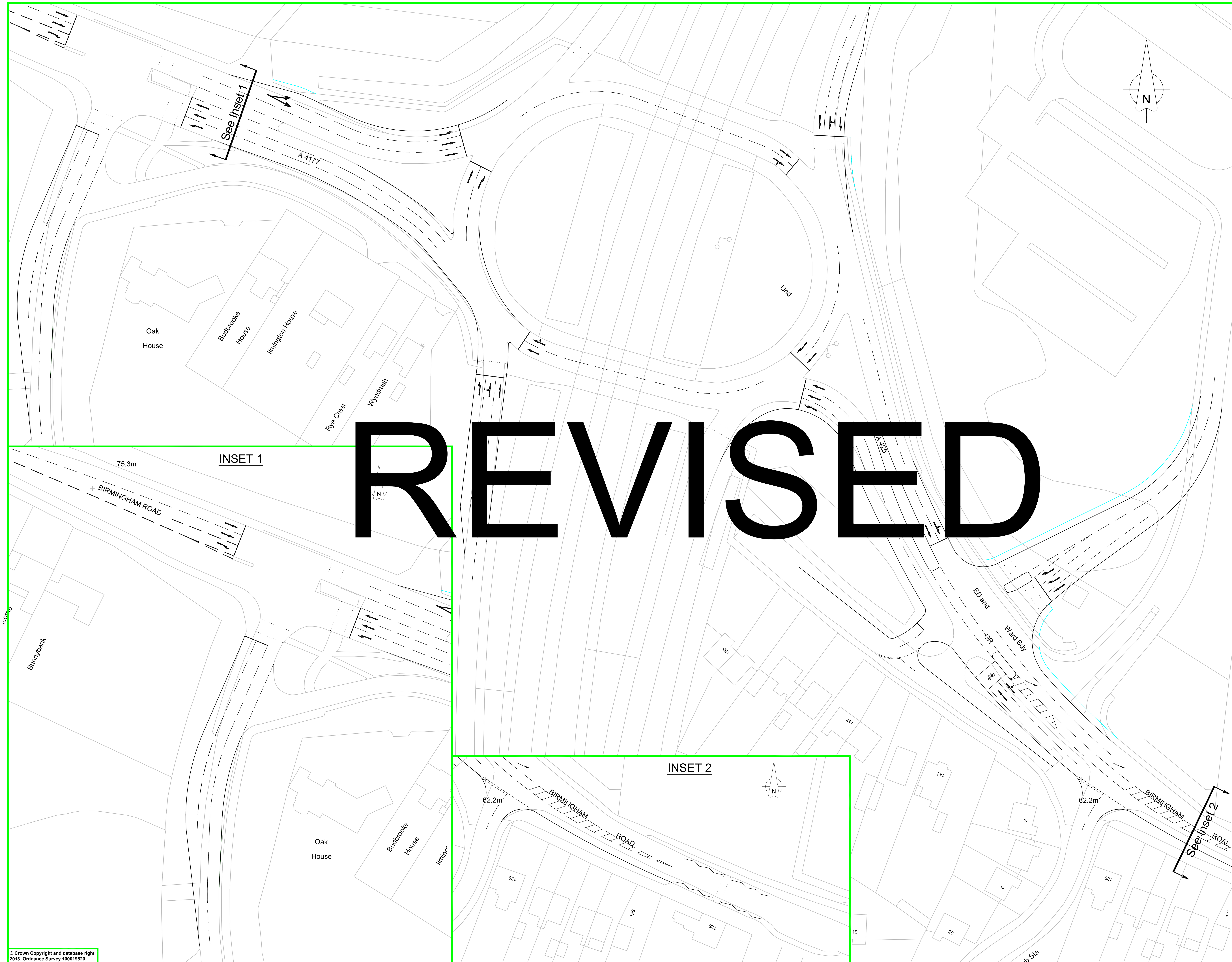
Appendix B

Part 1 – Original Business Case Appendices

Appendix A



NOTES

SAFETY HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARDS / RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING RISKS AND INFORMATION.

RISKS LISTED HERE ARE NOT EXHAUSTIVE. REFER TO CDM RISK ASSESSMENT REGISTER No.
(insert number here!)

CONSTRUCTION

INSERT A REF NUMBER!!!	CONTAMINATED LAND
INSERT A REF NUMBER!!!	WORKING IN CLOSE PROXIMITY TO RAILWAY LINE
INSERT A REF NUMBER!!!	DISTURBING OR STRIKING EXISTING UTILITIES INCLUDING LIVE UNCHARTED SERVICES
INSERT A REF NUMBER!!!	HIGH WATER TABLE. RISK OF FLOODING AND SLOPE STABILITY.

DEMOLITION

NO UNUSUAL HAZARDS / RISK

FOR INFORMATION RELATING TO USE, CLEANING AND MAINTENANCE SEE THE HEALTH AND SAFETY FILE.

IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT.

REV	DRN	AMENDMENT	DATE

Warwickshire County Council
TRANSPORT AND HIGHWAYS

Design Services
Communities, Shire Hall Post Room
Warwick, CV34 4SP
Tel : 01926 476822
Email : designservices@warwickshire.gov.uk
Web : www.warwickshire.gov.uk

FS 26655

2013-11-28 08-15-09 9.2-A425--059-001- PROOF.PDF

PROJECT
A425 - Birmingham Road
Stanks Island Capacity Improvements

TITLE
Preliminary Layout
Sheet 1 of 2

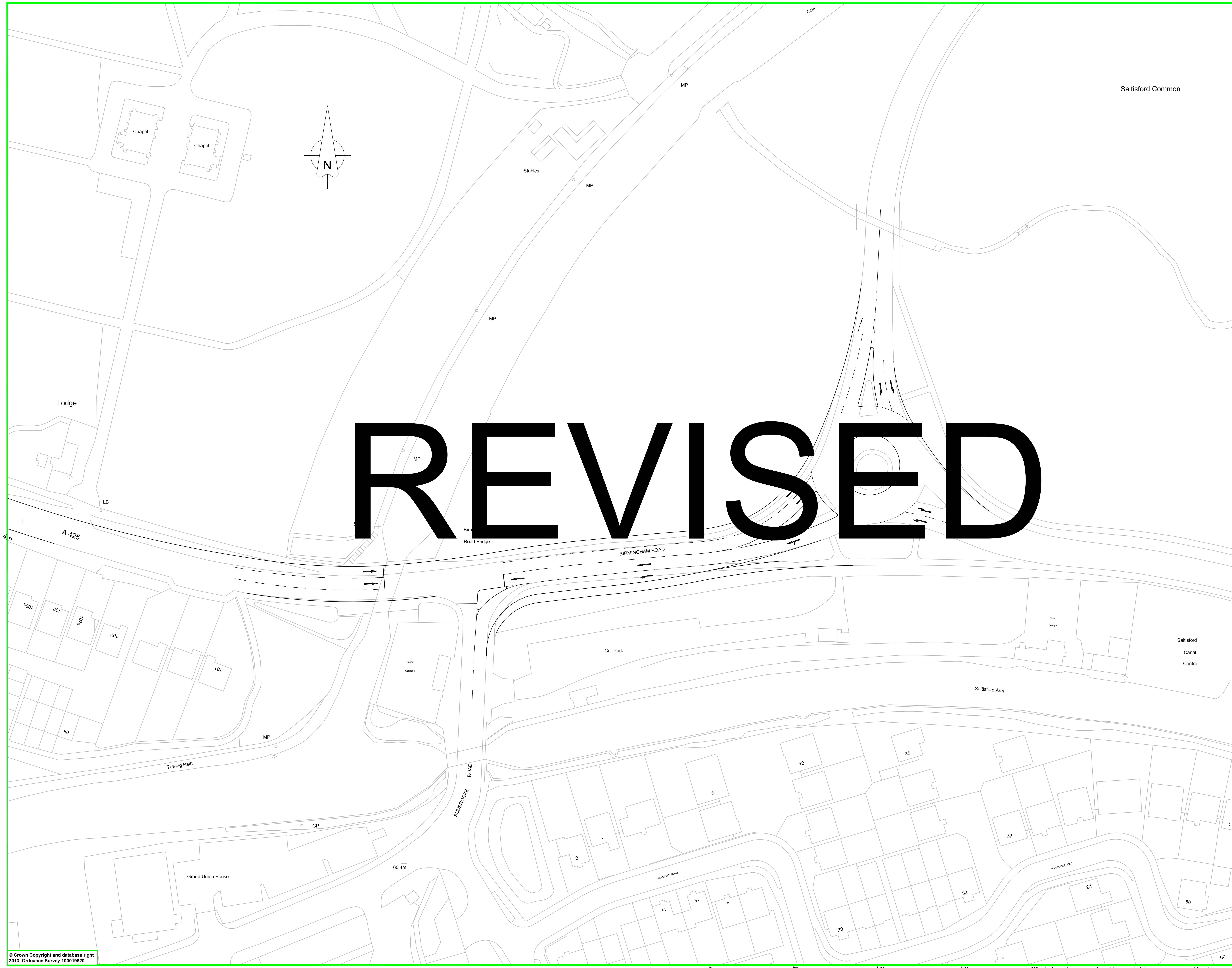
NOT FOR ISSUE

Status: Work in Progress

Scale: 1 : 500 @ A1 | Sheet size: A1

DRG. NO.: 9.2-A425--059-001 | Rev.: -

0mm 50mm 100mm 150mm 200mm This plot was produced from a digital source so may not be at true scale. It is the recipient's responsibility to confirm its accuracy.



NOTES

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(insert number here!)

CONSTRUCTION

INSERT A REF NUMBER!!!	CONTAMINATED LAND
INSERT A REF NUMBER!!!	WORKING IN CLOSE PROXIMITY TO RAILWAY LINE
INSERT A REF NUMBER!!!	DISTURBING OR STRIKING EXISTING UTILITIES INCLUDING LIVE UNCHARTED SERVICES
INSERT A REF NUMBER!!!	HIGH WATER TABLE. RISK OF FLOODING AND SLOPE STABILITY.

DEMOLITION

NO UNUSUAL HAZARDS / RISK

FOR INFORMATION RELATING TO USE, CLEANING AND MAINTENANCE SEE THE HEALTH AND SAFETY FILE.

IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT.

REV	DRN	AMENDMENT	DATE

Warwickshire County Council
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Communities, Shire Hall Post Room
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Web : www.warwickshire.gov.uk

FS 26655

2013-11-27 15-26-37 9.2-A425--059-002- PROOF.PDF

PROJECT

A425 - Birmingham Road

Stanks Island Capacity Improvements

TITLE

Preliminary Layout
Sheet 2 of 2

PROOF

NOT FOR ISSUE

Status: Work in Progress

Scale: 1 : 500 @ A1 — Sheet size: A1

DRG. NO.: 9.2-A425--059-002 — Rev.: -

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Appendix B

HIGHWAYS AGENCY

Safe roads, reliable journeys, informed travellers

Highways Agency
The Cube
199 Wharfside Street
Birmingham B1 1RN

Direct Line: 0121 687 8215

Mr A Law,
Warwickshire County Council

By Email

27 March 2014

Dear Mr Law,

A46/A425 Stanks Grade Separated Roundabout and Corridor Improvements
A46/A452 Thickthorn Grade Separated Roundabout and Corridor Improvements

Further to recent discussions I would like to confirm the Highways Agency's support for the above schemes.

These improvements are required in order to address congestion issues on the Warwickshire County Council highway network which result in significant and regular queue propagation onto the Highways Agency network (A46) causing serious safety concerns.

Yours sincerely,

Neil Hansen Asset Manager
NDD Midlands Asset Development
Email address: neil.hansen@highways.gsi.gov.uk

Chris Elliott
Chief Executive

Warwick District Council, Riverside House
Milverton Hill, Royal Leamington Spa, CV32 5HZ

Mr Roger Newham
Warwickshire County Council
Highways Division
Shire Hall
Warwick
CV34 4RL

direct line: 01926 456000
switchboard: 01926 410410
fax: 01926 456026
email: chris.elliott@warwickdc.gov.uk
web: www.warwickdc.gov.uk

our ref:**CE/GSH**
your ref:

27th March 2014

Dear Roger

Proposals for the A46/A425 Stanks Grade Separated Roundabout and Corridor Improvements and the A46/A452 Thickthorn Grade Separated Roundabout and Corridor Improvements in the Coventry and Warwickshire SEP

I would like to confirm this Council's support for the two highway schemes identified above as part of the Coventry and Warwickshire SEP proposals to deliver growth in our local economy.

As you know this Council's Local Plan, which is about to be considered as a draft for submission, contains some ambitious proposals and in global terms, over a 15 year period, will enable almost 13,000 homes to be built (a growth of over 20%); over 180 hectares of employment land; over 16,000 permanent jobs and almost 10,000 construction jobs, all amounting to a private sector capital investment of circa £4 billion. All of this will contribute significantly to the SEP ambitions, of which this Council is a key signatory.

As part of this overall package we envisage in the region of £200 million investment in supporting infrastructure which we hope to realise this through a mixture of S106, CIL and other investments. It is from this source that we anticipate the match funding being derived.

The key to turning our plans into reality is to overcome various barriers to development. In our area there are a range of constraints in relation to the local infrastructure, especially transport and in particular the A46 Corridor, which runs through our District and alongside which are a number of key sites that we anticipate coming forward to realise the envisaged growth. These two proposals for improvements to key junctions on the A46 are vitally important to our growth plans and to those of the SEP and we commend them.

Yours sincerely,

Chris Elliott
Chief Executive

Appendix C

Warwickshire County Council

A425 - Birmingham Road, Stanks Island Improvements

Feasibility Estimate

Issue and Revision Record:

Rev.	Date	Originator	Checked	Approved	Description
0	06/03/2014	SS			DRAFT
1	13/03/2014	SS			

A425 - Birmingham Road

Stanks Island Capacity Improvements

Summary

Section	Total Construction Cost	Indirects			Contingency (40%)	Total Project Cost
		Preliminaries (20%)	Design (10%)	Client Costs (10%)		
1. Temporary/Enabling Works	413,103.98	82,620.80	41,310.40	41,310.40	231,338.23	809,683.80
2. Site Clearance	37,759.87	7,551.97	3,775.99	3,775.99	21,145.53	74,009.35
3. Fencing and Environmental Barriers	6,361.30	1,272.26	636.13	636.13	3,562.33	12,468.15
4. Safety Fences, Barriers and Guardrails	0.00	0.00	0.00	0.00	0.00	0.00
5. Drainage	113,870.29	22,774.06	11,387.03	11,387.03	63,767.36	223,185.77
6. Earthworks	262,578.99	52,515.80	26,257.90	26,257.90	147,044.23	514,654.82
7. Pavements	399,951.28	79,990.26	39,995.13	39,995.13	223,972.72	783,904.51
8. Kerbs and Footways	63,575.36	12,715.07	6,357.54	6,357.54	35,602.20	124,607.70
9. Traffic Signs (Including Signals) and Road Markings	175,409.81	35,081.96	17,540.98	17,540.98	98,229.49	343,803.22
10. Lighting, Electrical Work and Communications	242,909.03	48,581.81	24,290.90	24,290.90	136,029.06	476,101.69
11. Retaining walls/Structures	0.00	0.00	0.00	0.00	0.00	0.00
12. Landscaping	0.00	0.00	0.00	0.00	0.00	0.00
TOTALS	**1,715,519.90**	**343,103.98**	**171,551.99**	**171,551.99**	**960,691.15**	**3,362,419.01**

A425 - Birmingham Road

Stanks Island Capacity Improvements

Notes, Assumptions and Exclusions

Description

Feasibility estimate capturing the new road and junction improvements around the Stanks Island and surrounding areas

Drawings & Documents

The following documents have been used in the preparation of this estimate:

D1 9.2-A452-055-001 Rev -
D2 9.2-A452-055-002 Rev -

Assumptions

General

G1 The estimate base date is 1Q14

G2 No allowance has been added for inflation at this moment in time as it is difficult to assess when the mid point of construction will be at this stage

G3 An uplift factor of 40% has been applied for estimating uncertainty due to the level of design received

G4 Service diversions/protection - Although difficult to assess at this stage, an allowance of 25% of the construction cost has been included for costs associated with services.

G5 Allowance for traffic management for 16 weeks (construction duration assumed)

G6 No major earthworks required

G7 The existing road is cold milled (binder and surface course removed) with the existing sub base and base being suitable for re use

G8 Highway construction - made up of:
- 250mm granular sub base
- 150mm bitumen base
- 60mm bitumen binder
- 40mm bitumen surface

G9 Footway construction - made up of:
- 150mm granular sub base
- 55mm bitumen base
- 25mm bitumen surface

G10 Please see estimate sheet for further notes and assumptions

G11 Footbridge will be a typical steel construction with stairs either side

Exclusions

EX1 Excludes 3rd party compensation costs
EX2 Excludes planning and approval charges
EX3 Costs associated with Statutory Fees (e.g. HMRI, Local Authority, etc.) unless confirmed
EX4 Costs associated with taxes and levies, including VAT
EX5 Costs associated with licences and all associated costs and fees
EX6 Costs associated with changes in legislation and any form of applicable standards
EX7 Costs associated with changes in legislation, regulation and interpretation covering
EX8 Land costs

A425 - Birmingham Road

Stanks Island Capacity Improvements

Ref	Description	Quantity	Unit	Rate	Total	Comments
1. Temporary/Enabling Works						
1.1	Service diversions/protection (allowance)	1	item	£373,103.98	£373,103.98	25% of construction cost
1.2	Traffic management and diversions	16	weeks	£2,500.00	£40,000.00	
2. Site Clearance						
2.1	Site Clearance	2650	m2	£3.10	£8,220.30	Areas of new road only
2.2	Removal of trees (allowance)	5	nr	£150.00	£750.00	allowance for 5 nr medium/large trees
2.3	Removal of kerbs from road and dispose to tip	1585	m	£11.46	£18,167.27	
2.4	Removal of existing pedestrian guard rail	100	m	£11.00	£1,100.00	
2.5	Removal of lighting columns (allowance)	26	nr	£308.55	£8,022.30	assume one every 30m staggered centres where footway alignment is being modified
2.6	Removal of signage	1	item	£1,500.00	£1,500.00	say 20 nr to be removed
3. Fencing and Environmental Barriers						
3.1	Pedestrian guard rail (allowance)	100	m	£63.61	£6,361.30	
4. Safety Fences, Barriers and Guardrails						
5. Drainage						
5.1	Carrier drain; 225 dia pipe including granular bed and surround	803	m	£79.81	£64,043.51	Allowance to 50% of new kerb length
5.2	Gullies	27	nr	£473.23	£12,777.24	One every 30m along new drain length
5.3	Gully leads	27	m	£54.52	£1,471.93	
5.4	Connections	38	nr	£185.45	£7,047.06	One to every gully and manhole
5.5	Manholes	11	nr	£1,684.60	£18,530.55	1 every 75m along new drain length
5.6	Modifications to existing manholes and gullies (allowance)	1	item	£10,000.00	£10,000.00	
6. Earthworks						
6.1	Excavation of all material	2084	m3	£4.85	£10,109.92	
6.2	Disposal of excavated material - to a tip off site - inert	2092	m3	£22.97	£48,060.37	assume 75% of total volume
6.3	Disposal of excavated material - to a tip off site - non-hazardous	697	m3	£190.64	£132,971.62	assume 25%
6.4	Cold milling to footway and highway	7059	m2	£10.12	£71,437.08	on areas of existing road which the new road alignment runs through
7. Pavements						
7.1	New highway construction	2516	m2	£70.76	£178,039.71	
7.2	Resurfacing to existing highway	7059	m2	£28.91	£204,061.57	
7.3	New road roundabout (allowance)	255	m2	£70.00	£17,850.00	As per footway construction with landscaping instead of tarmac
8. Kerbs and Footways						
8.1	New kerbs to road	1605	m	£14.98	£24,046.11	
8.2	New footway - surfacing tarmac	621	m2	£29.77	£18,484.69	
8.3	New pedestrian island areas	707	m3	£29.77	£21,044.56	As per footway construction
9. Traffic Signs (Including Signals) and Road Markings						
9.1	Intermittent white line	1318	m	£1.46	£1,928.23	
9.2	Solid white lining	144	m	£1.41	£202.75	
9.3	Hatching	58	m	£1.97	£114.20	
9.4	Road Arrows	41	nr	£61.82	£2,534.62	
9.5	Road Lettering	60	nr	£60.50	£3,630.00	
9.6	Mods to existing junction (allowance)	4	Junction	£40,000.00	£160,000.00	Signalised junctions will be required
9.7	New traffic sign and posts (allowance)	20	nr	£350.00	£7,000.00	
10. Lighting, Electrical Work and Communications						
10.1	New lighting columns	27	nr	£1,421.71	£38,386.06	say 30m staggered centres based on new kerb length
10.2	Cabling to lighting	6750	m	£30.00	£202,500.00	say 250m on average per light
10.3	Feeder pillar	1	nr	£2,022.97	£2,022.97	allowance for 1 nr
11. Retaining walls/Structures						
11.1	New pedestrian footbridge	50	m2	£3,000.00	£150,000.00	includes allowance for filling to build up the approaches to the same level as the road
12. Landscaping						
	TOTAL CONSTRUCTION COST				**£1,865,519.90**	

REVISED

Project Title: **A425 Birmingham Road, Stanks Island Improvements**
Client: **Warwickshire County Council**
Risk Review Date: 11th March 2014

Risk Description					Pre -		Pre-Mitigation Quantitative Evaluation							Post - Mitigation		Post-Mitigation Quantitative Evaluation							EV Total	Action, Mitigation & Notes				
Risk ID No	Date Identified	Risk Cause	Risk Description	Risk Consequence	Likelihood %		Justification	Cost Impact			Schedule Impact			Likelihood %		Justification	Cost Impact			Schedule Impact			£62,225.00	Risk Owner - Manager	Current Control Measures	Action Owner	Target Completion Date	Notes
Double-click to Sort	Double-click to Sort	Double-click to Sort	Double-click to Sort	Double-click to Sort				Opt	ML	Pess	Opt	ML	Pess				Opt	ML	Pess	Opt	ML	Pess						
1	11/3/14	Negotiation for land with British Waterways and Warwick District	There is a risk that the process of acquiring the land may take longer than anticipated	Increase time and cost	10%	#NAME?	Probability: Low as have not identified a cost for it yet. Small area. Cost will be in negotiations with British Waterways. Cost: is based on use of legal team Time: 60 days based on past experience of land negotiation and use of legal teams	5,000	15,000	50,000	20	60	120	5%	#NAME?	There will be some residual risk. Still have to pay some legal costs	0	5,000	15,000	0	20	60	333	Alan Law	1. Early engagement with British Waterways 2. Explanation of why the scheme is necessary	Alan Law	30/04/2014	
2	11/3/14	The scheme includes tree removal, risk of (bats and bird nesting season Mar-Sept), ponds (newts), stream nearby, badgers	There is a risk that Environmental surveys may show that there are protected species located within scheme area	Apply for Natural England licence for relocation (newt relocation quite a difficult and long process), time and cost impact. Tree preservation orders	70%	#NAME?	Probability: experience from other schemes and there are significant numbers of trees and habitats which could be affected Cost: transport newts and other relocation costs e.g. habitat creation Time: Pessimistic will be newts and is dependent on time of year and nesting time of birds. ML - plan ahead and programme work accordingly	5,000	10,000	15,000	0	80	180	5%	#NAME?	Small residual risk left. Once mitigation actions completed the site will be cleared, surveys completed and creatures moved	0	1,000	5,000	0	5	5	100	Alan Law	1. Need to programme work around bird nesting season Mar - Sept 2. Complete surveys as early as possible 3. Discussion with County Ecologist for advice on best way to proceed	Alan Law	31/07/2014	
3	11/3/14	Work with Highways Agency on schemes that affect the A46 dual carriageway. WCC are affecting HA network therefore they have to give approval to schemes	There is a risk that the Highways Agency may not approve scheme	Time delay. HA may request WCC to provide other options which would increase WCC cost. Could ultimately stop the scheme	10%	#NAME?	Probability: HA already engaged and continuation of process Cost: low, design costs Time: ML - past experience	5,000	10,000	15,000	20	40	60	0%	#NAME?	Risk will be mitigated	0	0	0	0	0	0	0	Alan Law	1. Continue with HA engagement (throughout project planning)	Alan Law	31/03/2015	
4	11/3/14	Geological surveys not yet completed	There is a risk that there may be unexpected ground conditions	Additional cost - if there are poor CBR values (density of the ground)	20%	#NAME?	Proba[illegible] based [illegible] CBR [illegible]d to be condu[illegible] Potentially lots o[illegible]oots in the groun[illegible] bridge will requi[illegible]ments as struct[illegible]idge. Next to the ca[illegible] Cost: [illegible] based [illegible]mber areas and le[illegible]f carria[illegible]. Optimistic is that [illegible]is high enoug[illegible] Time: [illegible]ing process in desig[illegible]o time impact	[illegible]	25,000	5[illegible]	[illegible]	[illegible]	0	5%	[illegible]ME?	Ground [illegible]igations will b[illegible] comple[illegible]d condition wil[illegible] be kn[illegible] Could get on site and f[illegible]ckets of soft area[illegible]erefore probability an[illegible]ct reduced	0	2,500	[illegible]	[illegible]	0	[illegible]	[illegible]	[illegible]aw	1. Gr[illegible]nvestigations	Alan Law	31/05/2014	
5	11/3/14	Requirement for planning permission. Changes to access and parking for local residents (B'ham Rd properties). Specifically feed road onto B'ham Rd	There is a risk that B'ham Road residents may object to changes proposed in scheme	Increased timescales, time for appeal if planning permission required	30%	#NAME?	Probability: based on previous experience Cost: Appeal costs Time: Optimistic - Residents would lodge objection, WCC would write response and this would be accepted. ML as for Opt but committee needs to visit site and go through additional cycle. Pessimistic - appeal	0	0	10,000	0	20	60	25%	#NAME?	Probability: based on previous experience Cost: Appeal costs Time: Optimistic - Residents would lodge objection, WCC would write response and this would be accepted. ML as for Opt but committee needs to visit site and go through additional cycle. Pessimistic - appeal	0	0	10,000	0	20	60	833	Alan Law	1. Appropriate consultation	Alan Law	31/05/2014	
6	11/3/14	Extra lane of traffic being added to the bridge and was only built for one lane	There is a risk that the bridge may not be strong enough to support the second lane of traffic	Scheme will need to change significantly or bridge will need to be strengthened	10%	#NAME?	Probability: Low probability based on professional opinion and regular mtce surveys undertaken in Warwick Cost: Only need to strengthen within existing footprint. Pessimistic - additional steel and concrete, but not a long bridge and width of a canal. Opt - minimal strengthening. ML - SME judgement Time: justification same as for cost	50,000	125,000	300,000	10	40	60	5%	#NAME?	Probability: Still some residual risk, impacts are the same Cost: Only need to strengthen within existing footprint. Pessimistic - additional steel and concrete, but not a long bridge and width of a canal. Opt - minimal strengthening. ML - SME judgement Time: justification same as for cost	50,000	125,000	300,000	10	40	60	7,917	Alan Law	1. Discuss with bridge maintenance section 2. Reassessments to be conducted by bridges section	Alan Law	31/05/2014	
7	11/3/14	Queuing traffic on dual carriageway (existing safety risk).	There is a risk of a traffic accident occurring before commencement of scheme	Reputational damage	5%	#NAME?	Probability: 2 incidents at this location over the last 12 months No time or cost as reputational impact	0	0	0	0	0	0	5%	#NAME?	Probability: 2 incidents at this location over the last 12 months No time or cost as reputational impact	0	0	0	0	0	0	0	Alan Law	1. Press releases once more certainty about funding and commencement of scheme	Alan Law	30/09/2014	
8	11/3/14	Modelling may not predict all outcomes and have to wait until the scheme goes live. Previous experience on other schemes	There is a risk that the desired outcome in terms of improvement to the network may not realised.	Reputational impact. Could impact on downstream schemes or create an additional scheme increasing costs.	5%	#NAME?	No cost or time impact to this project as a new project would be implemented. Reputational damage only	0	0	0	0	0	0	5%	#NAME?	No cost or time impact to this project as a new project would be implemented. Reputational damage only	0	0	0	0	0	0	0	Alan Law	1. Tolerate the risk			

REVISED

Project Title: **A425 Birmingham Road, Stanks Island Improvements**
Client: **Warwickshire County Council**
Risk Review Date: 11th March 2014

