



# Paternoster Hill, Waltham Abbey

Technical Note

47069898

Prepared for:  
Wattsdown Ltd

UNITED  
KINGDOM &  
IRELAND



**REVISION SCHEDULE**

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## TABLE OF CONTENTS

<b>1</b>	<b>INTRODUCTION .....</b>	<b>4</b>
<b>1.1</b>	<b>General.....</b>	<b>4</b>
<b>1.2</b>	<b>Report Layout.....</b>	<b>4</b>
<b>2</b>	<b>EXISTING CONDITIONS.....</b>	<b>4</b>
<b>2.1</b>	<b>Site Description.....</b>	<b>4</b>
<b>2.2</b>	<b>Surrounding Highway Network .....</b>	<b>4</b>
<b>3</b>	<b>PROPOSED DEVELOPMENT .....</b>	<b>5</b>
<b>3.1</b>	<b>General.....</b>	<b>5</b>
<b>3.2</b>	<b>Access Arrangements .....</b>	<b>5</b>
<b>3.3</b>	<b>Trip Generation .....</b>	<b>6</b>
<b>3.4</b>	<b>Trip Distribution .....</b>	<b>6</b>
<b>4</b>	<b>SUITABILITY OF NEW ROUNDABOUT .....</b>	<b>7</b>
<b>4.1</b>	<b>General.....</b>	<b>7</b>
<b>4.2</b>	<b>Capacity .....</b>	<b>7</b>
<b>5</b>	<b>CONCLUSIONS .....</b>	<b>8</b>

## LIST OF APPENDICES

Appendix A Site Location Plan
Appendix B Photographs
Appendix C Illustrative Masterplan
Appendix D Indicative Access Arrangements
Appendix E TRICS Data
Appendix F Census Data
Appendix G Traffic Flow Diagrams
Appendix H Traffic Count Data
Appendix I ARCADY Output

## 1 INTRODUCTION

### 1.1 General

- 1.1.1 This Technical Note has been prepared on behalf of The Farmers Club Charitable Trust to help promote land that lies to the north of Parklands and Paternoster Hill in Waltham Abbey for residential development. The site, which extends to some 9.05 hectares, could accommodate up to 500 residential units.
- 1.1.2 To access the site, a new four-arm roundabout is proposed on Parklands. This would incorporate Galley Hill Road which would be realigned at its southern end to form the north western arm at the roundabout. The site location is shown on a plan presented in Appendix A.
- 1.1.3 The main objective of this Technical Note is to demonstrate that the roundabout provides a suitable means of access and that it provides sufficient capacity to accommodate both the development and the growth in background traffic flows.

### 1.2 Report Layout

- 1.2.1 Following this Introduction, Section Two describes the existing conditions including a description of the site and the surrounding highway network.
- 1.2.2 Section Three sets out details of the proposed development including the access arrangements, the predicted trip generation and trip distribution.
- 1.2.3 Section Four considers the suitability of the proposed new roundabout and presents the results of a capacity assessment in the design year.
- 1.2.4 The conclusions to the Technical Note are set out in Section Five.

## 2 EXISTING CONDITIONS

### 2.1 Site Description

- 2.1.1 The site lies to the north of Paternoster Hill and is approximately 1.5 kilometres (kms) north east of Waltham Abbey town centre. It is irregular in shape and has a gross development area of 13.51 hectares. The areas earmarked for development extend to approximately 9.05 hectares. Parts of its eastern and western borders are formed by Cobbin's Brook that bisects the site between the two main parcels of land that are proposed for development.
- 2.1.2 The two areas of development are identified as Parcel A and Parcel B on the Masterplan. Parcel A lies to the south of Cobbin's Brook and Parcel B to the north. There are currently two garden nurseries on Parcel A that would be replaced by the proposed residential development. There is currently no built development on Parcel B.
- 2.1.3 To the north the site is bounded by open fields. To the west there is an industrial estate while to the east there is a care home and a horticultural area including glasshouses. The southern boundary is formed by a combination of Parklands and the rear gardens of semi-detached properties with direct frontage onto Paternoster Hill.

### 2.2 Surrounding Highway Network

- 2.2.1 Parklands has a 7.3 metre carriageway and is subject to a 40mph speed restriction. It has footways and wide verges on both sides and benefits from street lighting. There are no private means of access with direct frontage onto Parklands although there is an existing field access into the site midway between Galley Hill Road and Paternoster Hill. This would be closed as part of the development.

- 2.2.2 There is a mini roundabout at Ninefields and to the east of the roundabout Parklands is renamed Paternoster Hill. Just to the west of the mini roundabout the speed limit is reduced to 30mph. The characteristics of Parklands and Paternoster Hill are shown in photographs presented in Appendix B.
- 2.2.3 Galleyhill Road is a narrow rural road of varying width between 4 and 5 metres. It is subject to the national speed limit and forms a simple priority junction with Parklands just to the west of the development site boundary. The absence of a right turn lane means that traffic waiting to turn right into Galleyhill Road impedes the westbound ahead movement on Parklands.
- 2.2.4 Galleyhill Road is a long cul-de-sac although it serves a village, the industrial estate to the west of the site and a major complex of glasshouses. The industrial estate and glasshouses both generate a reasonable number of heavy goods vehicles (HGVs).
- 2.2.5 As it approaches the junction there is a bend on Galleyhill Road that makes it difficult for two vehicles travelling in opposite directions to pass unimpeded. The problem is exacerbated by HGVs as, travelling in either direction, they take up most of the available carriageway space. These characteristics are shown in photographs presented in Appendix B.
- 2.2.6 The visibility at the junction has been measured on site and from a 4.5 metre setback is estimated to be 27 metres to the right and in excess of 200 metres to the left. Visibility to the right is obstructed by a boundary hedge which is currently trimmed and not in leaf. The available visibility at the junction from a 4.5 metre setback is shown in photographs presented in Appendix B.
- 2.2.7 According to TD 41/95, '*Vehicular Access to All-Purpose Trunk Roads*' of the DMRB, the required visibility along a major road with a 40mph speed restriction is 120 metres. This is to enable drivers emerging from the side road to have adequate visibility to see oncoming traffic in sufficient time to make their manoeuvre safely without influencing the major road traffic speed.
- 2.2.8 It is clear from the measurement taken on site and the photograph presented in Appendix B that visibility to right is currently substandard.
- 2.2.9 Visibility to the right has also been measured from a 2.4 metre setback as this is sometimes acceptable for lightly trafficked roads. At 2.4 metres visibility to the right is estimated to be 48 metres which is still significantly substandard.

### 3 PROPOSED DEVELOPMENT

#### 3.1 General

- 3.1.1 The land proposed for development extends to more than 9 hectares and the expectation is that it could deliver up to 500 residential units. An Illustrative Masterplan is presented in Appendix C.

#### 3.2 Access Arrangements

- 3.2.1 The site would be accessed via the eastern arm of a new four-arm roundabout on Parklands. The indicative access arrangements are shown on Drawing No 09396/745/P/SK1 Rev B, presented in Appendix D.
- 3.2.2 As part of the proposals, Galley Hill Road would be realigned at its southern end to form the north western arm at the roundabout. This would allow the existing priority junction to be stopped-up thus removing a junction with substandard visibility from the network.
- 3.2.3 To accommodate the right turn into Ninefields, a ghost island priority junction would replace the existing mini roundabout at the Parklands/ Paternoster Hill junction.

### 3.3 Trip Generation

- 3.3.1 The trip generation calculation to the proposed development has been calculated using the latest version of the TRICS database, TRICS 7.1.1 Update 3.
- 3.3.2 Using data in the *houses privately owned* category, developments in the range of 100 to 500 households with a suburban, edge of town or neighbourhood centre location have been selected. Sites in Ireland have been excluded. TRICS identified 20 sites matching these criteria and the peak hour trip rates are shown in the table below. For residential development, trip rates are expressed as trips per dwelling. The TRICS data is presented in Appendix E.

**Table 3-1: Vehicle Trip Rates in the Houses Privately Owned Category**

	AM Peak		PM Peak	
	Arrivals	Deps	Arrivals	Deps
Vehicles	0.137	0.393	0.386	0.232

- 3.3.3 These trip rates have been applied to the proposed development (500 units) to calculate the predicted vehicle trip generation. The result of the trip generation calculation using the rates in Table 3.1 is shown in Table 3.2 below.

**Table 3-2: Trip Generation to Proposed Development Site**

	AM Peak		PM Peak	
	Arrivals	Deps	Arrivals	Deps
Vehicles	69	197	193	116

### 3.4 Trip Distribution

- 3.4.1 The spatial distribution of car trips generated by the development is based on 2001 Census Journey to Work data for the resident population in the Waltham Abbey Paternoster Ward. This ward contains the development site and also includes established residential areas in this part of Waltham Abbey. It should therefore provide a reliable estimate of the journey to work patterns that will be exhibited by the proposed development.
- 3.4.2 The Census Journey to Work data has been filtered to extract the place of employment for all journeys that are made by car and are involved in full-time employment. It is considered that the existing journey to work patterns from the ward will provide the best estimate of the distribution of trips generated by the proposed development during the peak hours.
- 3.4.3 For each ward or district to which people living in the Waltham Abbey Paternoster Ward drive to work, a route has been allocated. Trips have been assigned to routes using the route finder in Google Maps and knowledge of the local network.
- 3.4.4 The results of the route assignment exercise are summarised in Table 3.3 below while a summary of the Census Data and the proposed assignment is presented in Appendix F

**Table 3-3: Proposed Route Assignment for Development Trips**

Route	Proportion (%)
Parklands	66.15%
Paternoster Hill	33.85%
<b>Total</b>	<b>100.00%</b>

- 3.4.5 Traffic flow diagrams showing the proposed development trips are presented in Figures 3.1 and 3.2 contained within Appendix G.

## 4 SUITABILITY OF NEW ROUNDABOUT

### 4.1 General

- 4.1.1 The new roundabout would replace an existing priority junction with a poor alignment and substandard visibility. It would also act as a traffic calming feature, reducing the speed of vehicles on Parklands and Paternoster Hill. An existing field access into the site would also be closed. Compared with the existing road layout it is considered that the new layout has the potential to introduce safety benefits.

### 4.2 Capacity

- 4.2.1 The impact of the development has been assessed at the proposed new roundabout. To establish the traffic flows that would pass through the roundabout, a classified turning count was undertaken at the Parklands/ Galley Hill Road junction on Wednesday 4 December 2013.
- 4.2.2 The Survey was conducted from 7.30am to 9.30am and 4pm to 6.30pm and the morning and evening peak hours were established as 7.45am to 8.45am and 4.30pm to 5.30pm. The traffic count data is presented in Appendix H.
- 4.2.3 To reflect the proposed change to the network, the surveyed traffic flows have been transferred to the new roundabout. To factor the base traffic flows, traffic growth factors have been calculated using TEMPRO version 6.2.
- 4.2.4 Base traffic flows have been factored to a design year of 2023. Growth rates for principal urban roads in the Waltham Abbey authority area have been used to factor the traffic flows. To calculate the adjusted local growth figure, NTM traffic growth calculations have been used. The calculated growth rates are shown in the table below.

**Table 4-1: TEMPRO/ NTM Growth Rates for Waltham Abbey**

Year	AM Peak	PM Peak
2013 – 2023	1.1095	1.1126

- 4.2.5 The 2023 traffic flows have then been combined with the development flows and the total 2023 plus development traffic flows are presented in Figures 4.1 and 4.2 contained within Appendix G.



- 4.2.6 To determine whether the proposed new roundabout would have sufficient capacity to cater for a combination of the growth in background traffic and the proposed development traffic the assessment tool ARCADY has been used. ARCADY calculates queues and delays at roundabouts. The critical outputs are the Ratio of Flow to Capacity (RFC) and the maximum queue predicted for each arm. If the RFC is below 1.00 then the junction is operating within capacity and little or no queuing will result. In order to allow for a performance margin, a value of 0.85 is more typically considered to represent the desirable maximum value.
- 4.2.7 Within ARCADY the O-D Table option has been used to assess the performance of the junction. This generates a synthesised profile from the full turning count data and creates a peak half hour period within the middle of the modelled period to represent uplift in demand during the peaks.
- 4.2.8 The results of the ARCADY assessment are summarised in the table below. A printout of the full analysis is presented in Appendix I.

