321	F
	5 - Grovehurst Road	485	121	637	686	0.706	495	594	5.0	2.6	19.661	C

17:30 - 17:45

Junction	Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	LOS
1 - North	1 - A249 offslip (NB)	598	149	508	804	0.744	792	0	66.6	18.0	197.569	F
	2 - Grovehurst Road	173	43	948	528	0.328	174	352	0.7	0.5	10.184	B
	3 - A249 onslip (NB)			764				358				
	4 - B2005 - link	508	127	0	1575	0.322	508	764	0.5	0.5	3.376	A
	1 - A249 onslip (SB)			589				472				

2 - South	2 - B2005 - link	768	192	81	1775	0.433	768	509	0.8	0.8	3.575	A
	3 - A249 offslip (SB)	334	84	849	801	0.417	336	0	1.0	0.7	7.756	A
	4 - Swale Way	934	234	534	680	1.373	680	650	649.2	712.6	3608.836	F
	5 - Grovehurst Road	406	101	651	676	0.600	410	563	2.6	1.6	13.701	B

Q Variation Results for each time segment

16:15 - 16:30

Junction	Arm	Mean (Veh)	Q05 (Veh)	Q50 (Veh)	Q90 (Veh)	Q95 (Veh)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
1 - North	1 - A249 offslip (NB)	2.73	0.11	1.22	6.20	8.48			N/A	N/A
	2 - Grovehurst Road	0.37	0.00	0.00	0.37	0.37			N/A	N/A
	3 - A249 onslip (NB)									
	4 - B2005 - link	0.48	0.00	0.00	0.48	0.48			N/A	N/A
2 - South	1 - A249 onslip (SB)									
	2 - B2005 - link	0.51	0.51	1.00	1.40	1.45			N/A	N/A
	3 - A249 offslip (SB)	0.55	0.55	1.00	1.40	1.45			N/A	N/A
	4 - Swale Way	55.91	>199	>199	>199	>199			N/A	N/A
	5 - Grovehurst Road	1.51	1.05	1.50	1.90	1.95			N/A	N/A

16:30 - 16:45

Junction	Arm	Mean (Veh)	Q05 (Veh)	Q50 (Veh)	Q90 (Veh)	Q95 (Veh)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
1 - North	1 - A249 offslip (NB)	7.73	0.22	4.17	18.66	25.30			N/A	N/A
	2 - Grovehurst Road	0.57	0.55	1.00	1.40	1.45			N/A	N/A
	3 - A249 onslip (NB)									
	4 - B2005 - link	0.54	0.54	1.00	1.40	1.45			N/A	N/A
2 - South	1 - A249 onslip (SB)									
	2 - B2005 - link	0.67	0.18	0.92	1.38	1.44			N/A	N/A
	3 - A249 offslip (SB)	0.90	0.09	0.89	1.35	1.75			N/A	N/A
	4 - Swale Way	166.30	>199	>199	>199	>199			N/A	N/A
	5 - Grovehurst Road	2.34	0.09	1.42	5.36	7.39			N/A	N/A

16:45 - 17:00

Junction	Arm	Mean (Veh)	Q05 (Veh)	Q50 (Veh)	Q90 (Veh)	Q95 (Veh)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
1 - North	1 - A249 offslip (NB)	43.50	17.58	40.39	67.81	77.31			N/A	N/A
	2 - Grovehurst Road	0.92	0.03	0.26	0.92	0.92			N/A	N/A
	3 - A249 onslip (NB)									
	4 - B2005 - link	0.62	0.03	0.25	0.62	0.62			N/A	N/A
2 - South	1 - A249 onslip (SB)									
	2 - B2005 - link	0.79	0.03	0.25	0.79	0.79			N/A	N/A
	3 - A249 offslip (SB)	1.69	0.03	0.28	1.69	4.69			N/A	N/A
	4 - Swale Way	350.39	>199	>199	>199	>199			N/A	N/A
	5 - Grovehurst Road	4.70	0.04	0.43	12.95	24.45			N/A	N/A

17:00 - 17:15

Junction	Arm	Mean (Veh)	Q05 (Veh)	Q50 (Veh)	Q90 (Veh)	Q95 (Veh)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
1 - North	1 - A249 offslip (NB)	78.56	39.24	74.95	114.42	127.67			N/A	N/A
	2 - Grovehurst Road	0.94	0.03	0.28	0.96	3.59			N/A	N/A
	3 - A249 onslip (NB)									
	4 - B2005 - link	0.62	0.03	0.28	0.62	1.98			N/A	N/A
2 - South	1 - A249 onslip (SB)									
	2 - B2005 - link	0.80	0.03	0.27	0.80	1.29			N/A	N/A
	3 - A249 offslip (SB)	1.74	0.03	0.28	1.74	4.27			N/A	N/A
	4 - Swale Way	534.95	>199	>199	>199	>199			N/A	N/A
	5 - Grovehurst Road	5.04	0.03	0.33	9.23	26.77			N/A	N/A

17:15 - 17:30

Junction	Arm	Mean (Veh)	Q05 (Veh)	Q50 (Veh)	Q90 (Veh)	Q95 (Veh)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker

1 - North	1 - A249 offslip (NB)	66.61	29.42	62.67	101.38	114.64			N/A	N/A
	2 - Grovehurst Road	0.66	0.09	0.80	1.37	1.44			N/A	N/A
	3 - A249 onslip (NB)									
	4 - B2005 - link	0.55	0.55	1.00	1.40	1.45			N/A	N/A
2 - South	1 - A249 onslip (SB)									
	2 - B2005 - link	0.78	0.55	1.00	1.40	1.45			N/A	N/A
	3 - A249 offslip (SB)	1.05	0.08	0.93	1.80	2.33			N/A	N/A
	4 - Swale Way	649.16	>199	>199	>199	>199			N/A	N/A
	5 - Grovehurst Road	2.55	0.04	0.43	7.01	12.49			N/A	N/A

17:30 - 17:45

Junction	Arm	Mean (Veh)	Q05 (Veh)	Q50 (Veh)	Q90 (Veh)	Q95 (Veh)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
1 - North	1 - A249 offslip (NB)	18.05	1.14	13.20	38.45	48.83			N/A	N/A
	2 - Grovehurst Road	0.50	0.04	0.44	1.27	1.39			N/A	N/A
	3 - A249 onslip (NB)									
	4 - B2005 - link	0.48	0.00	0.00	0.48	0.48			N/A	N/A
2 - South	1 - A249 onslip (SB)									
	2 - B2005 - link	0.77	0.55	1.00	1.40	1.45			N/A	N/A
	3 - A249 offslip (SB)	0.73	0.05	0.51	1.28	1.81			N/A	N/A
	4 - Swale Way	712.64	>199	>199	>199	>199			N/A	N/A
	5 - Grovehurst Road	1.55	0.03	0.35	3.78	7.93			N/A	N/A