GOULD

Risk Description					Pre -		Pre-Mitigation Quantitative Evaluation							Post - Mitigation		Post-Mitigation Quantitative Evaluation							EV Total	Action, Mitigation & Notes				
Risk ID No	Date Identified	Risk Cause	Risk Description	Risk Consequence	Likelihood %		Justification	Cost Impact			Schedule Impact			Likelihood %		Justification	Cost Impact			Schedule Impact			£62,225.00	Risk Owner - Manager	Current Control Measures	Action Owner	Target Completion Date	Notes
Double-click to Sort	*Double-click to Sort*	*Double-click to Sort*	*Double-click to Sort*	*Double-click to Sort*				Opt	ML	Pess	Opt	ML	Pess				Opt	ML	Pess	Opt	ML	Pess						
9	11/3/14	Multiple schemes running at the same time and existing planned Utility Works	There is a risk that there is a conflict of work between Utility companies and WCC	Increased timescale, reputation (if during WCC works it looks as though it is WCC fault), increased congestion	10%	#NAME?	Prob: Low as WCC have a system where work is planned ahead, negotiations will take place. Cost: No cost impact, only time Time: delay scheme as would have to do different things with traffic mgt, change of start date, depends on what program of works is ongoing e.g. Pess would be replacement of sewers. ML - additional traffic mgt, different program of works, starting in a different location	0	0	0	0	20	120	5%	#NAME?	Probability: Low as WCC have a system where negotiations take place, work is planned ahead Cost: No cost impact, only time Time: delay scheme as would have to do different things with traffic mgt, change of start date, depends on what program of works is ongoing e.g. Pessimistic would be replacement of sewers. ML - additional traffic mgt, different program of works, starting in a different location	0	0	0	0	20	120	0	Alan Law	1. Talk to Street Works team about planned works 2. Come up with suitable traffic mgt schemes to give Street Works the confidence that work can be completed at the same time 3. Modelling work	Alan Law	31/01/2015	
10	11/3/14	Requirement to allow utilities emergency access. Emergency flood, sudden loss of power	There is a risk that the utility companies may need to address a serious concern and would be permitted to come on site to rectify the situation	Increase timescales, reputational damage, delay start	5%	#NAME?	Probability: Previous experience Cost: ML £10k, Pess £100k (assumes contractor is already mobilised and we are delaying scheme), Opt £0 Time: ML 1 wk, Pess 10 wk, Opt 0	0	10,000	100,000	0	5	50	5%	#NAME?	Probability: Previous experience Cost: ML £10k, Pess £100k (assumes contractor is already mobilised and we are delaying scheme), Opt £0 Time: ML 1 wk, Pess 10 wk, Opt 0	0	10,000	100,000	0	5	50	1,833	Alan Law	1. Tolerate the risk			
11	11/3/14	Uncharted Services	There is a risk that uncharted utilities may be discovered when work starts	Have to move equipment (Pipes, cables, etc) incurring additional cost and timescale	50%	#NAME?	Probability: Based on previous assessments and size of scheme Time: Based on volume of uncharted utilities discovered and location Cost: Based on volume of uncharted utilities discovered and location	0	10,000	100,000	0	5	40	50%	#NAME?	Prob: Based on previous assessments and size of scheme Cost: Based on volume of uncharted utilities discovered and location Time: Based on volume of uncharted utilities discovered and location	0	10,000	100,000	0	5	40	18,333	Alan Law	1. Tolerate the risk			
12	11/3/14	C3 and C4 reports exceed estimates	There is a risk that contingency may not cover cost of diversions	Increase cost for schemes		#NAME?	Identified as uncertainty		0						#NAME?								0	Alan Law				
13	11/3/14	Resource Constraints. Number of major schemes taking place over a short time period J12 dual carriageway, Kenilworth station, etc. Those schemes that already have permission and are being undertaken will take priority over these schemes at the moment. Some degree of conflict within existing schemes (some are delivered in parallel rather than series)	There is a risk that resources (Planners, PM and Eng) may not be available	Time delay	10%	#NAME?	Proba[illegible] identify what work [illegible] to be done when. [illegible]e Consu[illegible]es such as Atkins[illegible]aterman's for additi[illegible]esource Cost: [illegible] utilisi[illegible] Pess [illegible]g premiums for sp[illegible]t resource 1 and a[illegible]rson for 6 month[illegible] Time: [illegible]mistic - 6 month[illegible]d to pull people[illegible]ther jobs, recruitment. Optimistic - reorganising existing resource. ML - 4 weeks to source and mobilise resource	[illegible]	0	80[illegible]	5	20	120	0%	#[illegible]?	R[illegible]l be mitigated	0	0	0	0	0	[illegible]	0	Alan Law	1. Pr[illegible]ming 2. Ea[illegible]rnings to design services o[illegible]urce requir[illegible]s 3. En[illegible]nent with consultancies	Alan Law	31/05/2014	
14	11/3/14	Statutory consultation required (inc public and public transport operators), recent incident in Rugby where wrong person was contacted	There is risk that it may take longer to convince Stakeholders of the principles of the scheme	Reputational impact, Time impact, reassurance of stakeholders	20%	#NAME?	Probability: 1 in 5 people not understanding requirements of scheme and based on previous experience Time: Officers time, so will be absorbed by overall project Reputational impact,	0	0	0	0	0	0	15%	#NAME?	Probability: 1 in 5 people not understanding requirements of scheme and based on previous experience Time: Officers time, so will be absorbed by overall project Reputational impact,	0	0	0	0	0	0	0	Alan Law	1. Ensure consultation material is pitched at the correct level and goes to the right person for cascade 2. Press releases 3. Leaflet drops	Alan Law	30/11/2014	
15	11/3/14	Design has to go through Road Safety Audits and also has to go through consultation with public, conditions of planning permission	There is a risk that the design may need to be amended	Design may be more expensive, time delay, potential additional risks associated with new design	75%	#NAME?	Probability: Based on safety audits and will reduce over time as audits are conducted. High as experience has shown that items are always found Cost: Pess 10% of the design cost, ML 5% and Opt 2% Time: Pess 4 weeks for significant redesign, 2 weeks ML, 3 days Opt	3,200	8,000	16,000	3	10	20	25%	#NAME?	Probability: Based on safety audits and will reduce over time as audits are conducted. Cost: Pess 10% of the design cost, ML 5% and Opt 2% Time: Pess - 4 weeks for significant redesign, 2 weeks ML, 3 days Opt	3,200	8,000	16,000	3	10	20	2,267	Alan Law	1. Continue to engage with Road Safety during scheme development to minimise risk	Alan Law	Ongoing through design process	
16	11/3/14	Poor Workmanship. Previous experience on other schemes	There is a risk that there may be poor workmanship by the Contractor on the schemes	Reputational impact and some cost element (negotiation), delays as would need to go back and rectify situation	5%	#NAME?	Mainly reputational risk Cost: Would be transferred to the contractor Time: WCC view is that scheme is finished	0	0	0	0	0	0	5%	#NAME?	Mainly reputational risk Probability: Always the potential for this to happen. WCC procedures should pick up issues as work progresses Cost: Would be transferred to the contractor Time: WCC view is that scheme is finished	0	0	0	0	0	0	0	Alan Law	1. Withhold bond 2. Perform quality checks, standard procedure	Alan Law	End of contract	

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Project Title: **A425 Birmingham Road, Stanks Island Improvements**
Client: **Warwickshire County Council**
Risk Review Date: 11th March 2014

Risk Description					Pre -		Pre-Mitigation Quantitative Evaluation							Post - Mitigation		Post-Mitigation Quantitative Evaluation							EV Total	Action, Mitigation & Notes				
Risk ID No	Date Identified	Risk Cause	Risk Description	Risk Consequence	Likelihood %		Justification	Cost Impact			Schedule Impact			Likelihood %		Justification	Cost Impact			Schedule Impact			£62,225.00	Risk Owner - Manager	Current Control Measures	Action Owner	Target Completion Date	Notes
Double-click to Sort	*Double-click to Sort*	*Double-click to Sort*	*Double-click to Sort*	*Double-click to Sort*				Opt	ML	Pess	Opt	ML	Pess				Opt	ML	Pess	Opt	ML	Pess						
17	11/3/14	Noise Restrictions. Construction takes place near residential areas. Client Stakeholders drive changes to working practices	There is a risk of unacceptable level of noise during construction	Restrict working practices (may be cost savings due to working at night, but not acceptable to nearby residential properties)	50%	#NAME?	Probability: Highly residential area. Limitations as to what work can be done when. Noise restrictions will be included in tender. May have to do some work at night Cost: May not be able to work at certain time periods, would also take longer Time: Work will be piecemeal - prolongation of contract of 5 weeks @ cost of £150k	150,000	150,000	150,000	25	25	25	20%	#NAME?	Probability: Highly residential area. Limitations as to what work can be done when. Noise restrictions will be included in tender. May have to do some work at night Cost: May not be able to work at certain time periods, would also take longer Time: Work will be piecemeal - prolongation of contract of 5 weeks @ cost of £150k	150,000	150,000	150,000	25	25	25	30,000	Alan Law	1. Discuss with Warwick District Council Environmental Health Consultant 2. Soundproofing where possible 3. Barriers and screens to be erected 4. Programming of works	Alan Law	28/02/2015	
18	11/3/14	Adequacy of existing drainage. More carriageway being built	There is a risk that the current drainage system from the roads may not be adequate	Water will back up onto the carriageway and stay there as surface water	15%	#NAME?	Probability: Previous experience Cost: ML and Pess between £5 and £10k based on attenuation systems Time: No time impact	0	5,000	10,000	0	0	0	5%	#NAME?	Probability: Previous experience Cost: ML and Pess between £5 and £10k based on attenuation systems Time: No time impact	0	5,000	10,000	0	0	0	250	Alan Law	1. Accept risk and capacity of drainage system or install attenuation system			
19	11/3/14	Network disruption during construction. Main route in and out of Warwick	There is a risk of significant disruption during construction	Increased congestion and journey times, reputational damage, Increased levels of pollution	25%	#NAME?	Probability: Previous experience Cost: Officer time Time: No time impact Reputational impact	0	2,000	5,000	0	0	0	10%	#NAME?	Probability: Previous experience Cost: Officer time Time: No time impact Reputational impact	0	2,000	5,000	0	0	0	233	Alan Law	1. Good communication plan and engagement with public	Alan Law	31/05/2014	

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Quantitative Cost Risk Analysis

Warwickshire County Council

A425 Birmingham Road Stanks Island Improvement

14th March 2014

REVISED

REVISED

Document status					
Revision	Date	Status or comment	Prepared by	Checked by	Authorised by
01	12.03.14	First issue	Claire Mills	Mark Warner	Mark Warner

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CONTENTS PAGE

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1.0 EXECUTIVE SUMMARY

The Quantitative Cost Risk Analysis (QCRA) was undertaken to inform the level of risk contingency that is required to support the Outline Major Transport Scheme Business Case for A425 Birmingham Road Stanks Island Improvements being proposed by Warwickshire County Council (WCC).

The key assumptions and exclusions that the QCRA is based upon can be found in the Feasibility Estimate, produced by Faithful+Gould (F+G).

Note: The results from the QCRA do not include the cost of Schedule Delay. It is suggested that an additional contingency be included for this.

The QCRA summary can be seen in the table below:

Pre Mitigation			
Confidence Levels			
Mean	10%	50%	80%
£137,119	£19,139	£161,065	£211,594

Post Mitigation			
Confidence Levels			
Mean	10%	50%	80%
£62,279	£0	£28,730	£150,000

Table 1: Pre and Post Mitigated Confidence Values

The following three risks are those which have the biggest influence on risk exposure pre mitigation. These are the ones where it is suggested that management action should be focussed:

- Risk ID 17: There is a risk of unacceptable level of noise during construction;
- Risk ID 6: There is a risk that the bridge may not be strong enough to support the second lane of traffic;
- Risk ID 11: There is a risk that uncharted utilities may be discovered when work starts.

2.0 BACKGROUND

As part of the Coventry and Warwickshire Local Enterprise Partnership Strategic Economic Plan, Warwickshire County Council is submitting a number of Outline Major Transport Scheme Business Cases. F+G have been asked to support these by working with WCC to produce a risk register and QCRA for each of the 5 Outline Business Cases. These are:

- A425 Birmingham Road Stanks Island Improvement;
- A426 Avon Mill Roundabout;
- A444 Corridor Improvement, Coton Arches Roundabout to George Eliot Hospital;
- A452 Kenilworth Road;
- A3400 Bridgefoot/Bridgeway/Tiddington Road/Shipston Road

Further detail for each of these schemes can be found in the individual Outline Business Cases produced by Warwickshire County Council.

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3.0 METHODOLOGY

A risk identification workshop was held at Warwickshire County Council on Tuesday 11th March 2014 with the objective of identifying and assessing risks relevant to the A425 Birmingham Road Stanks Island Improvements scheme. Alan Law, Nick Dauncey and Nick Holland represented WCC, Steve Boden represented Atkins and Claire Mills from F+G facilitated the workshop. All participated in the deliberations.

The objectives of the meeting were to:

- identify significant risks to the achievement of the project objectives
- establish a project risk register, including quantified cost and time impacts pre and post mitigation
- identify actions to be undertaken to increase the probability of project success

The risks to the project were identified in a brainstorming session. Each risk was then analysed to understand the probability of occurrence and severity of the impact of the risks on the project outcome. A risk owner was allocated and a mitigation strategy decided upon.

Evaluation was conducted using Latin Hypercube analysis, using Primavera Risk Analysis software, 10,000 simulations were used. A tornado graph was created to identify the risks that have the most influence on the project.

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4.0 RESULTS

The mean risk exposure for the project pre mitigation is £137,119 and post mitigation is £62,279. This is represented as follows:

Pre Mitigation			
Confidence Levels			
Mean	10%	50%	80%
£137,119	£19,139	£161,065	£211,594

Post Mitigation			
Confidence Levels			
Mean	10%	50%	80%
£62,279	£0	£28,730	£150,000

Table 2: Pre and Post Mitigated Confidence Values

4.1 Pre Mitigation Results

The graph below shows the range of simulated total risk exposure pre mitigation:

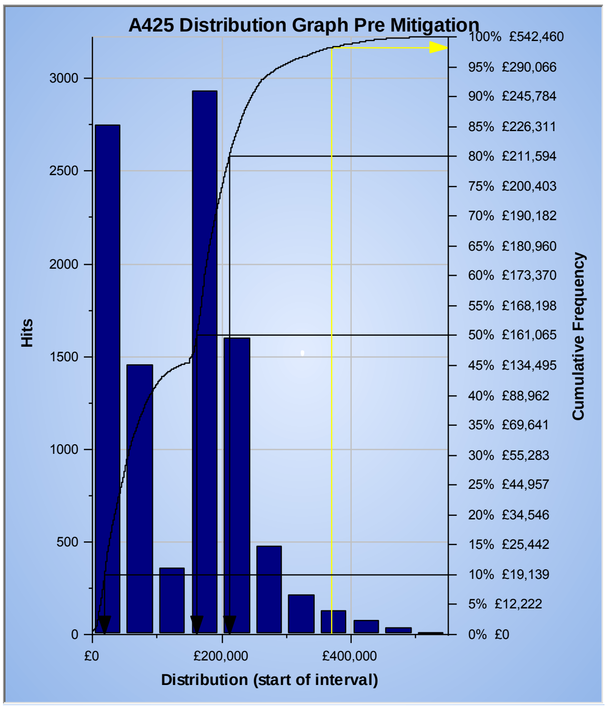

Figure 1: Distribution Graph Pre Mitigation

The evaluation also identified the top 5 risks that drive the risk exposure pre mitigation:

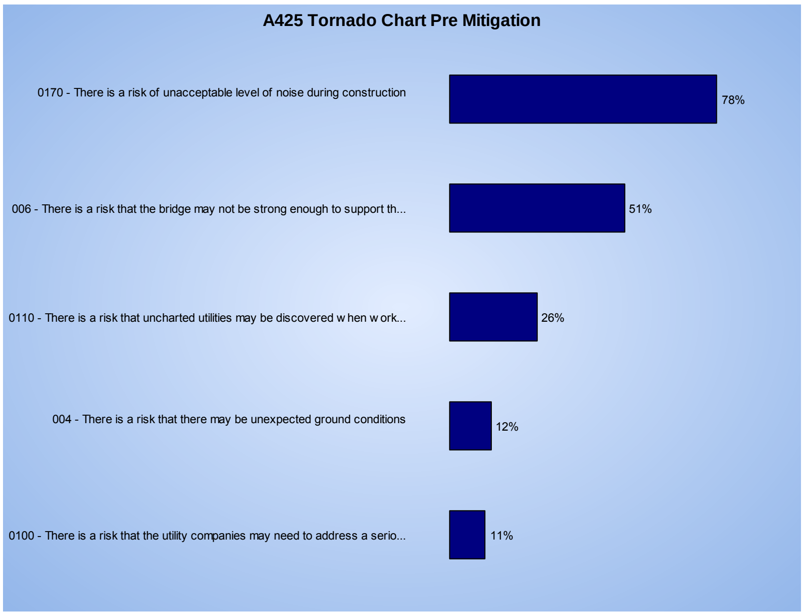

Figure 2: Tornado Chart Pre Mitigation

4.2 Post Mitigation Results

The graph below shows the range of simulated total risk exposure post mitigation:

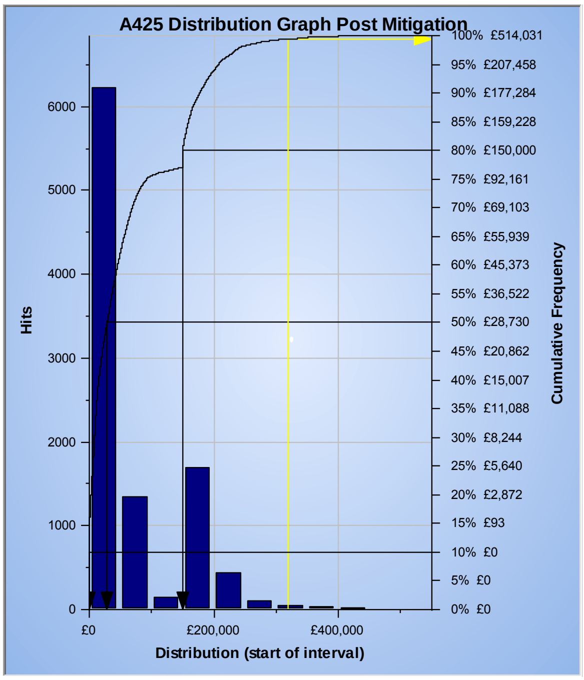

Figure 3: Distribution Graph Post Mitigation

The evaluation also identified the top 5 risks that drive the risk exposure post mitigation:

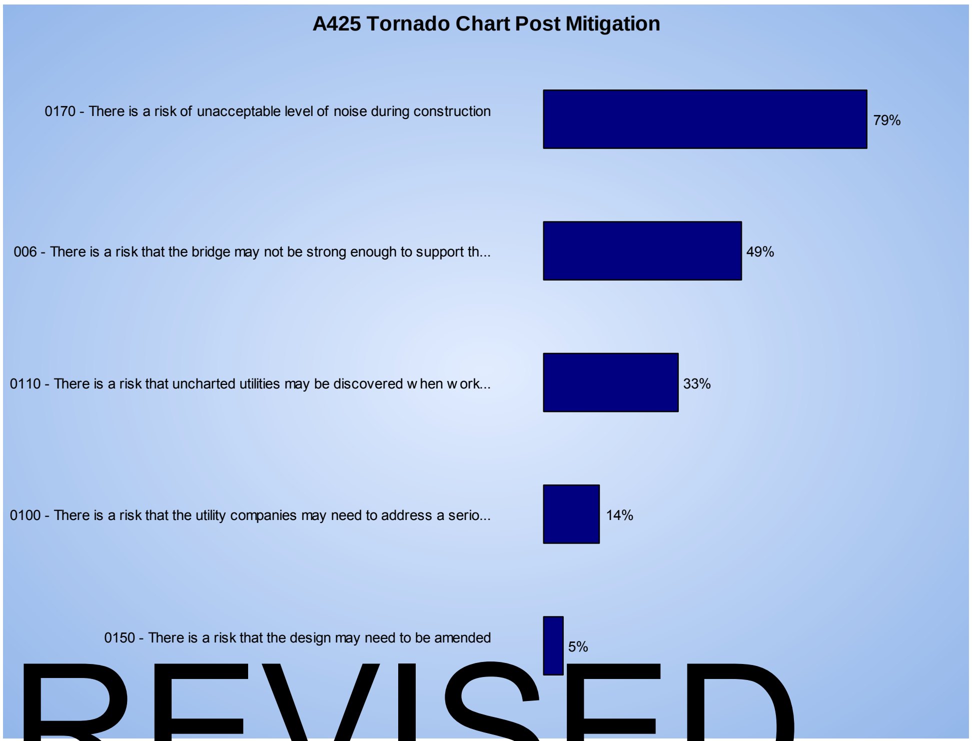

Figure 4: Tornado Chart Post Mitigation

QCRAnalysis
Warwickshire County Council
A425 Birmingham Road Stanks Island Improvement
10 March 2014

REVISED

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CONSTRUCTIVE EXPERTISE

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Appendix E

Table KS605EW
2011 Census: Industry, local authorities in England and Wales

England and Wales
Constituent Countries; Regions, counties, London boroughs, unitary authorities and districts in England; unitary authorities in Wales

All usual residents aged 16 to 74 in employment the week before the census

Area code	Area name	All categories: Industry	A Agriculture, forestry and fishing	B Mining and quarrying	C Manufacturing	D Electricity, gas, steam and air conditioning supply	E Water supply; sewerage, waste management and remediation activities	F Construction	G Wholesale and retail trade; repair of motor vehicles and motor cycles	H Transport and storage	I Accommodation and food service activities	J Information and communication	K Financial and insurance activities	L Real estate activities	M Professional, scientific and technical activities	N Administrative and support service activities	O Public administration and defence; compulsory social security	P Education	Q Human health and social work activities	R, S, T, U Other
		Persons Number	Persons Number	Persons Number	Persons Number	Persons Number	Persons Number	Persons Number	Persons Number	Persons Number	Persons Number	Persons Number	Persons Number	Persons Number	Persons Number	Persons Number	Persons Number	Persons Number	Persons Number	Persons Number
E10000031	**Warwickshire**	**272,321**	**2,662**	**437**	**31,646**	**2,475**	**2,049**	**18,182**	**46,514**	**16,148**	**14,249**	**10,576**	**8,245**	**3,361**	**18,595**	**12,807**	**13,164**	**27,788**	**30233.0**	**13,190**
E07000218	North Warwickshire	31,258	352	175	3,979	211	312	2,814	5,447	2,806	1,566	806	809	370	1,367	1,544	1,415	2,795	3142.0	1,348
E07000219	Nuneaton and Bedworth	60,205	118	157	8,641	397	486	3,836	11,698	4,748	2,662	1,482	1,747	540	2,353	2,717	3,103	5,278	7659.0	2,583
E07000220	Rugby	50,485	445	40	5,991	411	313	3,403	9,127	4,283	2,384	1,751	1,257	530	2,944	2,246	2,795	5,067	5332.0	2,166
E07000221	Stratford-on-Avon	60,765	1,408	34	5,830	399	493	4,367	9,936	2,100	3,894	2,641	2,433	998	5,226	3,295	2,444	6,009	5761.0	3,497
E07000222	Warwick	69,608	339	31	7,205	1,057	445	3,762	10,306	2,211	3,743	3,896	1,999	923	6,705	3,005	3,407	8,639	8339.0	3,596

Table 3.4

These tables are part of the Regional Gross Value Added release published on the 11th December 2013

				£million			
				2011			
	NUTS Level 1						
	NUTS Level 2						
	NUTS Level 3						
UKG13	Warwickshire			**GVA**	**Population**		
		A: Agriculture, forestry and fishing	R8KY	115	2,662	£43,201	
		BCDE: Production	R8KZ	1,950	36,607	£53,269	
		of which C: Manufacturing	KUK9	1,397	31,646	**£44,145**	Assume for B2 Land Use
		F: Construction	R8L2	915	18,182	£50,324	Use for 1 year construction activity pe
		GHI: Distribution; transport; accommodation and food	R8L3	2,663	76,911	**£34,624**	Assume for B8 Land Use
		J: Information and communication	R8L4	828	10,576	£78,290	
		K: Financial and insurance activities	R8L5	411	8245	£49,848	
		L: Real estate activities	R8L6	794	3,361	£236,239	
		MN: Business service activities	R8L7	1,560	31,402	**£49,678**	Assume for B1 Land Use
		OPQ: Public administration; education; health	R8L8	1,781	71,185	£25,019	
		RST: Other services and household activities	R8L9	434	13,190	£32,904	
	Total GVA		C32U	11,451			

er development

Strategic Economic Plan (GVA Calculations)

HCA Factor	**0.921375**			
GVA/Employee	**£49,678**	**£44,145**	**£34,624**	

2011 Prices

	Total Jobs (exc construction)	B1 Office	B2 Manufacturing	B8 Warehousing	B1 Office	B2 Manufacturing	B8 Warehousing	TOTAL (Gross) GVA
Stanks Junction	106	92	10	4	£4,582,999	£431,205	£150,316	£5,164,521
Avon Mill (Low Estimate)	1700	1003	395	302	£49,819,898	£17,439,842	£10,446,988	£77,706,728
Avon Mill (High Estimate)	2935	1732	682	521	£86,052,552	£30,088,518	£18,037,964	£134,179,034
A444 Corridor	2598	2251	244	103	£111,825,183	£10,780,122	£3,570,014	£126,175,319
A452/A46 Thickthorne Junction	189	164	17	8	£8,141,563	£766,586	£263,054	£9,171,204

http://budgetresponsibility.org.uk/economic-fiscal-outlook-march-2014/ Click Link
Table 1.1

https://www.gov.uk/government/publications/webtag-tag Click Link
Real GDP

	2012	2013	2014	2015	2016	2017	2018
	0.3	1.8	2.7	2.3	2.6	2.6	2.5
Stanks Junction	£5,180,014	£5,273,254	£5,415,632	£5,540,192	£5,684,237	£5,832,027	£5,977,828
Avon Mill (Low Estimate)	£77,939,848	£79,342,765	£81,485,020	£83,359,175	£85,526,514	£87,750,203	£89,943,958
Avon Mill (High Estimate)	£134,581,571	£137,004,039	£140,703,149	£143,939,321	£147,681,743	£151,521,469	£155,309,505
A444 Corridor	£126,553,845	£128,831,814	£132,310,273	£135,353,409	£138,872,598	£142,483,285	£146,045,367
A452/A46 Thickthorne Junction	£9,198,717	£9,364,294	£9,617,130	£9,838,324	£10,094,120	£10,356,568	£10,615,482

	2019	2020	2021	2022	2023	2024	2025
	2.8	2.8	2.4	2.4	2.4	2.4	2.5
Stanks Junction	£6,145,207	£6,317,273	£6,468,887	£6,624,140	£6,783,120	£6,945,915	£7,119,562
Avon Mill (Low Estimate)	£92,462,389	£95,051,336	£97,332,568	£99,668,550	£102,060,595	£104,510,049	£107,122,800
Avon Mill (High Estimate)	£159,658,171	£164,128,600	£168,067,687	£172,101,311	£176,231,743	£180,461,304	£184,972,837
A444 Corridor	£150,134,638	£154,338,407	£158,042,529	£161,835,550	£165,719,603	£169,696,874	£173,939,295
A452/A46 Thickthorne Junction	£10,912,715	£11,218,271	£11,487,510	£11,763,210	£12,045,527	£12,334,620	£12,642,985

GVA/Employee **£50,324**

	Construction Jobs	Construction Jobs	TOTAL (Gross) GVA
Stanks Junction	33	£1,660,708	£1,660,708
Avon Mill (Low Estimate)	59	£2,969,145	£2,969,145
Avon Mill (High Estimate)	59	£2,969,145	£2,969,145
A444 Corridor	84	£4,227,258	£4,227,258
A452/A46 Thickthorne Junction	108	£5,435,046	£5,435,046

Stanks Junction	£1,665,691	£1,695,673	£1,741,456	£1,781,510	£1,827,829	£1,875,352	£1,922,236
Avon Mill (Low Estimate)	£2,978,053	£3,031,658	£3,113,512	£3,185,123	£3,267,936	£3,352,903	£3,436,725
Avon Mill (High Estimate)	£2,978,053	£3,031,658	£3,113,512	£3,185,123	£3,267,936	£3,352,903	£3,436,725
A444 Corridor	£4,239,940	£4,316,258	£4,432,797	£4,534,752	£4,652,655	£4,773,624	£4,892,965
A452/A46 Thickthorne Junction	£5,451,351	£5,549,475	£5,699,311	£5,830,395	£5,981,985	£6,137,517	£6,290,955

		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Real GDP/GVA Growth Forecast		0.3	1.8	2.7	2.3	2.6	2.6	2.5	2.8	2.8	2.4	2.4	2.4	2.4	2.5
as a percentage		1.003	1.018	1.027	1.023	1.026	1.026	1.025	1.028	1.028	1.024	1.024	1.024	1.024	1.025
GDA/GVA multiplication factor		1.003	1.021	1.049	1.073	1.101	1.129	1.157	1.190	1.223	1.253	1.283	1.313	1.345	1.379
HCA Factor		0.921	0.921	0.921	0.921	0.921	0.921	0.921	0.921	0.921	0.921	0.921	0.921	0.921	0.921

GVA/Employee	
B1	£ 49,678
B2	£ 44,145
B8	£ 34,624
Construction (during)	£ 50,324

A452/A46 Thickthorn Grade Separated Roundabou

								0.125	0.25	0.375	0.5	0.625	0.75	0.875	1.00
Job Type	**Total**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
Total Non-Constructior	783	0	0	0	0	0	0	21.75	43.5	65.25	87	108.75	130.5	152.25	174
B1	*679.5*							*18.9*	*37.8*	*56.6*	*75.5*	*94.4*	*113.3*	*132.1*	*151*
B2	*72*							*2.0*	*4.0*	*6.0*	*8.0*	*10.0*	*12.0*	*14.0*	*16*
B8	*31.5*							*0.9*	*1.8*	*2.6*	*3.5*	*4.4*	*5.3*	*6.1*	*7*
Total Construction (6 months	108	0	0	0	0	0	108	0	0	0	0	0	0	0	0
Construction	*45*						*45*								
Utility	*30*						*30*								
Architectural Design & Engineering	*26*						*26*								
Business Support	*7*						*7*								
GVA (Non - Construction) (2011 Price)	£ 35,035,772	£ -	£ -	£ -	£ -	£ -	£ -	£ 973,216	£ 1,946,432	£ 2,919,648	£ 3,892,864	£ 4,866,079	£ 5,839,295	£ 6,812,511	£ 7,785,727
GVA (Construction) (2011 Price)	£ 2,503,858	£ -	£ -	£ -	£ -	£ -	£ 2,503,858	£ -	£ -	£ -	£ -	£ -	£ -	£ -	£ -
GVA (Non - Construction)	£ 45,696,008	£ -	£ -	£ -	£ -	£ -	£ -	£ 1,126,478	£ 2,316,038	£ 3,571,331	£ 4,876,057	£ 6,241,353	£ 7,669,374	£ 9,162,346	£ 10,733,033
GVA (Construction)	£ 2,827,477	£ -	£ -	£ -	£ -	£ -	£ 2,827,477	£ -	£ -	£ -	£ -	£ -	£ -	£ -	£ -
GVA (Total)	£ 48,523,486	£ -	£ -	£ -	£ -	£ -	£ 2,827,477	£ 1,126,478	£ 2,316,038	£ 3,571,331	£ 4,876,057	£ 6,241,353	£ 7,669,374	£ 9,162,346	£ 10,733,033