**Table 4-2: Summary of Main Performance Indicators at Proposed Roundabout – 2023 With Development**

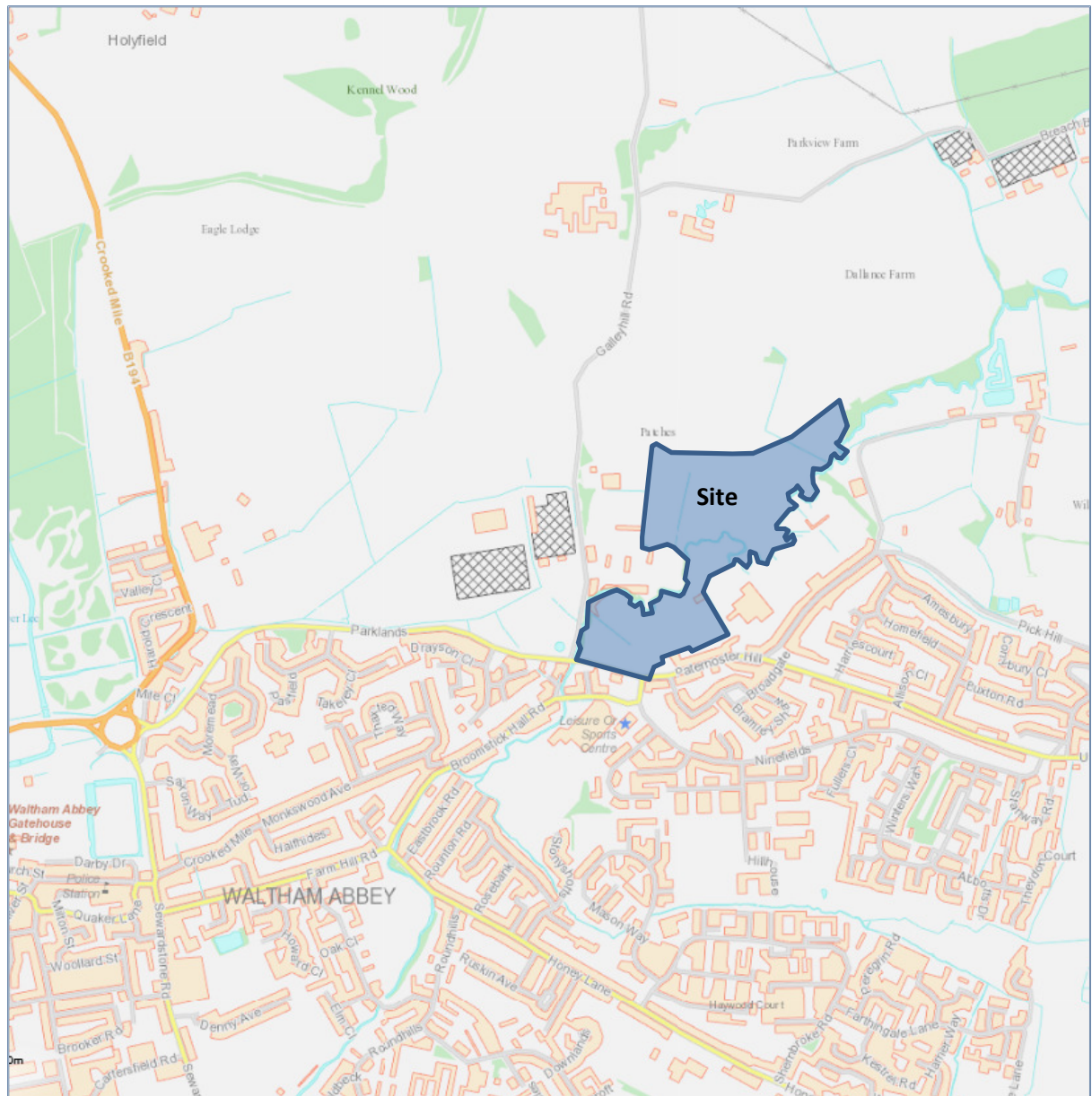
Approach Arm	AM Peak		PM Peak	
	RFC	Queue	RFC	Queue
Galley Hill Road	0.111	0	0.128	0
Site Access	0.181	0	0.109	0
Paternoster Hill	0.371	1	0.319	0
Parklands	0.379	1	0.477	1

- 4.2.9 Table 4.2 indicates that the proposed new roundabout would operate well within capacity during both peaks in 2023. During both peaks the maximum RFC is predicted on Parklands with values of 0.379 and 0.477 in the morning and evening respectively.

## 5 CONCLUSIONS

- 5.1.1 The main objective of this Technical Note is to demonstrate that a proposed new roundabout has the capacity to accommodate a proposed development of up to 500 residential units on land to the north of Parklands and Paternoster Hill in Waltham Abbey. The main conclusions are:
- That the roundabout would operate well within capacity during both peak periods in a design year of 2023;
  - That the roundabout would replace an existing priority junction with a poor alignment and substandard visibility;
  - That the roundabout would act as a traffic calming feature, reducing the speed of vehicles on Parklands and Paternoster Hill; and
  - Compared with the existing road layout, the new layout has the potential to introduce safety benefits.

## **Appendix A – Site Location Plan**



**Appendix A: Site Location Plan**

## **Appendix B – Photographs**



Photograph No 1 | Parklands towards Galley Hill Road Junction



Photograph No 2 | View Towards Paternoster Hill and Ninefields





Photograph No 3 | Parklands/ Galley Hill Road Junction from South



Photograph No 4 | Alignment of Galley Hill Road on Approach to Parklands



Photograph No 5 | HGV on Galley Hill Road



Photograph No 6 | HGV on Galley Hill Road





Photograph No 7 | Visibility to the Right from Galley Hill Road at 4.5m Setback

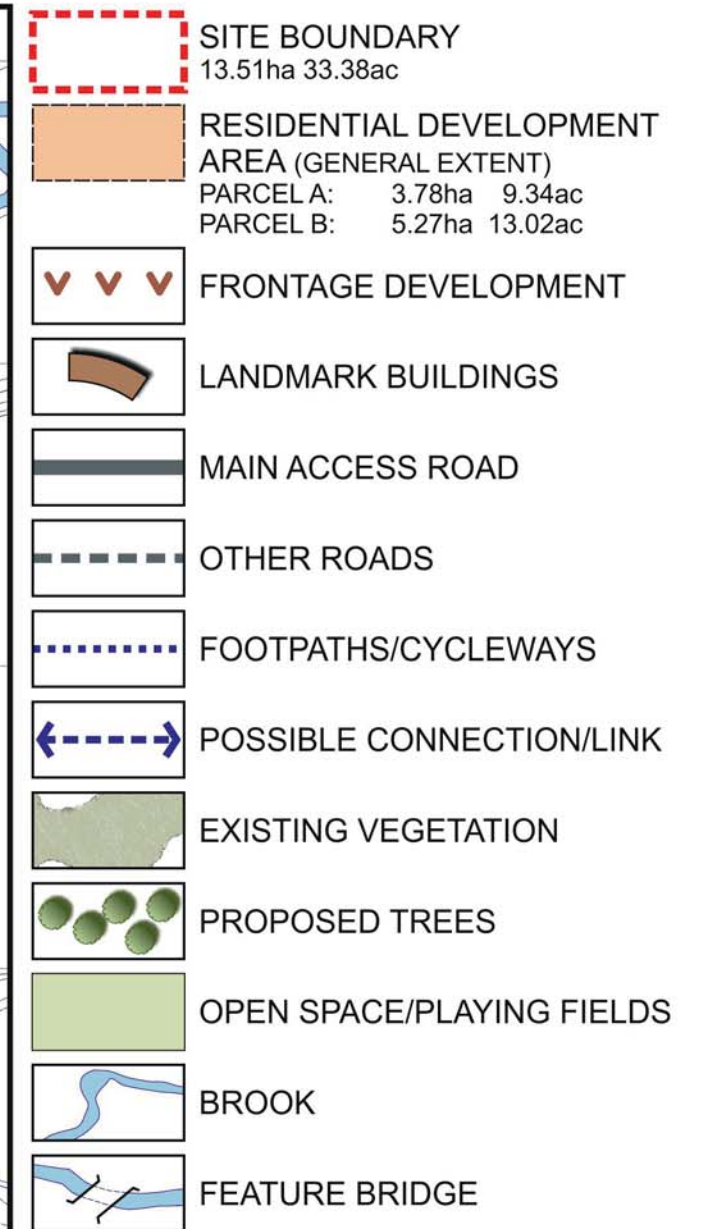


Photograph No 8 | Visibility to the Left from Galley Hill Road at 4.5m Setback



## **Appendix C – Illustrative Masterplan**





**REVISION B:**  
Amendments to road and footpaths  
HNA/12-10-2012

PROJECT TITLE  
Paternoster Hill  
WALTHAM ABBEY  
Essex

SCALE	DATE OCTOBER 2012	CHECKED
1:2500 @A3	DRAWN HNA	DATE

PROJECT No.						
4979			0	0	1	B

## VINCENT AND GORBING

**CHARTERED ARCHITECTS AND TOWN PLANNERS**

STERLING COURT NORTON ROAD STEVENAGE HERTS  
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## **Appendix D – Indicative Access Arrangements**



<div>Client</div> <div>The Farmers Club Charitable Trust</div>	<div>CONSULTING ENGINEERS</div> <div>URS</div> <div>200 Harpur Centre, Home Lane, Bedford MK40 1TS. Tel: 44 (0) 1234 349641</div>			<div>Title</div> <div>Indicative Access Arrangements</div>		
<div>Project</div> <div>Paternoster Hill, Waltham Abbey</div>	<div>Drawn</div> <div>SDW</div> <div>Checked</div>	<div>Approved</div> <div>Date</div> <div>22/07/03</div>	<div>Scale</div> <div>1:2500</div>	<div>Drg No</div> <div>09396/745/P/SK1</div>	<div>Rev</div> <div>B</div> <div>Sheet</div>	

## **Appendix E – TRICS Data**

## TRIP RATE CALCULATION SELECTION PARAMETERS:

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

Selected regions and areas:

02	SOUTH EAST	
	EX ESSEX	1 days
	HF HERTFORDSHIRE	1 days
04	EAST ANGLIA	
	SF SUFFOLK	2 days
05	EAST MIDLANDS	
	LN LINCOLNSHIRE	2 days
	NR NORTHAMPTONSHIRE	1 days
	NT NOTTINGHAMSHIRE	1 days
06	WEST MIDLANDS	
	SH SHROPSHIRE	1 days
	WO WORCESTERSHIRE	2 days
07	YORKSHIRE & NORTH LINCOLNSHIRE	
	NY NORTH YORKSHIRE	1 days
08	NORTH WEST	
	CH CHESHIRE	2 days
	MS MERSEYSIDE	1 days
09	NORTH	
	TV TEES VALLEY	1 days
10	WALES	
	CF CARDIFF	1 days
11	SCOTLAND	
	FA FALKIRK	1 days
	FI FIFE	1 days
	SR STIRLING	1 days

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

## Filtering Stage 2 selection:

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

Parameter: Number of dwellings  
 Actual Range: 101 to 372 (units: )  
 Range Selected by User: 100 to 500 (units: )

Public Transport Provision:

Selection by: Include all surveys

Date Range: 01/01/05 to 29/05/13

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

Selected survey days:

Monday	4 days
Tuesday	4 days
Wednesday	2 days
Thursday	5 days
Friday	3 days
Saturday	1 days
Sunday	1 days

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

Selected survey types:

Manual count	20 days
Directional ATC Count	0 days

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

Selected Locations:

Suburban Area (PPS6 Out of Centre)	10
Edge of Town	9
Neighbourhood Centre (PPS6 Local Centre)	1

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

Selected Location Sub Categories:

Residential Zone	15
Out of Town	1
No Sub Category	4

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

## Filtering Stage 3 selection:

Use Class:

C3	20 days
----	---------

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

## Filtering Stage 3 selection (Cont.):

Population within 1 mile:

1,001 to 5,000	1 days
5,001 to 10,000	2 days
10,001 to 15,000	2 days
15,001 to 20,000	8 days
20,001 to 25,000	5 days
25,001 to 50,000	2 days

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

Population within 5 miles:

5,001 to 25,000	1 days
50,001 to 75,000	2 days
75,001 to 100,000	5 days
100,001 to 125,000	5 days
125,001 to 250,000	7 days

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

Car ownership within 5 miles:

0.6 to 1.0	7 days
1.1 to 1.5	13 days

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

Travel Plan:

No	20 days
----	---------

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



LIST OF SITES relevant to selection parameters

1	CF-03-A-02 DROPE ROAD	MIXED HOUSES	CARDIFF
	CARDIFF Edge of Town Residential Zone Total Number of dwellings: 196 Survey date: FRIDAY 05/10/07		Survey Type: MANUAL
2	CH-03-A-02 SYDNEY ROAD	HOUSES/FLATS	CHESHIRE
	CREWE Edge of Town Residential Zone Total Number of dwellings: 174 Survey date: TUESDAY 14/10/08		Survey Type: MANUAL
3	CH-03-A-06 CREWE ROAD	SEMI-DET./BUNGALOWS	CHESHIRE
	CREWE Suburban Area (PPS6 Out of Centre) No Sub Category Total Number of dwellings: 129 Survey date: TUESDAY 14/10/08		Survey Type: MANUAL
4	EX-03-A-01 MILTON ROAD CORRINGHAM STANFORD-LE-HOPE Edge of Town Residential Zone Total Number of dwellings: 237 Survey date: TUESDAY 13/05/08	SEMI-DET.	ESSEX
5	FA-03-A-02 ROSEBANK AVENUE & SPRINGFIELD DRIVE	MIXED HOUSES	FALKIRK
	FALKIRK Suburban Area (PPS6 Out of Centre) Residential Zone Total Number of dwellings: 161 Survey date: WEDNESDAY 29/05/13		Survey Type: MANUAL
6	FI-03-A-03 WOODMILL ROAD	MIXED HOUSES	FIFE
	DUNFERMLINE Edge of Town Residential Zone Total Number of dwellings: 155 Survey date: MONDAY 30/04/07		Survey Type: MANUAL
7	HF-03-A-02 BLACK FAN ROAD PANSHANGER WELWYN GARDEN CITY Suburban Area (PPS6 Out of Centre) Residential Zone Total Number of dwellings: 195 Survey date: SUNDAY 20/07/08	HOUSES	HERTFORDSHIRE
			Survey Type: MANUAL

LIST OF SITES relevant to selection parameters (Cont.)

8	LN-03-A-01	MIXED HOUSES	LINCOLNSHIRE
	BRANT ROAD		
	BRACEBRIDGE		
	LINCOLN		
	Edge of Town		
	Residential Zone		
	Total Number of dwellings:	150	
	Survey date: TUESDAY	15/05/07	Survey Type: MANUAL
9	LN-03-A-02	MIXED HOUSES	LINCOLNSHIRE
	HYKEHAM ROAD		
	LINCOLN		
	Suburban Area (PPS6 Out of Centre)		
	Residential Zone		
	Total Number of dwellings:	186	
	Survey date: MONDAY	14/05/07	Survey Type: MANUAL
10	MS-03-A-01	TERRACED	MERSEYSIDE
	PALACE FIELDS AVENUE		
	RUNCORN		
	Neighbourhood Centre (PPS6 Local Centre)		
	Residential Zone		
	Total Number of dwellings:	372	
	Survey date: THURSDAY	06/10/05	Survey Type: MANUAL
11	NR-03-A-01	HOUSES	NORTHAMPTONSHIRE
	BOUGHTON GREEN ROAD		
	KINGSTHORPE		
	NORTHAMPTON		
	Suburban Area (PPS6 Out of Centre)		
	Residential Zone		
	Total Number of dwellings:	102	
	Survey date: SATURDAY	22/09/12	Survey Type: MANUAL
12	NT-03-A-03	SEMI DETACHED	NOTTINGHAMSHIRE
	B6018 SUTTON ROAD		
	KIRKBY-IN-ASHFIELD		
	Edge of Town		
	Residential Zone		
	Total Number of dwellings:	166	
	Survey date: WEDNESDAY	28/06/06	Survey Type: MANUAL
13	NY-03-A-06	BUNGALOWS & SEMI DET.	NORTH YORKSHIRE
	HORSEFAIR		
	BOROUGHBRIDGE		
	Suburban Area (PPS6 Out of Centre)		
	Residential Zone		
	Total Number of dwellings:	115	
	Survey date: FRIDAY	14/10/11	Survey Type: MANUAL
14	SF-03-A-02	SEMI DET./TERRACED	SUFFOLK
	STOKE PARK DRIVE		
	MAIDENHALL		
	IPSWICH		
	Edge of Town		
	Residential Zone		
	Total Number of dwellings:	230	
	Survey date: THURSDAY	24/05/07	Survey Type: MANUAL

LIST OF SITES relevant to selection parameters (Cont.)

15	SF-03-A-03	MIXED HOUSES		SUFFOLK
	BARTON HILL			
	FORNHAM ST MARTIN			
	BURY ST EDMUNDS			
	Edge of Town			
	Out of Town			
	Total Number of dwellings:	101		
	Survey date: MONDAY	15/05/06		Survey Type: MANUAL
16	SH-03-A-04	TERRACED		SHROPSHIRE
	ST MICHAEL'S STREET			
	SHREWSBURY			
	Suburban Area (PPS6 Out of Centre)			
	No Sub Category			
	Total Number of dwellings:	108		
	Survey date: THURSDAY	11/06/09		Survey Type: MANUAL
17	SR-03-A-01	DETACHED		STIRLING
	BENVIEW			
	STIRLING			
	Suburban Area (PPS6 Out of Centre)			
	Residential Zone			
	Total Number of dwellings:	115		
	Survey date: MONDAY	23/04/07		Survey Type: MANUAL
18	TV-03-A-01	HOUSES & FLATS		TEES VALLEY
	POWLETT ROAD			
	HARTLEPOOL			
	Suburban Area (PPS6 Out of Centre)			
	No Sub Category			
	Total Number of dwellings:	225		
	Survey date: THURSDAY	14/04/05		Survey Type: MANUAL
19	WO-03-A-03	DETACHED		WORCESTERSHIRE
	BLAKEBROOK			
	BLAKEBROOK			
	KIDDERMINSTER			
	Suburban Area (PPS6 Out of Centre)			
	Residential Zone			
	Total Number of dwellings:	138		
	Survey date: FRIDAY	05/05/06		Survey Type: MANUAL
20	WO-03-A-06	DET./TERRACED		WORCESTERSHIRE
	ST GODWALDS ROAD			
	ASTON FIELDS			
	BROMSGROVE			
	Edge of Town			
	No Sub Category			
	Total Number of dwellings:	232		
	Survey date: THURSDAY	30/06/05		Survey Type: MANUAL

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

TRIP RATE for Land Use 03 - RESIDENTIAL/A - HOUSES PRIVATELY OWNED  
VEHICLES

Calculation factor: 1 DWELLS

BOLD print indicates peak (busiest) period

Time Range	ARRIVALS			DEPARTURES			TOTALS		
	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	20	174	0.070	20	174	0.266	20	174	0.336
08:00 - 09:00	20	174	0.137	20	174	0.393	20	174	0.530
09:00 - 10:00	20	174	0.155	20	174	0.206	20	174	0.361
10:00 - 11:00	20	174	0.147	20	174	0.183	20	174	0.330
11:00 - 12:00	20	174	0.164	20	174	0.178	20	174	0.342
12:00 - 13:00	20	174	0.187	20	174	0.179	20	174	0.366
13:00 - 14:00	20	174	0.186	20	174	0.172	20	174	0.358
14:00 - 15:00	20	174	0.184	20	174	0.190	20	174	0.374
15:00 - 16:00	20	174	0.285	20	174	0.197	20	174	0.482
16:00 - 17:00	20	174	0.315	20	174	0.190	20	174	0.505
17:00 - 18:00	20	174	0.386	20	174	0.232	20	174	0.618
18:00 - 19:00	20	174	0.261	20	174	0.214	20	174	0.475
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:		2.477			2.600			5.077	

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

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

#### Parameter summary

Trip rate parameter range selected: 101 - 372 (units: )  
 Survey date range: 01/01/05 - 29/05/13  
 Number of weekdays (Monday-Friday): 18  
 Number of Saturdays: 1  
 Number of Sundays: 1  
 Surveys manually removed from selection: 0

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

TRIP RATE for Land Use 03 - RESIDENTIAL/A - HOUSES PRIVATELY OWNED  
OGVS

Calculation factor: 1 DWELLS

BOLD print indicates peak (busiest) period

Time Range	ARRIVALS			DEPARTURES			TOTALS		
	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	20	174	0.003	20	174	0.003	20	174	0.006
08:00 - 09:00	20	174	0.003	20	174	0.003	20	174	0.006
09:00 - 10:00	20	174	0.004	20	174	0.004	20	174	0.008
10:00 - 11:00	20	174	0.003	20	174	0.002	20	174	0.005
11:00 - 12:00	20	174	0.002	20	174	0.002	20	174	0.004
12:00 - 13:00	20	174	0.004	20	174	0.003	20	174	0.007
13:00 - 14:00	20	174	0.003	20	174	0.005	20	174	0.008
14:00 - 15:00	20	174	0.002	20	174	0.003	20	174	0.005
15:00 - 16:00	20	174	0.001	20	174	0.001	20	174	0.002
16:00 - 17:00	20	174	0.002	20	174	0.001	20	174	0.003
17:00 - 18:00	20	174	0.000	20	174	0.001	20	174	0.001
18:00 - 19:00	20	174	0.000	20	174	0.001	20	174	0.001
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			0.027			0.029			0.056

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

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

#### Parameter summary

Trip rate parameter range selected: 101 - 372 (units: )  
 Survey date range: 01/01/05 - 29/05/13  
 Number of weekdays (Monday-Friday): 18  
 Number of Saturdays: 1  
 Number of Sundays: 1  
 Surveys manually removed from selection: 0

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

TRIP RATE for Land Use 03 - RESIDENTIAL/A - HOUSES PRIVATELY OWNED

PSVS

Calculation factor: 1 DWELLS

BOLD print indicates peak (busiest) period

Time Range	ARRIVALS			DEPARTURES			TOTALS		
	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	20	174	0.000	20	174	0.000	20	174	0.000
08:00 - 09:00	20	174	0.001	20	174	0.001	20	174	0.002
09:00 - 10:00	20	174	0.000	20	174	0.000	20	174	0.000
10:00 - 11:00	20	174	0.000	20	174	0.000	20	174	0.000
11:00 - 12:00	20	174	0.000	20	174	0.000	20	174	0.000
12:00 - 13:00	20	174	0.000	20	174	0.000	20	174	0.000
13:00 - 14:00	20	174	0.000	20	174	0.000	20	174	0.000
14:00 - 15:00	20	174	0.000	20	174	0.000	20	174	0.000
15:00 - 16:00	20	174	0.001	20	174	0.001	20	174	0.002
16:00 - 17:00	20	174	0.000	20	174	0.000	20	174	0.000
17:00 - 18:00	20	174	0.000	20	174	0.000	20	174	0.000
18:00 - 19:00	20	174	0.000	20	174	0.000	20	174	0.000
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			0.002			0.002			0.004

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

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

#### Parameter summary

Trip rate parameter range selected: 101 - 372 (units: )  
 Survey date range: 01/01/05 - 29/05/13  
 Number of weekdays (Monday-Friday): 18  
 Number of Saturdays: 1  
 Number of Sundays: 1  
 Surveys manually removed from selection: 0