1 - North	1 - A249 offslip (NB)	354.46	>199	>199	>199	>199			N/A	N/A
	2 - Grovehurst Road	1.53	0.05	0.54	3.84	5.88			N/A	N/A
	3 - A249 onslip (NB)									
	4 - B2005 - link	0.62	0.55	1.00	1.40	1.45			N/A	N/A
2 - South	1 - A249 onslip (SB)									
	2 - B2005 - link	0.78	0.55	1.00	1.40	1.45			N/A	N/A
	3 - A249 offslip (SB)	1.32	0.05	0.58	3.15	4.75			N/A	N/A
	4 - Swale Way	815.57	>199	>199	>199	>199			N/A	N/A
	5 - Grovehurst Road	7.94	0.07	1.06	22.96	36.65			N/A	N/A

17:30 - 17:45

Junction	Arm	Mean (Veh)	Q05 (Veh)	Q50 (Veh)	Q90 (Veh)	Q95 (Veh)	Percentile message	Marker message	Probability of reaching or exceeding marker	Probability of exactly reaching marker
1 - North	1 - A249 offslip (NB)	359.40	>199	>199	>199	>199			N/A	N/A
	2 - Grovehurst Road	1.00	0.04	0.39	2.48	4.16			N/A	N/A
	3 - A249 onslip (NB)									
	4 - B2005 - link	0.51	0.51	1.00	1.40	1.45			N/A	N/A
2 - South	1 - A249 onslip (SB)									
	2 - B2005 - link	0.73	0.55	1.00	1.40	1.45			N/A	N/A
	3 - A249 offslip (SB)	0.84	0.04	0.37	1.97	3.48			N/A	N/A
	4 - Swale Way	903.38	>199	>199	>199	>199			N/A	N/A
	5 - Grovehurst Road	2.90	0.03	0.34	6.41	15.57			N/A	N/A

Appendix B – Supplementary Air Quality Assessment

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Quality Management

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Consideration of Air Quality Impacts due to Proposed Amendment to Condition 3 for Kemsley K3

Introduction

1.1 This short report provides the results of an assessment of the impact of additional Heavy Goods Vehicles (HGVs) on existing human and ecological receptors arising from the proposed amendment to Condition 3, attached to the planning permission for the K3 facility at Kemsley Generating Station.

1.2 The proposed amendment to Condition 3 will allow flexibility in the size/type of vehicles being used to import the waste. As a consequence of this amendment, the number of HGV movements is expected to increase. This assessment considers the air quality effect on human-health and the Swale Special Protection Area (SPA) and the Medway Estuary & Marshes SPA.

Assessment Methodology

Modelled Scenarios

1.3 The following scenarios were modelled:

- Permitted K3 Development – with the permitted K3 development in the first year that the development is expected to be fully operational, 2019; and
- Amended K3 Development – with the proposed amendment to the Permitted Development in the first year that the development is expected to be fully operational, 2019.

1.4 Both scenarios include cumulative developments to the extent that these are included within the traffic provided. This approach is consistent with the Traffic Assessment.

Model Input Data

Traffic Flow Data

1.5 Traffic data used in the assessment have been provided by the project's transport consultants, RPS. The traffic flow data provided for this assessment are summarised in Table 1. The modelled road links are illustrated in Figure 1.

Table 1 Traffic Data Used Within the Assessment

Road Link ID	Road Link Name	Speed ($km.hr^{-1}$)	Daily Two Way Vehicle Flow			
			Permitted Development		Amended Development	
			Total Vehicles	HDV %	Total Vehicles	HDV %
1	1 - Swale Way East of B2005 Grovehurst Roundabout	64	20912	13%	20980	14%
2	2 - Barge Way North of Swale Roundabout	44	6881	31%	6952	31%
3	3 - Barge Way, East of Fleet End Roundabout	63	3450	41%	3521	43%
4	4 - A249 South of Swale Way Junction	113	44430	11%	44494	11%
5	5 - A249 between the A2 and M2	113	57919	11%	57990	11%
6	6 - M2 West	113	71685	10%	71696	10%
7	7 - M2 East	113	64657	8%	64666	8%
8	8 - Swale Way north of Reams Way Junction	54	15227	7%	15230	7%
9	9 - Swale Way south of Reams Way Junction	55	15150	7%	15153	7%
10	10 - Swale Way south of Ridham Avenue Roundabout	74	13985	6%	13987	6%
11	11 - A249, North of Swale Way Junction	113	36203	7%	36205	7%

Notes: ($km.hr^{-1}$) = kilometres per hour
HDV = Heavy Duty Vehicle - vehicles greater than 3.5 t gross vehicle weight including buses
LDV = Light Duty Vehicle

1.6 The average speed on each road has been reduced by 10 km.hr^{-1} to take into account the possibility of slow moving traffic near junctions and at roundabouts in accordance with LAQM.TG16.

Vehicle Emission Factors

1.7 The modelling has been undertaken using Defra's 2017 emission factor toolkit (version 8.0) which draws on emissions generated by the European Environment Agency (EEA) COPERT 5 emission calculation tool.

Meteorological Data

1.8 ADMS-Roads requires detailed meteorological data as an input. The most representative observing station for the region of the study area that supplies all the data in the required format is Gravesend approximately 28 km west of the Application Site. Meteorological data from that station for 2016 have been used within the dispersion model. The wind rose is presented in Figure 2.

Receptors

1.9 Ecological receptors have been selected at the nearest point of designated sites within 200 m of a modelled road. The A249 goes through the Swale SPA so receptors have been included at the side of the road. The modelled receptors are shown in Figures 1 & 2 and listed in Table.2.

Table.2 Modelled Sensitive Receptors

ID	Description	Type	x	y
1	Recreation Way	Human-health	591391	166087
2	Swale Road		590967	166509
3	Grovehurst Rd Bramb.		590404	166463
4	Grovehurst Rd Kemsley		590746	165486
5	Saffron Way. Kemsley		590924	165184
6	Howt Green		589762	165887
7	Lorimar Court		589256	165287
8	Key Street		588127	164204
9	The Westlands School		588855	163953
10	Museum East Street		591165	163568
11	Boyces Hill		584437	165225
12	M2 Bredgar		588203	160829
13	Stuppington Farm		597167	159333
14	A249 South Green		584146	160880
15	M2 Cowstead		584841	163112
16	Recreation Way		590893	167531
17	The Swale 1	Ecological	590945	168008
18	The Swale 2		590917	168020

ID	Description	Type	x	y
19	The Swale 3		591834	167213
20	The Swale 4		591865	167352
21	The Swale 5		592005	167947
22	The Swale 6		591992	168059
23	The Swale 7		592009	167899
24	The Swale 8		592028	168080
25	The Swale 9		592717	164892
26	The Swale 10		592874	164792
27	The Swale 11		591214	169216
28	Medway Estuary & Marshes 1		591272	169260
29	Medway Estuary & Marshes 2		591398	169493
30	Medway Estuary & Marshes 3		591415	169469
31	Medway Estuary & Marshes 4		591725	169870
32	Medway Estuary & Marshes 5		592061	170167
33	Medway Estuary & Marshes 6		591391	166087

Long-Term Pollutant Predictions at Human-Health Receptors

1.10 Annual-mean NO_x and PM_{10} concentrations have been predicted at selected sensitive receptors using ADMS-Roads, then added to relevant background concentrations. Primary NO in the NO_X emissions is converted to NO_2 to a degree determined by the availability of atmospheric oxidants locally and the strength of sunlight. For road traffic sources, annual-mean NO_2 concentrations have been derived from the modelled road-related annual-mean NO_x concentration using Defra's calculator [1].