A444 Corridor Improvements - Coton Arches Roundabout to George Eliot Hospita

									0.143	0.286	0.429	0.571	0.714	0.857	1.000
Job Type	**Total**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
Total Non-Constructior	9576	0	0	0	0	0	0	0	342	684	1026	1368	1710	2052	2394
B1	*8296*								*296.3*	*592.6*	*888.9*	*1185.1*	*1481.4*	*1777.7*	*2074*
B2	*900*								*32.1*	*64.3*	*96.4*	*128.6*	*160.7*	*192.9*	*225*
B8	*380*								*13.6*	*27.1*	*40.7*	*54.3*	*67.9*	*81.4*	*95*
Total Construction (9 months	84	0	0	0	0	0	0	84	0	0	0	0	0	0	0
Construction	*35*							*35*							
Utility	*23*							*23*							
Architectural Design & Engineering	*20*							*20*							
Business Support	*6*							*6*							
GVA (Non - Construction) (2011 Price)	£ 428,457,007	£ -	£ -	£ -	£ -	£ -	£ -	£ -	£ 15,302,036	£ 30,604,072	£ 45,906,108	£ 61,208,144	£ 76,510,180	£ 91,812,216	£ 107,114,252
GVA (Construction) (2011 Price)	£ 1,947,445	£ -	£ -	£ -	£ -	£ -	£ -	£ 1,947,445	£ -	£ -	£ -	£ -	£ -	£ -	£ -
GVA (Non - Construction)	£ 563,282,750	£ -	£ -	£ -	£ -	£ -	£ -	£ -	£ 18,207,726	£ 37,435,085	£ 57,500,290	£ 78,507,062	£ 100,489,040	£ 123,480,932	£ 147,662,615
GVA (Construction)	£ 2,254,128	£ -	£ -	£ -	£ -	£ -	£ -	£ 2,254,128	£ -	£ -	£ -	£ -	£ -	£ -	£ -
GVA (Total)	£ 565,536,878	£ -	£ -	£ -	£ -	£ -	£ -	£ 2,254,128	£ 18,207,726	£ 37,435,085	£ 57,500,290	£ 78,507,062	£ 100,489,040	£ 123,480,932	£ 147,662,615

A425/A46 Stanks Grade Separated Roundabout and Corridor Improvement

						0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
Job Type	**Total**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
Total Non-Constructior	539	0	0	0	0	9.8	19.6	29.4	39.2	49	58.8	68.6	78.4	88.2	98
B1	*467.5*					*8.5*	*17*	*25.5*	*34*	*42.5*	*51*	*59.5*	*68*	*76.5*	*85*
B2	*49.5*					*0.9*	*1.8*	*2.7*	*3.6*	*4.5*	*5.4*	*6.3*	*7.2*	*8.1*	*9*
B8	*22*					*0.4*	*0.8*	*1.2*	*1.6*	*2*	*2.4*	*2.8*	*3.2*	*3.6*	*4*
Total Construction (6 months	33	0	0	0	33	0	0	0	0	0	0	0	0	0	0
Construction	*14*				*14*										
Utility	*9*				*9*										
Architectural Design & Engineering	*8*				*8*										
Business Support	*2*				*2*										
GVA (Non - Construction) (2011 Price)	£ 24,113,794	£ -	£ -	£ -	£ -	£ 438,433	£ 876,865	£ 1,315,298	£ 1,753,730	£ 2,192,163	£ 2,630,596	£ 3,069,028	£ 3,507,461	£ 3,945,894	£ 4,384,326
GVA (Construction) (2011 Price)	£ 765,068	£ -	£ -	£ -	£ 765,068	£ -	£ -	£ -	£ -	£ -	£ -	£ -	£ -	£ -	£ -
GVA (Non - Construction)	£ 30,952,488	£ -	£ -	£ -	£ -	£ 482,553	£ 990,199	£ 1,522,431	£ 2,086,745	£ 2,681,467	£ 3,294,987	£ 3,936,411	£ 4,606,725	£ 5,306,948	£ 6,044,024
GVA (Construction)	£ 820,719	£ -	£ -	£ -	£ 820,719	£ -	£ -	£ -	£ -	£ -	£ -	£ -	£ -	£ -	£ -
GVA (Total)	£ 31,773,207	£ -	£ -	£ -	£ 820,719	£ 482,553	£ 990,199	£ 1,522,431	£ 2,086,745	£ 2,681,467	£ 3,294,987	£ 3,936,411	£ 4,606,725	£ 5,306,948	£ 6,044,024

A426/A4071 Avon Mill Roundabout and Hunters Lane Improvements (LOW ESTIMATI

								0.125	0.25	0.375	0.5	0.625	0.75	0.875	1
Job Type	**Total**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
Total Non-Constructior	7047	0	0	0	0	0	0	195.75	391.5	587.25	783	978.75	1174.5	1370.25	1566
B1	*4158*							*115.5*	*231.0*	*346.5*	*462.0*	*577.5*	*693.0*	*808.5*	*924*
B2	*1638*							*45.5*	*91.0*	*136.5*	*182.0*	*227.5*	*273.0*	*318.5*	*364*
B8	*1251*							*34.8*	*69.5*	*104.3*	*139.0*	*173.8*	*208.5*	*243.3*	*278*

Total Construction (9 months	59	0	0	0	0	0	59	0	0	0	0	0	0	0	0
Construction	*16*						*16*								
Utility	*25*						*25*								
Architectural Design & Engineering	*14*						*14*								
Business Support	*4*						*4*								
GVA (Non - Construction) (2011 Price)	£ 296,854,737	£ -	£ -	£ -	£ -	£ -	£ -	£ 8,245,965	£ 16,491,930	£ 24,737,895	£ 32,983,860	£ 41,229,825	£ 49,475,789	£ 57,721,754	£ 65,967,719
GVA (Construction) (2011 Price)	£ 1,367,848	£ -	£ -	£ -	£ -	£ -	£ 1,367,848	£ -	£ -	£ -	£ -	£ -	£ -	£ -	£ -
GVA (Non - Construction)	£ 387,177,894	£ -	£ -	£ -	£ -	£ -	£ -	£ 9,544,537	£ 19,623,568	£ 30,259,541	£ 41,314,360	£ 52,882,381	£ 64,981,870	£ 77,631,674	£ 90,939,961
GVA (Construction)	£ 1,544,640	£ -	£ -	£ -	£ -	£ -	£ 1,544,640	£ -	£ -	£ -	£ -	£ -	£ -	£ -	£ -
GVA (Total)	£ 388,722,534	£ -	£ -	£ -	£ -	£ -	£ 1,544,640	£ 9,544,537	£ 19,623,568	£ 30,259,541	£ 41,314,360	£ 52,882,381	£ 64,981,870	£ 77,631,674	£ 90,939,961

A426/A4071 Avon Mill Roundabout and Hunters Lane Improvements (HIGH ESTIMATI

Job Type	Total	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
								0.125	0.25	0.375	0.5	0.625	0.75	0.875	1
Total Non-Constructior	12168	0	0	0	0	0	0	338	676	1014	1352	1690	2028	2366	2704
B1	*7182*							*199.5*	*399*	*598.5*	*798*	*997.5*	*1197*	*1396.5*	*1596*
B2	*2826*							*78.5*	*157*	*235.5*	*314*	*392.5*	*471*	*549.5*	*628*
B8	*2160*							*60*	*120*	*180*	*240*	*300*	*360*	*420*	*480*
Total Construction (9 months	59	0	0	0	0	0	59	0	0	0	0	0	0	0	0
Construction	*16*						*16*								
Utility	*25*						*25*								
Architectural Design & Engineering	*14*						*14*								
Business Support	*4*						*4*								
GVA (Non - Construction) (2011 Price)	£ 512,589,875	£ -	£ -	£ -	£ -	£ -	£ -	£ 14,238,608	£ 28,477,215	£ 42,715,823	£ 56,954,431	£ 71,193,038	£ 85,431,646	£ 99,670,253	£ 113,908,861
GVA (Construction) (2011 Price)	£ 1,367,848	£ -	£ -	£ -	£ -	£ -	£ 1,367,848	£ -	£ -	£ -	£ -	£ -	£ -	£ -	£ -
GVA (Non - Construction)	£ 668,554,157	£ -	£ -	£ -	£ -	£ -	£ -	£ 16,480,899	£ 33,884,728	£ 52,250,251	£ 71,339,009	£ 91,313,932	£ 112,206,560	£ 134,049,437	£ 157,029,340
GVA (Construction)	£ 1,544,640	£ -	£ -	£ -	£ -	£ -	£ 1,544,640	£ -	£ -	£ -	£ -	£ -	£ -	£ -	£ -
GVA (Total)	£ 670,098,797	£ -	£ -	£ -	£ -	£ -	£ 1,544,640	£ 16,480,899	£ 33,884,728	£ 52,250,251	£ 71,339,009	£ 91,313,932	£ 112,206,560	£ 134,049,437	£ 157,029,340

GVA Non-Construction (from development sites)

Scheme	2025 GVA	Cumulative GVA to 2025
A452/A46 Thickthorn Grade Separated Roundabout	£10,733,000	£45,696,000
A444 Corridor Improvements - Coton Arches Roundabout to George Eliot Hospital	£147,663,000	£563,283,000
A425/A46 Stanks Grade Separated Roundabout and Corridor Improvements	£6,044,000	£30,952,000
A426/A4071 Avon Mill Roundabout and Hunters Lane Improvements (LOW ESTIMATE)	£90,940,000	£387,178,000
A426/A4071 Avon Mill Roundabout and Hunters Lane Improvements (HIGH ESTIMATE)	£157,029,000	£668,554,000

Construction GVA

Scheme	GVA	Year
A452/A46 Thickthorn Grade Separated Roundabout	£2,827,000	2017
A444 Corridor Improvements - Coton Arches Roundabout to George Eliot Hospital	£2,254,000	2018
A425/A46 Stanks Grade Separated Roundabout and Corridor Improvements	£821,000	2015
A426/A4071 Avon Mill Roundabout and Hunters Lane Improvements	£1,545,000	2017

Appendix F

Warwickshire County Council

Warwick Town PARAMICS Modelling

Local Model Validation & Forecast Report

232815-02 /R001

Issue | 31 March 2014

Job number 232815-02

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Warwick Bluetooth Survey – Data Analysis

1 Introduction

1.1 Background

Arup were commissioned by Warwickshire County Council to build a PARAMICS model of Warwick town centre.

There are a number of reasons behind the development of this area specific model including:

- To enable detailed testing of scheme proposals within the area of the A46/A4177 junction to be undertaken.
- To enable options for proposals pertaining to the simplification of traffic movements across the town centre to be undertaken through a separate, subsequent, study.
- To enable detailed testing of the implications of the Local Plan allocations to be undertaken within a more refined and detailed study model.

It is also intended that the model will also be made available for development control testing should it be required.

1.2 Modelling Software

In this instance, as the original model was developed using PARAMICS it was natural for any extension or update to be undertaken using the same software particularly when considering the proficiency of WCC in PARAMICS.

PARAMICS Micro-simulation as an Assessment Tool

PARAMICS is a micro-simulation traffic model that simulates the behaviour of each individual vehicle and presents its output as a real time visual display for traffic management and road network design.

PARAMICS allows a detailed representation of the highway network in the form of modelling of individual lanes, traffic signals, junctions, pedestrian crossings and bus stops as well as the events which occur on it. Each individual vehicle is separately represented and therefore the programme can take an account of each individual driver’s behaviour.

The output is a visual display which shows the changing position of individual vehicles and queues on the highway network in real time. The advantage of a visual display enables the non-technical experts to view the results of highway and development proposals in terms of traffic flows and congestion.

Driver and Vehicle Behaviour

The movement of individual vehicles within PARAMICS is governed by three interacting models representing vehicle-following, junction behaviour (gap acceptance) and lane-changing behaviour. All these three models are well documented in transport research and accepted world-wide.

Vehicle dynamics are relatively simple, combining a mixture of driver behaviour and some limitations based on vehicles' physical type and kinematics (e.g. size and acceleration/deceleration).

Individual driver behaviour is determined through the random allocation of aggression and awareness characteristics to the driver of each vehicle. Junction behaviour (gap acceptance), top speed, headway and propensity to change lanes are all examples of quantities that vary according to the behaviour parameters.

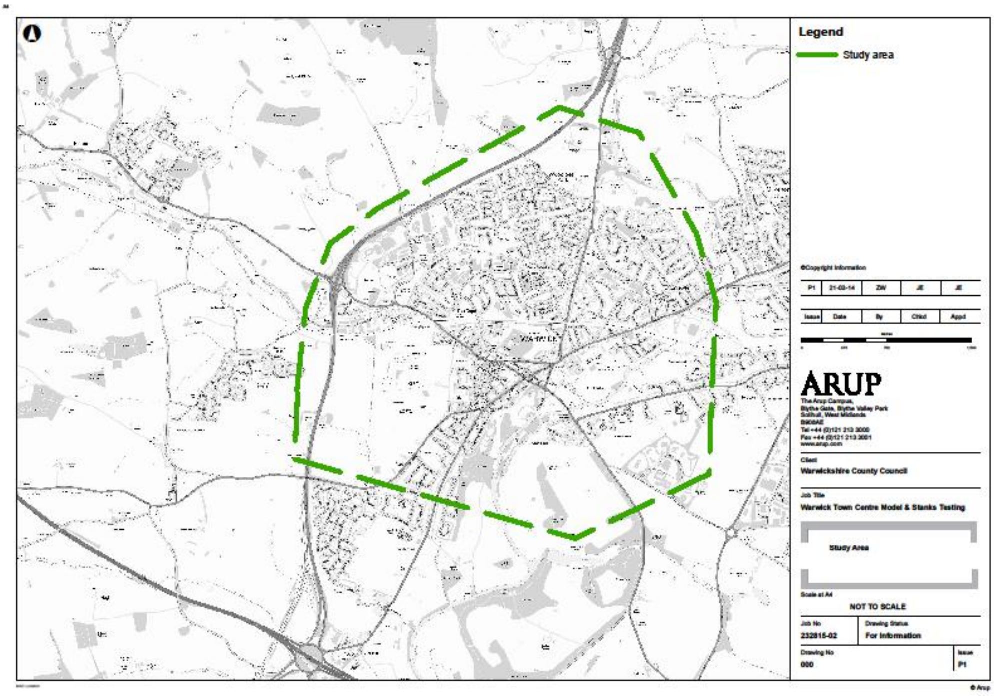
Road Network

PARAMICS is sensitive to the definition of the road network. The success of a model in reproducing the existing conditions and forecasting changes in travel behaviour is largely dependent on the accuracy in modelling the road layout and geometry. The speed of each vehicle is determined by the interaction between vehicles within the constraints imposed by the road layout.

1.3 Scope

The coverage of the study area is outlined within **Figure 1**.

Figure 1- Study Area



The extent of the model network has been derived from a cordon of the existing Warwick and Leamington Wide Area PARAMICS model (WLWA). The purpose of defining a smaller study area, when producing a microsimulation model, is that allows the model to be refined and calibrated to a greater level of detail.

As the study area grows it becomes increasingly difficult to ensure accuracy with regards vehicle behaviour, routing, queuing and delay. Thus a smaller model can, at times, be more desirable.

Furthermore, recent Origin-Destination data, in the form of Bluetooth surveys, has become available. This data source is covered in more detail within the following section of this Report; however, the availability of this data has contributed to the definition of the proposed study area as the model has been developed with specific consideration having been given to this new source of O-D data.

2 Existing Conditions & Data

2.1 Traffic Data

A number of site surveys have been undertaken by both Arup and WCC, specifically with the purpose of understanding conditions within the proposed model area. These surveys have consisted of both formal scheduled surveys and ad-hoc network performance reviews undertaken during both the AM and PM peak periods.

In addition to site observations a series of counts have been collected across the study area. In total 9 link counts and 38 turn counts have been used for the purpose of model calibration.

An additional 7 link counts were retained for the purposes of model validation.

An overview of the locations of the calibration and validation counts used for the purposes of the model development have been illustrated within the following **Figure 2** and **Figure 3** for calibration and validation respectively.

Figure 2 – Calibration Survey locations

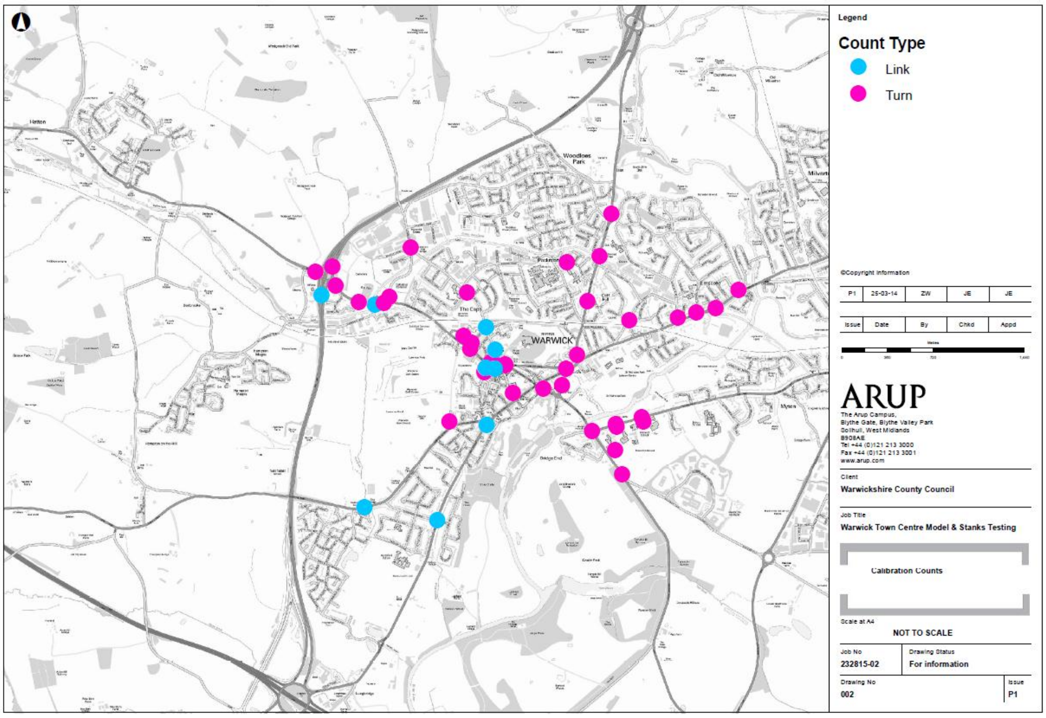
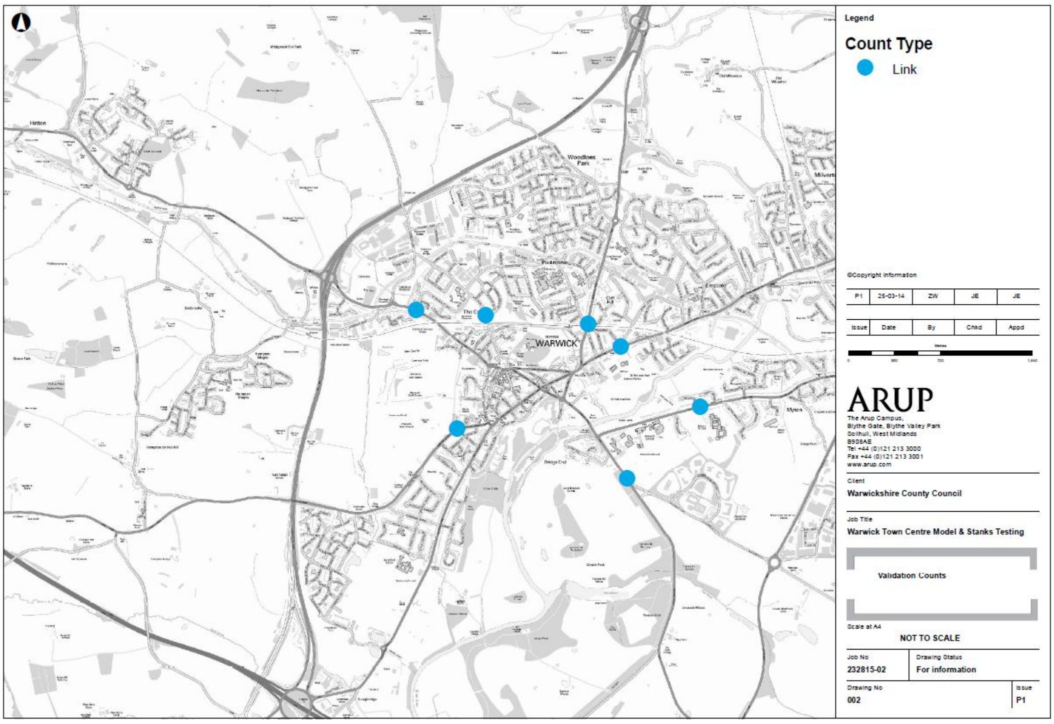


Figure 3 – Validation Survey locations

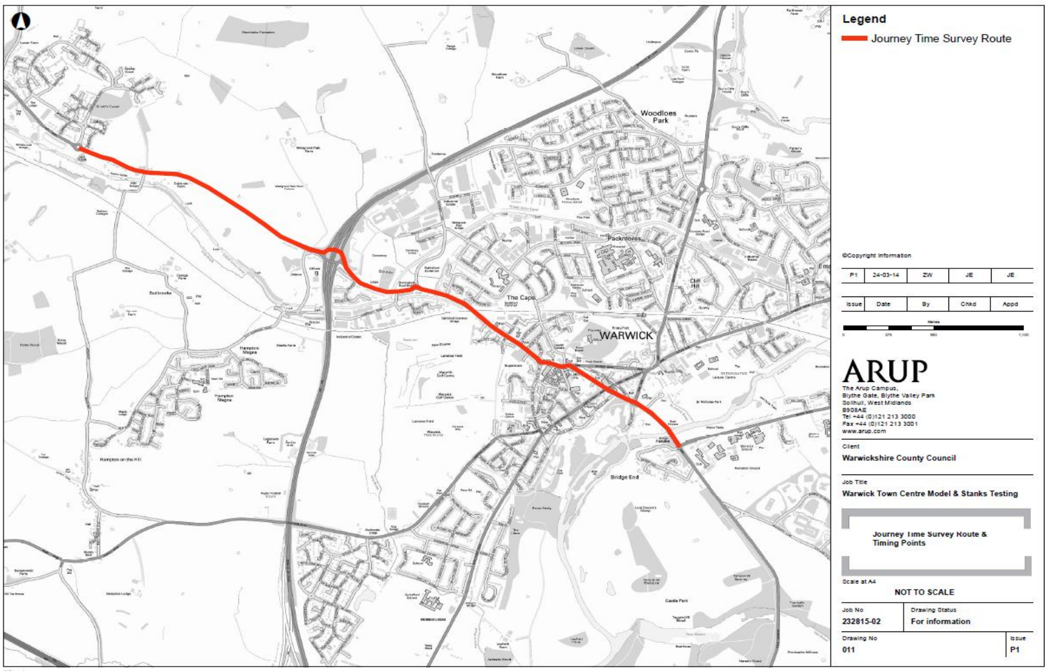


2.2 Journey Time Surveys

In addition to the retention of link counts for the purposes of model validation, journey time surveys were undertaken.

The surveys were undertaken by direction, split using consistent timing points, during Thursday 3rd October 2013 across the route illustrated within **Figure 4**.

Figure 4 – Journey time Survey Route & Timing Points



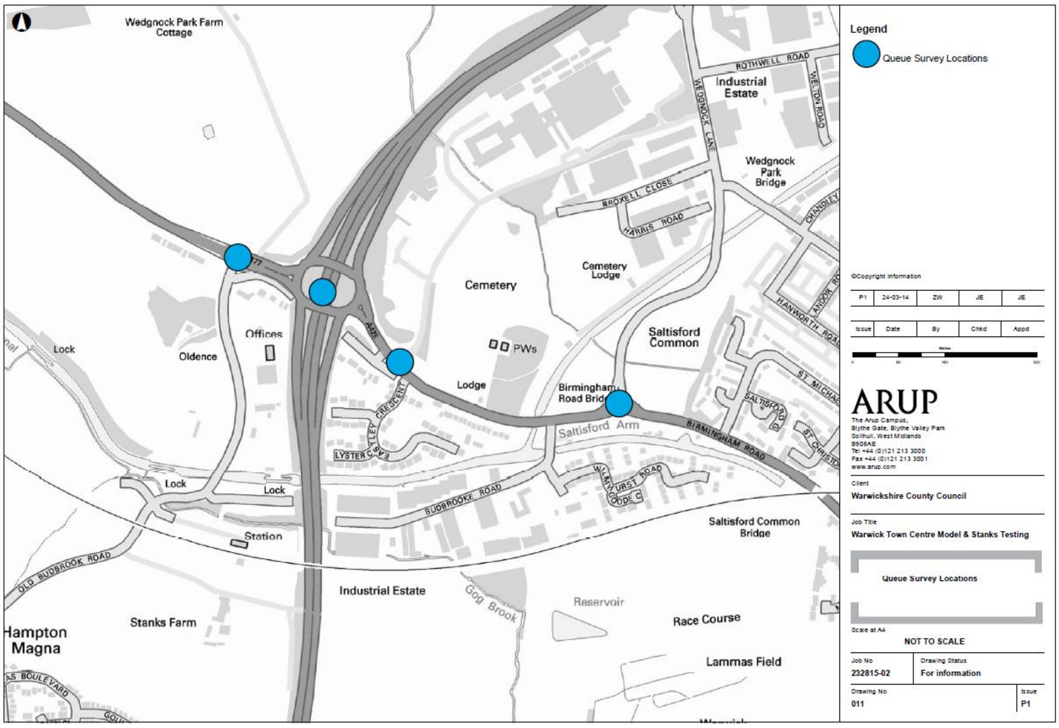
This data was reviewed and compiled for the purpose of model validation.

2.3 Queuing Analysis

Information on the queuing levels experienced during the peak periods, at a number of locations, was also surveyed. This information was collected in the form of maximum queue lengths in vehicles, at 5 minute intervals for both AM and PM model periods.

The queuing surveys were collected at 5 specific locations as identified within the following **Figure 5**:

Figure 5 – Queue Survey Locations



2.4 Demand Data

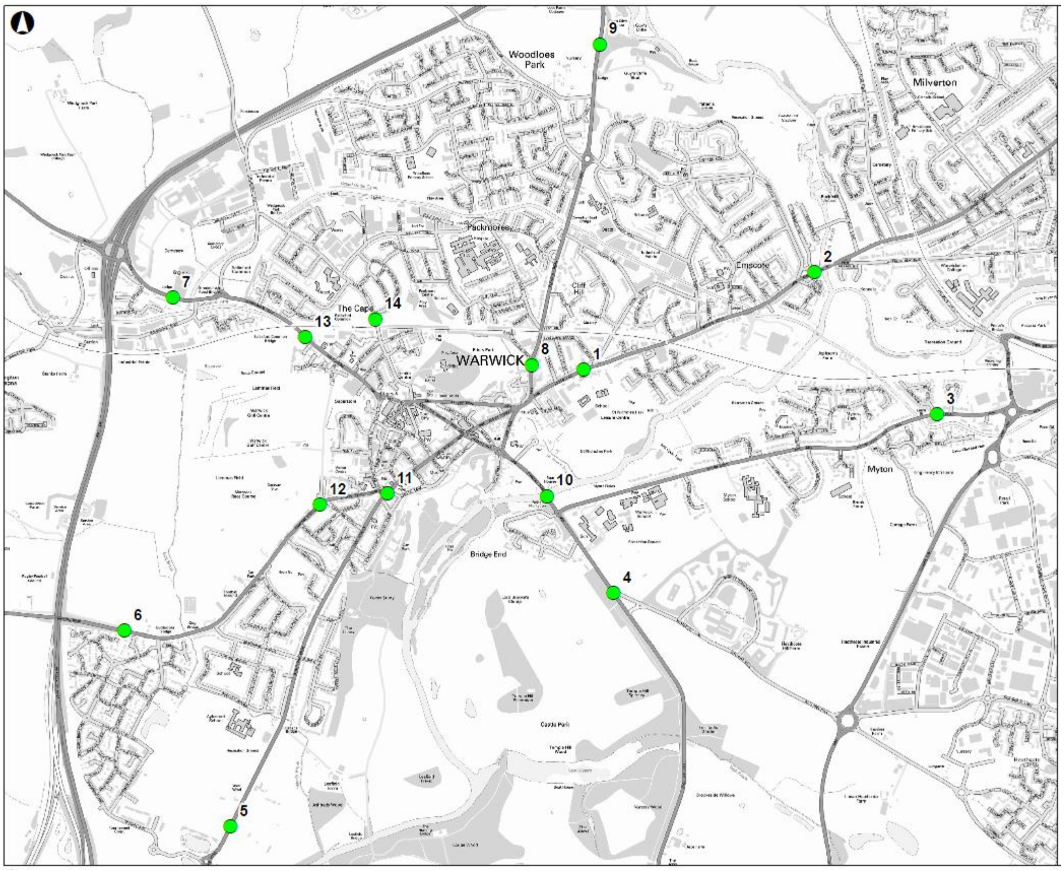
As has been mentioned previously, an origin-destination survey was undertaken across Warwick between the 7th of July 2012 and 13th July 2012. The survey was carried out across two concentric cordons, with one inner town and one outer town cordon boundary having been defined.