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

TRIP RATE for Land Use 03 - RESIDENTIAL/A - HOUSES PRIVATELY OWNED  
CYCLISTS

Calculation factor: 1 DWELLS

BOLD print indicates peak (busiest) period

Time Range	ARRIVALS			DEPARTURES			TOTALS		
	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	20	174	0.005	20	174	0.007	20	174	0.012
08:00 - 09:00	20	174	0.004	20	174	0.012	20	174	0.016
09:00 - 10:00	20	174	0.004	20	174	0.003	20	174	0.007
10:00 - 11:00	20	174	0.002	20	174	0.005	20	174	0.007
11:00 - 12:00	20	174	0.004	20	174	0.003	20	174	0.007
12:00 - 13:00	20	174	0.004	20	174	0.005	20	174	0.009
13:00 - 14:00	20	174	0.004	20	174	0.004	20	174	0.008
14:00 - 15:00	20	174	0.003	20	174	0.005	20	174	0.008
15:00 - 16:00	20	174	0.012	20	174	0.008	20	174	0.020
16:00 - 17:00	20	174	0.009	20	174	0.004	20	174	0.013
17:00 - 18:00	20	174	0.010	20	174	0.010	20	174	0.020
18:00 - 19:00	20	174	0.010	20	174	0.005	20	174	0.015
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			0.071			0.071			0.142

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

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

#### Parameter summary

Trip rate parameter range selected: 101 - 372 (units: )  
 Survey date range: 01/01/05 - 29/05/13  
 Number of weekdays (Monday-Friday): 18  
 Number of Saturdays: 1  
 Number of Sundays: 1  
 Surveys manually removed from selection: 0

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

## **Appendix F – Census Data**



C_Ward_Cod	Area	OD_WardW_1	OD_CarDri	Route	Percentage	Route Summary	Total
00ABFX	Barking and Dagenham	Abbey	6	Paternoster Hill	0.55%	Parklands	66.15%
00ABGK	Barking and Dagenham	River	5	Paternoster Hill	0.46%	Paternoster Hill	33.85%
00ABGA	Barking and Dagenham	Chadwell Heath	2	Paternoster Hill	0.18%		100.00%
00ABGL	Barking and Dagenham	Thames	2	Paternoster Hill	0.18%		
00ACGA	Barnet	Colindale	4	Parklands	0.36%		
00ACFX	Barnet	Brunswick Park	2	Parklands	0.18%		
00ACGC	Barnet	East Barnet	2	Parklands	0.18%		
00ACGK	Barnet	Hendon	2	Parklands	0.18%		
00ACGM	Barnet	Mill Hill	2	Parklands	0.18%		
00ACGN	Barnet	Oakleigh	2	Parklands	0.18%		
22UBFQ	Basildon	Billericay East	2	Paternoster Hill	0.18%		
22UBFU	Basildon	Fryerns	2	Paternoster Hill	0.18%		
00MANN	Bracknell Forest	Wildridings and Central	2	Parklands	0.18%		
22UCHN	Braintree	Witham Chipping Hill and Central	2	Paternoster Hill	0.18%		
00AEGM	Brent	Dollis Hill	2	Parklands	0.18%		
00AEGN	Brent	Dudden Hill	2	Parklands	0.18%		
00AEHA	Brent	Stonebridge	2	Parklands	0.18%		
22UDFW	Brentwood	Brentwood West	2	Paternoster Hill	0.18%		
22UDFY	Brentwood	Herongate, Ingrave and West Horndon	2	Paternoster Hill	0.18%		
22UDFZ	Brentwood	Hutton Central	2	Paternoster Hill	0.18%		
22UDGJ	Brentwood	Warley	2	Paternoster Hill	0.18%		
26UBGC	Broxbourne	Waltham Cross	92	Parklands	8.39%		
26UBGA	Broxbourne	Rye Park	22	Parklands	2.01%		
26UBFS	Broxbourne	Cheshunt Central	20	Parklands	1.82%		
26UBFT	Broxbourne	Cheshunt North	14	Parklands	1.28%		
26UBFY	Broxbourne	Hoddesdon Town	11	Parklands	1.00%		
26UBGB	Broxbourne	Theobalds	10	Parklands	0.91%		
26UBFR	Broxbourne	Bury Green	4	Parklands	0.36%		
26UBFQ	Broxbourne	Broxbourne	2	Parklands	0.18%		
26UBFW	Broxbourne	Goffs Oak	2	Parklands	0.18%		
26UBFZ	Broxbourne	Rosedale	2	Parklands	0.18%		
26UBGD	Broxbourne	Wormley & Turnford	2	Parklands	0.18%		
00AGGP	Camden	Holborn and Covent Garden	4	Parklands	0.36%		
00AGGH	Camden	Fortune Green	2	Parklands	0.18%		
00AGGL	Camden	Hampstead Town	2	Parklands	0.18%		
00AGGQ	Camden	Kentish Town	2	Parklands	0.18%		
22UFGG	Chelmsford	Broomfield and The Walthams	2	Paternoster Hill	0.18%		
22UFGR	Chelmsford	Moulsham and Central	2	Paternoster Hill	0.18%		
22UFGZ	Chelmsford	South Woodham-Elmwood and Woodville	2	Paternoster Hill	0.18%		
00AAGB	City of London	Walbrook	4	Parklands	0.36%		
00AAFQ	City of London	Cripplegate	2	Parklands	0.18%		
00AAFZ	City of London	Tower	2	Parklands	0.18%		
45UEGB	Crawley	Southgate	2	Paternoster Hill	0.18%		
26UCGX	Dacorum	Hemel Hempstead Central	2	Parklands	0.18%		
00AJGJ	Ealing	Elthorne	2	Parklands	0.18%		
26UDGT	East Hertfordshire	Hertford Castle	12	Parklands	1.09%		
26UDHL	East Hertfordshire	Ware Christchurch	6	Parklands	0.55%		
26UDHK	East Hertfordshire	Ware Chadwell	4	Parklands	0.36%		
26UDGJ	East Hertfordshire	Bishop's Stortford Central	2	Paternoster Hill	0.18%		
26UDGS	East Hertfordshire	Hertford Bengoe	2	Parklands	0.18%		
26UDGZ	East Hertfordshire	Hertford Sele	2	Parklands	0.18%		
26UDHG	East Hertfordshire	Stanstead Abbots	2	Parklands	0.18%		
26UDHH	East Hertfordshire	Thundridge & Standon	2	Parklands	0.18%		
26UDHM	East Hertfordshire	Ware St Mary's	2	Parklands	0.18%		
26UDHN	East Hertfordshire	Ware Trinity	2	Parklands	0.18%		
00AKGR	Enfield	Enfield Highway	41	Parklands	3.74%		
00AKHB	Enfield	Southbury	29	Parklands	2.65%		
00AKHA	Enfield	Ponders End	18	Parklands	1.64%		
00AKGQ	Enfield	Edmonton Green	11	Parklands	1.00%		
00AKHG	Enfield	Upper Edmonton	10	Parklands	0.91%		
00AKGT	Enfield	Grange	8	Parklands	0.73%		
00AKGX	Enfield	Jubilee	7	Parklands	0.64%		
00AKHE	Enfield	Town	7	Parklands	0.64%		
00AKHF	Enfield	Turkey Street	6	Parklands	0.55%		
00AKHC	Enfield	Southgate	4	Parklands	0.36%		
00AKGL	Enfield	Bowes	2	Parklands	0.18%		
00AKGM	Enfield	Bush Hill Park	2	Parklands	0.18%		
00AKGU	Enfield	Haselbury	2	Parklands	0.18%		
00AKGW	Enfield	Highlands	2	Parklands	0.18%		
00AKGY	Enfield	Lower Edmonton	2	Parklands	0.18%		
00AKHH	Enfield	Winchmore Hill	2	Parklands	0.18%		
22UHHQ	Epping Forest	Waltham Abbey Paternoster	124	Paternoster Hill	11.31%		
22UHHR	Epping Forest	Waltham Abbey South West	56	Parklands	5.11%		
22UHGQ	Epping Forest	Epping Lindsey and Thornwood Common	43	Paternoster Hill	3.92%		
22UHHN	Epping Forest	Waltham Abbey Honey Lane	35	Paternoster Hill	3.19%		
22UHMM	Epping Forest	Waltham Abbey High Beach	22	Parklands	2.01%		
22UHGP	Epping Forest	Epping Hemnall	16	Paternoster Hill	1.46%		
22UHGX	Epping Forest	Loughton Broadway	13	Paternoster Hill	1.19%		
22UHHC	Epping Forest	Loughton St Mary's	10	Paternoster Hill	0.91%		
22UHHP	Epping Forest	Waltham Abbey North East	10	Parklands	0.91%		
22UHHD	Epping Forest	Lower Nazeing	6	Parklands	0.55%		
22UHGH	Epping Forest	Broadley Common, Epping Upland and Nazeing	6	Parklands	0.55%		
22UHGK	Epping Forest	Buckhurst Hill West	6	Paternoster Hill	0.55%		
22UHGW	Epping Forest	Loughton Alderton	5	Paternoster Hill	0.46%		
22UHGZ	Epping Forest	Loughton Forest	2	Paternoster Hill	0.18%		
22UHHA	Epping Forest	Loughton Roding	2	Paternoster Hill	0.18%		
22UHHE	Epping Forest	Lower Sheering	2	Paternoster Hill	0.18%		
22UHHG	Epping Forest	North Weald Bassett	2	Paternoster Hill	0.18%		
22UHHK	Epping Forest	Shelley	2	Paternoster Hill	0.18%		
22UHHL	Epping Forest	Theydon Bois	2	Paternoster Hill	0.18%		
22UHJG	Epping Forest	Buckhurst Hill East	2	Paternoster Hill	0.18%		
22UHGL	Epping Forest	Chigwell Row	2	Paternoster Hill	0.18%		
22UHGM	Epping Forest	Chigwell Village	2	Paternoster Hill	0.18%		