Short-Term Pollutant Predictions at Human-Health Receptors

1.11 In order to predict the likelihood of exceedences of the hourly-mean AQS objectives for NO_2 and the daily-mean AQS objective for PM_{10}, the following relationships between the short-term and the annual-mean values at each receptor have been considered.

Hourly-Mean AQS Objective for NO_2 at Human-Health Receptors

1.12 Research undertaken in support of LAQM.TG16 has indicated that the hourly-mean limit value and objective for NO_2 is unlikely to be exceeded at a roadside location where the annual-mean NO_2 concentration is less than 60 $\mu g.m^{-3}$. The threshold of 60 $\mu g.m^{-3}$ NO_2 has been used the guideline for considering a likely exceedence of the hourly-mean nitrogen dioxide objective.

Daily-Mean AQS Objective for PM_{10} at Human-Health Receptors

1.13 The number of exceedences of the daily-mean AQS objective for PM_{10} of 50 $\mu g.m^{-3}$ may be estimated using the relationship set out in LAQM.TG16:

*Number of Exceedences of Daily Mean of 50 $\mu g.m^{-3}$ = -18.5 + 0.00145 * (Predicted Annual-mean PM_{10})^3 + 206 / (Predicted Annual-mean PM_{10} Concentration)*

1.14 This relationship indicates that the daily-mean AQS objective for PM_{10} is likely to be met if the predicted annual-mean PM_{10} concentration is 31.8 $\mu g.m^{-3}$ or less.

1.15 The daily mean objective is therefore not considered further within this assessment if the annual-mean PM_{10} concentration is predicted to be less than 31.5 $\mu g.m^{-3}$.

Fugitive PM_{10} Emissions at Human-Health Receptors

1.16 Transport PM_{10} emissions arise from both the tailpipe exhausts and from fugitive sources such as brake and tyre wear and re-suspended road dust. Improvements in vehicle technologies are reducing PM_{10} exhaust emissions; therefore, the relative importance of fugitive PM_{10} emissions is increasing. Current emission factors for particulate matter include brake dust and tyre wear (which studies suggest may account for approximately one-third of the total particulate emissions from road transport); however, no allowance is made for re-suspended road dust as this remains unquantified.

Critical Levels at Ecological Receptors

1.17 Critical levels are maximum atmospheric concentrations of pollutants for the protection of vegetation and ecosystems and are specified within relevant European air quality directives and corresponding UK air quality regulations. Process Contribution (PCs) and Predicted Environmental Concentrations (PECs) of NOx have been calculated for comparison with the 30 $\mu g.m^{-3}$ critical level. Background NOx concentrations at each designated site have been derived from the UK Air Pollution Information System (APIS) database [2].

Critical Loads at Ecological Receptors

1.18 Critical loads refer to the quantity of pollutant deposited, below which significant harmful effects on sensitive elements of the environment do not occur, according to present knowledge.

Critical Loads – Nutrient N Deposition

1.19 Percentage contributions to nutrient nitrogen deposition have been derived from the results of the ADMS dispersion modelling. Deposition rates have been calculated using empirical methods recommended by the Environment Agency, as follows:

1. The dry deposition flux ($\mu g.m^{-2}.s^{-1}$) has been calculated by multiplying the ground level NO_2 concentrations ($\mu g.m^{-3}$) by the deposition velocity of 0.0015 $m.s^{-1}$ for grassland/short habitats and 0.003 $m.s^{-1}$ for forests/tall habitats.

2. Units of $\mu g.m^{-2}.s^{-1}$ have been converted to units of $kg.ha^{-1}.year^{-1}$ by multiplying the dry deposition flux by the standard conversion factor of 96 for NOx.

3. Predicted contributions to nitrogen deposition have been calculated and compared with the relevant critical load range for the habitat types associated with the designated site. These have been derived from the APIS database.

Significance Criteria – Human-health Receptors

1.20 The EPUK & IAQM Land-Use Planning & Development Control: Planning For Air Quality document [3] advises that:

"The significance of the effects arising from the impacts on air quality will depend on a number of factors and will need to be considered alongside the benefits of the development in question. Development under current planning policy is required to be sustainable and the definition of this includes social and economic dimensions, as well as environmental. Development brings opportunities for reducing emissions at a wider level through the use of more efficient technologies and better designed buildings, which could well displace emissions elsewhere, even if they increase at the development site. Conversely, development can also have adverse consequences for air quality at a wider level through its effects on trip generation."

1.21 When describing the air quality impact at a sensitive receptor, the change in magnitude of the concentration should be considered in the context of the absolute concentration at the sensitive receptor. Table 3 provides the EPUK & IAQM approach for describing the long-term air quality impacts at sensitive human-health receptors in the surrounding area.

Table 3 Impact Descriptors for Individual Sensitive Receptors

Long term average concentration at receptor in assessment year	% Change in concentration relative to Air Quality Assessment Level			
	1	2-5	6-10	>10
75 % or less of AQAL	Negligible	Negligible	Slight	Moderate
76 -94 % of AQAL	Negligible	Slight	Moderate	Moderate
95 - 102 % of AQAL	Slight	Moderate	Moderate	Substantial
103 – 109 % of AQAL	Moderate	Moderate	Substantial	Substantial
110 % or more than AQAL	Moderate	Substantial	Substantial	Substantial

1. AQAL = Air Quality Assessment Level, which may be an air quality objective, EU limit or target value, or an Environment Agency 'Environmental Assessment Level (EAL)'.
2. The table is intended to be used by rounding the change in percentage pollutant concentration to whole numbers, which then makes it clearer which cell the impact falls within. The user is encouraged to treat the numbers with recognition of their likely accuracy and not assume a false level of precision. Changes of 0%, i.e. less than 0.5% will be described as negligible.
3. The table is only designed to be used with annual mean concentrations.
4. Descriptors for individual receptors only; the overall significance is determined using professional judgement. For example, a 'moderate' adverse impact at one receptor may not mean that the overall impact has a significant effect. Other factors need to be considered.
5. When defining the concentration as a percentage of the AQAL, use the 'without scheme' concentration where there is a decrease in pollutant concentration and the 'with scheme;' concentration for an increase.
6. The total concentration categories reflect the degree of potential harm by reference to the AQAL value. At exposure less than 75% of this value, i.e. well below, the degree of harm is likely to be small. As the exposure approaches and exceeds the AQAL, the degree of harm increases. This change naturally becomes more important when the result is an exposure that is approximately equal to, or greater than the AQAL.
7. It is unwise to ascribe too much accuracy to incremental changes or background concentrations, and this is especially important when total concentrations are close to the AQAL. For a given year in the future, it is impossible to define the new total concentration without recognising the inherent uncertainty, which is why there is a category that has a range around the AQAL, rather than being exactly equal to it.