The purpose of two cordons was to ascertain the types of trip pattern undertaken across the entire area and allow through trips (trips travelling through the entire network) to be captured and enumerated at the same time. In order track vehicle movements through the cordons, it was identified that Bluetooth Vehicle Tracking could provide an efficient solution.

The post-processed data that was refined as a result of this survey was identified as the appropriate starting point for the development of a refined Prior Matrix for the study area. The outcomes from this survey were recorded within a separate Report which has been provided within **Appendix E** of this report. Details on how this information was translated into O-D movements across the model have been provided within **Section 4** of this report.

The cordon sites for which the data was collected are illustrated within the following **Figure 6**:

Figure 6 – Bluetooth Cordon Locations



3 Base Model Development

3.1 Time Periods

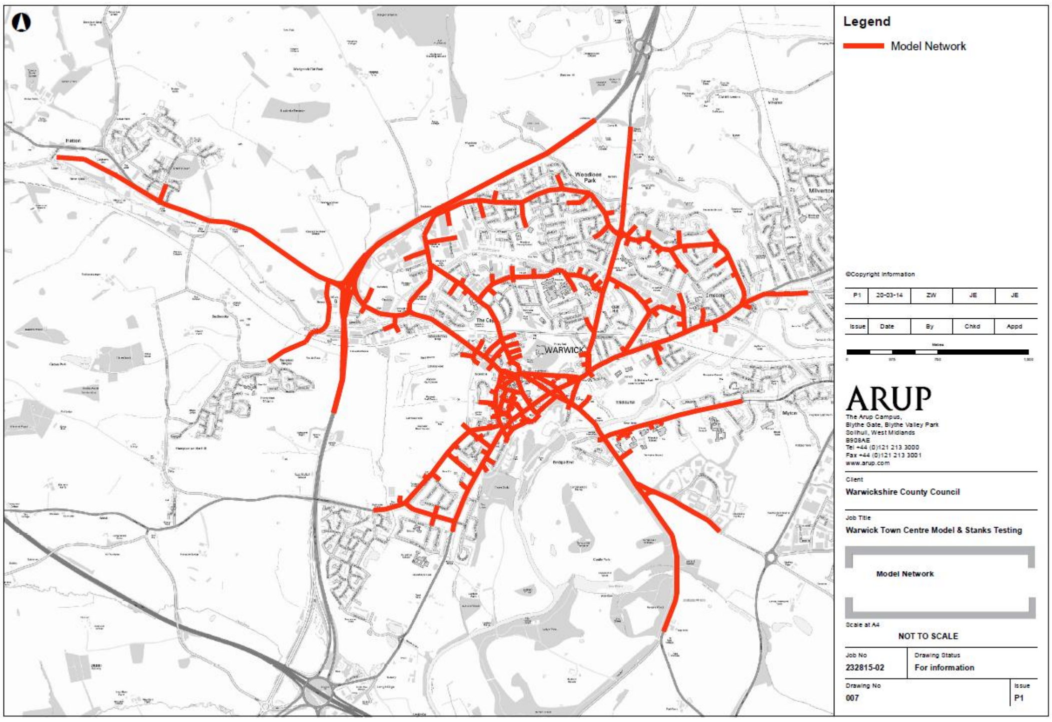
The model has been developed to be inclusive of both AM (07:00 to 10:00) and PM (16:00 to 19:00) time periods. In line with WCC requirements these have been modelled using discrete hourly periods within the PARAMICS model. This has resulted in the following periodic configuration:

- **Period 1:** 07:00 to 08:00
- **Period 2:** 08:00 to 09:00
- **Period 3:** 09:00 to 10:00
- **Period 4:** spare
- **Period 5:** 16:00 to 17:00
- **Period 6:** 17:00 to 18:00
- **Period 7:** 18:00 to 19:00

3.2 Network Extent

Figure 7 illustrates the coverage of the model was defined by the scope of the study area.

Figure 7 – Model Extent



3.3 Link Categories

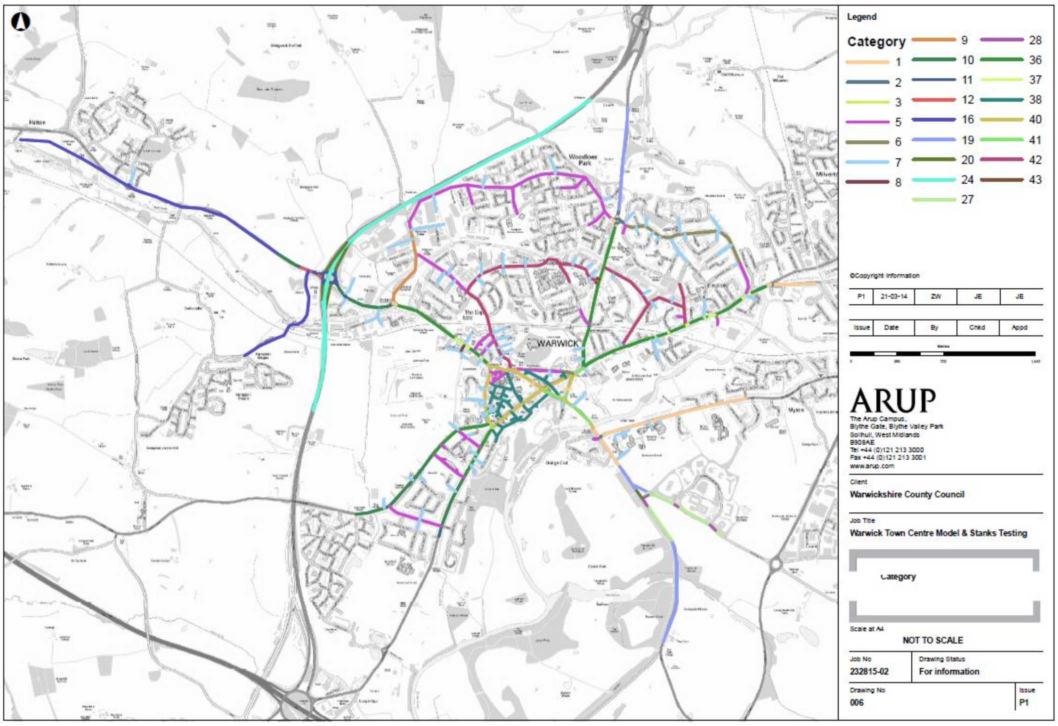
The link categories adopted within the modelling have been carried forward from the WLA model and are consistent with the approach adopted to link hierarchy in that model.

The attributes of the categories used in the model are depicted in Table 1 below:

Table 1 – Category attributes

Cat.	Speed	Width (m)	Lanes	Type	Cost factor
1	30	3.7	1	Urban major	1
2	30	7.3	2	Urban major	1
3	30	11	3	Urban major	1
5	30	3.7	1	Urban minor	1
6	30	6	2	Urban minor	1
7	20	3.7	1	Urban minor	1
8	20	7.3	2	Urban minor	1
9	40	3.7	1	Urban minor	1
10	40	3.7	1	Urban major	1
11	40	7.3	2	Urban major	1
12	40	11	3	Urban major	1
16	40	3.7	1	Highway minor	1
20	60	8	2	Highway major	1
24	70	8	2	Highway major	1
27	60	4	1	Urban major	1
28	60	8	2	Urban major	1
36	30	3.7	1	Urban major	0.8
37	30	7.3	2	Urban major	0.8
38	20	3.7	1	Urban minor	2
40	30	3.7	1	Urban major	0.8
41	30	7.3	2	Urban major	0.8
42	30	3.7	1	Urban minor	1.2
43	30	7.4	2	Urban minor	1.2

Figure 8 – Link Categories



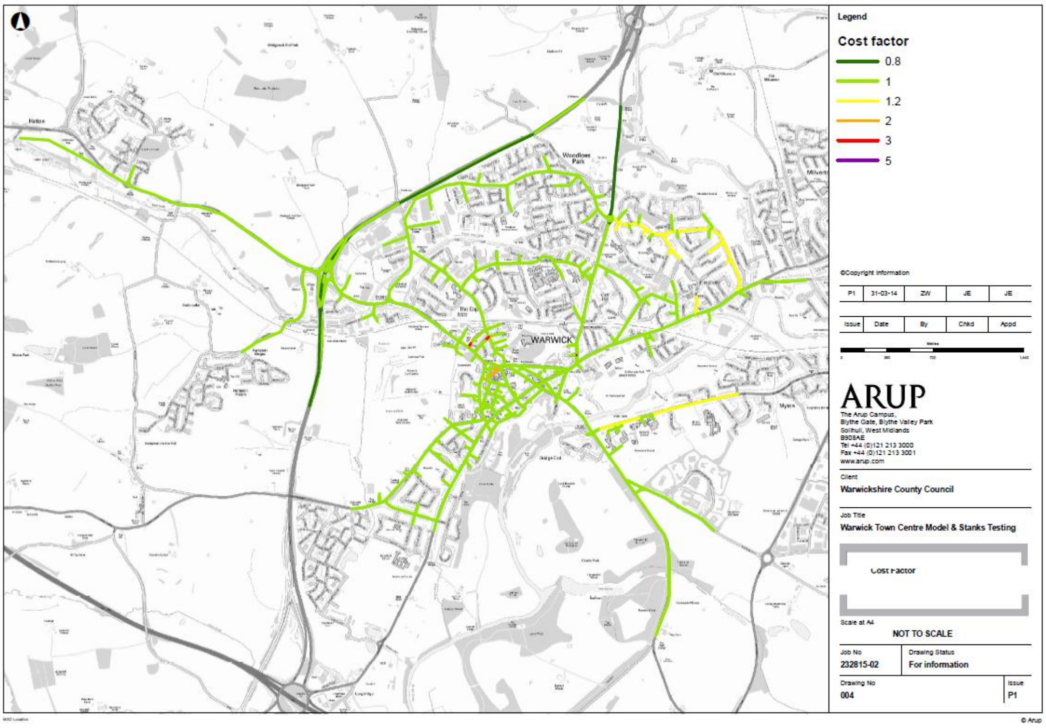
3.4 Cost Factors

Cost factors serve as an additional means of influencing route choice within a model. The Good Practice Guide[1] recommends the use of cost factors as being valid in the following cases:

- To reflect signposting and a level of road hierarchy beyond that afforded by the major/minor link classification;
- To account for site specific factors that may make a route less attractive to drivers, e.g. on-street parking, narrow road, etc.
- As shown in **Figure 9**, the majority of roads have been assigned a cost factor of 1, with some minor routes around Warwick Town Centre having an increased cost factor of 2. This increased rate results in drivers finding these routes half as attractive as those with a cost factor of 1. This is turn means these routes will be less utilised.

[1] Microsimulation Consultancy Good Practice Guide, SiAS Ltd, 2005, Section 7-10

Figure 9 – Cost factors



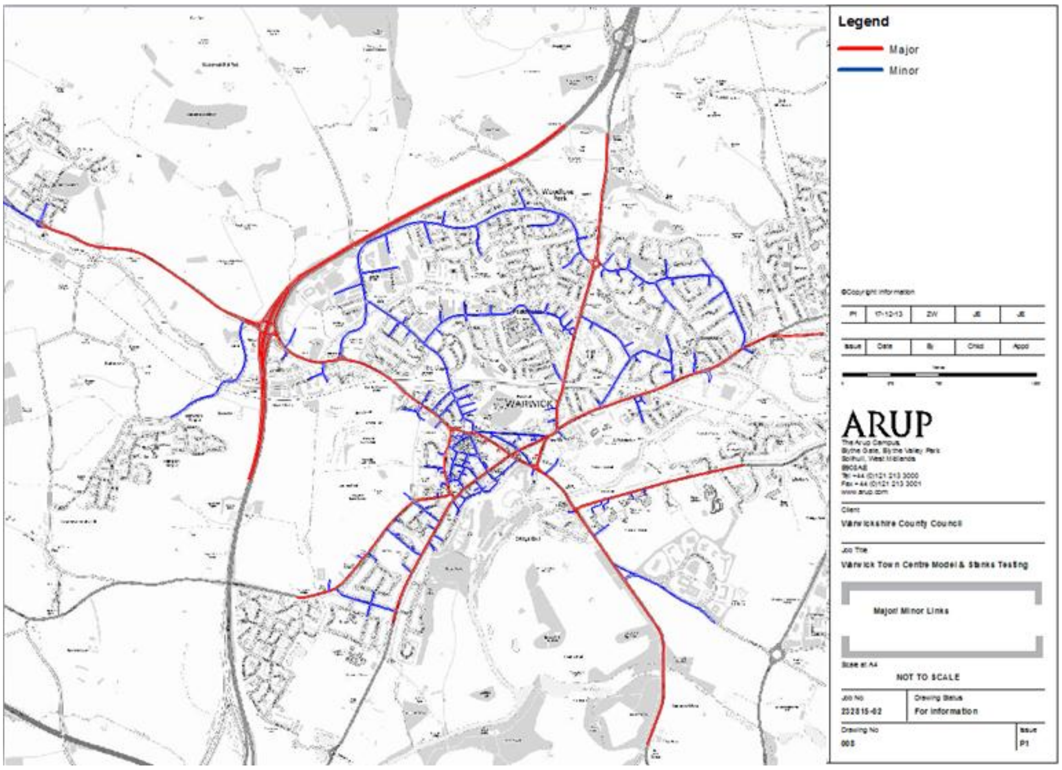
3.5 Road Hierarchy

Major/Minor Links

Road hierarchy is used to alter the cost of travelling on particular links. Whether a link has been classified as major or minor will have a direct impact on the perceived cost of using that link. Major links are assumed to be signposted, so the true cost of travelling along them is known to both familiar and unfamiliar drivers whilst the cost of travelling along minor links is perceived as being twice the true cost for drivers who are unfamiliar.

The classification of major and minor links within the model network was defined primarily by the road classification and is shown in **Figure 10**:

Figure 10 – Minor/ Major links



Urban/Highway Links

Defining a link as urban or highway will also have an impact on vehicle behaviour within the model. On highway links vehicles will demonstrate motorway behaviour, some examples include:

- Using the outside lanes for overtaking
- Merging / diverging rather than getting into lane immediately
- Greater speed differential (I.e. a larger willingness to exceed the speed limit)
- Lane based speed desegregation (I.e. slower speeds in lane 1 and faster speeds on lanes 2, 3 etc)

On urban links vehicles exhibit urban behaviour such as getting into lane immediately on approach to junctions, giving-way at priority junctions, and a lower speed differential.

Prior to the latest release of PARAMICS (version 2011.1) hazard propagation on both highway and urban links was limited, on highway links only a single hazard was observed at a time. This meant that links which contained a high number of junctions were best coded as urban. However, in the latest release this has now been remedied and it is understood that hazard propagation is limited only by the signposting at the node from which the hazard extends back.

Speed Limits

Speed limits have been coded as per the following figure and reflect current site conditions and this has been presented within **Figure 12.**

Figure 11 – Urban/ highway Link Classification

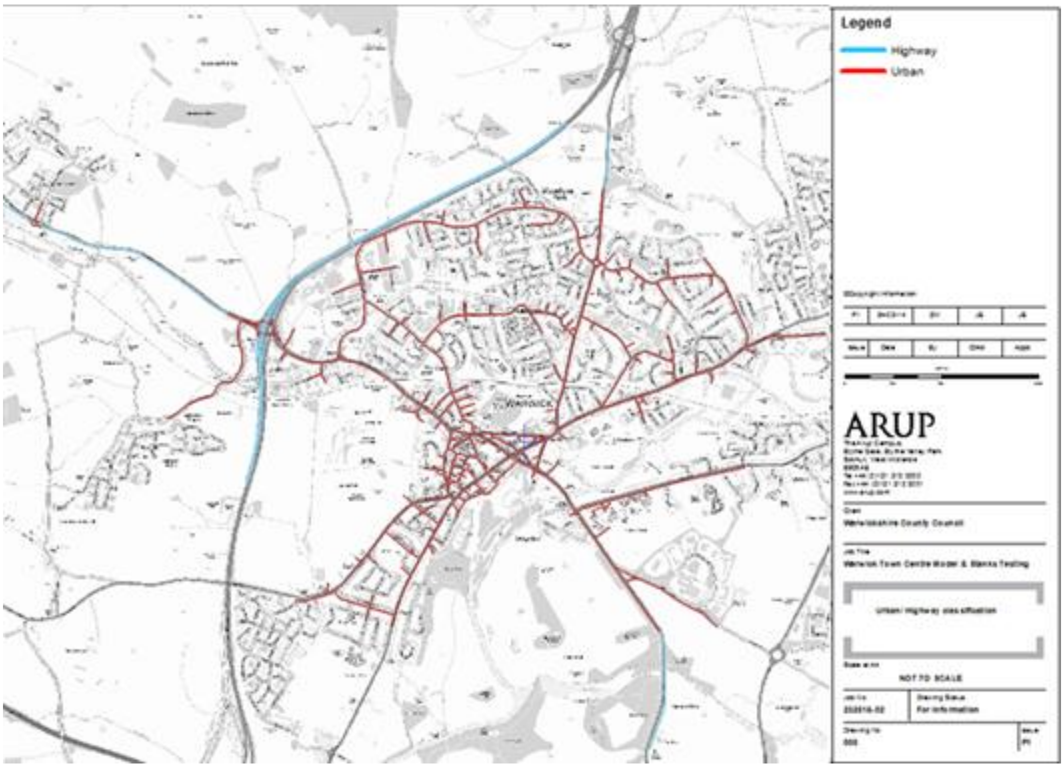
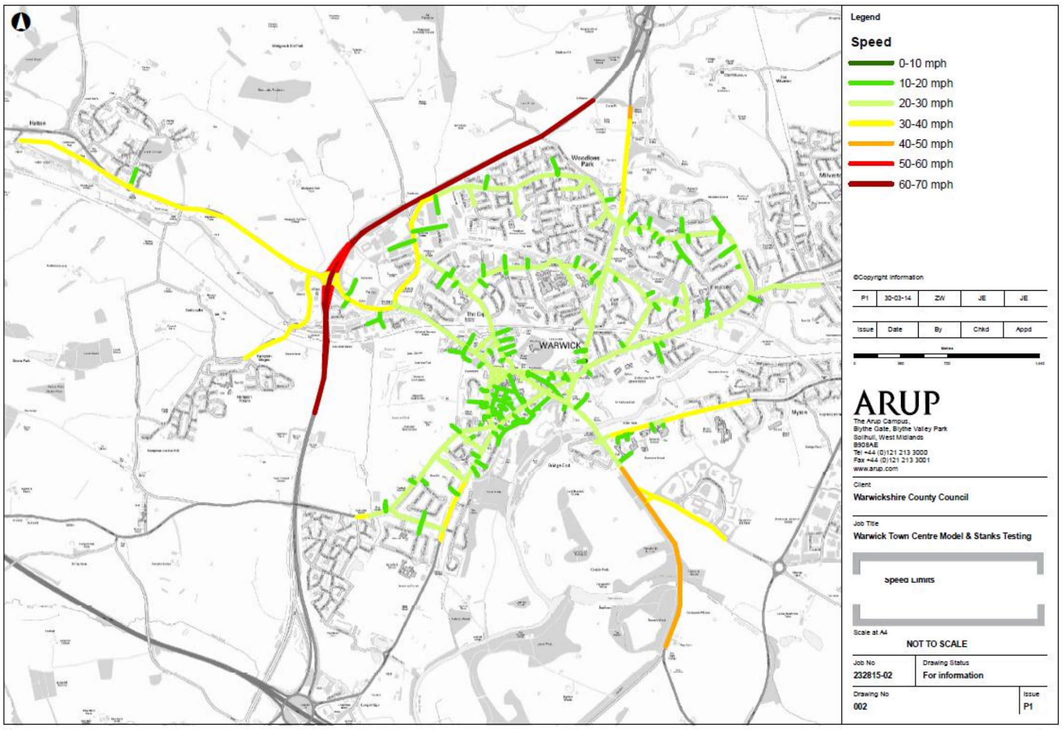


Figure 12 – Network Speed Limits



3.6 Zone Development

The zoning system adopted within this model was developed to be hierarchical and based on the system used to derive the cordon matrices from the Warwick and Leamington Strategic model.

The zone system was initially transposed directly from the WLWA model network. Once the transposition was completed the zones outside the study area were then removed.

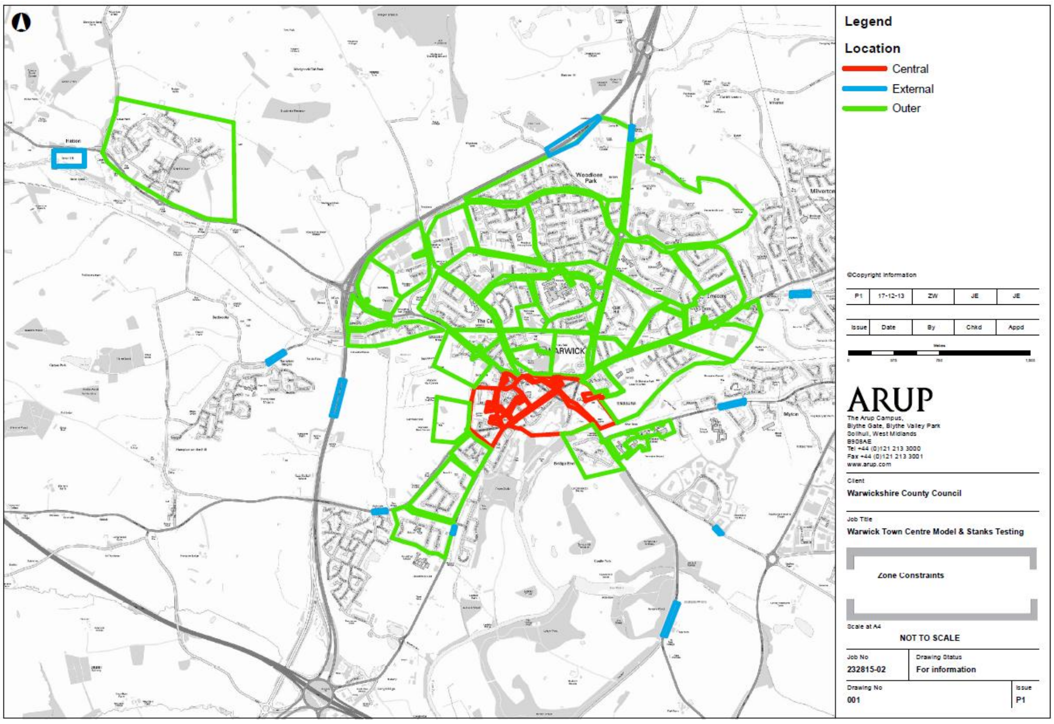
External zones were then included within the model to cover the external loading points created as a result of the cordoning process. In addition some of the zones were simplified to either increase the coverage of the zones or to enable refined and simplified routeing considerations to be adopted within the model network.

The zones were then classified into three broad categories:

- Central – Zones which are considered to be within the town centre boundary
- Outer – zones outside the inner town centre boundary
- External – Zones which represent the external loading points across the model network.

The resultant zone system, and associated classifications, adopted within the model is shown in the **Figure 13**.

Figure 13 – Zone classification



3.7 Traffic Signals

The following junctions are signalised within the model network:

- A4177/ Old Budbrooke Road

- A425/ Vittle Drive/ Ansell Way
- Theatre Street/ Market Place
- A425/ Jury Street
- A429/ Weston Close/ A445
- A445/ Pickard Street
- A445/ Tesco entrance

The signal timings for these junctions were included in the model network that was provided by WCC and these were deemed sufficient for the purposes of model calibration. As well as these, there are also signalised pedestrian crossings within Warwick Town Centre that have been included in the model network based on the same principle.

4 Matrix Development

4.1 Overview

In common with all other traffic model applications an Origin Destination (O-D) matrix of travel demand through the network is required. This matrix is estimated through the PARAMICS Matrix Estimation (ME) module. The PARAMICS ME module requires three key elements for each individual model period in order to assign an O-D matrix. These are:

- A Survey File
- A Routeing File
- A Prior Matrix

The PARAMICS ME combines these elements and produces an estimated matrix for each hourly period under consideration. This is not the final matrix as dynamic assignment and model network calibration parameters are not considered during this stage. The assigned link flows do consider these elements and thus the validation is based on assigned flows rather than matrix estimated flows. The estimated matrix is therefore subject to calibration once it has been assigned to the network.

The survey file is derived from observed count data, recorded from surveys and manipulated through a spread sheet. This then provides a 'target' against which the PARAMICS ME module can attempt to balance the matrix.

Survey files were developed for each specific model period and split by vehicle type. Cars and LGVs were combined into the first survey file whilst OGV1 and OGV2 were combined in the second. Segregating the survey file by vehicle type allows tiered matrices to be estimated using specific count data and routing files for specific vehicle types. In this case a two tier approach was taken to the production of assignment matrices.

- Matrix 1: Controls the estimation of car and lights goods vehicle types
- Matrix 2: Controls the estimation of heavy goods vehicle types.

These initial matrix levels were adopted to control the estimation of the two different vehicle classifications. Post-estimation the matrices were divided into further sub-categories. This process is detailed towards the end of this section.

The routeing file utilised in Matrix estimation was a PARAMICS generated Pija file. The Pija file is generated by assessment of 100 routeing tests, assigned to every O-D pair. This information is used to generate a set of routes through the network. The routing for each individual O-D pair is recorded and assigned within the ME process.

4.2 Generalised Cost Equation (GCE)

The generalised cost equation used during the development of a PARAMICS model has a direct effect on the way vehicles route through the network. As a result the generalised cost equation that is adopted throughout the course of the model development should be defined in advance of Matrix Estimation.

Since the model was cordoned directly from the WLWA PARAMICS model a consistent GCE has been adopted between the model scenarios.

As a result, the GCE applied during the development of the Warwick Town PARAMICS model is as follows:

GCE = 1.00 T + 0.65 D (min/mile) + 0.00 p

Where: T = Time

D = Distance

P = Cost (toll)

4.3 Prior Matrix Development

The primary use of the Matrix Estimation module is to refine and reflect the existing demand conditions reflected in the prior matrix. It is important that the prior matrix reflects a good approximation of traffic distributions and volumes which are representative of the study area.

The primary source of data used to inform the development of a prior matrix was the Origin Destination data collected through the Bluetooth survey, further detail on this survey is provided within the Warwick Bluetooth Survey – Data Analysis Report which is contained within **Appendix E**.

One specific outcome of the distribution analysis was the production of period specific distribution matrix which identified the relative proportions of trips travelling between the various cordons points defined within the study area.

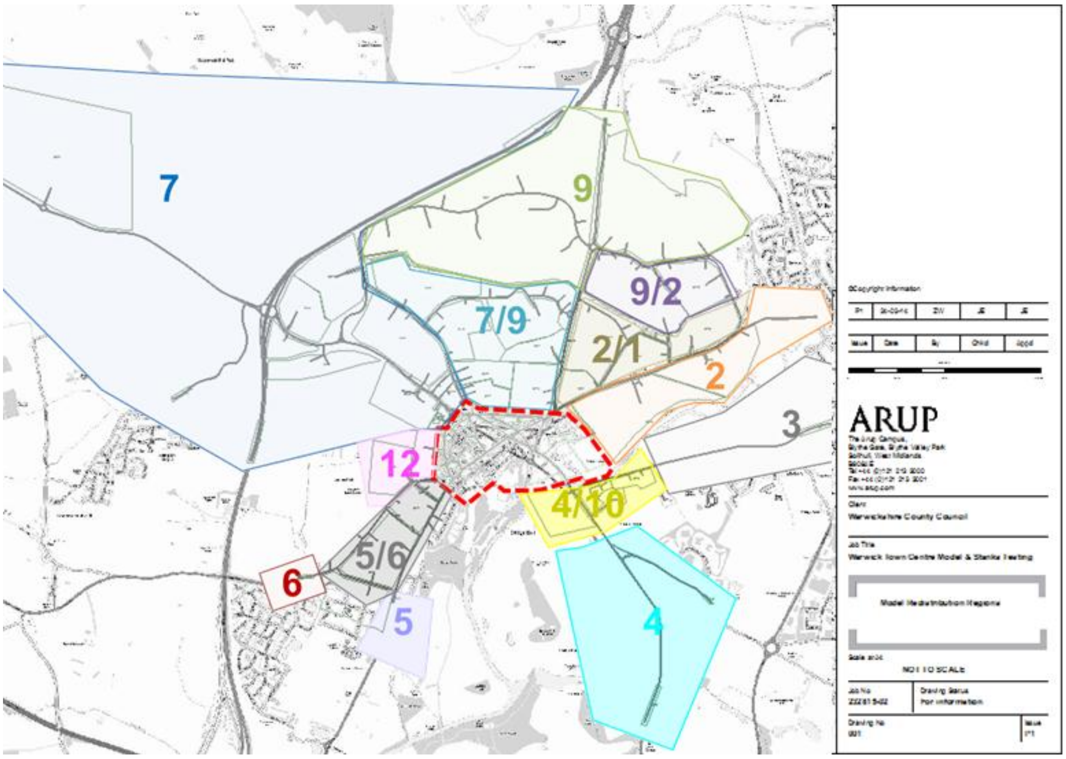
In total 14 separate distributions were identified, one for each of the cordon locations. These were however, aggregated into distribution regions for the purpose of developing the prior matrix. The reason behind the aggregation is that the distributions at each of the cordon locations, when considered in isolation, are not necessarily representative of the likely distribution of trips that may occur when considering each of the model zones on an individual basis.

In order that this process could be simplified, a series of distribution regions where defined which related directly to the model zone structure. To further simplify the process the zones within the Central region were assigned a distribution derived from combining all of the central cordon points and each of the outbound distributions therefrom.

Trips between zones contained within the Central region where removed entirely from the matrix as the likelihood of these trips occurring in the first place is low and, furthermore the magnitude of any trips that do occur would likely be too small to be considered of material concern. Trips were the re-input into the model matrix only on occasions where the survey data indicated that they existed. This was done in order that the number of errors identified during the Matrix Estimation process could be minimised.