22UHGN	Epping Forest	Chipping Ongar, Greensted and Marden Ash	2 Paternoster Hill	0.18%
00ALHG	Greenwich	Woolwich Riverside	2 Paternoster Hill	0.18%
00ALGY	Greenwich	Greenwich West	2 Paternoster Hill	0.18%
00AMGF	Hackney	De Beauvoir	6 Parklands	0.55%
00AMGA	Hackney	Brownswood	2 Parklands	0.18%
00AMGC	Hackney	Chatham	2 Parklands	0.18%
00AMGE	Hackney	Dalston	2 Parklands	0.18%
00AMGG	Hackney	Hackney Central	2 Parklands	0.18%
00AMGN	Hackney	Lordship	2 Parklands	0.18%
00AMGS	Hackney	Stoke Newington Central	2 Parklands	0.18%
00AMGU	Hackney	Wick	2 Parklands	0.18%
00ANGF	Hammersmith and Fulham	Fulham Reach	2 Parklands	0.18%
00ANGJ	Hammersmith and Fulham	North End	2 Parklands	0.18%
00ANGN	Hammersmith and Fulham	Sands End	2 Parklands	0.18%
00APGR	Haringey	Tottenham Hale	11 Parklands	1.00%
00APGB	Haringey	Bounds Green	6 Parklands	0.55%
00APGL	Haringey	Northumberland Park	5 Parklands	0.46%
00APGQ	Haringey	Tottenham Green	5 Parklands	0.46%
00APGD	Haringey	Crouch End	4 Parklands	0.36%
00APGT	Haringey	White Hart Lane	4 Parklands	0.36%
00APGU	Haringey	Woodside	4 Parklands	0.36%
00APGC	Haringey	Bruce Grove	2 Parklands	0.18%
00APGH	Haringey	Hornsey	2 Parklands	0.18%
00APGK	Haringey	Noel Park	2 Parklands	0.18%
00APGN	Haringey	Seven Sisters	2 Parklands	0.18%
22UJFX	Harlow	Little Parndon and Hare Street	14 Parklands	1.28%
22UJFY	Harlow	Mark Hall	12 Parklands	1.09%
22UJGD	Harlow	Toddbrook	9 Parklands	0.82%
22UJFZ	Harlow	Netteswell	6 Parklands	0.55%
22UJFU	Harlow	Great Parndon	2 Parklands	0.18%
00ARGK	Havering	Havering Park	2 Paternoster Hill	0.18%
26UEGL	Hertsmere	Potters Bar Parkfield	8 Parklands	0.73%
00AUGB	Islington	Clerkenwell	4 Parklands	0.36%
00AUGL	Islington	St Mary's	4 Parklands	0.36%
00AUFX	Islington	Barnsbury	2 Parklands	0.18%
00AUFY	Islington	Bunhill	2 Parklands	0.18%
00AUGC	Islington	Finsbury Park	2 Parklands	0.18%
00AYGB	Lambeth	Clapham Common	2 Parklands	0.18%
00AYGL	Lambeth	Prince's	2 Parklands	0.18%
09UCHA	Mid Bedfordshire	Northill and Blunham	2 Parklands	0.18%
00BBGG	Newham	East Ham Central	2 Paternoster Hill	0.18%
00BBGJ	Newham	East Ham South	2 Paternoster Hill	0.18%
00BBGM	Newham	Green Street East	2 Paternoster Hill	0.18%
00BBGU	Newham	Stratford and New Town	2 Paternoster Hill	0.18%
00BCGF	Redbridge	Cranbrook	4 Paternoster Hill	0.36%
00BCGN	Redbridge	Monkhams	4 Paternoster Hill	0.36%
00BCGR	Redbridge	Seven Kings	4 Paternoster Hill	0.36%
00BCGA	Redbridge	Bridge	2 Paternoster Hill	0.18%
00BCGC	Redbridge	Church End	2 Paternoster Hill	0.18%
00BCGE	Redbridge	Clementswood	2 Paternoster Hill	0.18%
00BCGG	Redbridge	Fairlop	2 Paternoster Hill	0.18%
00BCGK	Redbridge	Hainault	2 Paternoster Hill	0.18%
00BCGQ	Redbridge	Roding	2 Paternoster Hill	0.18%
00BCGT	Redbridge	Valentines	2 Paternoster Hill	0.18%
00BEGU	Southwark	South Bermondsey	2 Paternoster Hill	0.18%
26UGFX	St Albans	Ashley	2 Parklands	0.18%
26UGGK	St Albans	Park Street	2 Parklands	0.18%
26UGGS	St Albans	Wheathampstead	2 Parklands	0.18%
26UHFZ	Stevenage	Roebuck	2 Parklands	0.18%
00KGNS	Thurrock	West Thurrock and South Stifford	2 Paternoster Hill	0.18%
00BGFV	Tower Hamlets	Bethnal Green North	2 Paternoster Hill	0.18%
00BGFY	Tower Hamlets	Blackwall and Cubitt Town	2 Paternoster Hill	0.18%
00BGFZ	Tower Hamlets	Bow East	2 Paternoster Hill	0.18%
00BGGB	Tower Hamlets	Bromley-by-Bow	2 Paternoster Hill	0.18%
00BGGE	Tower Hamlets	Mile End and Globe Town	2 Paternoster Hill	0.18%
00BGGJ	Tower Hamlets	St Katherine's and Wapping	2 Paternoster Hill	0.18%
00BGGN	Tower Hamlets	Whitechapel	2 Paternoster Hill	0.18%
22UQHB	Uttlesford	Stansted South	2 Paternoster Hill	0.18%
00BHGC	Waltham Forest	Forest	7 Parklands	0.64%
00BHGL	Waltham Forest	Lea Bridge	6 Parklands	0.55%
00BHGM	Waltham Forest	Leyton	5 Parklands	0.46%
00BHGS	Waltham Forest	Wood Street	5 Parklands	0.46%
00BHGH	Waltham Forest	Higham Hill	4 Parklands	0.36%
00BHGQ	Waltham Forest	Valley	4 Parklands	0.36%
00BHFX	Waltham Forest	Cann Hall	2 Parklands	0.18%
00BHFY	Waltham Forest	Cathall	2 Parklands	0.18%
00BHGA	Waltham Forest	Chingford Green	2 Parklands	0.18%
00BHGB	Waltham Forest	Endlebury	2 Parklands	0.18%
00BHGE	Waltham Forest	Hale End and Highams Park	2 Parklands	0.18%
00BHGJ	Waltham Forest	Hoe Street	2 Parklands	0.18%
00BHGK	Waltham Forest	Larkswood	2 Parklands	0.18%
26UKFY	Watford	Tudor	2 Parklands	0.18%
26ULGU	Welwyn Hatfield	Northaw	6 Parklands	0.55%
26ULGK	Welwyn Hatfield	Haldens	2 Parklands	0.18%
26ULGP	Welwyn Hatfield	Hatfield North	2 Parklands	0.18%
00BKGD	Westminster	Churchill	2 Parklands	0.18%
00BKGM	Westminster	Marylebone High Street	2 Parklands	0.18%