1.22 The human-health impact descriptors above apply at individual receptors. The EPUK & IAQM guidance states that the impact descriptors *"are not, of themselves, a clear and unambiguous guide to reaching a conclusion on significance. These impact descriptors are intended for application at a series of individual receptors. Whilst it maybe that there are 'slight', 'moderate' or 'substantial' impacts at one or more receptors, the overall effect may not necessarily be judged as being significant in some circumstances."*

1.23 Professional judgement by a competent, suitably qualified professional is required to establish the significance associated with the consequence of the impacts. This judgement is likely to take into account the extent of the current and future population exposure to the impacts and the influence and/or validity of any assumptions adopted during the assessment process.

Significance Criteria – Ecological Receptors

1.24 The change in predicted concentrations and the predicted annual-mean NOx concentration/N deposition rate have been compared against the relevant critical level/load for the relevant habitat type/interest feature. Based on current Environment Agency guidelines [4] and the Institute of Air Quality Management Position Statement [5] the following criteria have been used to determine if the effects are potentially significant:

- The predicted annual-mean NOx concentration/N deposition rate is close to (or above) the Critical Level/Load; and
- The change in NOx concentration/N deposition rate exceeds 1% of the relevant Critical Level/Load.

Results

Effects on Human Health Receptors

Annual-mean NO_2 Concentrations

1.25 Table 4 presents the annual-mean NO_2 concentrations predicted at the façades of existing receptors.

Table 4 Predicted Annual-Mean NO_2 Impacts at Existing Receptors

Receptor ID	Concentration ($\mu g.m^{-3}$)		Amended – Permitted Dev as % of the AQS Objective	Impact Descriptor
	Permitted Development	Amended Development		
Recreation Way	16.69	16.69	0	Negligible
Swale Road	18.12	18.13	0	Negligible
Grovehurst Rd Bramb.	16.60	16.60	0	Negligible
Grovehurst Rd Kemsley	14.17	14.17	0	Negligible
Saffron Way. Kemsley	14.01	14.01	0	Negligible

Receptor ID	Concentration (µg.m^{-3})		Amended – Permitted Dev as % of the AQS Objective	Impact Descriptor
	Permitted Development	Amended Development		
Howt Green	28.15	28.17	0	Negligible
Lorimar Court	28.25	28.27	0	Negligible
Key Street	22.40	22.41	0	Negligible
The Westlands School	14.37	14.37	0	Negligible
Museum East Street	13.75	13.75	0	Negligible
Boyces Hill	13.97	13.97	0	Negligible
M2 Bredgar	22.43	22.43	0	Negligible
Stuppington Farm	25.36	25.36	0	Negligible
A249 South Green	13.64	13.64	0	Negligible
M2 Cowstead	17.55	17.56	0	Negligible
Maximum	**28.25**	**28.27**	**0**	**-**
Minimum	**13.64**	**13.64**	**0**	**-**

Concentrations are shown to 2 decimal places to illustrate the very small relative differences in the 'amended' and 'permitted' development predictions. This is not intended to be indicative of the accuracy of the model.

1.26 Predicted annual-mean NO_2 concentrations in the opening year at the façades of the existing receptors are below the AQS objective for NO_2. When the magnitude of change is considered in the context of the absolute concentrations, the impact descriptor is categorised as 'negligible' at all receptors.

1.27 As all predicted annual-mean NO_2 concentrations are below 60 µg.m^{-3}, the hourly-mean objective for NO_2 is likely to be met at all receptors. The short-term NO_2 impact can be considered 'negligible' and is not considered further within this assessment.

1.28 Overall, the impact on the surrounding area from NO_2 is considered to be 'negligible', using the criteria adopted for this assessment and based on professional judgement.

Annual-mean PM_{10} Concentrations

1.29 Table 5 presents the annual-mean PM_{10} concentrations predicted at the façades of existing receptors.

Table 5 Predicted Annual-Mean PM_{10} Impacts at Existing Receptors

Receptor ID	Concentration (µg.m^{-3})		Amended – Permitted Dev as % of the AQS Objective	Impact Descriptor
	Permitted Development	Amended Development		
Recreation Way	20.68	20.68	0	Negligible
Swale Road	20.98	20.98	0	Negligible
Grovehurst Rd Bramb.	20.55	20.55	0	Negligible

Receptor ID	Concentration (µg.m^{-3})		Amended – Permitted Dev as % of the AQS Objective	Impact Descriptor
	Permitted Development	Amended Development		
Grovehurst Rd Kemsley	20.18	20.18	0	Negligible
Saffron Way. Kemsley	20.16	20.16	0	Negligible
Howt Green	22.23	22.23	0	Negligible
Lorimar Court	22.24	22.24	0	Negligible
Key Street	21.41	21.41	0	Negligible
The Westlands School	20.21	20.21	0	Negligible
Museum East Street	20.12	20.12	0	Negligible
Boyces Hill	20.15	20.15	0	Negligible
M2 Bredgar	21.37	21.37	0	Negligible
Stuppington Farm	21.78	21.78	0	Negligible
A249 South Green	20.10	20.10	0	Negligible
M2 Cowstead	20.66	20.66	0	Negligible
Maximum	**22.24**	**22.24**	**0**	-
Minimum	**20.10**	**20.10**	**0**	-

Concentrations are shown to 2 decimal places to illustrate the very small relative differences in the 'amended' and 'permitted' development predictions. This is not intended to be indicative of the accuracy of the model.

1.30 Predicted annual-mean PM_{10} concentrations in the opening year at the façades of the existing receptors are well below the AQS objective for PM_{10}. When the magnitude of change is considered in the context of the absolute concentrations, the impact descriptor is categorised as 'negligible' at all receptors.

1.31 As all predicted annual mean PM_{10} concentrations are below 31.5 µg.m^{-3}, the daily-mean PM_{10} objective is expected to be met at all receptors and the short-term PM_{10} impact is not considered further within this assessment.

1.32 Overall, the impact on the surrounding area from PM_{10} is considered to be 'negligible', using the criteria adopted for this assessment and based on professional judgement.