The distribution regions defined across the model area have been illustrated within the following **Figure 14**

Figure 14 - Model Distribution Regions



Each of the zones within the model was then assigned a distribution based on its location relative to the regions defined within the previous Figure.

Once a suitable distribution had been assigned to each zone the next step was to assign an appropriate level of trip generation. As a result trip generation levels for each of the zones were defined based on one of three data sources subject to the appropriateness of each for the intended purpose:

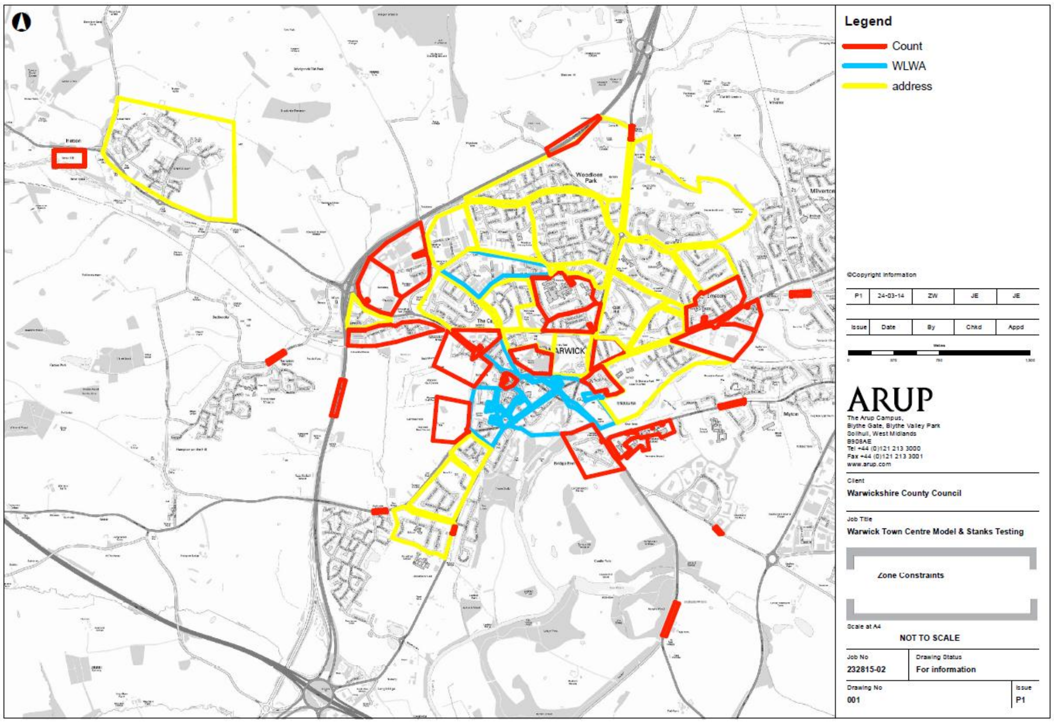
- Proximate survey data
- Address point information, furnessed by established trip rates
- Original WLWA zone totals

The preferred source of trip generation information was count data. Where there was no appropriate count data to adopt the secondary choice was address point data (factored using WCC trip rates), in areas where this was inappropriate, i.e. because the zone represented a mixture of land uses or similar, then the original WLWA model zone totals were used as a guide for the overall trip generation levels.

The source of trip generation and therefore the primary zone constraint, as assigned to each of the individual zones within the model is identified as illustrated within **Figure 15**.

The outcome from this process was an initial prior matrix. The only amendments that followed were in response to the errors in the prior matrix identified during the matrix estimation process. Primarily these occur when a value for a movement could not be estimated which, in turn, is as a result of the O-D information being missing from the prior matrix. When these errors were identified additional values were input into the prior matrix to match the missing movements.

Figure 15 – Zone Constraints



4.4 HGV Prior Matrices

It is good practice to model the assignment of Heavy Goods Vehicles (HGVs) explicitly using a separate level matrix to which only OGV1 and OGV2 vehicle types can be assigned. This matrix can be estimated by creating a survey file relating specifically to the observed HGV movements within the model network.

HGV vehicles within the network also tend to be less familiar with the area than the car and LGV trips and as a result tend to stick to sign-posted routes. To account for this a lower level of familiarity is set and a routing file is generated which uses the HGV familiarity level and subsequently perceived cost factors to populate the routing information.

Just as HGVs are likely to route differently within the model the origin and destination of HGV trips are also likely to be more refined, making application of the Prior matrix derived for the estimation of cars and light goods vehicles as unsuitable for this purpose.

A more representative HGV prior matrix was produced by sectoring the matrix and seeding the sector to sector movements relative to the likelihood of HGV movements being created.

The initial sector to sector movements adopted for this process and the weighted values assigned to these movements are outlined within the following **Table 2**:

Table 2 HGV Seeding

	HGV Value
Central to Central	0
Outer to Central	0
External to Central	1
Central to Outer	0
Outer to Outer	0
External to Outer	20
Central to External	1
Outer to External	20
External to External	1000

The above values include the divisor which was set at 100.

4.5 Constraints

Constraints are a vital part of almost all Matrix Estimation (ME) processes. Potentially the only exception is if ALL the movements into and out of ALL zones have a count on them. Constraints can be used to:

- Prevent known movements / robust data in the prior matrix from reducing
- Prevent ME from increasing unwanted trips (e.g. short trips between adjacent zones)
- Develop a robust ME process (e.g. by developing constraints based on trip type / prior matrix data sources)

A tiered approach to the application of the constraints was applied whereby the type and level of constraint that was applied was informed by the initial value assigned to the O-D movement and also the sector to sector movement being considered. For example small O-D's between adjacent sectors were constrained by absolute values, since percentages would have no impact, whilst large O-Ds making the same movement were constrained by percentages. Similarly movements to and from external zones were able to alter by a larger amount than the movements between the internal sectors.

O-D values were classified as either small medium or large base on the following criteria:

- Small O-D: 15 or less
- Medium O-D: between 15 to 50
- Large O-D: greater than 50

The type of constraint applied was either an absolute change (ABS) or a percentage (%) change subject to the initial O-D value and the movement being considered.

An overview of the constraints that were adopted during the Matrix Estimation process is provided within the following **Table 3**:

Table 3 - ME Constraints

	Small OD		Medium OD		Large OD	
OD Type	Type	value	Type	value	Type	value
Central to Central	ABS	0	ABS	0	ABS	0
Outer to Central	ABS	15	ABS	50	%	40%
External to Central	ABS	30	ABS	75	%	60%
Central to Outer	ABS	15	ABS	50	%	40%
Outer to Outer	ABS	15	ABS	50	%	40%
External to Outer	ABS	45	ABS	100	%	40%
Central to External	ABS	30	ABS	75	%	60%
Outer to External	ABS	45	ABS	100	%	60%
External to External	None		None		None	

4.6 Matrix Segregation

Demand to be assigned within the model was estimated based on 2 matrix levels, matrix level 1 was used to represent light vehicles whilst matrix level 2 was used to represent HGVs.

Matrix Level 1: Cars and Lights

Matrix Level 2: HGV trips

4.7 Base Matrix Estimation

Upon the development of the survey routing and matrix files, the PARAMICS ME module was then used to estimate 2 tier matrices for each individual modelled hour. As mentioned previously, Matrix Estimation does not calculate a demand matrix; it is used to refine the existing prior matrix against observations.

Matrix estimation is an iterative process in which the estimated matrix is assigned to the model for checking. Corrections are made within the prior matrix and the process is rerun. During the actual estimation process itself PARAMICS carries out internal run iterations which calculate and revise the output demand matrix at each step.

In an effort to ensure that the ME module does not output an estimated matrix which is far removed from the original prior matrix the number of iterations undertaken during ME was restricted to 15. The target was set in such a way that 90% of the estimated values which, when compared to the observed, return a GEH value of 6 or less for Matrix level 1 (i.e. cars and lights) and 80% for Matrix level 2 (i.e. HGVs).

This criterion was achieved for all matrices associated with each model period.

4.8 Demand Totals

The trip totals by matrix level, assigned within the model are provided within the following **Table 4**:

Table 4 – Assigned Demand Totals

Level	07 to 08	08 to 09	09 to 10	16 to 17	17 to 18	18 to 19
M1	12229	18515	12499	15526	17587	13111
M2	145	219	254	131	122	100

4.9 Sector to Sector Comparisons

As has been outlined within the previous **Section 4.5** of this report, a number of factors have been used to constrain the movement of trips across the model network. One of these factors has been the sector movement. The difference in these values, pre and post estimation and also how they compare to the predictions that were estimated from the original O-D survey information has been presented within the following **Table 5** and **Table 6** for the AM and PM peak hours respectively:

Table 5 - AM Sector to Sector Comparisons

	O-D Survey	Prior Matrix		Output Matrix	
	%	ABS	%	ABS	%
Central/Central	n/a	26	0.2%	0	0.0%
Central/Outer	12.0%	694	5.8%	634	3.4%
Central/External	12.0%	1285	10.6%	1189	6.4%
Outer/Outer	n/a	1425	11.8%	1939	10.5%
Outer/External	40.0%	5767	47.8%	6749	36.5%
External/External	n/a	9677	23.8%	8003	43.2%

Table 6 - PM Sector to Sector Comparisons

	O-D Survey	Prior Matrix		Output Matrix	
	%	ABS	%	ABS	%
Central/Central	n/a	30	0.2%	0	0.0%
Central/Outer	18.0%	738	4.8%	577	3.3%
Central/External	8.0%	1356	8.7%	1157	6.6%
Outer/Outer	n/a	1252	8.1%	1854	10.5%
Outer/External	48.0%	7605	49.0%	5959	33.9%
External/External	n/a	11344	29.3%	8039	45.7%

With the exception of the intra-external movements, which vary significantly as they haven’t been constrained, the values for each movement before and after ME are comparable which is a useful indicator of the level of change incurred as a result of the ME process.

In addition to the previous comparisons a review of the composition of the matrices, in terms of the sector movements, both before and after ME has also been undertaken. The proportion of each of the movements, less the external movements, that comprise the overall matrix have been compared within both the Prior and the output matrix. This figure, alongside the level of change between each O-D movement between the two matrices, has been presented for the AM and PM time periods within the following **Table 7:**

Table 7 - Sector Changes Pre & Post ME

	AM (08:00 to 09:00)			**PM (17:00 to 18:00)**		
	Prior	Output	Variation	Prior	Output	Variation
Central/Central	0.28%	0.00%	0.28%	0.27%	0.00%	0.27%
Central/Outer	7.55%	6.03%	1.52%	6.72%	6.05%	0.68%
Central/External	13.97%	11.31%	2.65%	12.35%	12.12%	0.23%
Outer/Outer	15.49%	18.45%	2.95%	11.40%	19.42%	8.02%
Outer/External	62.71%	64.21%	1.50%	69.25%	62.42%	6.83%

The previous table reveals that the composition of the matrices before and after ME is not subject to a significant level of change. The AM variation levels are less than 3% for all movements whilst the differences within the PM matrix rise to 8% when considering the movements between zones within the Outer Region. Furthermore, the difference is as a result of a reduction in the total trips making those movements between the prior and output matrix rather than an increase which could be indicative of ‘trip dumping’ during the ME process.

4.10 Vehicle Fleet Mix

Each matrix level can be used to assign different vehicle types as necessary dependent upon the method of matrix production and the purpose of that matrix. Analysis of the mix of vehicles entering the model network was undertaken, at key locations, to ensure that the proportion of vehicles contained within the model network reflect, as closely as possible, those that have been observed.

A summary of the resultant vehicle type proportions assigned within the model is provided within the following Table 8

Table 8 – Hourly Vehicle Type Proportions

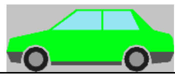
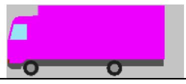
Class	**Type**	**07 to 08**	**08 to 09**	**09 to 10**	**16 to 17**	**17 to 18**	**18 to 19**
LIGHTS	Cars	85%	89%	88%	89%	92%	92%
	LGV	15%	11%	12%	11%	8%	8%
HEAVIES	OGV1	27%	16%	13%	16%	15%	17%
	OGV2	73%	84%	87%	84%	85%	83%

Since the ratio of cars and lights across the entire model period was approximately 9:1 generalised 90% and 10% proportions of cars and lights respectively where considered sufficient for the purposes of allocating vehicle type proportions to matrix level two (SRN traffic)

4.11 Vehicle types

The table below highlights which vehicle types were applied to each matrix level:

Table 9 –Vehicle Types

Matrix	Number	Type	Trip purpose	Familiarity (%)	Perturbation (%)	Colour
1	1	Car	Background	70	5	
1	12	LGV	Background	60	5	
2	14	OGV2	Other	40	5	
2	15	OGV1	Business	40	5	

The resultant mix of fleet assigned within the AM and PM model periods is summarised within the following figures for the AM and PM periods respectively.

Figure 16 - AM Model Period (07:00 to 10:00) Vehicle Fleet Mix

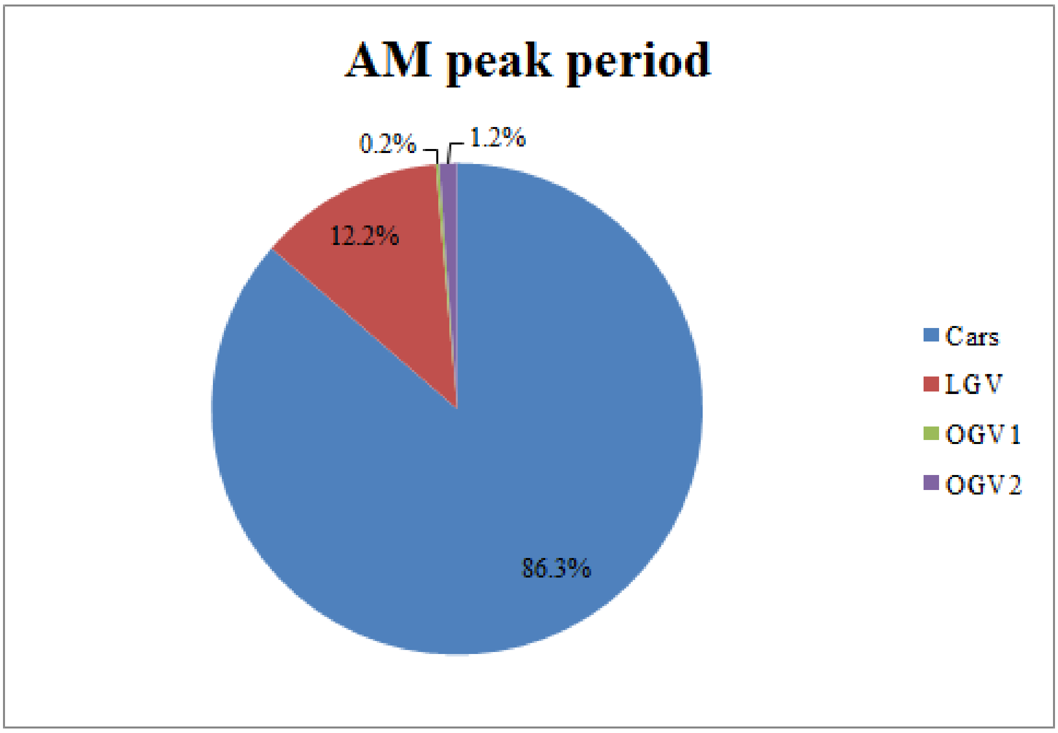
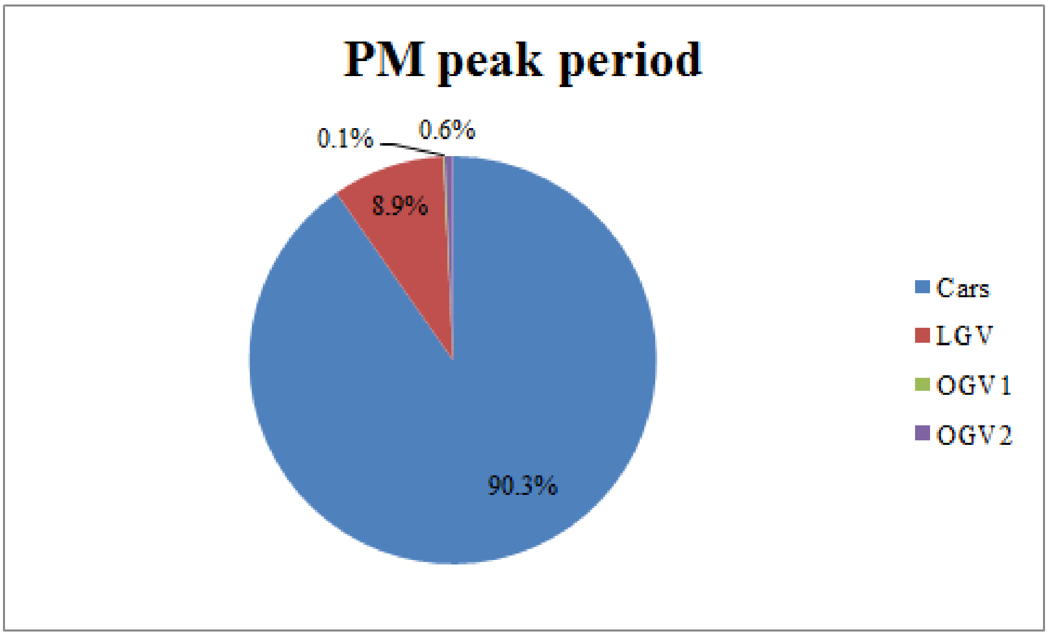


Figure 17 - PM Model Period (16:00 to 19:00) Vehicle Fleet Mix



5 Network Calibration

5.1 General

Model calibration and validation are necessary to achieve accuracy in modelling. Model calibration is defined as the process by which individual components of a simulation are adjusted to ensure model performance provides an accurate representation of the observed traffic data used in model development. Model validation is the process of checking the calibrated model against observed traffic data independent of the model development process. The model calibration and validation has been undertaken in line with the guidance outlined in DMRB Volume 12 and 12a and subsequent Interim Advice note (IAN36/01) as well as the HA Guidelines for the Use of Microsimulation Software (July, 2007).

The base model has been calibrated and validated for the AM (07:00 to 10:00) and PM (16:00 to 19:00) time periods. The geometrical data included in the model has been obtained from site surveys and the use of an Ordnance Survey (OS) data overlay, against which the model network has been coded. Ariel photographs were also used as a reference to ensure the correct layout of junctions as well as to confirm stop line placement.

The initial model network was developed using the existing WCC Europa Way Corridor model as the basis for model development.

5.2 Key Microsimulation Parameters

The key global driver behaviour parameters used in the model calibration are included in Table 10. Default driving parameters are included for all three modelled periods. To avoid modelling bias, the settings for these parameters should remain constant for the existing and proposed models.

Table 10- Key Global Microsimulation Parameters

Parameters	**Value/Selection**
Mean Headway (sec)	1 second (Default)
Minimum Gap (m)	2 metres (Default)
Driver Behaviour (Aggressiveness / Awareness)	Default
Link Categories	Default
Vehicle Speeds	Maximum desired speed set at speed limits in force.
Seeds run per Model	10 with Random Seeds

5.3 Routing and Feedback Parameters

Feedback Interval

Setting a feedback interval that is longer than 2 or 3 minutes duration has the potential to result in too many vehicles switching routes in one go. Delay along a route is given a greater amount of time to increase before vehicles elect to reassign and, furthermore, a number of vehicles have missed the opportunity to reassign by the time the level of delay is at such a magnitude that the wholesale reassignment becomes possible.

The feedback interval was set to 2 minutes because there is a constant need for vehicles to assess the levels of delay along the available routes in order that the right balance of reassignment can be achieved.

Feedback Method

The actual method of feedback calculation was also reviewed. In this case it was decided that the most appropriate method of feedback calculation that should be adopted was the 'Aggression and Awareness Method' (AggrAw).

The AggrAw method of applying feedback uses the sum of each vehicles aggression and awareness values to determine the propensity to reroute. Thus, vehicles with a high level of both will have a greater propensity to switch routes. Vehicles in the middle of the distribution are likely to allow delay to build up to higher levels before reassigning whilst vehicles with low levels of both will only reroute once delay levels have become extremely high. It should be noted that this method of feedback only affects familiar drivers (70% of Lights and 40% Heavies).

The AggrAw method of feedback reduces the effects of the overall reassignment process as it shifts some drivers early enough so that the level of delay that is unacceptable to the 'mid distribution' drivers takes significantly longer to be realised, at this point the drivers that have already switched may have caused sufficient queuing on the alternative route that the switch can become less pronounced.

In addition to the application of the AggAw feedback method some fine tuning of the routing and assignment parameters was undertaken within the model. The refinement was undertaken through iterative amendments to the feedback and scale factors during the calibration process.

Feedback Factor

Links that produce a low cost in an empty network, and hence will be a popular route choice, will produce a higher cost once congestion starts to build up, making alternative routes more attractive. As the congestion reduces, the costs will also reduce, and the route will become attractive once more.

The feedback interval controls the frequency with which this information is updated, and made available to vehicles on the network whilst the Feedback Factor is the controlling coefficient for the smoothing filter associated with the feedback process. As a result a larger feedback factor will result in a greater propensity for vehicles to reroute whilst a lower feedback factor will reduce the propensity for vehicles to reroute, which, in turn, means that larger queues are likely to form before vehicles will elect to reassign away from the chosen route.

The default feedback factor is 0.5 but within this model this has been reduced to **0.4**. The purpose of this change is that it enables larger queues to form on the network.

Scale Factor

The scale factor allows the delay in the network to be altered before vehicles perceive it. A scale value greater than 1.0 will increase the perceived delay, while a scale value less than 1.0 will decrease it. Increasing the perceived delay has the effect of causing the percentage of familiar vehicles re-routeing to increase faster. Decreasing the perceived delay will cause the percentage to increase more slowly.

For the purposes of developing this model the scale factor was reduced from the default value of 1.00 to **0.75**.

These changes were observed to have an impact on the queuing levels within the model network, in so far as the application of these parameters resulted in levels of queuing comparable to those which had been observed on street. During the review process, whereby the overall level of model calibration was checked through the process of comparing modelled and observed flows, the refinements were also noted as having a positive impact on the overall levels of calibration.

5.4 Network Calibration

Calibration parameters have also been applied to specific sections of the network to allow a better representation of the individual junctions, aside from the repositioning of the stop lines, the main Calibration parameters applied within the model, by junction or section, include the headway, visibility and gap acceptance parameters in the form of Path Merge, Path Cross and Lane Cross, respectively.

Headway

Application of a headway factor reduces the gap between vehicles proportionally to the headway factor. This makes vehicles more aggressive in their tendency to ‘bunch’ together in areas where this has been applied, e.g. a headway factor of 0.5 reduces the headway between vehicles to 1m (by 50%) where applied whilst a headway factor of 2 increases the headway between vehicles to 4m (by 100%).

Visibility

Default visibility within PARAMICS is set to 0m any increase on this will increase the distance from which the vehicles will begin to check whether or not their entry into a junction is unopposed. Application of visibility within PARAMICS is a standard mechanism through which the throughput of individual junction entry arms can be increased.

Gap Acceptance

A reduction in gap acceptance from the default of 4 (and 3 for Lane Cross) reduces the gap which vehicles deem acceptable between themselves and oncoming vehicles when entering a junction.

A reduction in gap acceptance from the default of 4 (and 3 for Lane Cross) reduces the gap which vehicles deem acceptable between themselves and oncoming vehicles when entering into a junction. The variables which are controlled by the link modifiers tab are essentially ‘buffer’ values as this time is added to the time it takes a vehicles tail to clear the collision point to give the true cap acceptance value.

The true gap acceptance values are therefore set as a minimum of 6[2] (and 5 for lane cross). Altering these parameters tends to be done on an ad-hoc basis as a means of calibration and in some circumstances it has now become necessary to look at negative gap acceptance parameters which, when applied, appear to use some of the residual time allocated within the gap acceptance parameters rather than just the 4, 4 and 3 that can traditionally be amended.

The need to apply negative gap acceptance parameters to achieve model calibration appears to be increasing in frequency and has done since the PARAMICS version release of 2008 onwards. This calibration technique has been accepted in a number of independent audits including SIAS. It is also likely that driver behaviour is changing and vehicles are becoming more aggressive than they were around 3 decades ago when the first commercial version of PARAMICS was released.

Because of the aforementioned reasons the application of negative gap acceptance is deemed an appropriate response to the need to increase junction throughput to match observed levels.

5.5 Network Calibration

Visibility

The visibility of specific links is shown in **Figure 18**.

Gap acceptance

The gap acceptance of the links within the model are shown in **Figure 19**.

[2] See SiAS PARAMICS Support Knowledgebase Article 194 (www.paramics-support.com) for further information.

Figure 18 – Link Visibility

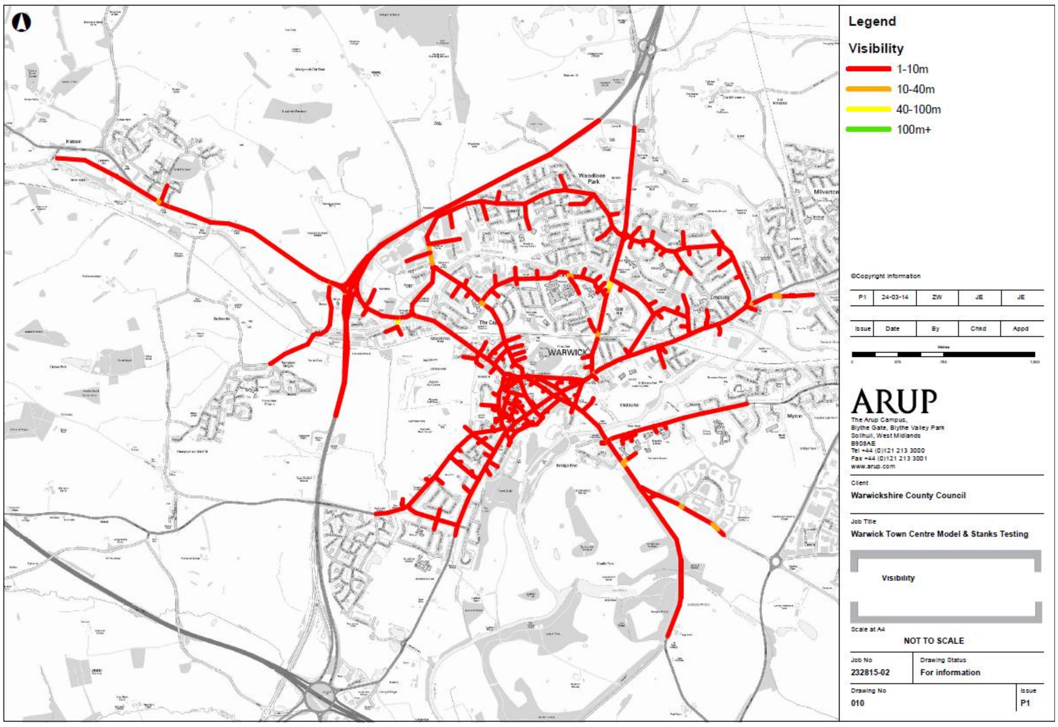
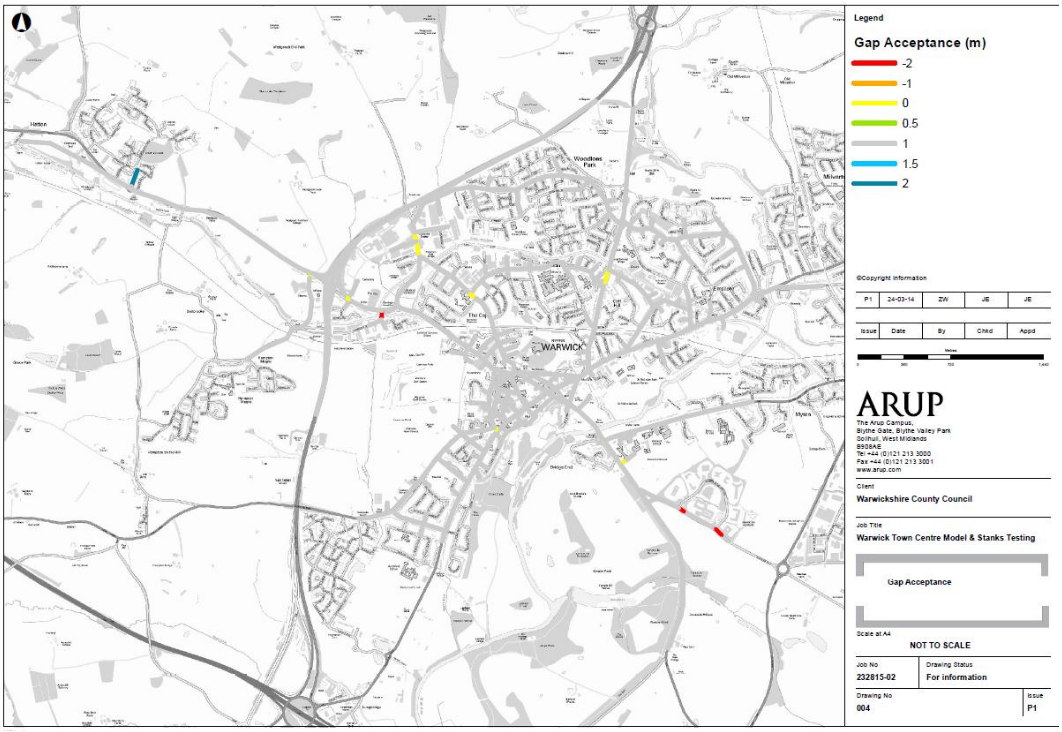


Figure 19 – Link gap acceptance

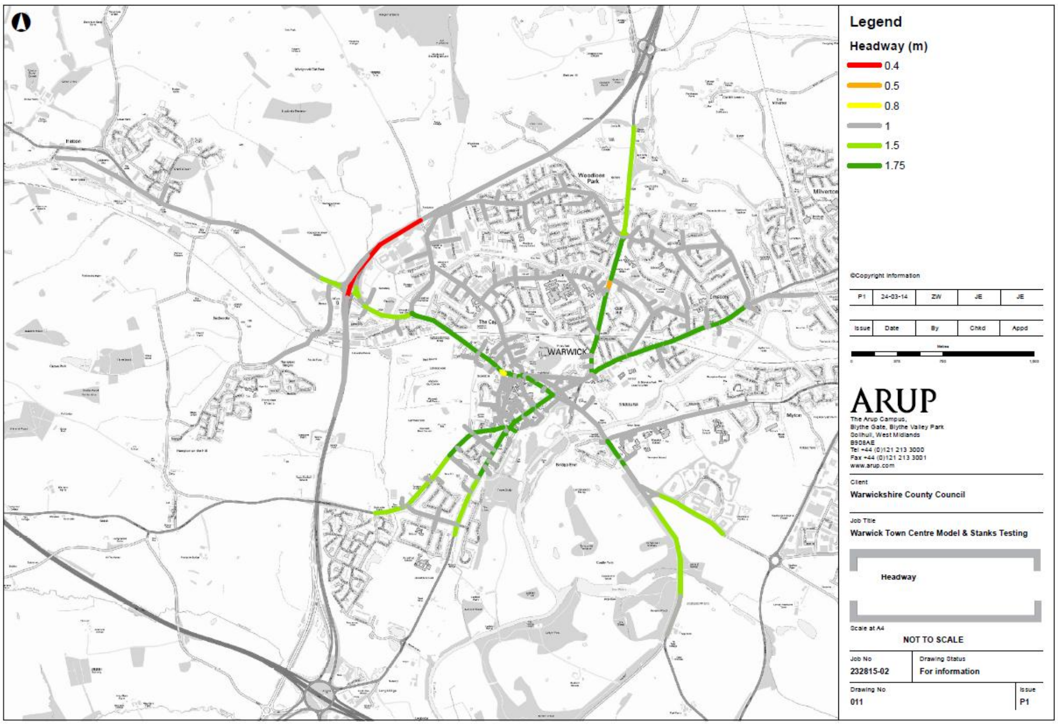


Headway

As mentioned previously, amending the headway factor that has been applied to a link will alter the distance between vehicles from the default value (2m) dependent upon the factor applied.