## **Appendix G – Traffic Flow Diagrams**

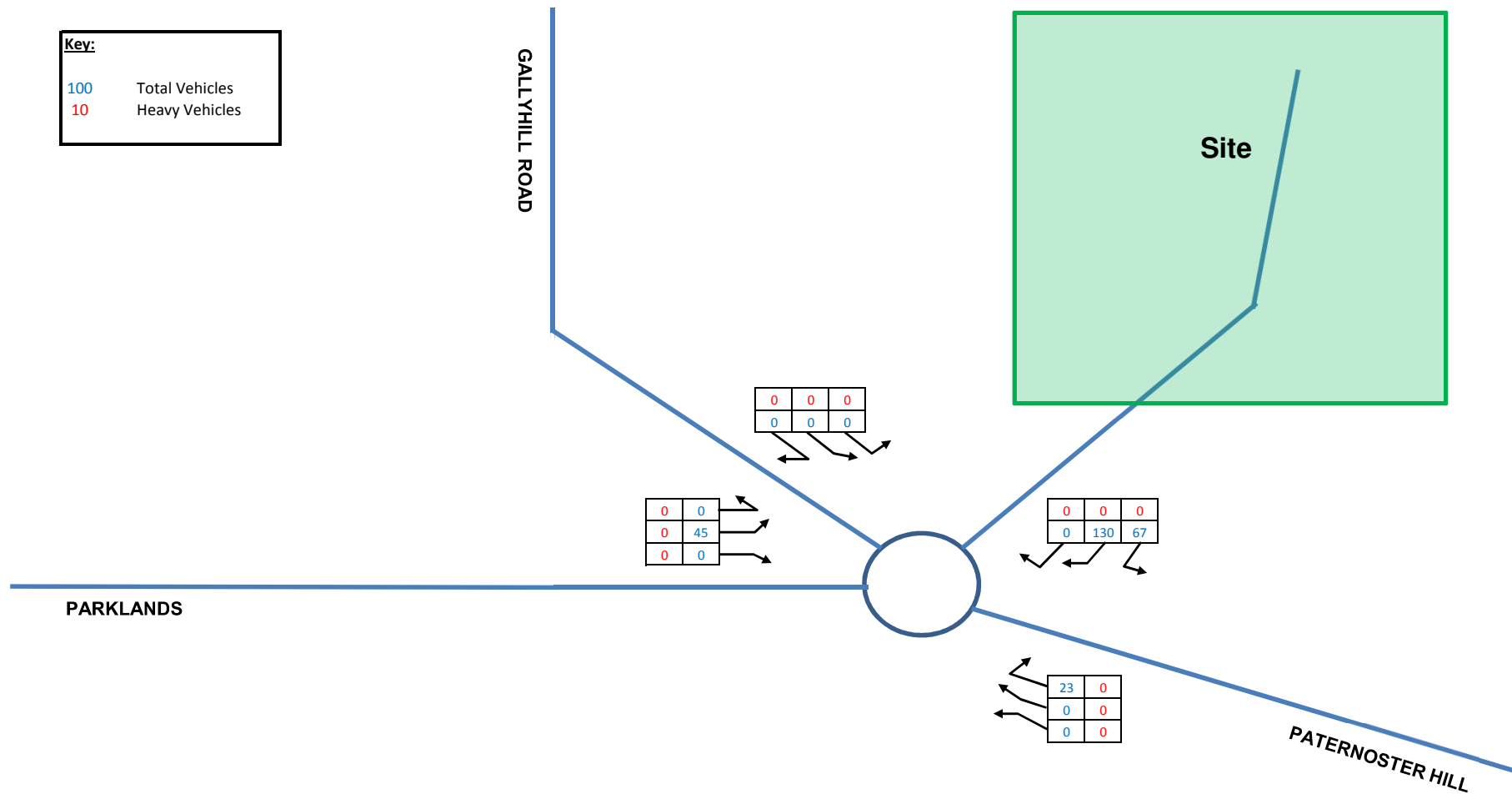


Figure 3.1 AM Peak Development Flows

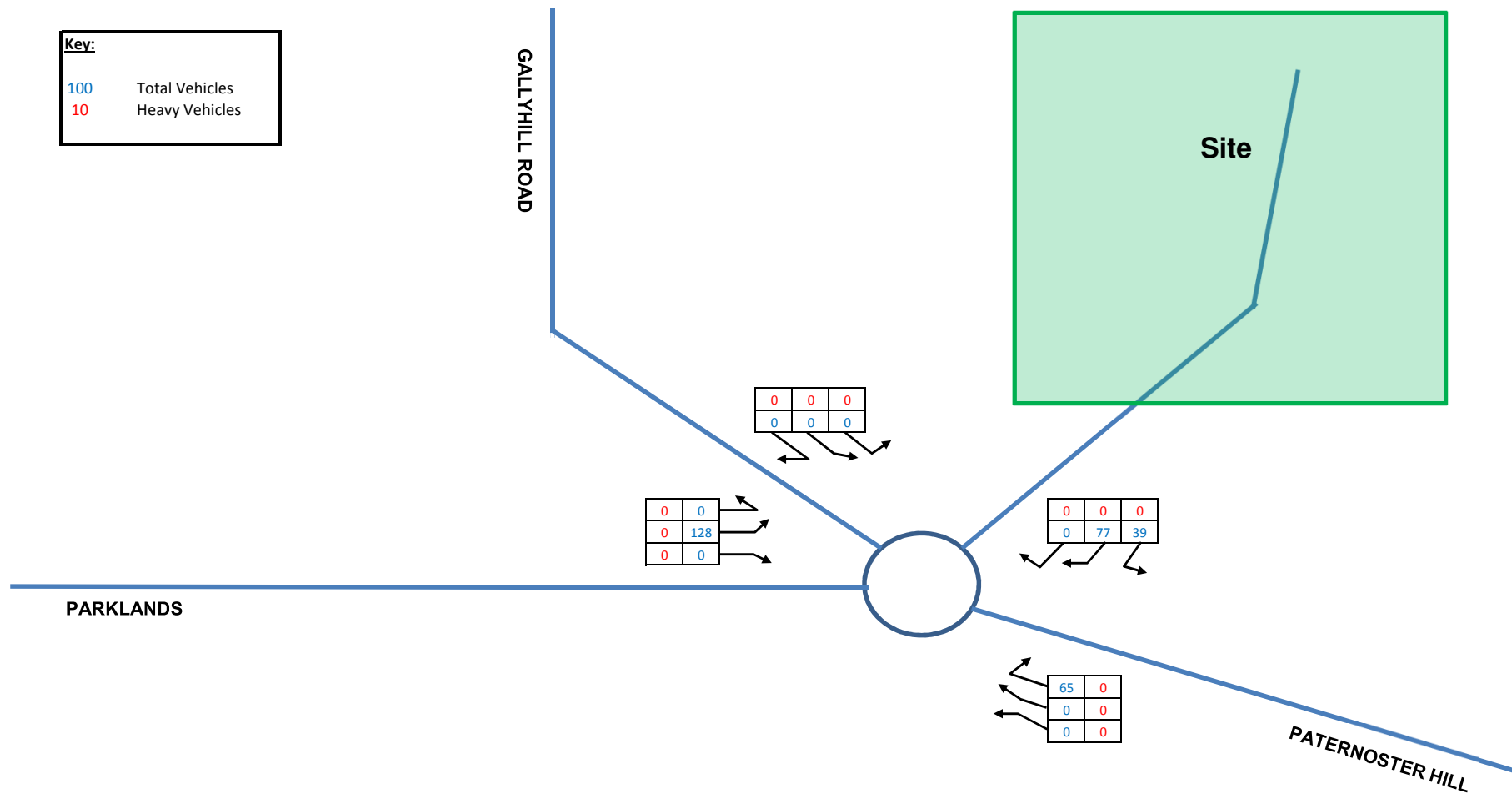


Figure 3.2: PM Peak Development Flows

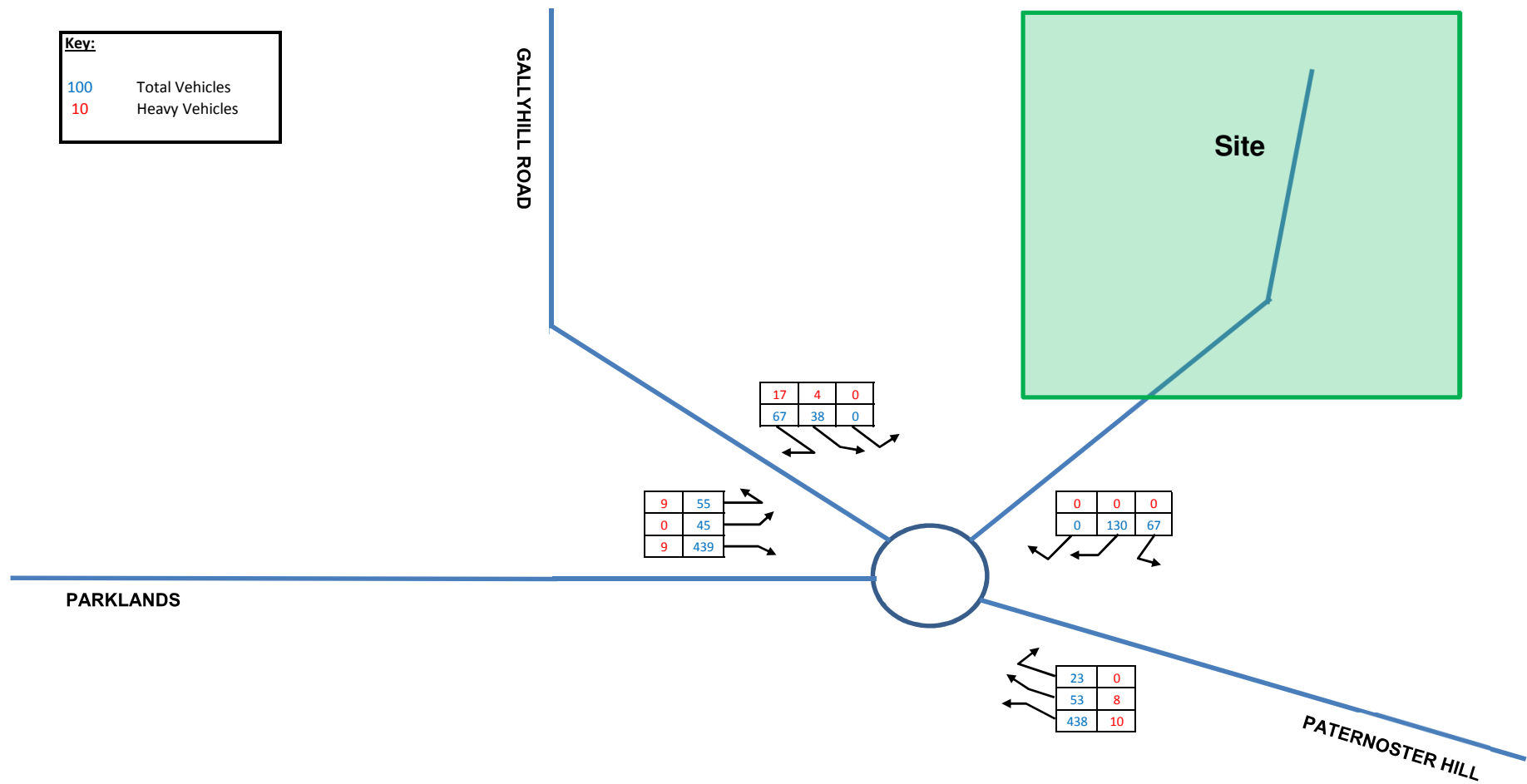


Figure 4.1: 2023 AM Peak Flows Plus Development

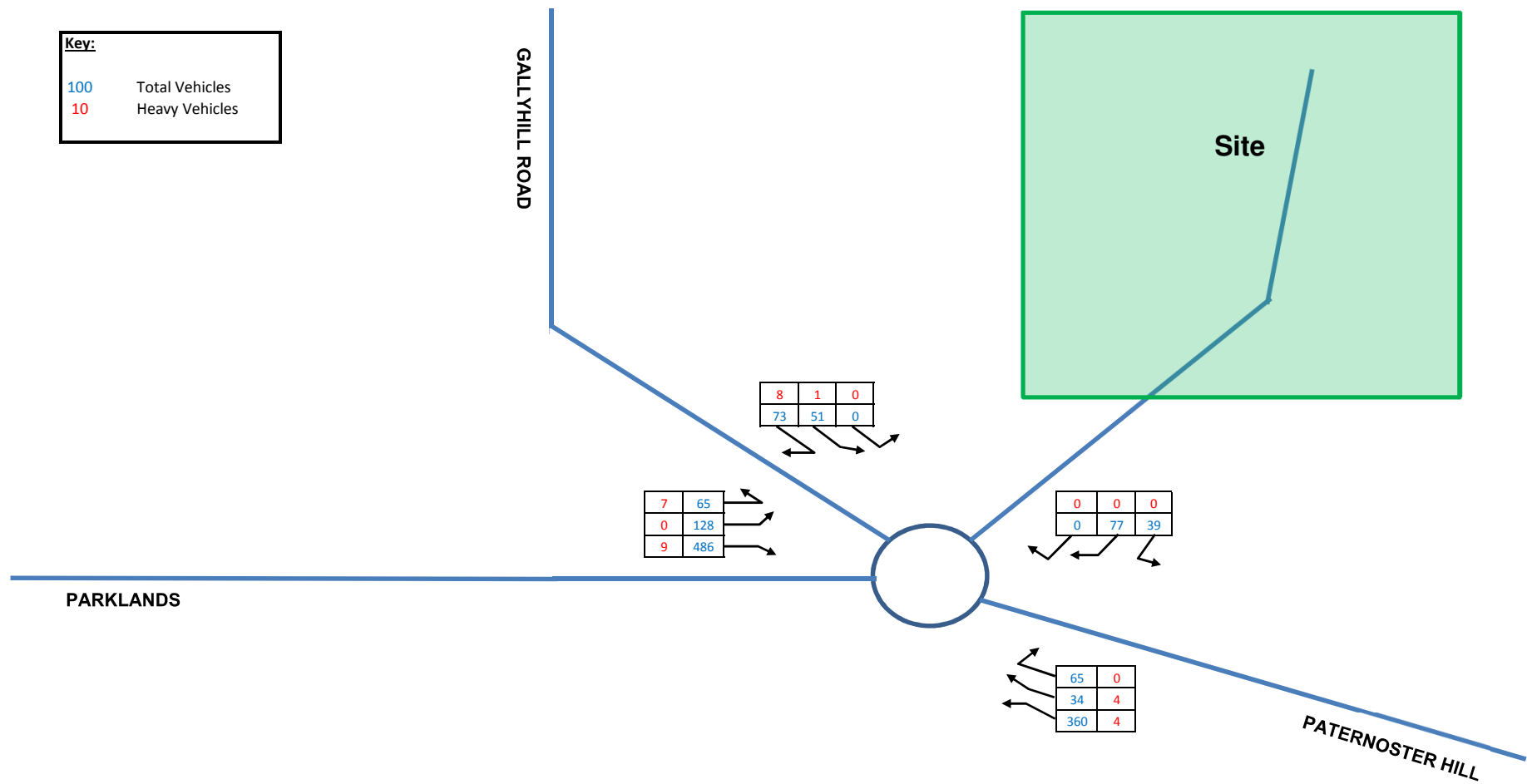


Figure 4.2: 2023 PM Peak Flows Plus Development

## **Appendix H – Traffic Count Data**



## K&M TRAFFIC SURVEYS

DATE : 4th DECEMBER 2013

DAY : WEDNESDAY

LOCATION : GALLEYHILL RD / PARKLANDS, WALTHAM ABBEY, ESSEX.



K&M TRAFFIC SURVEYS

DATE : 4th DECEMBER 2013

DAY : WEDNESDAY

LOCATION : GALLEYHILL RD / PARKLANDS, WALTHAM ABBEY, ESSEX.

	GALLEYHILL RD TO PARKLANDS - EAST						GALLEYHILL RD TO PARKLANDS - WEST						PARKLANDS - WEST TO GALLEYHILL RD						PARKLANDS - WEST EASTBOUND						PARKLANDS - EAST WESTBOUND						PARKLANDS - EAST TO GALLEYHILL RD							
	MOVEMENT 1						MOVEMENT 2						MOVEMENT 3						MOVEMENT 4						MOVEMENT 5						MOVEMENT 6							
	LIGHT	HEAVY	BUS	MCYCLE	PCYCLE	TOTAL	LIGHT	HEAVY	BUS	MCYCLE	PCYCLE	TOTAL	LIGHT	HEAVY	BUS	MCYCLE	PCYCLE	TOTAL	LIGHT	HEAVY	BUS	MCYCLE	PCYCLE	TOTAL	LIGHT	HEAVY	BUS	MCYCLE	PCYCLE	TOTAL	LIGHT	HEAVY	BUS	MCYCLE	PCYCLE	TOTAL		
0730-0745	6	0	0	0	0	6	12	2	0	0	0	14	12	2	0	0	0	14	80	2	1	0	0	83	98	0	0	0	0	0	98	8	2	0	0	0	10	
0745-0800	7	2	0	0	0	9	8	5	1	0	0	14	12	2	0	0	0	14	94	2	3	2	0	101	87	2	1	0	2	92	10	1	0	0	0	11		
0800-0815	14	0	0	0	1	15	12	3	0	0	0	15	5	3	0	0	0	8	85	1	0	0	0	86	74	2	1	0	1	78	10	2	0	0	0	12		
0815-0830	4	0	0	0	0	4	6	3	0	0	0	9	15	0	1	0	0	16	103	0	0	0	0	103	99	1	0	0	0	100	8	0	0	0	0	8		
0830-0845	5	1	1	0	0	7	19	3	0	0	0	22	10	2	0	0	0	12	106	2	0	0	0	108	126	2	0	2	0	130	13	4	0	0	0	17		
0845-0900	7	1	0	0	0	8	10	2	0	0	0	12	7	0	0	0	0	7	60	3	0	0	0	63	97	0	2	4	0	103	8	1	0	0	0	9		
0900-0915	2	1	0	0	0	3	4	1	0	0	0	5	6	0	0	0	0	6	78	4	0	0	0	82	99	4	3	2	0	108	8	0	0	0	0	8		
0915-0930	13	1	0	0	0	14	15	2	0	0	0	17	10	3	0	0	0	13	62	3	2	0	0	67	79	4	0	0	0	83	6	0	0	0	0	6		
0730-0930	58	6	1	0	1	66	86	21	1	0	0	108	77	12	1	0	0	90	668	17	6	2	0	693	759	15	7	8	3	792	71	10	0	0	0	81		
0730-0830	31	2	0	0	1	34	38	13	1	0	0	52	44	7	1	0	0	52	362	5	4	2	0	373	358	5	2	0	3	368	36	5	0	0	0	41		
0745-0845	30	3	1	0	1	35	45	14	1	0	0	60	42	7	1	0	0	50	388	5	3	2	0	398	386	7	2	2	3	400	41	7	0	0	0	48		
0800-0900	30	2	1	0	1	34	47	11	0	0	0	58	37	5	1	0	0	43	354	6	0	0	0	360	396	5	3	6	1	411	39	7	0	0	0	46		
0815-0915	18	3	1	0	0	22	39	9	0	0	0	48	38	2	1	0	0	41	347	9	0	0	0	356	421	7	5	8	0	441	37	5	0	0	0	42		
0830-0930	27	4	1	0	0	32	48	8	0	0	0	56	33	5	0	0	0	38	306	12	2	0	0	320	401	10	5	8	0	424	35	5	0	0	0	40		

K&M TRAFFIC SURVEYS

DATE : 4th DECEMBER 2013

DAY : WEDNESDAY

LOCATION : GALLEYHILL RD / PARKLANDS, WALTHAM ABBEY, ESSEX.