Annual-mean $PM_{2.5}$ Concentrations

1.33 Table 6 presents the annual-mean $PM_{2.5}$ concentrations predicted at the façades of existing receptors.

Table 6 Predicted Annual-Mean $PM_{2.5}$ Impacts at Existing Receptors

Receptor ID	Concentration (µg.m^{-3})		Amended - Permitted Dev as % of the AQS Objective	Impact Descriptor
	Permitted Development	Amended Development		
Recreation Way	11.3	11.3	0	Negligible
Swale Road	11.5	11.5	0	Negligible

Receptor ID	Concentration (µg.m^{-3})		Amended - Permitted Dev as % of the AQS Objective	Impact Descriptor
	Permitted Development	Amended Development		
Grovehurst Rd Bramb.	11.2	11.2	0	Negligible
Grovehurst Rd Kemsley	11.0	11.0	0	Negligible
Saffron Way. Kemsley	11.0	11.0	0	Negligible
Howt Green	12.2	12.2	0	Negligible
Lorimar Court	12.2	12.2	0	Negligible
Key Street	11.7	11.7	0	Negligible
The Westlands School	11.0	11.0	0	Negligible
Museum East Street	11.0	11.0	0	Negligible
Boyces Hill	11.0	11.0	0	Negligible
M2 Bredgar	11.7	11.7	0	Negligible
Stuppington Farm	11.9	11.9	0	Negligible
A249 South Green	11.0	11.0	0	Negligible
M2 Cowstead	11.3	11.3	0	Negligible
Maximum	**12.2**	**12.2**	**0**	**-**
Minimum	**11.0**	**11.0**	**0**	**-**

Concentrations are shown to 2 decimal places to illustrate the very small relative differences in the 'amended' and 'permitted' development predictions. This is not intended to be indicative of the accuracy of the model.
AQS objective = 25 µg.m^{-3}

1.34 Predicted annual-mean $PM_{2.5}$ concentrations in the opening year at the façades of the existing receptors are well below the AQS objective for $PM_{2.5}$ at all receptors. When the magnitude of change is considered in the context of the absolute concentrations, the impact descriptor is categorised as 'negligible' at all receptors.

1.35 Overall, the impact on the surrounding area from $PM_{2.5}$ is considered to be 'negligible', using the criteria adopted for this assessment and based on professional judgement.

1.36 As the maximum predicted annual-mean $PM_{2.5}$ concentration is below 25 µg.m^{-3} in the opening year, and concentrations of $PM_{2.5}$ are expected to decrease in future years, the AQS objective for $PM_{2.5}$ is expected to be met by a wide margin by its target date of 2020.

1.37 The AQS objectives for NO_2, PM_{10} and $PM_{2.5}$ are likely to be met at the facades of the Proposed Development. On that basis, future occupants of the development should be exposed to acceptable air quality and the site is deemed suitable for its proposed future in this respect.

1.38 Using professional judgement, the resulting air quality effect is considered to be 'not significant' overall.

Effects on Ecological Receptors

Annual-mean NO_X Concentrations

1.39 Annual-mean NO_X concentrations have been predicted at the nearest point of designated sites within 200 m of a modelled road.

Table 7: Predicted Annual-Mean NOX Impacts

Receptor	Concentration (µg.m^{-3})		Amended – Permitted Scheme as % of the Critical Level
	Permitted Development	Amended Development	
The Swale 1	35.6	35.6	0
The Swale 2	79.2	79.2	0
The Swale 3	84.1	84.1	0
The Swale 4	22.2	22.3	0
The Swale 5	21.7	21.8	0
The Swale 6	29.3	29.5	1
The Swale 7	24.5	24.6	0
The Swale 8	23.8	23.9	0
The Swale 9	24.3	24.5	0
The Swale 10	19.7	19.7	0
The Swale 11	18.5	18.5	0
Medway Estuary & Marshes 1	92.0	92.0	0
Medway Estuary & Marshes 2	84.3	84.3	0
Medway Estuary & Marshes 3	85.2	85.2	0
Medway Estuary & Marshes 4	85.7	85.7	0
Medway Estuary & Marshes 5	93.3	93.3	0
Medway Estuary & Marshes 6	105.7	105.7	0

1.40 The increase in predicted annual-mean NO_X concentration does not exceed 1% of the Critical Level at any modelled receptors. On that basis, the air quality effects on the Swale and Medway Estuary & Marshes is considered to be 'not significant'.

1.41 Table 8 presents the change in nutrient N deposition rate for the modelled ecological receptors.

Table 8: Predicted Nutrient N Impacts in 2017

Receptor	N Deposition Rates (kg N ha^{-1} yr^{-1})		Amended – Permitted Scheme as % of the Critical Level
	Permitted Development	Amended Development	
The Swale 1	5.13	5.13	0
The Swale 2	11.40	11.40	0

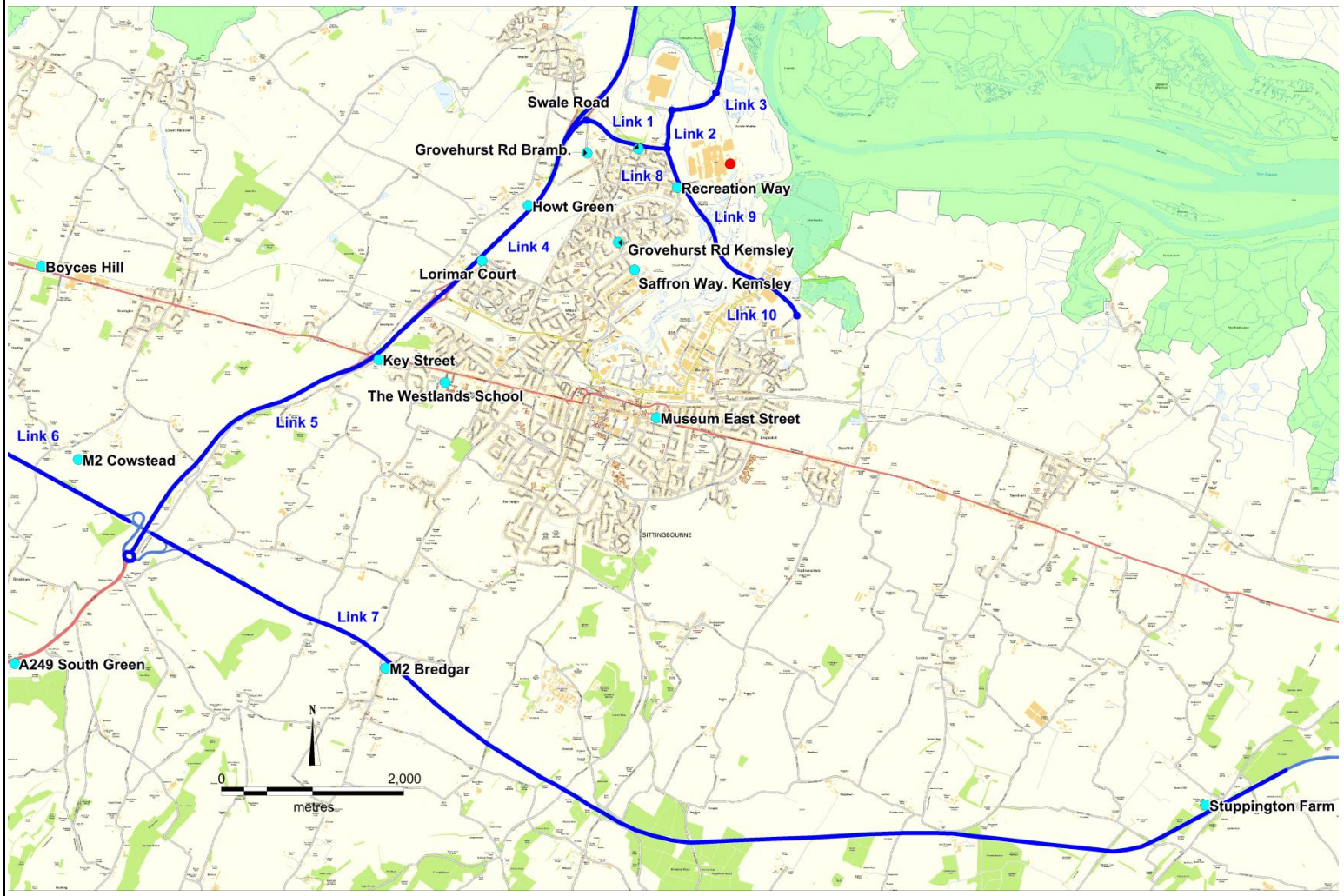
Receptor	N Deposition Rates (kg N ha^{-1} yr^{-1})		Amended – Permitted Scheme as % of the Critical Level
	Permitted Development	Amended Development	
The Swale 3	12.11	12.12	0
The Swale 4	3.19	3.20	0
The Swale 5	3.13	3.14	0
The Swale 6	4.22	4.25	0
The Swale 7	3.53	3.55	0
The Swale 8	3.43	3.45	0
The Swale 9	3.50	3.52	0
The Swale 10	2.84	2.84	0
The Swale 11	2.66	2.66	0
Medway Estuary & Marshes 1	13.25	13.25	0
Medway Estuary & Marshes 2	12.14	12.14	0
Medway Estuary & Marshes 3	12.27	12.27	0
Medway Estuary & Marshes 4	12.34	12.34	0
Medway Estuary & Marshes 5	13.43	13.43	0
Medway Estuary & Marshes 6	15.22	15.22	0