When undertaking a number of site surveys, for both this model and historically, it has been noted that, in some areas, vehicles appear to accept larger gaps between them and the car in front than in other areas. As shown in **Figure 20**, the headway for the entire model has been amended as follows:

Figure 20 – Link Headway



Cost Factors

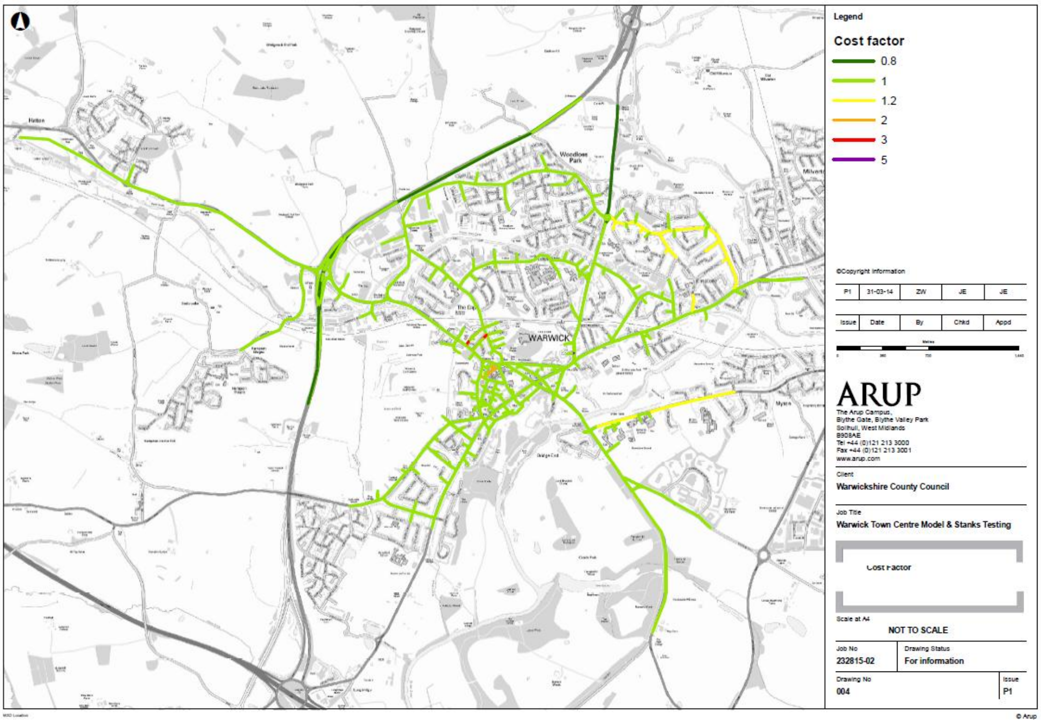
Cost factors are an additional calibration tool which can be adopted to influence the route choice. The Good Practice Guide[3] recommends the use of cost factors as being valid in the following instances:

- To reflect signposting and a level of road hierarchy beyond that afforded by the major minor link definition
- To account for site specific factors that may make a route less attractive to drivers, e.g. on-street parking, narrow roads, etc.

An illustration of the location of relevant cost factors is provided within the following figure:

3 Microsimulation Consultancy Good Practice Guide, SiAS Ltd, 2005 Section 7-10

Figure 21 – Link Cost factors



5.6 Vehicle Release Profiles

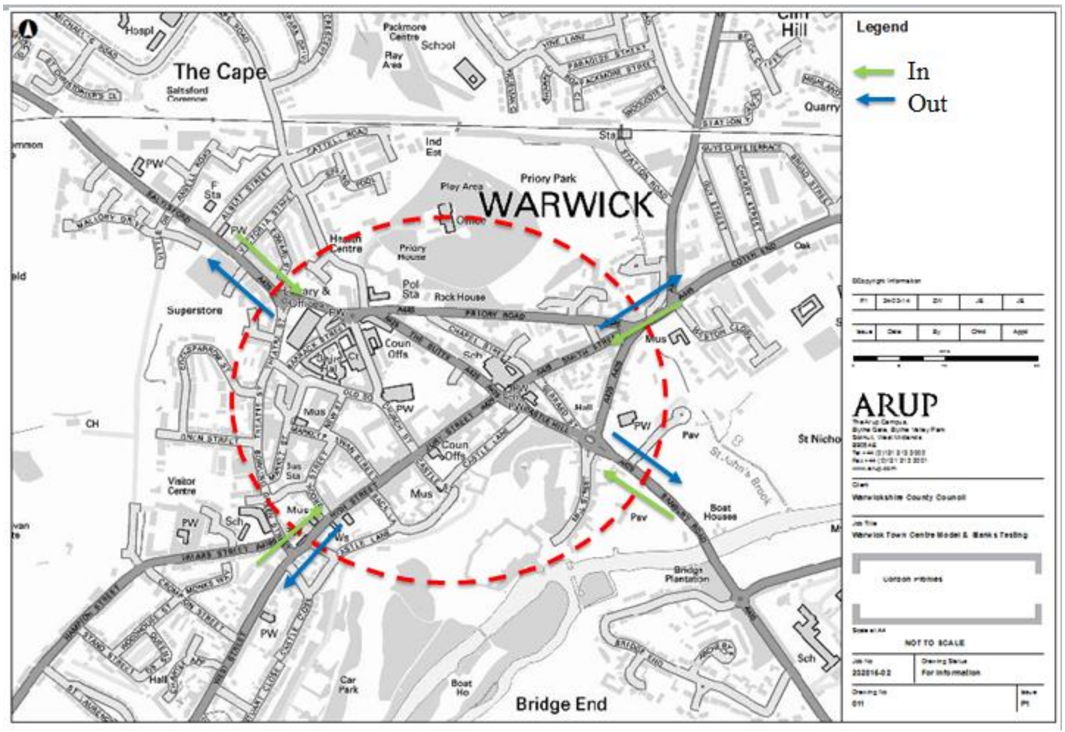
Wherever possible the profiles within the model have been derived directly from proximate count data. This approach is, however reliant upon data sites being in close proximity to the zones and that that data has been disaggregated into, at least, 15 minute intervals.

In certain cases, for the reasons outlined previously, it is not always possible to derive specific profiles for zones. When this situation occurs it is necessary to derive more general profiles to control the release of vehicles into the model network.

For this model two proxy profiles were derived. Both profiles were derived by aggregating the count data across the inner cordon points. The first profile was derived using all of the counts perceived as exiting the inner cordon and entering into the outer region. This profile was termed ‘OUT’. This profile was assigned to the zones inside the central region for which no alternative profile was available.

The second profile was termed ‘IN’ and was calculated by aggregating the count data travelling in the opposite direction. This profile was assigned to all of the zones within the outer region for which no alternative existed. This has been illustrated within the following **Figure 22**.

Figure 22 – Cordon Profiles



6 Flow Calibration

6.1 Count Data

In total 7 link counts and 29 Junction counts were utilised during the model calibration process.

6.2 The GEH Statistic

The observed flows were checked against the modelled flows on the network and the level of convergence between flows has been calculated. The initial assessment measure is the GEH statistic, which is a common comparative measure in this context. The formula of the GEH statistic is as follows:

$$GEH = \sqrt{\frac{(O-E)^2}{0.5(O+E)}}$$

Where

O = Observed flow

E = Modelled assigned flow

The GEH is a measure that includes both the absolute and the relative difference. The convergence is considered acceptable if the GEH statistic is less than 5 in 85% of data (DMRB, Volume 12).

Calibration and validation results are based on an average of ten random seed runs per time period. A full summary of the comparisons of the Modelled and Observed link and turn count data is available in **Appendix A.**

6.3 DMRB Criteria

The model calibration and validation process has been carried out, where possible, in accordance with the criteria specified within DMRB Vol.12 (Traffic Appraisal Manual). These guidelines are summarised in the following table:

Table 11 - DMRB Requirements

Criteria and Measure	**Acceptability**
Assigned Hourly Flows	
Individual flows within 100vph (flows<700vph)	85% of all cases
Individual flows within 15% (flows 700-2700vph)	85% of all cases
Individual flows within 400vph (flows>2700vph)	85% of all cases
GEH statistic: individual flows GEH<5	85% of all cases
Modelled Journey Times	
Times within 15% (or 1 minute, if higher)	85% of all cases

DMRB Vol12

6.4 GEH Calibration

A significant proportion of the count data used for model calibration was collected in the form of turn counts from Manual Classified Counts. As a result the count calibration process adopted was reflective of both links and turn counts within the model.

This results in around 275 data samples being used as opposed to 18 if link counts are used in isolation. Therefore GEH comparisons were made using both observed link counts and observed turn counts.

A summary of the overall level of model calibration achieved is presented within the following Table 12 and Table 13 for the AM and PM respectively:

Table 12- AM Count Comparison - GEH

	07:00 to 08:00		08:00 to 09:00		09:00 to 10:00	
Counts:	273		275		278	
GEH ≤ 5	244		239		256	
%	**89.38%**		**86.91%**		**92.09%**	
GEH ≤						
3	204	74.7%	206	74.9%	223	80.2%
4	233	85.3%	224	81.5%	243	87.4%
5	244	89.4%	239	86.9%	256	92.1%
6	256	93.8%	255	92.7%	271	97.5%
7	263	96.3%	263	95.6%	274	98.6%
8	268	98.2%	266	96.7%	275	98.9%
9	268	98.2%	267	97.1%	276	99.3%
10	271	99.3%	270	98.2%	278	100.0%

Table 13- PM Count Comparison - GEH

	16:00 to 17:00		17:00 to 18:00		18:00 to 19:00	
Counts:	275		276		276	
GEH ≤ 5	258		252		251	
%	**93.82%**		**91.30%**		**90.94%**	
GEH ≤						
3	217	78.9%	223	80.8%	218	79.0%
4	245	89.1%	240	87.0%	235	85.1%
5	258	93.8%	252	91.3%	251	90.9%
6	262	95.3%	259	93.8%	258	93.5%
7	267	97.1%	266	96.4%	266	96.4%
8	271	98.5%	269	97.5%	269	97.5%
9	272	98.9%	272	98.6%	273	98.9%
10	274	99.6%	273	98.9%	274	99.3%

Analysis of the aforementioned tables reveals that the level of calibration that has been achieved within the model is of a sufficiently high standard to enable the model to be declared fit for purpose. As the network conditions within the PM are less prone to congestion effects then it is not surprising that such a high level of calibration is achievable within the PM time period.

Analysis of instances where the GEH is higher than 10 reveals that less than 1% of all comparisons return a GEH of greater than 10.

A full breakdown of the GEH comparisons has been provided within **Appendix A** of this report.

6.5 Link Calibration

As an additional check, the entry flows have been aggregated for all links that comprise the turning count surveys. The result of this is to provide an overall level of calibration in the context of purely link flows, since a large number of small turning counts can potentially bias the results of the previous calibration check. An overview of the outcome of this process is provided within the following **Table 14** and **Table 15** for the AM and PM respectively.

Analysis of these tables reveals that, when considering aggregate link flow levels in isolation, the model demonstrates a high level of calibration across all of the modelled hours.

Table 14- AM Count Comparison - GEH

	07:00 to 08:00		**08:00 to 09:00**		**09:00 to 10:00**	
Counts:	156		156		156	
GEH ≤ 5	141		140		140	
%	**90.38%**		**89.74%**		**89.74%**	
GEH ≤						
3	109	69.87%	117	75.00%	127	81.41%
4	132	84.62%	131	83.97%	137	87.82%
5	141	90.38%	140	89.74%	145	92.95%
6	146	93.59%	147	94.23%	151	96.79%
7	149	95.51%	152	97.44%	152	97.44%
8	151	96.79%	153	98.08%	153	98.08%
9	152	97.44%	153	98.08%	155	99.36%
10	153	98.08%	154	98.72%	155	99.36%

Table 15- PM Count Comparison - GEH

	16:00 to 17:00		17:00 to 18:00		18:00 to 19:00	
Counts:	155		156		155	
GEH ≤ 5	146		152		139	
%	**94.19%**		**97.44%**		**89.68%**	
GEH ≤						
3	122	78.21%	135	86.54%	114	73.08%
4	136	87.18%	145	92.95%	127	81.41%
5	146	93.59%	152	97.44%	139	89.10%
6	150	96.15%	154	98.72%	146	93.59%
7	153	98.08%	155	99.36%	148	94.87%
8	153	98.08%	155	99.36%	152	97.44%
9	154	98.72%	155	99.36%	152	97.44%
10	154	98.72%	155	99.36%	152	97.44%

6.6 Flow Calibration

In order that a comparison of the observed and modelled flows could be undertaken according to DMRB flow calibration criteria, turn counts on each link were aggregated to provide link counts of a sufficiently robust standard to allow the comparisons to be made. Flow calibration checks should not be undertaken using a high number of low observed values as the standard is too easily achievable. It is very rare that a large number of turn counts will exist which are greater than 700 vph and, in reality a very large number will be under 100. This means that a modelled count could be 100% out from the observed and still meet the required flow criteria.

As a result the flow calibration levels were assessed using the same aggregate link data that was presented within the previous **Section 6.5** of this report. The outcome of these comparisons, for both AM and PM model periods, has been presented within the following **Table 16** and **Table 17** respectively.

Table 16 – AM Link Flow Calibration

	07:00 to 08:00	08:00 to 09:00	09:00 to 10:00
Observed <700vph	137	123	141
Modelled within 100vph	130	109	133
% within DMRB	94.89%	88.62%	94.33%
Pass / fail	Pass	Pass	Pass
Observed 700 to 2700vph	19	33	15
Modelled within 15%	18	30	15
% within DMRB	94.74%	90.91%	100.00%
Pass / fail	Pass	Pass	Pass
Total Counts	156	156	156
Total within standard	148	139	148
%	94.87%	89.10%	94.87%
Pass / fail	Pass	Pass	Pass

Table 17 - PM Link Flow Calibration

	16:00 to 17:00	17:00 to 18:00	18:00 to 19:00
Observed <700vph	126	119	133
Modelled within 100vph	121	115	123
% within DMRB	96.03%	96.64%	92.48%
Pass / fail	Pass	Pass	Pass
Observed 700 to 2700vph	29	37	22
Modelled within 15%	27	37	20
% within DMRB	93.10%	100.00%	90.91%
Pass / fail	Pass	Pass	Pass
Total Counts	155	156	155
Total within standard	148	152	143
%	95.48%	97.44%	92.26%
Pass / fail	Pass	Pass	Pass

6.7 Queue Calibration

In addition to the comparisons against flow data, comparisons of the queuing levels within the model have also been undertaken. These comparisons have been undertaken using the queue survey data outlined within the previous **Section 2.3** of this report.

Comparisons of the queuing levels were undertaken using the average maximum queue lengths, in vehicles, which was summarised for every 5 minute interval within the model period.

This meant that for every approach that was surveyed within the model 12 comparisons where made per hour meaning 36 comparisons across the model period.

The modelled versus observed queuing comparisons were undertaken using a ±5 vehicle threshold. This meant that any instance where the modelled queue length was recorded as being within 5 vehicles of the surveyed queue length a=was recorded as an acceptable match.

The outcome of these comparisons, across the AM and PM model periods are presented within the following **Table 18** and **Table 19**

Table 18 - AM Queue Calibration

	Arm	Name	Sample	Within Criteria	Calibration level
4	A	A425 Birmingham Road, East	36	35	97%
	B	Budbroke Road, South	36	30	83%
	C	A425 Birmingham Road, West	36	34	94%
5	A	A425 Birmingham Road, East	36	35	97%
	B	Eastley Crescent, South	36	36	100%
	C	A425 Birmingham Road, West	36	30	83%
14	A	A46 Southbound Offslip, North	36	29	81%
	B	A425 Birmingham Road, East	36	35	97%
	C	A46 Northbound Offslip, South	36	29	81%
	D	A4177 Birmingham Road, West	36	27	75%

Table 19 - PM Queue Calibration

	Arm	Name	Sample	Within Criteria	Calibration level
4	A	A425 Birmingham Road, East	36	36	100%
	B	Budbroke Road, South	36	33	92%
	C	A425 Birmingham Road, West	36	35	97%
5	A	A425 Birmingham Road, East	36	35	97%
	B	Eastley Crescent, South	36	36	100%
	C	A425 Birmingham Road, West	36	36	100%
14	A	A46 Southbound Offslip, North	36	35	97%
	B	A425 Birmingham Road, East	36	31	86%
	C	A46 Northbound Offslip, South	36	32	89%
	D	A4177 Birmingham Road, West	36	35	97%

Although there is no strict guidance regarding calibration of traffic models against queue data, it is reasonable to conclude from the previous tables that queuing levels within the model are representative of those which have been surveyed.

Within the AM, in all but one instance, modelled queuing levels are within 5 vehicles of the observed levels in over 80% of comparisons across every arm. Within the PM period the over 85% of modelled queue lengths, by arm, are within 5 vehicles of observed queuing levels.

6.8 Calibration Summary

Overall it is reasonable to conclude that a high level of flow calibration has been achieved during the model development process with every comparison demonstrating a level of adherence beyond the minimum requirement outlined within DMRB.

7 Model Validation

7.1 Overview

DMRB requires that, once a model has been successfully calibrated, an independent check of the model should be undertaken using data that has not been used to inform any of the model calibration.

In this case a limited number of journey time surveys were made available to inform the model validation checks. The coverage of the journey time routes specifically dealt with the area around the A46/A4177 and the NW to SE route through Warwick town that is facilitated by the A425. As a result additional link counts were retained across the study area for the purpose of validation checks.

These link counts were selected on the basis that turn counts were available along the same corridors to inform the Matrix Estimation process meaning the counts could be retained for validation without compromising the production of the demand matrices for assignment within the model.

7.2 Link Count Validation

The locations used for link count validation have been detailed previously within **Section 2.2** of this report. DMRB Guidance states that an acceptable level of link flow validation has been achieved if 85% or more of the observed versus modelled link count comparisons returns a GEH of 5 or less[4].

Comparisons have been made between observed and modelled link counts across the entire AM and PM model periods. The outcome from these comparisons has been presented within the following **Table 20** and **Table 21** for the AM and PM model periods respectively:

Table 20- AM Link Flow Validation

	07:00 to 08:00		**08:00 to 09:00**		**09:00 to 10:00**	
Counts:	14		14		14	
GEH ≤ 5	11		12		13	
%	**78.57%**		**85.71%**		**92.86%**	
GEH ≤						
3	9	64.29%	8	57.14%	8	57.14%
4	10	71.43%	10	71.43%	9	64.29%
5	11	78.57%	12	85.71%	13	92.86%
6	12	85.71%	14	100.00%	13	92.86%
7	13	92.86%	14	100.00%	14	100.00%
8	14	100.00%	14	100.00%	14	100.00%
9	14	100.00%	14	100.00%	14	100.00%
10	14	100.00%	14	100.00%	14	100.00%

[4] DMRB, Volume 12 Section 2 Part 1 – Table 4.2

Table 21- PM Link Flow Validation

	16:00 to 17:00		17:00 to 18:00		18:00 to 19:00	
Counts:	14		14		14	
GEH ≤ 5	13		14		14	
%	**92.86%**		**100.00%**		**100.00%**	
GEH ≤						
3	10	71.43%	13	92.86%	9	64.29%
4	13	92.86%	13	92.86%	12	85.71%
5	13	92.86%	14	100.00%	14	100.00%
6	13	92.86%	14	100.00%	14	100.00%
7	14	100.00%	14	100.00%	14	100.00%
8	14	100.00%	14	100.00%	14	100.00%
9	14	100.00%	14	100.00%	14	100.00%
10	14	100.00%	14	100.00%	14	100.00%

Analysis of the previous tables reveals that the model demonstrates the necessary level of validation across both AM and PM peak hours. The only hour which does not conform to the required standard is the AM pre-peak hour where three comparisons return GEH higher than 5.

This is not consider a material concern however because the sample size is relatively limited, meaning each comparison represents nearly 8% of the sample. Furthermore, no comparisons return a GEH of 8 or higher which means that even when the required standard has not been met the modelled flows must still be within a reasonable range of the observed flows.

7.3 Journey Time Validation

In addition to the link flow validation, validation of the model against journey times was also undertaken. Two routes were used for the validation and these have been illustrated previously within **Figure 4** of this report.

DMRB states 85% or more of modelled journey times must be within 15% (or 1 minute, if higher) of observed journey times for the model to be considered as validated.

The routes were split by 12 timing points meaning that each direction was split into 11 sections. Comparison where made between the observed and modelled journey times both by each individual section as well as across the entire route.

A full breakdown of the various comparison tables has been presented within **Appendix C** of this Report.

The first method of checking modelled and observed journey times involved the definition of comparable journey time routes within the model area. Each route was defined to reflect the timing points used during the survey.

PARAMICS collected the time it takes for every vehicle to traverse the entire length of the path within the model period. This information is collated and then the average journey time calculated for all vehicles, across each model hour.

This exercise was undertaken for each section of the routes surveyed. Analysis of the outcome of the section by section comparison is presented within the following **Table 22**:

Table 22- Sectional Journey Time Validation

	07:00 to 08:00	08:00 to 09:00	09:00 to 10:00	16:00 to 17:00	17:00 to 18:00	18:00 to 19:00
Count	22	22	22	22	22	22
PASS	**100.00%**	**95.45%**	**95.45%**	**100.00%**	**95.45%**	**100.00%**
FAIL	0.00%	4.55%	4.55%	0.00%	4.55%	0.00%

The previous table demonstrates that, when comparing modelled and observed journey times, each of the individual journey time sections conforms to the required standard.

Since each of these individual sections are relatively short in length, it is reasonable to expect the majority of the sample to meet the required standard. As a result, comparisons have been made between the observed and modelled journey times across the entire route.

The outcome of these comparisons is presented, for the AM and PM periods within the following **Table 23** and **Table 24** respectively.

Table 23- AM Route Journey Time Validation

	07:00 to 08:00			08:00 to 09:00			09:00 to 10:00		
Dir.	OBS	MOD	Status	OBS	MOD	Status	OBS	MOD	Status
EB	08:06	07:13	PASS	18:22	15:29	FAIL	08:39	08:33	PASS
WB	07:03	05:34	FAIL	07:57	06:15	FAIL	07:00	05:40	FAIL

Table 24- PM Route Journey Time Validation

	16:00 to 17:00			17:00 to 18:00			18:00 to 19:00		
Dir.	OBS	MOD	Status	OBS	MOD	Status	OBS	MOD	Status
EB	08:38	07:44	PASS	10:28	09:14	PASS	07:00	07:17	PASS
WB	09:16	07:58	PASS	10:06	08:12	FAIL	07:05	06:06	PASS

The previous Tables indicate that the model performs poorly when considering the journey times across the entire route.

In order that the reason for the discrepancies between modelled and observed journey times could be better understood a review of the observed data was undertaken which revealed the following:

- The modelled data was being compared against a relatively limited sample size, within both AM and PM model periods a maximum of 40 runs had been achieved, instantly this is halved on account of the two directions. Furthermore, the network congestion within the peaks limits the sample size within the peak hours, these are the most important hours and they are also the hours demonstrated to suffer from the greatest modelled and observed divergence levels. During the AM peak hour as few as 4 journey times commenced within the assessment period.

- The limited peak hour sample size was also adversely effected by the delays experienced within a single section of the route, specifically on the A452 between the Birmingham Road/Wedgenock Road and Ansell Way.

When considering these issues with the observed data the following, additional, comparisons where undertaken:

  - A comparison of the modelled and observed journey times with the Wedgenock Lane to Ansell Way section having been removed from the analysis.
  - A comparison has been undertaken using specifically defined journey time analysis vehicles within the model. This form of analysis consist of releasing vehicles into the model network at times which precisely match the departure times recorded within the observed surveys.

The outcome of both of these approaches has been presented as follows:

Revised Sectional Analysis

The first approach to reviewing the data involved checking how well the modelled journey times compared to the observed with the section between Wedgenock Lane and Theatre Street removed from the analysis.

In effect this approach split the route into two sections which in turn created four comparisons, one per section/direction. Section 1 was defined between Charingworth Drive and Wedgenock Lane whilst Section 2 was defined from Ansell Way to Myton Road. The outcome of these comparisons has been presented within the following **Table 25** and **Table 26** for the AM and PM respectively:

Table 25- AM Revised Route Journey Time Validation

	07:00 to 08:00			08:00 to 09:00			09:00 to 10:00		
Route	OBS	MOD	Status	OBS	MOD	Status	OBS	MOD	Status
Route 2 EB 1	02:59	02:45	PASS	05:14	05:09	PASS	03:12	02:31	PASS
Route 2 WB 1	03:03	02:20	PASS	03:11	02:25	PASS	02:55	02:21	PASS
Route 2 EB 2	03:55	03:24	PASS	08:30	08:23	PASS	03:56	04:53	PASS
Route 2 WB 2	03:59	03:14	PASS	04:46	03:50	PASS	04:05	03:19	PASS

Table 26- PM Revised Route Journey Time Validation

	16:00 to 17:00			17:00 to 18:00			18:00 to 19:00		
Route	OBS	MOD	Status	OBS	MOD	Status	OBS	MOD	Status
Route 2 EB 1	02:52	02:28	PASS	03:15	02:34	PASS	02:52	02:28	PASS
Route 2 WB 1	03:17	02:32	PASS	03:38	02:38	PASS	03:00	02:27	PASS
Route 2 EB 2	05:46	05:16	PASS	07:13	06:40	PASS	04:08	04:48	PASS
Route 2 WB 2	05:58	05:26	PASS	06:28	05:33	PASS	04:05	03:39	PASS

The previous tables demonstrate that when the section is removed from the analysis, the remaining elements of the route conform to the required standards.

This indicates that this section of the route has a disproportionate impact on the overall comparisons. This is because at certain periods the route is heavily congested an subject to large levels of delay whilst for the remainder of the period vehicles are able to move more freely across the route. When the average journey time of all vehicles travelling this section of the route is considered within the model this is inevitably going to result in faster journey times than has been recorded since 25 to 50% of the recorded observations where collected during periods of high congestion.

As a result of this, it was also considered appropriate to undertake a direct check of modelled versus observed journey times based on the departure time of the route surveys. To undertake these comparisons vehicles were assigned to fixed routes within the model. These routes were defined to precisely match the surveyed routes and the vehicles were released into the model network at exactly the same time as the surveys commencement. This provided an exact replication of the survey parameters within the model network.

The results of this comparison are presented within the following **Table 27**:

Table 27- Vehicle Route Journey Time Validation

Period	OBS	MOD	Diff	Status
07:00 to 08:00	07:19	08:06	00:47	PASS
	06:19	07:03	00:43	PASS
08:00 to 09:00	16:31	18:22	01:51	PASS
	07:21	07:57	00:36	PASS
09:00 to 10:00	08:46	08:39	00:06	PASS
	06:41	07:00	00:19	PASS
16:00 to 17:00	08:10	08:38	00:28	PASS
	08:50	09:16	00:26	PASS
17:00 to 18:00	09:50	09:05	00:45	PASS
	09:03	10:06	01:02	PASS
18:00 to 19:00	07:43	09:14	01:31	FAIL
	07:01	07:05	00:04	PASS

Analysis of the previous table reveals that the modelled journey times conform to the standards outlined in DMRB in all but one case. Of greatest significance are the results obtained from the AM and PM peak hours which demonstrate, when the survey parameters are reflected precisely within the modelling, a sufficient level of overall model validation.

7.4 Validation Summary

On an hour by hour basis the previous sectional analysis indicates that the journey times within all model hours are comparable to observed in almost all occasions.