	GALLEYHILL RD TO PARKLANDS - EAST							GALLEYHILL RD TO PARKLANDS - WEST							PARKLANDS - WEST TO GALLEYHILL RD							PARKLANDS - WEST EASTBOUND							PARKLANDS - EAST WESTBOUND							PARKLANDS - EAST TO GALLEYHILL RD													
	MOVEMENT 1							MOVEMENT 2							MOVEMENT 3							MOVEMENT 4							MOVEMENT 5							MOVEMENT 6													
	LIGHT	HEAVY	BUS	MCYCLE	PCYCLE	TOTAL		LIGHT	HEAVY	BUS	MCYCLE	PCYCLE	TOTAL		LIGHT	HEAVY	BUS	MCYCLE	PCYCLE	TOTAL		LIGHT	HEAVY	BUS	MCYCLE	PCYCLE	TOTAL		LIGHT	HEAVY	BUS	MCYCLE	PCYCLE	TOTAL		LIGHT	HEAVY	BUS	MCYCLE	PCYCLE	TOTAL								
1600-1615	18	1	0	0	0	19		22	0	0	0	0	22		7	7	0	0	0	14		88	1	1	0	0	90		84	0	1	0	0	85		12	5	0	0	0	17								
1615-1630	5	1	0	0	0	6		21	2	0	0	0	23		14	4	0	0	0	18		79	1	1	2	0	83		72	3	1	0	0	76		12	1	0	0	0	13								
1630-1645	16	0	0	1	0	17		12	4	0	0	0	16		16	0	1	0	0	17		106	0	1	1	0	108		79	1	1	0	0	81		5	2	0	0	0	7								
1645-1700	8	1	0	1	0	10		12	1	1	2	0	16		8	1	0	0	0	9		108	5	0	0	0	113		80	1	0	0	1	82		7	1	0	0	0	8								
1700-1715	9	0	0	0	0	9		19	1	0	0	0	20		13	2	0	0	0	15		102	0	1	0	0	103		76	0	1	0	0	77		7	0	0	0	0	7								
1715-1730	12	0	0	0	0	12		16	0	0	0	0	16		15	2	0	0	0	17		113	1	0	3	0	117		85	0	0	0	0	85		8	1	0	0	0	9								
1730-1745	9	0	0	0	0	9		17	0	0	1	0	18		13	0	0	0	0	13		88	0	0	0	0	88		79	3	0	0	0	82		12	0	0	0	1	13								
1745-1800	8	2	0	0	0	10		7	2	0	0	0	9		12	0	0	0	0	12		91	0	2	1	0	94		71	0	0	0	0	71		7	1	1	0	0	9								
1800-1815	5	2	0	0	0	7		5	1	1	1	0	8		17	0	0	0	0	17		103	2	0	2	0	107		78	0	0	0	0	78		6	0	0	0	1	7								
1815-1830	6	1	0	0	0	7		3	0	0	0	0	3		6	0	0	0	0	6		73	0	0	5	0	78		52	0	1	1	0	54		5	0	0	0	0	5								
1600-1830	96	8	0	2	0	106		134	11	2	4	0	151		121	16	1	0	0	138		951	10	6	14	0	981		756	8	5	1	1	771		81	11	1	0	2	95								
1600-1700	47	3	0	2	0	52		67	7	1	2	0	77		45	12	1	0	0	58		381	7	3	3	0	394		315	5	3	0	1	324		36	9	0	0	0	45								
1615-1715	38	2	0	2	0	42		64	8	1	2	0	75		51	7	1	0	0	59		395	6	3	3	0	407		307	5	3	0	1	316		31	4	0	0	0	35								
1630-1730	45	1	0	2	0	48		59	6	1	2	0	68		52	5	1	0	0	58		429	6	2	4	0	441		320	2	2	0	1	325		27	4	0	0	0	31								
1645-1745	38	1	0	1	0	40		64	2	1	3	0	70		49	5	0	0	0	54		411	6	1	3	0	421		320	4	1	0	1	326		34	2	0	0	1	37								
1700-1800	38	2	0	0	0	40		59	3	0	1	0	63		53	4	0	0	0	57		394	1	3	4	0	402		311	3	1	0	0	315		34	2	1	0	1	38								
1715-1815	34	4	0	0	0	38		45	3	1	2	0	51		57	2	0	0	0	59		395	3	2	6	0	406		313	3	0	0	0	316		33	2	1	0	2	38								
1730-1830	28	5	0	0	0	33		32	3	1	2	0	38		48	0	0	0	0	48		355	2	2	8	0	367		280	3	1	1	0	285		30	1	1	0	2	34								

## **Appendix I: ARCADY Output**

A R C A D Y 6

ASSESSMENT OF ROUNDABOUT CAPACITY AND DELAY

Analysis Program: Release 3.0 (JUNE 2005)

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Run with file:-  
"j:\Bedford-Jobs\Wattsdown Limited\00000000 General Client Information\DMS\Other Documents\AM peak 2023+dev.vai"  
(drive-on-the-left ) at 10:46:35 on Wednesday, 26 February 2014

FILE PROPERTIES  
\*\*\*\*\*

RUN TITLE: Proposed Roundabout on Paternoster Hill Waltham Abbey - AM Peak 2023 + Dev  
LOCATION:  
DATE: 26/02/2014  
CLIENT:  
ENUMERATOR: jon\_ashcroft [UK1005289D]  
JOB NUMBER:  
STATUS:  
DESCRIPTION:

INPUT DATA  
\*\*\*\*\*  
ARM A - Galley Hill Road  
ARM B - Site Access  
ARM C - Paternoster Hill  
ARM D - Parklands

GEOMETRIC DATA  
-----

I	ARM	I	V (M)	I	E (M)	I	L (M)	I	R (M)	I	D (M)	I	PHI (DEG)	I	SLOPE	I	INTERCEPT (PCU/MIN)	I
I	ARM A	I	4.25	I	6.00	I	11.00	I	45.00	I	50.00	I	48.0	I	0.576	I	26.355	I
I	ARM B	I	3.65	I	7.00	I	18.00	I	12.00	I	50.00	I	54.0	I	0.545	I	25.671	I
I	ARM C	I	3.65	I	7.50	I	19.00	I	22.00	I	50.00	I	48.0	I	0.593	I	28.474	I
I	ARM D	I	3.65	I	7.00	I	25.00	I	18.00	I	50.00	I	53.0	I	0.577	I	27.692	I

V = approach half-width L = effective flare length D = inscribed circle diameter  
E = entry width R = entry radius PHI = entry angle

TRAFFIC DEMAND DATA  
-----

(Only sets included in the current run are shown)

I	ARM	I	FLOW SCALE (%)	I
I	A	I	100	I
I	B	I	100	I
I	C	I	100	I
I	D	I	100	I

TIME PERIOD BEGINS 07.30 AND ENDS 09.00

LENGTH OF TIME PERIOD - 90 MINUTES.  
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

DEMAND SET TITLE: Proposed Roundabout on Paternoster Hill Waltham Abbey - AM Peak 2023 + Dev

		NUMBER OF MINUTES FROM START WHEN			RATE OF FLOW (VEH/MIN)		
I	ARM	I FLOW STARTS	I TOP OF PEAK	I FLOW STOPS	I BEFORE	I AT TOP	I AFTER
I		I TO RISE	I IS REACHED	IFALLING	I PEAK	I OF PEAK	I PEAK
I	ARM A	I 15.00	I 45.00	I 75.00	I 1.31	I 1.97	I 1.31
I	ARM B	I 15.00	I 45.00	I 75.00	I 2.46	I 3.69	I 2.46
I	ARM C	I 15.00	I 45.00	I 75.00	I 6.43	I 9.64	I 6.43
I	ARM D	I 15.00	I 45.00	I 75.00	I 6.74	I 10.11	I 6.74

DEMAND SET TITLE: Proposed Roundabout on Paternoster Hill Waltham Abbey - AM Peak 2023 + Dev

		TURNING PROPORTIONS							
		TURNING COUNTS (VEH/HR)							
		(PERCENTAGE OF H.V.S)							
TIME		FROM/TO	ARM A	ARM B	ARM C	ARM D			
07.30 - 09.00		ARM A	0.000	0.000	0.362	0.638			
			0.0	0.0	38.0	67.0			
			( 20.0)	( 20.0)	( 20.0)	( 20.0)			
		ARM B	0.000	0.000	0.340	0.660			
			0.0	0.0	67.0	130.0			
			( 0.0)	( 0.0)	( 0.0)	( 0.0)			
		ARM C	0.103	0.045	0.000	0.852			
			53.0	23.0	0.0	438.0			
			( 3.5)	( 3.5)	( 3.5)	( 3.5)			
		ARM D	0.102	0.083	0.814	0.000			
			55.0	45.0	439.0	0.0			
			( 3.3)	( 3.3)	( 3.3)	( 3.3)			

QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
07.30-07.45									
ARM A	1.31	18.83	0.070		0.0	0.1	1.1		0.06
ARM B	2.46	21.74	0.113		0.0	0.1	1.9		0.05
ARM C	6.43	26.01	0.247		0.0	0.3	4.8		0.05
ARM D	6.74	26.26	0.257		0.0	0.3	5.1		0.05

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
07.45-08.00									
ARM A	1.57	18.21	0.086		0.1	0.1	1.4		0.06
ARM B	2.94	20.96	0.140		0.1	0.2	2.4		0.06
ARM C	7.67	25.71	0.298		0.3	0.4	6.3		0.06
ARM D	8.05	26.15	0.308		0.3	0.4	6.5		0.06

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
08.00-08.15									
ARM A	1.92	17.37	0.110		0.1	0.1	1.8		0.06
ARM B	3.60	19.90	0.181		0.2	0.2	3.2		0.06
ARM C	9.40	25.31	0.371		0.4	0.6	8.6		0.06
ARM D	9.85	26.01	0.379		0.4	0.6	8.9		0.06

I	TIME	DEMAND	CAPACITY	DEMAND/	PEDESTRIAN	START	END	DELAY	GEOMETRIC DELAY	AVERAGE DELAY	I
I		(VEH/MIN)	(VEH/MIN)	CAPACITY	FLOW	QUEUE	QUEUE	(VEH.MIN/	(VEH.MIN/	PER ARRIVING	I
I				(RFC)	(PEDS/MIN)	(VEHS)	(VEHS)	TIME SEGMENT)	TIME SEGMENT)	VEHICLE (MIN)	I
I	08.15-08.30										I
I	ARM A	1.92	17.37	0.111		0.1	0.1	1.9		0.06	I
I	ARM B	3.60	19.90	0.181		0.2	0.2	3.3		0.06	I
I	ARM C	9.40	25.31	0.371		0.6	0.6	8.8		0.06	I
I	ARM D	9.85	26.00	0.379		0.6	0.6	9.1		0.06	I
I											I

I	TIME	DEMAND	CAPACITY	DEMAND/	PEDESTRIAN	START	END	DELAY	GEOMETRIC DELAY	AVERAGE DELAY	I
I		(VEH/MIN)	(VEH/MIN)	CAPACITY	FLOW	QUEUE	QUEUE	(VEH.MIN/	(VEH.MIN/	PER ARRIVING	I
I				(RFC)	(PEDS/MIN)	(VEHS)	(VEHS)	TIME SEGMENT)	TIME SEGMENT)	VEHICLE (MIN)	I
I	08.30-08.45										I
I	ARM A	1.57	18.20	0.086		0.1	0.1	1.4		0.06	I
I	ARM B	2.94	20.95	0.140		0.2	0.2	2.5		0.06	I
I	ARM C	7.67	25.71	0.298		0.6	0.4	6.5		0.06	I
I	ARM D	8.05	26.15	0.308		0.6	0.4	6.8		0.06	I
I											I