For receptors located within the Swale SPA the minimum Critical Load for sensitive habitats is 15 kg N ha^{-1} yr^{-1}
For receptors located within the Medway Estuary & Marshes SPA the minimum Critical Load for sensitive habitats is 8 kg N ha^{-1} yr^{-1}

1.42 The increase in the predicted N deposition rate is below 1% at all modelled receptors. On that basis, the air quality effects on the Swale and Medway Estuary & Marshes is considered to be 'not significant'.

Conclusions

1.43 Detailed atmospheric dispersion modelling has been undertaken for the first year in which the development is expected to be fully operational, 2019. Pollutant concentrations are predicted to be well within the relevant health-based air quality objectives at the façades of existing receptors. The operational impact of the additional traffic on existing human-health receptors is predicted to be "negligible" taking into account the changes in pollutant concentrations and absolute levels. The impact on ecological receptors is predicted to be not significant taking into account the changes in pollutant concentrations. Using the criteria adopted for this assessment together with professional judgement, the operational air quality effects are considered to be 'not significant' overall.



Receptor

Modelled Road Link

SPA

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Figure 1: Human-health Receptors

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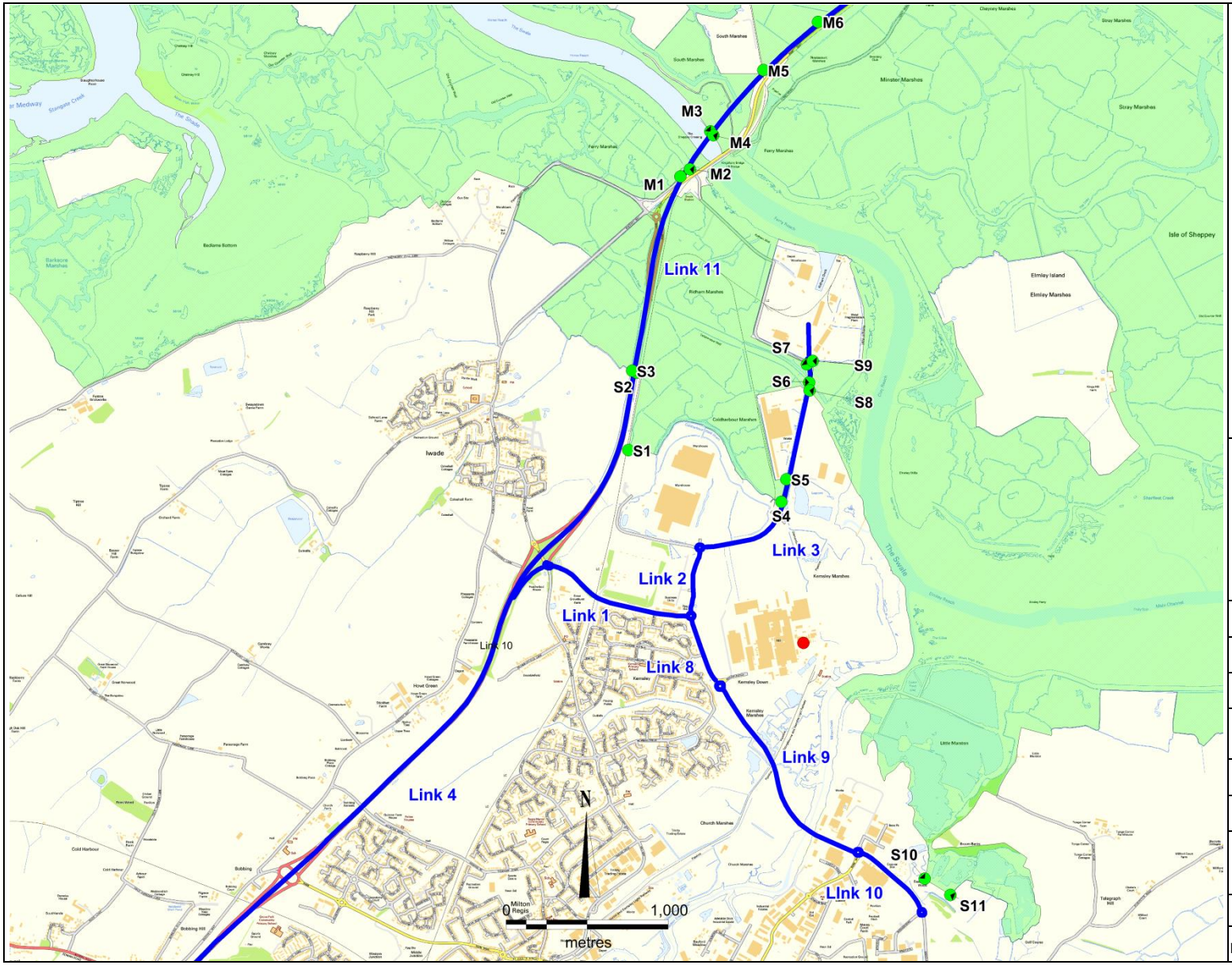

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Figure 2: Ecological Receptors

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Appendices

Appendix A: Model Verification

For the verification and adjustment of NO_x /NO_2 concentrations, the LAQM.TG16 guidance recommends that the comparison considers a broad spread of automatic and diffusion monitoring. Swale Borough Council monitors roadside NO_2 concentrations passively using diffusion tubes at 14 locations in the vicinity of the Application Site.