When considering the analysis of the entire routes delay within one section, coupled with a limited sample size, was observed to adversely bias the comparisons.

Removal of this section from the analysis revealed that the remaining sections of the route were observed to conform to the required DMRB standard.

Furthermore, vehicle routes were defined within the model area which precisely matched the survey routes. Vehicles were then released into the model at matching times to the first timing point of the surveys. When comparing the modelled and observed journey times in this manner, both directions of the route, within the AM and PM peak hours, are demonstrated to conform to the standards outlined with DRMB.

Based on the outcome of both the link and journey time comparisons it is reasonable to conclude that the model demonstrates an appropriate level of validation.

8 Model Forecasting

8.1 Introduction

WCC requested that a model be produced that can be used to test the implication of schemes and developments under future year 2016 and 2021 conditions.

8.2 Objectives

The objective of this exercise is to produce future year Warwick Town PARAMICS models, in line with current guidelines, which can be deemed fit for purpose as a means of assessing the impact of any localised growth strategy and associated mitigation packages.

It is intended that the final models will serve as a sound basis upon which the impacts of local development proposals and transport interventions can be assessed.

8.3 Scope

The process by which these models have been produced is based on the methodology outlined in the 'Warwickshire County Council draft modelling protocol'.

Traditionally the forecasting process would require the allocation of committed developments within the study area and then demands would be adjusted, through interrogation of the TEMPRO database, to ensure that the necessary levels of growth are assigned within the model.

At this stage, however, there are no major committed developments anticipated within the study area. Furthermore, the Local Plan sites are currently out for consultation. Given the relative uncertainty associated with the Local Plan it was decided, in the short term, that the demands would be forecast through direct interpretation of the TEMPRO database.

It is envisaged that once the Local Plan sites have been allocated O-D information for both Local Plan demands and Committed Developments should be cordoned out of the WLWA model and re-assigned within the town centre model to ensure the forecasting process is both robust and reflective of known assumptions.

8.4 Background Forecasts

The forecasting was informed through the following steps:

- Light vehicle growth associated with O-Ds within the model not directly between external zones was derived directly from the TEMPRO database.
- TEMPRO factors were adjusted by NTMAF09 to provide the forecast growth levels for external trips.
- The 2011 to 2022 NTEM 'all roads' West Midlands were used to inform the growth of HGV trips on the model network.

8.5 Matrix Levels

Traditionally the forecast growth levels have been stored within a separate matrix level. However, because this forecast model represents and interim model which will be updated once the certainty around the Local Plan allocations has increased, it was decided that growth would be applied directly to the existing matrix levels.

8.6 TEMPRO/NTEM Factors

The NTEM table used to derive the factors for HGV growth is provided within **Appendix D** of this report. In line with current guidance, the TEMPRO dataset applied was 6.2, these factors were not adjusted by income and fuel as it is intended that adjusted factors will serve as the cap on growth within the model and a cap is not likely to be required until forecast growth associated with the Local Plan allocations is included within the model.

Thus, to ensure that any forecasting is not overly robust, TEMPRO factors to inform internal growth within the model have not been adjusted at this stage.

A summary of the 2013 to 2016 and 2021 factors used to inform the forecasting is provided within the following tables:

Table 28- 2013 to 2016 Growth Factors

Level	**Name**	**AM**		**PM**	
		Origin	*Destination*	*Origin*	*Destination*
County	Warwickshire	1.0169	1.0283	1.0275	1.0204
44UF0	rural (Warwick)	1.0223	1.0274	1.0269	1.0235
44UF3	Warwick	1.0232	1.0271	1.0267	1.0239
NTEM	All Roads Factor	1.024			

Application of these factors results in demand being predicted for the 2022 test year based on TEMPRO/NTEM growth predictions. NTEM factors govern the growth of HGV trips whilst TEMPRO informs the growth of cars and LGV trips.

8.7 2013 Demand Levels

The total volume of demand assigned to the model across each matrix level, for each individual model hour, is summarised in the following table:

Table 29 – Assigned Demand Totals

Level	**07 to 08**	**08 to 09**	**09 to 10**	**16 to 17**	**17 to 18**	**18 to 19**
M1	12229	18515	12499	15526	17587	13111
M2	145	219	254	131	122	100
Total	**12374**	**18734**	**12753**	**15657**	**17709**	**13210**

8.8 2016 Demand Levels

The total volume of demand assigned to the model across each matrix level, for each individual model hour, is summarised in the following table:

Level	**07 to 08**	**08 to 09**	**09 to 10**	**16 to 17**	**17 to 18**	**18 to 19**
M1	12457	18869	12738	15846	17949	13377
M2	149	224	260	134	125	102
Total	**12606**	**19093**	**12998**	**15980**	**18074**	**13479**
Growth from 2013	*1.87%*	*1.92%*	*1.92%*	*2.07%*	*2.06%*	*2.03%*

8.9 2021 Demands Levels

The total volume of demand assigned to the model across each matrix level, for each individual model hour, is summarised in the following table:

Level	**07 to 08**	**08 to 09**	**09 to 10**	**16 to 17**	**17 to 18**	**18 to 19**
M1	12683	19213	12970	16167	18311	13642
M2	159	241	279	144	134	110
Total	**12842**	**19454**	**13248**	**16311**	**18445**	**13752**
Growth from 2013	*3.78%*	*3.84%*	*3.89%*	*4.17%*	*4.16%*	*4.10%*

9 Summary and Conclusions

9.1 Summary

Arup were commissioned by Warwickshire County Council to build a PARAMICS model of Warwick town centre.

There are a number of reasons behind the development of this area specific model including:

- To enable detailed testing of scheme proposals within the area of the A46/A4177 junction to be undertaken.
- To enable options for proposals pertaining to the simplification of traffic movements across the town centre to be undertaken through a separate, subsequent, study.
- To enable detailed testing of the implications of the Local Plan allocations to be undertaken within a more refined and detailed study model.

It is also intended that the model will also be made available for development control testing should it be required.

The model has been developed to be inclusive of both AM (07:00 to 10:00) and PM (16:00 to 19:00) time periods. In line with WCC requirements these have been modelled using discrete hourly periods within the PARAMICS model. This has resulted in the following periodic configuration:

- **Period 1:** 07:00 to 08:00
- **Period 2:** 08:00 to 09:00
- **Period 3:** 09:00 to 10:00
- **Period 4:** spare
- **Period 5:** 16:00 to 17:00
- **Period 6:** 17:00 to 18:00
- **Period 7:** 18:00 to 19:00

The model has been calibrated in line with current traffic modelling guidelines and GEH comparisons have been undertaken using all available observed data. A summary of the outcome of these comparisons is provided within the following table:

Table 30 - Model Calibration Summary

	07:00 to 08:00	08:00 to 09:00	09:00 to 10:00	16:00 to 17:00	17:00 to 18:00	18:00 to 19:00
Counts:	273	275	278	275	276	276
GEH ≤ 5	244	239	256	258	252	251
%	**89.38%**	**86.91%**	**92.09%**	**93.82%**	**91.30%**	**90.94%**

A summary of the overall level of model validation achieved has been summarised as follows:

- Link count validation comparisons indicate that over 85% of locations achieve the required standard across both AM and PM peak hours.
- Sector analysis of the journey time data reveals that when modelled and observed journey times are compared by sector almost all of the modelled journey times are within the necessary range.
- Analysis of the entire route using journey paths was revealed to be inappropriate due to a limited sample size along one particular section which incurred a high level of delay as a result the following steps where undertaken:
  - A comparison of the modelled and observed journey times with the Wedgeknock Lane to Ansell Way section having been removed from the analysis.
  - A comparison has been undertaken using specifically defined journey time analysis vehicles within the model. This form of analysis consist of releasing vehicles into the model network at times which precisely match the departure times recorded within the observed surveys.
- The supplementary journey time analysis demonstrated that, when the section is removed from the analysis, the remaining elements of the route conform to the required standards.
- Similary the journey times produced from vehicles assigned to fixed routes within the model defined to precisely match the surveyed routes and released into the model network at exactly the same time as the surveys commencement. This demonstrated that, when the survey parameters are reflected precisely within the modelling, a sufficient level of overall model validation has been achieved.

9.2 Conclusion

The model has been calibrated and validated for the entire AM (6:00 to 10:00) and PM (16:00 to 19:00) time period.

A high degree of calibration has been achieved for all hours and, in particular, the ability to demonstrate that the AM and PM peak hour calibration levels exceed those required by DMRB, provides the necessary evidence to conclude that this model provides a realistic and accurate representation of traffic operations within the study area.

The model has been forecast in line with the methodology outlined within WCC’s Modelling Protocol for development and through interrogation of the TEMPRO database to provide a reasonable and robust basis upon which the assessment of future year interventions can be undertaken.

Appendix A

Link Flow Calibration Tables

ALL MOVEMENT CALIBRATION TABLES

				07:00:00			08:00:00			09:00:00			16:00:00			17:00:00			18:00:00		
Count Ref	Site	Road	Mvt	OBS	MOD	GEH	OBS	MOD	GEH	OBS	MOD	GEH	OBS	MOD	GEH	OBS	MOD	GEH	OBS	MOD	GEH
A429 Stratford Road	Link	Stratford Road	SB	347	278	3.9	698	525	7.0	427	418	0.5	340	364	1.3	455	462	0.3	334	369	1.9
A429 Stratford Road	Link	Stratford Road	NB	343	369	1.4	364	384	1.0	281	303	1.3	520	445	3.4	604	515	3.8	271	268	0.2
A429 West Street	Link	West Street	NB	335	324	0.6	499	472	1.2	424	381	2.1	387	393	0.3	449	498	2.3	376	357	1.0
A429 West Street	Link	West Street	SB	235	226	0.6	305	404	5.2	306	337	1.8	506	410	4.5	553	505	2.1	404	390	0.7
Cape Road Millers Road	Turn	A - Cape Rd South	B	194	111	6.7	249	152	6.9	134	79	5.3	105	129	2.2	141	150	0.7	79	100	2.2
Cape Road Millers Road	Turn	A - Cape Rd South	C	155	37	12.0	267	111	11.4	163	93	6.1	132	161	2.4	146	182	2.8	132	94	3.6
Cape Road Millers Road	Turn	B - Millers Rd	C	96	115	1.9	219	221	0.1	187	185	0.1	176	269	6.2	204	290	5.5	116	186	5.7
Cape Road Millers Road	Turn	B - Millers Rd	A	75	80	0.6	111	134	2.0	106	121	1.4	177	112	5.4	226	136	6.7	108	137	2.6
Cape Road Millers Road	Turn	C - Cape Rd North	A	69	63	0.8	79	238	12.6	102	130	2.6	219	132	6.6	254	172	5.7	121	108	1.2
Cape Road Millers Road	Turn	C - Cape Rd North	B	102	166	5.5	169	288	7.9	97	119	2.1	119	125	0.5	117	124	0.7	78	100	2.4
Coventry Road St Johns Coton End	Turn	A - Coventry Road	B	23	80	7.9	24	116	11.0	62	93	3.6	90	101	1.1	81	106	2.5	80	118	3.8
Coventry Road St Johns Coton End	Turn	A - Coventry Road	C	4	3	0.7	3	3	0.2	6	5	0.5	10	12	0.6	5	6	0.4	10	12	0.5
Coventry Road St Johns Coton End	Turn	A - Coventry Road	D	527	486	1.8	348	391	2.2	390	382	0.4	294	343	2.7	328	369	2.2	336	350	0.8
Coventry Road St Johns Coton End	Turn	B - Coton End	C	2	2	0.2	8	9	0.4	10	9	0.2	7	6	0.5	14	12	0.5	10	9	0.2
Coventry Road St Johns Coton End	Turn	B - Coton End	D	283	233	3.1	283	339	3.2	358	340	1.0	371	297	4.0	414	330	4.3	389	351	2.0
Coventry Road St Johns Coton End	Turn	B - Coton End	A	88	108	2.0	84	132	4.7	119	107	1.1	91	133	4.0	79	115	3.6	80	116	3.7
Coventry Road St Johns Coton End	Turn	C - Weston Close	D	6	5	0.6	7	7	0.2	20	20	0.0	9	9	0.1	12	12	0.0	14	12	0.6
Coventry Road St Johns Coton End	Turn	C - Weston Close	A	6	7	0.5	8	9	0.4	8	10	0.6	9	8	0.3	11	10	0.2	7	6	0.4
Coventry Road St Johns Coton End	Turn	C - Weston Close	B	4	2	1.2	5	4	0.4	6	7	0.4	3	4	0.4	7	7	0.2	10	8	0.8
Coventry Road St Johns Coton End	Turn	D - St Johns	A	323	322	0.1	323	381	3.1	281	346	3.7	446	453	0.3	510	511	0.0	412	445	1.6
Coventry Road St Johns Coton End	Turn	D - St Johns	B	200	196	0.3	277	252	1.5	334	393	3.1	441	363	3.9	461	438	1.1	438	410	1.4
Coventry Road St Johns Coton End	Turn	D - St Johns	C	3	2	0.6	11	11	0.1	16	13	0.7	7	9	0.5	14	14	0.1	12	12	0.1
Emscote Road All Saints Road	Turn	A - All Saints Road	B	46	51	0.7	143	155	1.0	81	92	1.2	84	93	1.0	105	100	0.5	64	64	0.0
Emscote Road All Saints Road	Turn	A - All Saints Road	C	11	17	1.5	10	13	0.8	24	25	0.1	6	6	0.1	13	11	0.5	11	13	0.5
Emscote Road All Saints Road	Turn	B - Emscote Road East	C	382	404	1.1	592	587	0.2	541	562	0.9	618	576	1.7	675	623	2.0	578	524	2.3
Emscote Road All Saints Road	Turn	B - Emscote Road East	A	13	14	0.2	63	60	0.4	38	39	0.1	68	77	1.0	92	91	0.1	43	55	1.7
Emscote Road All Saints Road	Turn	C - Emscote Road West	A	3	3	0.3	16	13	0.8	15	12	0.9	15	14	0.2	26	20	1.2	17	18	0.2
Emscote Road All Saints Road	Turn	C - Emscote Road West	B	287	268	1.1	584	610	1.1	603	613	0.4	658	634	0.9	792	792	0.0	652	658	0.2
Emscote Road Greville Road	Turn	A - Greville Road	B	333	185	9.2	394	290	5.6	383	259	7.0	334	320	0.8	385	390	0.3	323	308	0.8
Emscote Road Greville Road	Turn	A - Greville Road	C	0	0		0	0		1	2	0.4	1	2	0.5	1	1	0.2	0	2	
Emscote Road Greville Road	Turn	A - Greville Road	D	4	31	6.4	7	20	3.5	11	30	4.2	14	38	4.6	8	26	4.3	13	52	6.9
Emscote Road Greville Road	Turn	B - Emscote Road East	C	5	5	0.0	7	7	0.0	12	12	0.0	14	14	0.0	16	16	0.0	24	24	0.1
Emscote Road Greville Road	Turn	B - Emscote Road East	D	398	398	0.0	639	624	0.6	600	565	1.5	695	575	4.8	706	617	3.4	627	474	6.5
Emscote Road Greville Road	Turn	B - Emscote Road East	A	278	261	1.1	405	435	1.5	293	283	0.6	460	383	3.8	448	426	1.0	347	330	0.9
Emscote Road Greville Road	Turn	C - Bridge Street	D	15	13	0.5	33	32	0.2	19	17	0.4	26	22	0.8	20	18	0.5	21	12	2.1
Emscote Road Greville Road	Turn	C - Bridge Street	A	5	4	0.5	1	3	1.3	1	1	0.1	1	2	0.4	1	1	0.1	1	4	1.8
Emscote Road Greville Road	Turn	C - Bridge Street	B	8	8	0.0	3	3	0.1	5	5	0.0	4	4	0.0	0	0		9	9	0.0
Emscote Road Greville Road	Turn	D - Emscote Road West	A	28	39	1.8	35	59	3.5	26	37	1.9	51	86	4.2	47	103	6.5	41	72	4.1
Emscote Road Greville Road	Turn	D - Emscote Road West	B	336	279	3.3	678	674	0.2	605	632	1.1	696	629	2.6	805	782	0.8	647	640	0.3
Emscote Road Greville Road	Turn	D - Emscote Road West	C	1	1	0.6	8	11	0.9	17	16	0.2	22	21	0.2	23	22	0.1	24	20	0.8
Hamton Street Bread & Meat Close	Turn	A - Bread & Meat Close	B	14	15	0.3	4	5	0.3	11	12	0.4	21	22	0.2	18	18	0.1	17	19	0.4
Hamton Street Bread & Meat Close	Turn	A - Bread & Meat Close	C	3	3	0.2	3	3	0.2	7	7	0.1	1	3	1.3	7	7	0.1	7	7	0.2
Hamton Street Bread & Meat Close	Turn	A - Bread & Meat Close	D	2	3	0.4	3	4	0.3	20	22	0.4	4	2	1.0	20	18	0.5	6	5	0.5
Hamton Street Bread & Meat Close	Turn	B - Friars Street	C	10	0	4.5	16	1	5.2	19	0	6.0	26	0	7.2	36	0	8.4	32	0	7.9
Hamton Street Bread & Meat Close	Turn	B - Friars Street	D	82	86	0.4	143	181	3.0	124	140	1.4	290	239	3.1	381	310	3.8	342	292	2.8
Hamton Street Bread & Meat Close	Turn	B - Friars Street	A	14	13	0.4	23	23	0.0	32	33	0.2	16	16	0.0	25	25	0.0	15	15	0.0
Hamton Street Bread & Meat Close	Turn	C - Crompton Street	D	6	6	0.1	8	9	0.2	10	9	0.5	9	6	1.0	18	17	0.1	15	11	1.2
Hamton Street Bread & Meat Close	Turn	C - Crompton Street	A	3	3	0.1	7	7	0.2	7	8	0.3	6	6	0.1	3	3	0.2	4	5	0.5
Hamton Street Bread & Meat Close	Turn	C - Crompton Street	B	15	34	3.9	22	55	5.3	11	27	3.6	7	22	4.0	20	23	0.6	20	28	1.7
Hamton Street Bread & Meat Close	Turn	D - Hampton Street	A	2	2	0.1	16	14	0.5	29	23	1.1	7	8	0.4	9	10	0.2	5	5	0.0
Hamton Street Bread & Meat Close	Turn	D - Hampton Street	B	312	237	4.5	403	363	2.0	260	211	3.2	189	193	0.3	212	207	0.4	248	210	2.5
Hamton Street Bread & Meat Close	Turn	D - Hampton Street	C	9	9	0.1	19	19	0.0	8	8	0.0	7	11	1.3	13	11	0.5	6	12	2.0
Northgate Cape Road	Turn	A - Cape Road	B	118	115	0.3	130	203	5.6	158	202	3.3	178	181	0.2	228	219	0.6	146	171	2.0
Northgate Cape Road	Turn	A - Cape Road	C	18	41	4.2	27	100	9.1	58	115	6.1	42	107	7.5	34	106	8.6	25	102	9.7
Northgate Cape Road	Turn	B - Northgate East	C	237	273	2.2	317	406	4.7	265	301	2.2	400	387	0.7	392	376	0.8	342	352	0.6
Northgate Cape Road	Turn	B - Northgate East	A	96	93	0.3	126	107	1.8	118	94	2.3	134	97	3.5	130	99	2.9	121	83	3.8
Northgate Cape Road	Turn	C - Northgate West	A	14	85	10.1	31	137	11.5	52	106	6.1	32	109	9.2	19	98	10.4	13	64	8.3
Northgate Cape Road	Turn	C - Northgate West	B	448	428	1.0	515	464	2.3	424	464	1.9	502	418	3.9	588	502	3.7	461	480	0.9
Northgate Priory The Butts	Turn	A - Northgate	B	184	151	2.6	230	248	1.2	248	289	2.5	288	146	9.6	361	243	6.8	268	192	5.0
Northgate Priory The Butts	Turn	A - Northgate	C	382	391	0.4	408	419	0.5	330	376	2.5	390	451	3.0	454	478	1.1	347	460	5.6
Northgate Priory The Butts	Turn	C - The Butts	A	334	368	1.8	442	512	3.2	389	395	0.3	535	485	2.2	521	475	2.1	464	435	1.4
Northgate Priory The Butts	Turn	C - The Butts	B	10	0	4.5	26	0	7.2	11	0	4.7	22	0	6.6	30	0	7.7	20	0	6.3
Saltisford Albert Street	Turn	A - Albert Street	B	66	16	7.9	178	109	5.8	136	53	8.6	144	24	13.2	212	64	12.6	121	26	11.1
Saltisford Albert Street	Turn	A - Albert Street	C	28	14	3.0	39	31	1.3	31	16	3.2	24	4	5.4	17	19	0.4	24	14	2.3
Saltisford Albert Street	Turn	B - Saltisford East	C	333	379	2.4	460	569	4.8	323	416	4.8	485	511	1.1	469	453	0.8	422	472	2.4
Saltisford Albert Street	Turn	C - Saltisford West	B	522	529	0.3	483	505	1.0	542	668	5.1	570	625	2.2	678	704	1.0	649	686	1.4
Saltisford Ansell Way	Turn	A - Ansell Way	B	19	14	1.2	20	20	0.0	25	26	0.1	65	65	0.0	56	62	0.8	27	24	0.6
Saltisford Ansell Way	Turn	A - Ansell Way	C	2	2	0.0	3	3	0.0	4	4	0.0	7	0	3.7	5	0	3.2	6	0	3.5
Saltisford Ansell Way	Turn	A - Ansell Way	D	29	29	0.0	48	51	0.4	22	23	0.2	62	61	0.1	50	45	0.8	15	23	1.8
Saltisford Ansell Way	Turn	B - Saltisford East	C	7	9	0.8	22	26	0.7	16	21	1.1	9	13	1.3	11	17	1.5	14	28	3.0
Saltisford Ansell Way	Turn	B - Saltisford East	D	333	355	1.2	397	484	4.1	316	387	3.8	482	469	0.6	453	425	1.3	410	436	1.2
Saltisford Ansell Way	Turn	B - Saltisford East	A	25	21	0.8	81	91	1.1	20	26	1.2	21	23	0.5	20	31	2.2	22	23	0.3
Saltisford Ansell Way	Turn	C - Vittle Drive	D	52	49	0.5	68	69	0.1	69	62	0.8	149	137	1.0	153	138	1.3	164	149	1.2
Saltisford Ansell Way	Turn	C - Vittle Drive	A	4	4	0.0	1	1	0.0	2	2	0.0	2	0	2.0	8	0	4.0	3	0	2.4
Saltisford Ansell Way	Turn	C - Vittle Drive	B	20	18	0.4	38	39	0.2	76	75	0.1	119	119	0.0	153	164	0.8	148	138	0.9
Saltisford Ansell Way	Turn	D - Saltisford West	A	39	27	2.1	90	91	0.1	30	39	1.5	27	22	1.1	19	19	0.1	28	25	0.5
Saltisford Ansell Way	Turn	D - Saltisford West	B	479	499	0.9	426	444	0.8	437	568	5.9	386	441	2.7	478	478	0.0	478	523	2.0
Saltisford Ansell Way	Turn	D - Saltisford West	C	46	33	2.1	73	76	0.4	77	89	1.3	100	85	1.6	94	92	0.2	91	82	1.0
Saltisford Northgate Barrack	Turn	A - Saltisford	B	429	487	2.7	446	413	1.6	414	515	4.7	440	416	1.2	527	431	4.4	426	477	2.4
Saltisford Northgate Barrack	Turn	A - Saltisford	C	19	28	1.9	17	34	3.4	71	72	0.2	55	48	0.9	53	41	1.7	29	44	2.4
Saltisford Northgate Barrack	Turn	B - Northgate	C	22	7	4.0	31	31	0.1	65	51	1.8	63	51	1.6	48	53	0.7	48	35	2.0
Saltisford Northgate Barrack	Turn	B - Northgate	A	230	286	3.5	314	425	5.8	257	351	5.4	385	396	0.6	382	387	0.2	323	398	4.0
Saltisford Northgate Barrack	Turn	D - Barrack Street	A	7	0	3.5	6	2	1.9	14	6	2.6	23	12	2.6	23	9	3.5	11	4	2.4
Saltisford Northgate Barrack	Turn	D - Barrack Street	B	34	9	5.4	103	136	3.1	60	39	3.0	101	68	3.6	77	126	4.9	53	45	1.1
Saltisford Northgate Barrack	Turn	D - Barrack Street	C	32	1	7.5	77	45	4.1	26	7	4.7	32	20	2.4	23	28	0.9	36	9	5.6
Saltisford Victoria Street	Turn	A - Saltisford North	B	17	10	2.0	44	62	2.4	77	35	5.6	51	45	0.9	69	72	0.3	52	33	2.9
Saltisford Victoria Street	Turn	A - Saltisford North	C	571	533	1.6	615	554	2.5	598	685	3.4	668	602	2.6	827	696	4.8	723	679	1.7
Saltisford Victoria Street	Turn	C - Saltisford South	A	337	381	2.3	461	568	4.7	323	415	4.8	498	514	0.7	469	450	0.9	422	473	2.4
Saltisford Victoria Street	Turn	C - Saltisford South	B	71	21	7.4	138	128	0.8	84	85	0.1	70	75	0.6	100	121	2.0	56	50	0.8
Smith Street Priory Road St Johns	Turn	A - Priory Road	B	135	76	5.7	185	65	10.8	213	96	9.4	235	123	8.4	284	169	7.6	249	145	7.4
Smith Street Priory Road St Johns	Turn	A - Priory Road	C	36	67	4.3	35	114	9.1	30	72	5.9	39	32	1.1	28	64	5.3	23	46	3.9
Smith Street Priory Road St Johns	Turn	B - St Johns	C	817	723	3.4	649	736	3.3	769	742	1.0	683	649	1.3	761	711	1.8	746	713	1.2
Smith Street Priory Road St Johns	Turn	D - Smith Street	B	414	456	2.0	454	572	5.2	442	661	9.3	702	710	0.3	744	796	1.9	663	720	2.2
Smith Street Priory Road St Johns	Turn	D - Smith Street	C	14	26	2.7	44	79	4.5	28	55	4.2	48	59	1.4	51	67	2.1	35	49	2.1
Theatre Street New Bridge Street	Turn	A - Theatre street North	B	22	1	6.4	46	35	1.7	10	4	2.1	13	13	0.0	9	32	5.1	8	9	0.3
Theatre Street New Bridge Street	Turn	A - Theatre street North	C	129	122	0.6	224	298	4.6	223	279	3.5	327	362	1.9	412	439	1.3	335	368	1.7
Theatre Street New Bridge Street	Turn	B - New Bridge Street	C	4	0	2.7	5	0	2.8	16	1	5.3	23	1	6.5	22	1	6.3	15	0	5.4
Theatre Street New Bridge Street	Turn	B - New Bridge Street	A	25	18	1.6	49	36	2.0	80	34	6.0	85	48	4.6	63	48	2.1	48	32	2.5
Theatre Street New Bridge Street	Turn	C - Theatre Street South	A	334	305	1.6	504	484	0.9	296	328	1.8	328	301	1.5	365	317	2.6	309	272	2.1
Theatre Street New Bridge Street	Turn	C - Theatre Street South	B	21	9	3.2	40	124	9.3	11	23	2.8	8	29	4.8	5	60	9.6	11	20	2.4
Wedgnock Lane Cape Road	Turn	A - Wedgnock Lane North	B	92	58	3.9	203	122	6.3	131	78	5.2	132	84	4.6	120	59	6.5	108	76	3.3
Wedgnock Lane Cape Road	Turn	A - Wedgnock Lane North	C	247	229	1.2	340	362	1.2	299	267	1.9	440	422	0.9	431	522	4.2	327	306	1.2
Wedgnock Lane Cape Road	Turn	B - Cape Road	C	134	105	2.7	194	187	0.5	128	117	1.0	272	315	2.5	291	180	7.3	139	180	3.2
Wedgnock Lane Cape Road	Turn	B - Cape Road	A	49	35	2.2	76	41	4.5	81	53	3.5	108	125	1.5	155	200	3.4	74	93	2.0
Wedgnock Lane Cape Road	Turn	C - Wedgnock Lane South	A	257	220	2.4	482	527	2.0	311	301	0.6	328	272	3.3	355	350	0.2	286	268	1.1
Wedgnock Lane Cape Road	Turn	C - Wedgnock Lane South	B	239	178	4.2	329	432	5.3	163	138	2.0	137	117	1.8	168	176	0.6	98	102	0.4
Butts Jury Smith	Turn	B - A425 Castle Hill	C	310	276	2.0	401	365	1.8	420	402	0.9	552	514	1.7	643	605	1.5	603	547	2.4
Butts Jury Smith	Turn	B - A425 Castle Hill	D	351	396	2.3	546	592	1.9	456	449	0.3	563	531	1.4	548	520	1.2	426	437	0.5
Butts Jury Smith	Turn	B - A425 Castle Hill	A	307	259	2.8	373	398	1.3	295	322	1.5	433	412	1.0	470	455	0.7	379	359	1.1
Butts Jury Smith	Turn	C - A429 Jury Street	A	133	133	0.0	105	79	2.8	240	181	4.1	245	213	2.1	256	229	1.7	284	255	1.8
Butts Jury Smith	Turn	C - A429 Jury Street	B	342	249	5.4	368	414	2.3	227	274	3.0	224	234	0.7	233	260	1.7	246	219	1.8
Butts Jury Smith	Turn	D - A425 The Butts	B	374	273	5.6	406	278	6.9	329	229	6.0	391	329	3.3	417	328	4.6	331	338	0.4
Spinney Hill rbt	Turn	A - A429 Coventry Road North	B	211	201	0.7	245	249	0.2	168	167	0.1	196	184	0.9	282	273	0.6	217	219	0.1
Spinney Hill rbt	Turn	A - A429 Coventry Road North	C	692	674	0.7	531	599	2.8	428	452	1.1	391	363	1.4	402	377	1.3	328	289	2.2
Spinney Hill rbt	Turn	A - A429 Coventry Road North	D	89	82	0.8	212	210	0.1	103	103	0.0	117	112	0.5	167	168	0.0	122	120	0.2
Spinney Hill rbt	Turn	B - Spinney Hill	C	108	94	1.4	177	223	3.2	135	123	1.1	135	145	0.8	101	135	3.1	104	174	5.9
Spinney Hill rbt	Turn	B - Spinney Hill	D	168	156	1.0	291	237	3.3	199	194	0.4	323	239	5.0	335	229	6.3	245	235	0.6
Spinney Hill rbt	Turn	B - Spinney Hill	A	251	199	3.4	277	260	1.0	184	185	0.1	284	296	0.7	278	306	1.6	189	223	2.4
Spinney Hill rbt	Turn	C - A429 Coventry Road South	D	53	50	0.4	95	99	0.4	66	67	0.1	116	103	1.3	71	70	0.1	84	77	0.8
Spinney Hill rbt	Turn	C - A429 Coventry Road South	A	308	248	3.6	312	330	1.0	236	213	1.5	582	519	2.7	611	579	1.3	418	470	2.5
Spinney Hill rbt	Turn	C - A429 Coventry Road South	B	85	103	1.9	106	140	3.1	99	96	0.3	136	115	1.9	136	118	1.6	124	122	0.2
Spinney Hill rbt	Turn	D - Primrose Hill	A	151	141	0.8	130	130	0.0	78	76	0.2	152	145	0.6	190	200	0.7	110	113	0.3
Spinney Hill rbt	Turn	D - Primrose Hill	B	169	139	2.4	399	277	6.6	236	200	2.5	243	190	3.6	300	230	4.3	238	204	2.3
Spinney Hill rbt	Turn	D - Primrose Hill	C	114	126	1.1	86	130	4.2	92	118	2.5	92	115	2.3	105	103	0.2	64	90	3.0
Castle roundabout Warwick	Turn	A - A429 St Nicholas Church Street	B	515	477	1.7	411	602	8.5	332	421	4.6	387	325	3.3	441	444	0.1	361	331	1.6
Castle roundabout Warwick	Turn	A - A429 St Nicholas Church Street	C	1	1	0.4	3	4	0.4	9	9	0.0	1	3	1.5	7	5	0.6	12	14	0.6
Castle roundabout Warwick	Turn	A - A429 St Nicholas Church Street	D	289	309	1.2	294	320	1.5	463	442	1.0	430	387	2.1	459	393	3.2	469	433	1.7
Castle roundabout Warwick	Turn	B - A425 Banbury Road	C	3	3	0.2	4	7	1.2	5	10	1.7	2	6	2.1	6	6	0.1	6	16	3.0
Castle roundabout Warwick	Turn	B - A425 Banbury Road	D	715	629	3.3	1009	1,019	0.3	747	737	0.4	1132	1,079	1.6	1164	1,195	0.9	923	933	0.3
Castle roundabout Warwick	Turn	C - D4187 Mill Street	D	3	7	1.6	1	4	1.9	13	8	1.6	8	6	0.9	2	4	0.9	6	8	0.6
Castle roundabout Warwick	Turn	C - D4187 Mill Street	B	3	4	0.5	0	1		2	2	0.1	1	1	0.1	3	2	0.5	6	3	1.3
Castle roundabout Warwick	Turn	C - D4187 Mill Street	C	0	0		0	0		1	0	1.4	0	0		0	0		0	0	
Castle roundabout Warwick	Turn	D - A425 Castle Hill	B	683	514	6.9	783	699	3.1	538	497	1.8	593	548	1.9	622	575	1.9	538	532	0.3
Castle roundabout Warwick	Turn	D - A425 Castle Hill	C	0	1		2	3	0.7	3	4	0.5	3	5	1.0	7	8	0.2	12	13	0.2
Myton Road/Banbury Road	Turn	Banbury Road North	Left	354	299	3.1	451	520	3.1	363	370	0.4	391	349	2.2	448	400	2.4	354	392	2.0
Myton Road/Banbury Road	Turn	Banbury Road North	Ahead	819	673	5.4	849	837	0.4	568	546	0.9	592	521	3.0	657	617	1.6	442	477	1.6
Myton Road/Banbury Road	Turn	Banbury Road North	Right	8	6	0.6	6	7	0.5	7	7	0.0	9	9	0.1	13	12	0.4	15	16	0.2
Myton Road/Banbury Road	Turn	Myton Road	Right	259	221	2.5	455	463	0.4	316	341	1.4	513	473	1.8	553	518	1.5	397	386	0.5
Myton Road/Banbury Road	Turn	Myton Road	Left	49	51	0.3	76	85	1.0	45	48	0.5	101	103	0.2	102	97	0.5	42	52	1.5
Myton Road/Banbury Road	Turn	Myton Road	Ahead	5	5	0.1	1	2	0.6	5	5	0.0	5	5	0.0	4	4	0.0	6	7	0.5
Myton Road/Banbury Road	Turn	Banbury Road South	Ahead	497	422	3.5	698	639	2.3	418	403	0.8	604	600	0.2	648	688	1.6	505	506	0.0
Myton Road/Banbury Road	Turn	Banbury Road South	Right	62	67	0.6	150	176	2.0	63	64	0.1	72	84	1.4	84	86	0.2	60	77	2.1
Myton Road/Banbury Road	Turn	Banbury Road South	Left	2	2	0.1	5	5	0.1	4	4	0.1	2	2	0.1	2	2	0.1	1	1	0.2
Myton Road/Banbury Road	Turn	Bridge End	Left	7	7	0.2	19	19	0.0	11	11	0.1	15	14	0.4	7	6	0.2	9	7	0.6
Myton Road/Banbury Road	Turn	Bridge End	Ahead	1	1	0.1	1	1	0.2	7	7	0.0	5	5	0.1	4	4	0.1	1	1	0.0
Myton Road/Banbury Road	Turn	Bridge End	Right	3	3	0.0	6	6	0.0	2	2	0.1	3	3	0.0	2	2	0.1	1	1	0.1
Myton School Site 5	Turn	School Entrance to Banbury Rd (S)		9	9	0.1	251	253	0.2	29	29	0.0	168	172	0.3	64	61	0.4	8	8	0.0
Myton School Site 5	Turn	Banbury Rd (S) to School		57	60	0.4	227	219	0.5	13	16	0.7	44	49	0.7	12	14	0.6	12	15	0.7
Myton School Site 5	Turn	School Entrance to Banbury Rd (N)		1	2	0.9	1	1	0.1	4	5	0.6	3	5	1.1	3	3	0.1	2	2	0.2
Myton School Site 5	Turn	Banbury Rd (N) to School Entrance		36	37	0.2	82	84	0.2	3	8	2.2	28	24	0.7	11	12	0.3	8	8	0.1
Myton School Site 4	Turn	Myton Rd (W) to School		47	41	0.9	76	66	1.1	8	12	1.2	27	22	0.9	25	27	0.4	23	21	0.4