I	TIME	DEMAND	CAPACITY	DEMAND/	PEDESTRIAN	START	END	DELAY	GEOMETRIC DELAY	AVERAGE DELAY	I
I		(VEH/MIN)	(VEH/MIN)	CAPACITY	FLOW	QUEUE	QUEUE	(VEH.MIN/	(VEH.MIN/	PER ARRIVING	I
I				(RFC)	(PEDS/MIN)	(VEHS)	(VEHS)	TIME SEGMENT)	TIME SEGMENT)	VEHICLE (MIN)	I
I	08.45-09.00										I
I	ARM A	1.31	18.82	0.070		0.1	0.1	1.1		0.06	I
I	ARM B	2.46	21.72	0.113		0.2	0.1	2.0		0.05	I
I	ARM C	6.43	26.00	0.247		0.4	0.3	5.0		0.05	I
I	ARM D	6.74	26.26	0.257		0.4	0.3	5.3		0.05	I
I											I

QUEUE AT ARM A

TIME SEGMENT	NO. OF
ENDING	VEHICLES
	IN QUEUE
07.45	0.1
08.00	0.1
08.15	0.1
08.30	0.1
08.45	0.1
09.00	0.1

QUEUE AT ARM B

TIME SEGMENT	NO. OF
ENDING	VEHICLES
	IN QUEUE
07.45	0.1
08.00	0.2
08.15	0.2
08.30	0.2
08.45	0.2
09.00	0.1

QUEUE AT ARM C

TIME SEGMENT	NO. OF
ENDING	VEHICLES
	IN QUEUE
07.45	0.3
08.00	0.4
08.15	0.6 *
08.30	0.6 *
08.45	0.4
09.00	0.3

QUEUE AT ARM D

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
07.45	0.3
08.00	0.4
08.15	0.6 *
08.30	0.6 *
08.45	0.4
09.00	0.3

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

I	ARM	I	TOTAL DEMAND	I	* QUEUEING *	I	* INCLUSIVE QUEUEING *	I						
I		I		I	* DELAY *	I	* DELAY *	I						
I		I	-----						I					
I		I	(VEH)	(VEH/H)	I	(MIN)	(MIN/VEH)	I	(MIN)	(MIN/VEH)	I			
I	A	I	144.0	I	96.0	I	8.8	I	0.06	I	8.8	I	0.06	I
I	B	I	270.1	I	180.1	I	15.3	I	0.06	I	15.3	I	0.06	I
I	C	I	704.8	I	469.9	I	40.1	I	0.06	I	40.1	I	0.06	I
I	D	I	739.1	I	492.7	I	41.7	I	0.06	I	41.7	I	0.06	I
I	ALL	I	1858.0	I	1238.7	I	105.8	I	0.06	I	105.8	I	0.06	I

\* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD.  
\* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.  
\* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

END OF JOB

===== end of file =====



A R C A D Y 6

ASSESSMENT OF ROUNDABOUT CAPACITY AND DELAY

Analysis Program: Release 3.0 (JUNE 2005)

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Run with file:-  
"j:\Bedford-Jobs\Wattsdown Limited\00000000 General Client Information\DMS\Other Documents\PM peak 2023+dev.vai"  
(drive-on-the-left ) at 10:49:55 on Wednesday, 26 February 2014

FILE PROPERTIES  
\*\*\*\*\*

RUN TITLE: Proposed Roundabout on Paternoster Hill Waltham Abbey - PM Peak 2023 + Dev  
LOCATION:  
DATE: 26/02/2014  
CLIENT:  
ENUMERATOR: jon\_ashcroft [UK1005289D]  
JOB NUMBER:  
STATUS:  
DESCRIPTION:

INPUT DATA  
\*\*\*\*\*  
ARM A - Galley Hill Road  
ARM B - Site Access  
ARM C - Paternoster Hill  
ARM D - Parklands

GEOMETRIC DATA

I	ARM	I	V (M)	I	E (M)	I	L (M)	I	R (M)	I	D (M)	I	PHI (DEG)	I	SLOPE	I	INTERCEPT (PCU/MIN)	I
I	ARM A	I	4.25	I	6.00	I	11.00	I	45.00	I	50.00	I	48.0	I	0.576	I	26.355	I
I	ARM B	I	3.65	I	7.00	I	18.00	I	12.00	I	50.00	I	54.0	I	0.545	I	25.671	I
I	ARM C	I	3.65	I	7.50	I	19.00	I	22.00	I	50.00	I	48.0	I	0.593	I	28.474	I
I	ARM D	I	3.65	I	7.00	I	25.00	I	18.00	I	50.00	I	53.0	I	0.577	I	27.692	I

V = approach half-width L = effective flare length D = inscribed circle diameter  
E = entry width R = entry radius PHI = entry angle

TRAFFIC DEMAND DATA

(Only sets included in the current run are shown)

I	ARM	I	FLOW SCALE (%)	I
I	A	I	100	I
I	B	I	100	I
I	C	I	100	I
I	D	I	100	I

TIME PERIOD BEGINS 16.15 AND ENDS 17.45

LENGTH OF TIME PERIOD - 90 MINUTES.  
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

DEMAND SET TITLE: Proposed Roundabout on Paternoster Hill Waltham Abbey - AM Peak 2023 + Dev

I			NUMBER OF MINUTES FROM START WHEN			RATE OF FLOW (VEH/MIN)		
I	ARM	I	I FLOW STARTS	I TOP OF PEAK	I FLOW STOPS	I BEFORE	I AT TOP	I AFTER
I	I	I	I TO RISE	I IS REACHED	I FALLING	I PEAK	I OF PEAK	I PEAK
I	ARM A	I	15.00	I	45.00	I	75.00	I
I	ARM B	I	15.00	I	45.00	I	75.00	I
I	ARM C	I	15.00	I	45.00	I	75.00	I
I	ARM D	I	15.00	I	45.00	I	75.00	I

DEMAND SET TITLE: Proposed Roundabout on Paternoster Hill Waltham Abbey - AM Peak 2023 + Dev

[illegible]

QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
16.15-16.30									
ARM A	1.55	19.92	0.078		0.0	0.1	1.2		0.05
ARM B	1.45	21.39	0.068		0.0	0.1	1.1		0.05
ARM C	5.74	26.87	0.214		0.0	0.3	4.0		0.05
ARM D	8.49	26.34	0.322		0.0	0.5	6.9		0.06

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
16.30-16.45									
ARM A	1.85	19.00	0.097		0.1	0.1	1.6		0.06
ARM B	1.73	20.54	0.084		0.1	0.1	1.4		0.05
ARM C	6.85	26.65	0.257		0.3	0.3	5.1		0.05
ARM D	10.13	26.20	0.387		0.5	0.6	9.2		0.06

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
16.45-17.00									
ARM A	2.27	17.75	0.128		0.1	0.1	2.2		0.06
ARM B	2.12	19.40	0.109		0.1	0.1	1.8		0.06
ARM C	8.39	26.34	0.319		0.3	0.5	6.9		0.06
ARM D	12.41	26.01	0.477		0.6	0.9	13.2		0.07

I	TIME	DEMAND	CAPACITY	DEMAND/	PEDESTRIAN	START	END	DELAY	GEOMETRIC DELAY	AVERAGE DELAY	I
I		(VEH/MIN)	(VEH/MIN)	CAPACITY	FLOW	QUEUE	QUEUE	(VEH.MIN/	(VEH.MIN/	PER ARRIVING	I
I				(RFC)	(PEDS/MIN)	(VEHS)	(VEHS)	TIME SEGMENT)	TIME SEGMENT)	VEHICLE (MIN)	I
I	17.00-17.15										I
I	ARM A	2.27	17.74	0.128		0.1	0.1	2.2		0.06	I
I	ARM B	2.12	19.39	0.109		0.1	0.1	1.8		0.06	I
I	ARM C	8.39	26.34	0.319		0.5	0.5	7.0		0.06	I
I	ARM D	12.41	26.01	0.477		0.9	0.9	13.6		0.07	I
I											I

I	TIME	DEMAND	CAPACITY	DEMAND/	PEDESTRIAN	START	END	DELAY	GEOMETRIC DELAY	AVERAGE DELAY	I
I		(VEH/MIN)	(VEH/MIN)	CAPACITY	FLOW	QUEUE	QUEUE	(VEH.MIN/	(VEH.MIN/	PER ARRIVING	I
I				(RFC)	(PEDS/MIN)	(VEHS)	(VEHS)	TIME SEGMENT)	TIME SEGMENT)	VEHICLE (MIN)	I
I	17.15-17.30										I
I	ARM A	1.85	18.98	0.097		0.1	0.1	1.7		0.06	I
I	ARM B	1.73	20.53	0.084		0.1	0.1	1.4		0.05	I
I	ARM C	6.85	26.64	0.257		0.5	0.3	5.3		0.05	I
I	ARM D	10.13	26.20	0.387		0.9	0.6	9.7		0.06	I
I											I

I	TIME	DEMAND	CAPACITY	DEMAND/	PEDESTRIAN	START	END	DELAY	GEOMETRIC DELAY	AVERAGE DELAY	I
I		(VEH/MIN)	(VEH/MIN)	CAPACITY	FLOW	QUEUE	QUEUE	(VEH.MIN/	(VEH.MIN/	PER ARRIVING	I
I				(RFC)	(PEDS/MIN)	(VEHS)	(VEHS)	TIME SEGMENT)	TIME SEGMENT)	VEHICLE (MIN)	I
I	17.30-17.45										I
I	ARM A	1.55	19.89	0.078		0.1	0.1	1.3		0.05	I
I	ARM B	1.45	21.37	0.068		0.1	0.1	1.1		0.05	I
I	ARM C	5.74	26.86	0.214		0.3	0.3	4.1		0.05	I
I	ARM D	8.49	26.33	0.322		0.6	0.5	7.3		0.06	I
I											I

QUEUE AT ARM A

TIME SEGMENT	NO. OF
ENDING	VEHICLES
	IN QUEUE
16.30	0.1
16.45	0.1
17.00	0.1
17.15	0.1
17.30	0.1
17.45	0.1

QUEUE AT ARM B

TIME SEGMENT	NO. OF
ENDING	VEHICLES
	IN QUEUE
16.30	0.1
16.45	0.1
17.00	0.1
17.15	0.1
17.30	0.1
17.45	0.1

QUEUE AT ARM C

TIME SEGMENT	NO. OF
ENDING	VEHICLES
	IN QUEUE
16.30	0.3
16.45	0.3
17.00	0.5
17.15	0.5
17.30	0.3
17.45	0.3

QUEUE AT ARM D

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
16.30	0.5
16.45	0.6 *
17.00	0.9 *
17.15	0.9 *
17.30	0.6 *
17.45	0.5

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

I	ARM	I	TOTAL DEMAND	I	* QUEUEING *	I	* INCLUSIVE QUEUEING *	I
I		I		I	* DELAY *	I	* DELAY *	I
I		I		I		I		I
I		I	(VEH)	(VEH/H)	(MIN)	(MIN/VEH)	(MIN)	(MIN/VEH)
I	A	I	170.0	I 113.4	I 10.1	I 0.06	I 10.1	I 0.06
I	B	I	159.1	I 106.0	I 8.6	I 0.05	I 8.6	I 0.05
I	C	I	629.4	I 419.6	I 32.4	I 0.05	I 32.4	I 0.05
I	D	I	931.1	I 620.7	I 60.0	I 0.06	I 60.1	I 0.06
I	ALL	I	1889.5	I 1259.7	I 111.1	I 0.06	I 111.1	I 0.06

\* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD.  
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\* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

END OF JOB

===== end of file =====