The concentrations monitored over recent years are provided in Table A.1.

Table A.1 Measured Annual-mean NO_2 Concentrations ($\mu g.m^{-3}$)

Site Code	Site Name	Annual Mean NO_2 Concentration				
		2011	2012	2013	2014	2015
ZW6	Newington (3)	28.5	30.4	34.8	32.9	29.7
SW76	155 Canterbury Road	37.9	40.7	33.8	30.7	31.6
SW75	109 Canterbury Road	26.7	26.9	24.6	22.4	21.0
SW90	Jncn Canterbury Road/ Goodnestone Road	ND	ND	31.6	29.1	30.7
SW56	126 East Street	46.5	39.8	42.8	42.5	38.7
SW58	Dover Street Filling Station	36.8	31.1	28.6	39.8	33.5
SW53	114 East Street. Sittingbourne	38.8	41	33.6	34.5	33.9
SW87	Canterbury Road	ND	36	33.2	31.7	33.8
SW62	Key Street	46.5	47.5	39.9	37.1	37.2
SW66	96/94 High Street	45	39.2	40.9	42.6	36.2
SW45	64 High Street	44.4	42	40.4	41.3	39.6
SW38	15a High Street	35.4	34.7	36.4	33.4	31.4
SW37	32 High Street	40.7	41.5	36.5	36.7	31.4
SW20	Newington Co-Op	37.3	34.2	33.4	35.3	31.2

ND= No data

The monitored annual-mean NO_x road contributions have been derived from the monitored annual-mean NO_2 concentrations using the LAQM.TG16 calculator. The monitored annual-mean NO_X road contributions have then been compared with the modelled annual-mean NO_x road contributions. This comparison is provided in Table A.2 below.

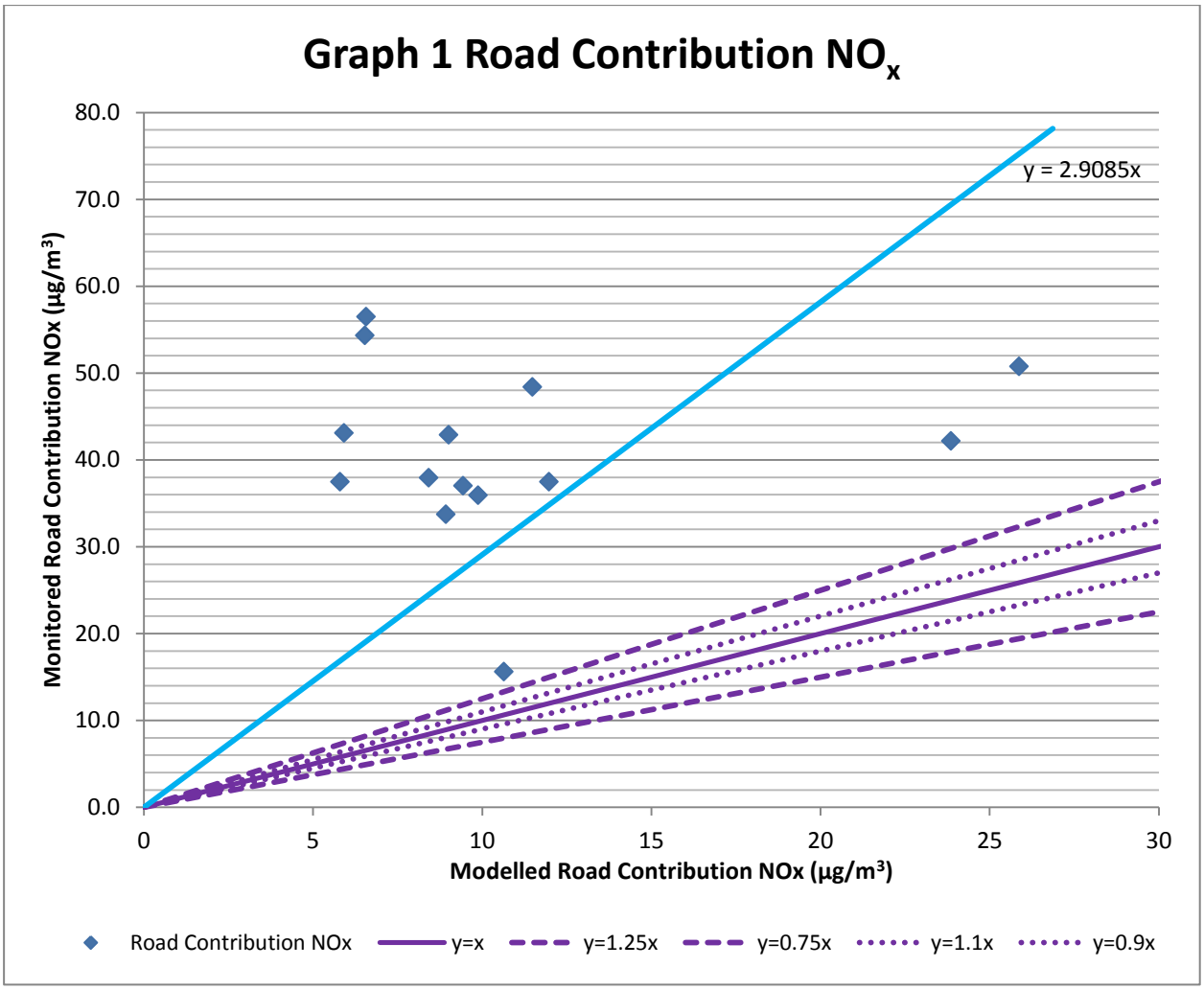
Table A.2 Comparison of Monitored and Modelled Annual-mean Road NO_x Contribution ($\mu g.m^{-3}$)

Site Code	Site Name	Annual-mean Road NO_X Contribution ($\mu g.m^{-3}$)	
		Monitored	Modelled
ZW6	Newington (3)	33.7	8.9
SW76	155 Canterbury Road	37.9	8.4

Site Code	Site Name	Annual-mean Road NO_X Contribution ($\mu g.m^{-3}$)	
		Monitored	Modelled
SW75	109 Canterbury Road	15.6	10.6
SW90	Jncn Canterbury Road/ Goodnestone Road	35.9	9.9
SW56	126 East Street	54.3	6.5
SW58	Dover Street Filling Station	42.2	23.9
SW53	114 East Street. Sittingbourne	43.1	5.9
SW87	Canterbury Road	42.9	9.0
SW62	Key Street	50.7	25.9
SW66	96/94 High Street	48.4	11.5
SW45	64 High Street	56.5	6.6
SW38	15a High Street	37.5	12.0
SW37	32 High Street	37.5	5.8
SW20	Newington Co-Op	37.0	9.4

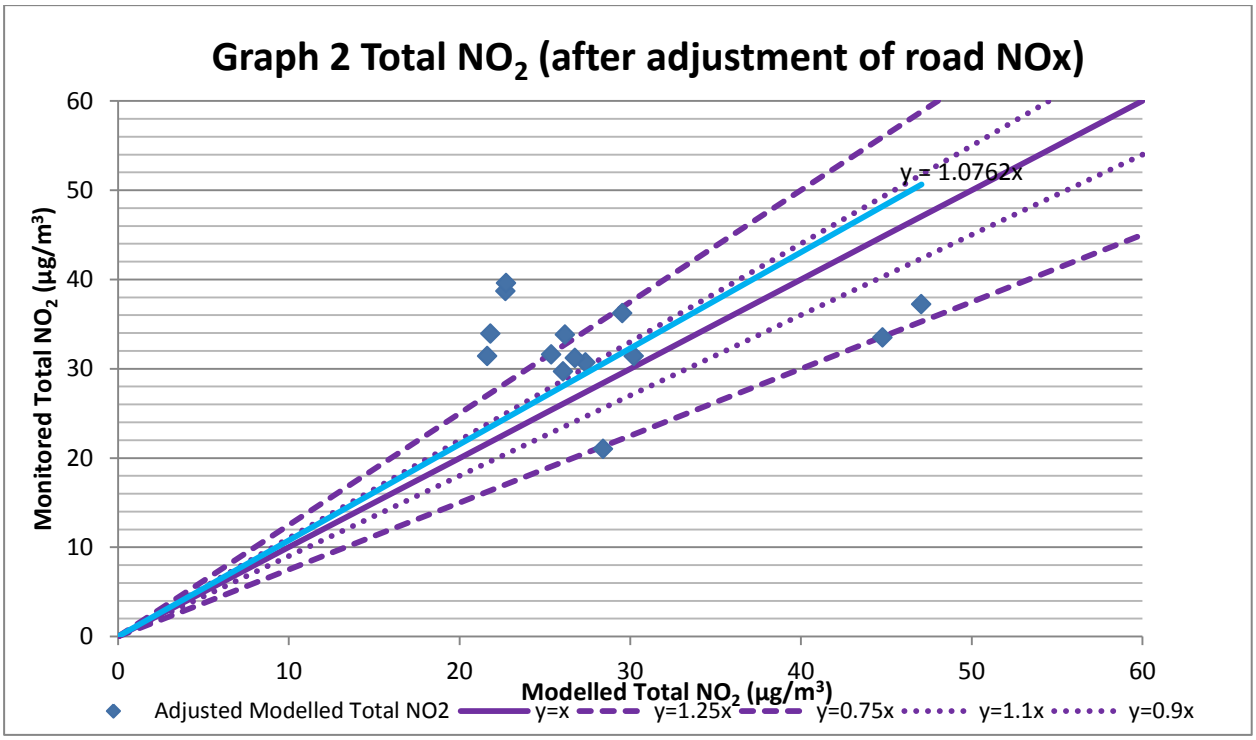
It should be borne in mind that the monitored concentrations are themselves only estimates to the true concentrations at each point; the EU Directive on air quality designates passive NO_2 samplers indicative measures with a potential uncertainty of +/-30 %. Ignoring any uncertainty errors in the monitoring results, Table A.2 above indicates that the model is under-predicting at all monitoring locations.

The modelled annual-mean NO_x road contributions for the 14 concentrations have been plotted against the monitored annual-mean NO_x road contributions in Graph 1.



The modelled NO_x contributions have been multiplied by the gradient of the trend line (2.9085) to determine the corrected NO_x contributions.

Modelled annual-mean NO_2 concentrations have been derived from the corrected modelled annual-mean NO_x road contributions. The corrected modelled annual-mean NO_2 concentrations have been plotted against the monitored annual-mean NO_2 concentrations in Graph 2.



The majority of the corrected modelled annual-mean NO_2 concentrations are within 25% of the monitored annual-mean NO_2 concentrations. The correction factor therefore improves the modelled concentrations and has been applied to all predictions used within the assessment.

The fractional bias can also be used to determine whether the corrected model has a tendency to over or under-predict. The fractional bias is calculated as:

(Average Monitored NO_X Concentration – Average Predicted NO_x Concentration) / 0.5 x (Average Monitored NO_X + Average Predicted NOx Concentration)

Fractional bias values vary between +2 and -2 and has an ideal value of zero. A negative value suggests a model over-prediction and a positive value suggests a model under-prediction.

Table A3 sets out the average monitored concentration and the average predicted concentration.

Table A3 Comparison of Monitored and Adjusted Modelled Annual-mean Road NO_X Contribution ($\mu g.m^{-3}$)

Site Code	Site Code	Annual-mean Road NO_X Contribution ($\mu g.m^{-3}$)	
		Monitored	Corrected Modelled
ZW6	Newington (3)	33.7	26.0
SW76	155 Canterbury Road	37.9	24.5

Site Code	Site Code	Annual-mean Road NO_X Contribution ($\mu g.m^{-3}$)	
		Monitored	Corrected Modelled
SW75	109 Canterbury Road	15.6	31.0
SW90	Jncn Canterbury Road/ Goodnestone Road	35.9	28.8
SW56	126 East Street	54.3	19.0
SW58	Dover Street Filling Station	42.2	69.4
SW53	114 East Street. Sittingbourne	43.1	17.2
SW87	Canterbury Road	42.9	26.2
SW62	Key Street	50.7	75.2
SW66	96/94 High Street	48.4	33.4
SW45	64 High Street	56.5	19.1
SW38	15a High Street	37.5	34.8
SW37	32 High Street	37.5	16.9
SW20	Newington Co-Op	37.0	27.4
Average		**40.9**	**32.1**

The fractional bias for this study is therefore (40.9 – 32.1) / (0.5 x (40.9 + 32.1)) = 0.24. As the fractional bias is close to zero, the model is performing well.

References

1 http://laqm.defra.gov.uk/review-and-assessment/tools/tools.html

2 Air Pollution Information Systems, www.apis.ac.uk

3 EPUK & IAQM (January 2017) Land-Use Planning & Development Control: Planning For Air Quality

4 https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit#screening-for-protected-conservation-areas

5 IAQM (2016) Use of a Criterion for the Determination of an Insignificant Effect of Air Quality Impacts on Sensitive Habitats