Myton School Site 4	Turn	Myton Rd (E) to School		33	34	0.1	74	52	2.8	4	4	0.1	33	33	0.1	15	15	0.0	14	17	0.7
Myton School Site 3	Turn	School Entrance to Myton Rd (W)		30	28	0.3	70	60	1.2	3	0	2.1	51	52	0.1	38	37	0.2	13	0	5.1
Myton School Site 3	Turn	School Entrance to Myton Rd (E)		20	19	0.1	71	85	1.6	0	0		63	65	0.3	25	23	0.4	13	0	5.1
Myton School Site 2	Turn	Myton Rd (W) to School		60	52	1.1	139	119	1.8	42	43	0.2	33	29	0.7	16	18	0.6	10	10	0.1
Myton School Site 2	Turn	Myton Rd (E) to School		42	43	0.1	75	55	2.5	15	16	0.2	35	35	0.1	24	24	0.1	7	9	0.7
Myton School Site 1	Turn	School Entrance to Myton Rd (W)		24	21	0.6	178	130	3.8	42	63	2.9	132	128	0.4	54	53	0.1	20	15	1.1
Myton School Site 1	Turn	School Entrance to Myton Rd (E)		3	2	0.6	23	23	0.0	17	22	1.1	39	40	0.2	14	13	0.3	7	7	0.0
Banbury Road/Gallows Hill (new survey site 4a&4b)	Turn	FROM BANBURY ROAD (N) TO GALLOWS HILL		646	562	3.4	796	818	0.8	469	483	0.7	478	423	2.6	448	406	2.0	286	286	0.0
Banbury Road/Gallows Hill (new survey site 4a&4b)	Turn	FROM BANBURY ROAD (N) TO BANBURY ROAD (S)		139	121	1.6	273	274	0.1	133	131	0.2	380	337	2.3	375	352	1.2	204	238	2.3
Banbury Road/Gallows Hill (new survey site 4a&4b)	Turn	FROM BANBURY ROAD (S) TO BANBURY ROAD (N)		250	231	1.2	537	518	0.8	232	229	0.2	255	226	1.9	279	262	1.1	245	187	3.9
Banbury Road/Gallows Hill (new survey site 4a&4b)	Turn	FROM BANBURY ROAD (S) TO GALLOWS HILL		108	106	0.2	482	478	0.2	130	136	0.5	18	18	0.0	16	16	0.1	20	20	0.0
Banbury Road/Gallows Hill (new survey site 4a&4b)	Turn	FROM GALLOWS HILL TO BANBURY ROAD (S)		17	17	0.1	8	8	0.1	6	6	0.0	128	127	0.1	201	200	0.1	135	136	0.0
Banbury Road/Gallows Hill (new survey site 4a&4b)	Turn	FROM GALLOWS HILL TO BANBURY ROAD (N)		387	324	3.3	530	510	0.9	252	241	0.7	565	504	2.6	560	520	1.7	488	399	4.3
Book 1	Turn	Wharf Street		5	1	2.5	23	14	2.2	7	4	1.3	3	1	1.3	8	5	1.2	4	4	0.2
Book 1	Turn	Wharf Street		45	58	1.8	78	96	1.9	61	62	0.1	61	49	1.7	82	94	1.2	53	96	5.0
Book 1	Turn	Wharf Street		1	2	0.9	21	24	0.6	6	7	0.4	5	7	0.7	12	13	0.3	17	16	0.2
Book 1	Turn	Wharf Street		32	26	1.2	96	74	2.4	49	43	0.9	62	54	1.1	58	58	0.0	38	22	3.0
Book 1	Turn	Broad Street		3	2	0.6	25	13	2.7	3	3	0.2	11	5	2.2	5	4	0.7	7	3	1.7
Book 1	Turn	Broad Street		16	19	0.6	26	40	2.4	19	27	1.7	17	25	1.7	13	16	0.7	11	17	1.6
Book 1	Turn	Wharf Street		21	18	0.6	55	57	0.3	43	36	1.1	44	32	2.0	57	42	2.2	37	23	2.7
Book 1	Turn	Wharf Street		40	58	2.5	49	79	3.7	37	53	2.3	34	42	1.3	38	66	3.8	27	92	8.4
Book 1	Turn	Emscote Road		222	310	5.4	398	380	0.9	394	407	0.7	478	417	2.9	552	407	6.6	463	374	4.4
Book 1	Turn	Emscote Road		12	11	0.3	63	46	2.2	23	19	1.0	23	22	0.3	24	24	0.1	28	15	2.7
Book 1	Turn	Emscote Road		21	17	1.0	54	52	0.3	32	31	0.2	44	39	0.8	46	47	0.1	27	23	0.9
Book 1	Turn	Emscote Road		348	261	5.0	302	320	1.0	391	462	3.4	411	428	0.8	440	503	2.9	457	514	2.6
Book 1	Turn	Emscote Road		403	366	1.9	583	577	0.3	468	513	2.0	552	512	1.7	527	550	1.0	462	426	1.7
Book 1	Turn	Emscote Road		73	68	0.5	98	98	0.0	158	103	4.8	185	107	6.5	205	104	8.1	193	125	5.4
Book 1	Turn	Tesco		55	54	0.2	86	88	0.2	135	136	0.1	165	179	1.1	218	225	0.4	211	191	1.4
Book 1	Turn	Tesco		54	52	0.3	70	71	0.1	86	88	0.2	191	141	3.9	211	166	3.3	210	156	4.0
Book 1	Turn	Emscote Road		56	49	1.0	123	103	1.9	196	161	2.6	202	155	3.5	237	204	2.2	194	193	0.1
Book 1	Turn	Emscote Road		365	265	5.6	803	658	5.4	562	549	0.5	661	562	4.0	691	683	0.3	479	539	2.6
00150092E280612-V01 149206 Hampton Rd	Link			160	253	6.5	287	381	5.1	130	198	5.3	260	250	0.6	327	326	0.1	206	218	0.8
00150092E280612-V01 149206 Hampton Rd	Link			243	187	3.8	366	339	1.4	218	217	0.1	177	241	4.4	228	323	5.7	198	309	7.0
00150058E280612-V01 149207 Birmingham Rd	Link			688	637	2.0	885	959	2.4	636	685	1.9	1357	1,304	1.5	1426	1,426	0.0	842	978	4.5
00150058E280612-V01 149207 Birmingham Rd	Link			1043	935	3.5	1352	1,385	0.9	930	972	1.4	926	903	0.7	1013	1,125	3.4	778	823	1.6
Cape Road bluetooth	Link	Cape Road Northbound		126	149	2.0	222	262	2.6	195	172	1.7	348	291	3.2	362	331	1.6	171	192	1.6
Cape Road bluetooth	Link	Cape Road Southbound		244	140	7.5	489	371	5.7	331	251	4.7	309	242	4.1	354	306	2.6	199	246	3.1
Jury St-Church St-Castle St, Wa	Turn	A - Chruch Street	B	6	15	2.7	16	19	0.7	21	20	0.2	33	29	0.7	25	26	0.1	23	22	0.2
Jury St-Church St-Castle St, Wa	Turn	A - Chruch Street	D	3	10	2.8	11	14	0.7	10	15	1.3	15	16	0.2	23	18	1.0	16	15	0.3
Jury St-Church St-Castle St, Wa	Turn	B - Jury Street	C	0	0		1	0	1.2	2	0	2.0	2	0	2.0	1	0	1.4	3	0	2.2
Jury St-Church St-Castle St, Wa	Turn	B - Jury Street	D	252	274	1.4	274	366	5.1	343	402	3.1	437	511	3.4	531	604	3.1	427	547	5.4
Jury St-Church St-Castle St, Wa	Turn	D - High Street	B	355	392	1.9	436	469	1.5	363	426	3.1	330	438	5.5	407	460	2.6	357	448	4.5
Jury St-Church St-Castle St, Wa	Turn	D - High Street	C	0	2		0	3		5	11	2.1	1	6	2.6	6	11	1.8	2	15	4.4
Millers Road-Lakin Road, Warwick.txt	Turn	A - Guys Cross Park Road	B	180	149	2.4	316	303	0.7	126	154	2.4	72	73	0.1	50	55	0.6	92	86	0.6
Millers Road-Lakin Road, Warwick.txt	Turn	A - Guys Cross Park Road	C	196	204	0.6	389	380	0.5	201	222	1.5	181	224	3.0	176	209	2.4	114	205	7.2
Millers Road-Lakin Road, Warwick.txt	Turn	B - Lakin Road	C	79	52	3.3	95	91	0.4	102	97	0.5	164	136	2.3	221	196	1.8	91	60	3.6
Millers Road-Lakin Road, Warwick.txt	Turn	B - Lakin Road	A	49	62	1.8	61	64	0.3	65	60	0.6	179	191	0.9	144	149	0.4	73	76	0.4
Millers Road-Lakin Road, Warwick.txt	Turn	C - Millers Road	A	78	102	2.5	199	251	3.5	124	144	1.8	220	229	0.6	245	258	0.8	116	142	2.3
Millers Road-Lakin Road, Warwick.txt	Turn	C - Millers Road	B	131	43	9.5	168	96	6.2	102	41	7.2	63	40	3.3	62	48	1.9	73	38	4.7
Coventry Road-Lakin Road-Station Ave Warwick.txt	Turn	A - Coventry Road North	B	7	0	3.7	11	0	4.7	7	0	3.7	3	0	2.4	4	0	2.8	4	0	2.8
Coventry Road-Lakin Road-Station Ave Warwick.txt	Turn		C	554	567	0.5	390	425	1.7	385	404	1.0	255	384	7.2	305	389	4.5	310	394	4.5
Coventry Road-Lakin Road-Station Ave Warwick.txt	Turn		D	12	14	0.6	17	32	3.0	29	35	1.1	25	24	0.3	46	48	0.2	21	32	2.2
Coventry Road-Lakin Road-Station Ave Warwick.txt	Turn	C - Coventry Road South	D	147	88	5.4	171	142	2.3	184	133	4.0	93	86	0.7	128	114	1.2	120	76	4.4
Coventry Road-Lakin Road-Station Ave Warwick.txt	Turn		A	269	334	3.7	280	370	5.0	224	319	5.8	488	498	0.4	547	503	1.9	406	483	3.7
Coventry Road-Lakin Road-Station Ave Warwick.txt	Turn		B	5	0	3.2	14	0	5.3	13	0	5.1	3	0	2.4	15	0	5.5	3	0	2.4
Coventry Road-Lakin Road-Station Ave Warwick.txt	Turn	D - Lakin Road	A	45	49	0.6	77	80	0.3	38	50	1.8	45	47	0.3	70	71	0.1	25	0	7.1
Coventry Road-Lakin Road-Station Ave Warwick.txt	Turn		B	3	0	2.4	11	0	4.7	2	0	2.0	1	0	1.4	1	0	1.4	1	0	1.4
Coventry Road-Lakin Road-Station Ave Warwick.txt	Turn		C	48	42	1.0	54	56	0.2	74	65	1.0	123	87	3.5	113	99	1.4	101	0	14.2
D4193 Church Street, Warwick (AQM).txt	Turn	A - Coventry Road North	B	60	86	3.0	115	125	0.9	77	100	2.4	86	104	1.9	105	133	2.6	68	108	4.3
D4193 Church Street, Warwick (AQM).txt	Turn		C	850	797	1.8	734	832	3.5	580	593	0.5	511	512	0.0	477	484	0.3	422	446	1.1
D4193 Church Street, Warwick (AQM).txt	Turn	B - Nelson Lane	C	68	57	1.5	162	157	0.4	67	96	3.2	85	104	2.0	81	144	5.9	71	161	8.4
D4193 Church Street, Warwick (AQM).txt	Turn		A	37	36	0.2	73	71	0.2	33	37	0.7	51	33	2.7	63	34	4.2	40	47	1.0
D4193 Church Street, Warwick (AQM).txt	Turn	C - Coventry Road South	A	409	372	1.9	477	498	0.9	359	338	1.1	792	735	2.1	775	735	1.4	606	598	0.3
D4193 Church Street, Warwick (AQM).txt	Turn		B	58	53	0.7	159	185	2.0	78	84	0.7	138	159	1.7	178	212	2.4	57	74	2.0
Emscote Rd-Charles St, Warwick	Turn	A - Charles Street	B	71	44	3.6	284	233	3.2	186	152	2.6	208	225	1.1	278	299	1.2	159	153	0.5
Emscote Rd-Charles St, Warwick	Turn		C	21	14	1.7	47	30	2.8	25	27	0.4	27	23	0.8	36	31	0.9	27	24	0.6
Emscote Rd-Charles St, Warwick	Turn	B - Emscote Road East	C	276	315	2.3	433	401	1.6	414	397	0.9	446	411	1.7	512	410	4.7	463	339	6.2
Emscote Rd-Charles St, Warwick	Turn		A	122	104	1.7	239	200	2.6	166	180	1.1	163	169	0.5	160	221	4.4	119	201	6.5
Emscote Rd-Charles St, Warwick	Turn	C - Emscote Road West	A	32	9	5.1	49	13	6.4	36	10	5.4	31	11	4.4	39	23	2.9	36	30	1.0
Emscote Rd-Charles St, Warwick	Turn		B	213	227	1.0	369	392	1.2	424	470	2.2	449	426	1.1	534	520	0.6	503	518	0.7
Junction:(3) Access Road / Birmingham Road	Turn	A - Birmingham Road North	B	120	129	0.8	203	212	0.6	194	196	0.2	6	6	0.0	3	4	0.3	6	7	0.3
Junction:(3) Access Road / Birmingham Road	Turn	B - IBM South Access	C	8	6	1.0	2	0	1.9	4	3	0.5	56	83	3.2	131	156	2.1	58	50	1.2
Junction:(3) Access Road / Birmingham Road	Turn		B	18	18	0.0	15	17	0.5	12	16	1.0	0	0		2	2	0.1	0	0	
Junction:(4) Access Road / Wedgnock Lane	Turn	A -	B	16	15	0.2	60	59	0.1	56	54	0.3	6	6	0.1	10	10	0.2	6	6	0.1
Junction:(4) Access Road / Wedgnock Lane	Turn		C	488	273	11.0	637	467	7.2	414	335	4.1	538	445	4.2	535	493	1.8	338	325	0.7
Junction:(4) Access Road / Wedgnock Lane	Turn	B - IBM North Access	C	6	14	2.5	11	17	1.6	6	11	1.7	46	63	2.2	74	88	1.5	42	56	2.0
Junction:(4) Access Road / Wedgnock Lane	Turn		A	16	16	0.1	8	9	0.2	12	11	0.2	106	81	2.6	84	81	0.3	64	63	0.1
Junction:(4) Access Road / Wedgnock Lane	Turn	C -	A	284	226	3.6	508	528	0.9	314	337	1.2	448	395	2.6	603	546	2.4	440	346	4.7
Junction:(4) Access Road / Wedgnock Lane	Turn		B	30	28	0.4	35	40	0.8	12	17	1.4	0	1		3	4	0.6	12	16	1.0
Site 4 - A425 Birmingham Road/Budbroke Road	Turn	A - Birmingham Road East	B	117	109	0.7	104	126	2.1	86	106	2.0	76	105	3.0	68	74	0.7	62	79	2.1
Site 4 - A425 Birmingham Road/Budbroke Road	Turn	A - Birmingham Road East	C	676	597	3.1	898	883	0.5	639	637	0.1	1354	1,189	4.6	1352	1,299	1.5	934	923	0.3
Site 4 - A425 Birmingham Road/Budbroke Road	Turn	B - Budbrooke Road	C	42	41	0.1	83	76	0.8	53	47	0.8	112	117	0.5	112	127	1.4	52	54	0.2
Site 4 - A425 Birmingham Road/Budbroke Road	Turn	B - Budbrooke Road	A	14	19	1.2	21	23	0.4	36	40	0.7	18	25	1.5	22	25	0.6	31	48	2.7
Site 4 - A425 Birmingham Road/Budbroke Road	Turn	C - Birmingham Road West	A	1062	935	4.0	1299	1,385	2.4	1048	972	2.4	989	903	2.8	1152	1,125	0.8	809	823	0.5
Site 4 - A425 Birmingham Road/Budbroke Road	Turn	C - Birmingham Road West	B	2	0	2.0	6	0	3.5	5	0	3.2	0	0		0	0		1	0	1.4
Site 5 - A425 Birmingham Road/Eastley Crescent	Turn	A - A425 Birmingham Road East	B	3	3	0.0	12	11	0.2	3	3	0.1	14	14	0.1	22	20	0.4	16	11	1.4
Site 5 - A425 Birmingham Road/Eastley Crescent	Turn	A - A425 Birmingham Road East	C	719	632	3.3	961	947	0.5	654	682	1.1	1400	1,288	3.1	1420	1,406	0.4	963	968	0.2
Site 5 - A425 Birmingham Road/Eastley Crescent	Turn	B - Eastley Crescent	C	35	45	1.6	39	41	0.3	13	15	0.5	10	11	0.2	16	17	0.3	17	21	0.9
Site 5 - A425 Birmingham Road/Eastley Crescent	Turn	B - Eastley Crescent	A	3	4	0.5	3	2	0.6	5	5	0.0	4	6	0.8	3	3	0.1	7	10	1.1
Site 5 - A425 Birmingham Road/Eastley Crescent	Turn	C - A425 Birmingham Road West	A	1075	941	4.2	1310	1,376	1.8	1040	965	2.4	989	901	2.9	1150	1,123	0.8	801	811	0.3
Site 5 - A425 Birmingham Road/Eastley Crescent	Turn	C - A425 Birmingham Road West	B	0	0		15	17	0.6	5	6	0.3	20	18	0.5	21	22	0.3	9	11	0.8
Site 6 - A4177/Budbroke Road	Turn	A - Birmingham Road East	B	237	146	6.6	297	264	2.0	235	201	2.3	241	204	2.5	266	264	0.1	174	158	1.2
Site 6 - A4177/Budbroke Road	Turn	A - Birmingham Road East	C	390	413	1.1	535	583	2.0	438	472	1.6	929	865	2.1	1067	1,062	0.2	754	799	1.6
Site 6 - A4177/Budbroke Road	Turn	B - Old Budbrooke Road	C	13	13	0.1	21	21	0.1	14	14	0.1	19	18	0.2	56	56	0.0	34	35	0.1
Site 6 - A4177/Budbroke Road	Turn	B - Old Budbrooke Road	A	189	156	2.5	308	286	1.3	216	200	1.1	219	187	2.3	253	236	1.1	250	187	4.3
Site 6 - A4177/Budbroke Road	Turn	C - Birmingham Road West	A	928	790	4.7	973	990	0.5	603	630	1.1	526	544	0.8	661	693	1.2	676	721	1.7
Site 6 - A4177/Budbroke Road	Turn	C - Birmingham Road West	B	25	23	0.5	33	34	0.2	17	19	0.4	18	17	0.1	18	18	0.1	28	28	0.1
Site 14 - A46/A4177 Roundabout	Turn	A - A46 Southbound Off Slip	B	400	342	3.0	576	489	3.8	409	361	2.4	221	222	0.0	311	297	0.8	180	172	0.6
Site 14 - A46/A4177 Roundabout	Turn	A - A46 Southbound Off Slip	D	118	90	2.8	142	148	0.5	164	153	0.9	233	228	0.3	333	334	0.1	201	203	0.2
Site 14 - A46/A4177 Roundabout	Turn	B - Birmingham Road East	C	221	202	1.3	301	284	1.0	195	190	0.4	370	348	1.2	386	395	0.4	226	253	1.7
Site 14 - A46/A4177 Roundabout	Turn	B - Birmingham Road East	D	279	277	0.1	404	431	1.3	319	335	0.9	622	550	3.0	659	646	0.5	476	491	0.7
Site 14 - A46/A4177 Roundabout	Turn	B - Birmingham Road East	A	239	178	4.2	269	256	0.8	157	157	0.0	500	395	5.0	400	379	1.1	303	248	3.3
Site 14 - A46/A4177 Roundabout	Turn	C - A46 Northbound Off Slip	D	230	197	2.3	278	268	0.6	197	186	0.8	305	305	0.0	348	351	0.2	252	252	0.0
Site 14 - A46/A4177 Roundabout	Turn	C - A46 Northbound Off Slip	C	328	284	2.5	560	465	4.2	330	300	1.7	207	213	0.4	253	232	1.4	151	143	0.6
Site 14 - A46/A4177 Roundabout	Turn	D - Birmingham Road West	A	264	247	1.1	299	337	2.1	139	148	0.8	150	132	1.6	176	171	0.4	144	137	0.6
Site 14 - A46/A4177 Roundabout	Turn	D - Birmingham Road West	B	575	452	5.4	712	650	2.4	506	499	0.3	377	414	1.9	445	465	1.0	444	460	0.8
Site 14 - A46/A4177 Roundabout	Turn	D - Birmingham Road West	C	245	227	1.2	269	304	2.1	182	189	0.5	210	183	1.9	306	292	0.8	333	312	1.2
Site 16 - A425 Birmingham Road/Wedgnock Lane	Turn	A - Wedgnock Lane	B	39	44	0.8	59	83	2.8	81	85	0.5	61	90	3.3	63	61	0.2	111	109	0.2
Site 16 - A425 Birmingham Road/Wedgnock Lane	Turn	A - Wedgnock Lane	C	338	278	3.4	481	471	0.4	326	301	1.4	575	614	1.6	553	646	3.8	329	399	3.6
Site 16 - A425 Birmingham Road/Wedgnock Lane	Turn	B - Birmingham Road East	C	391	365	1.4	433	454	1.0	336	378	2.2	635	547	3.6	642	551	3.7	563	540	1.0
Site 16 - A425 Birmingham Road/Wedgnock Lane	Turn	B - Birmingham Road East	A	65	64	0.1	144	148	0.3	93	96	0.3	93	81	1.3	73	78	0.6	80	80	0.0
Site 16 - A425 Birmingham Road/Wedgnock Lane	Turn	C - Birmingham Road West	A	417	342	3.9	693	811	4.3	418	339	4.0	320	313	0.4	379	449	3.5	273	287	0.8
Site 16 - A425 Birmingham Road/Wedgnock Lane	Turn	C - Birmingham Road West	B	576	536	1.7	544	518	1.2	603	611	0.3	465	473	0.4	580	525	2.4	494	524	1.3
Site 16 - A425 Birmingham Road/Wedgnock Lane	Turn	C - Birmingham Road West	C	74	69	0.6	87	83	0.4	67	64	0.4	220	139	6.1	198	175	1.7	69	63	0.8
A46 TRADS	Link	A46 NB		1895	1,876	0.4	2675	2,675	0.0	1857	1,865	0.2	2114	2,098	0.4	2502	2,503	0.0	2084	2,085	0.0
A46 TRADS	Link	A46 SB		2002	1,950	1.2	2431	2,431	0.0	1771	1,791	0.5	2082	2,037	1.0	2433	2,427	0.1	1934	1,948	0.3
Theatre Street Saltisford	Turn	A - North Rock / Road A425	B	28	45	2.7	42	94	6.3	49	89	4.8	47	117	7.7	31	122	10.4	36	104	8.1
Theatre Street Saltisford	Turn	A - North Rock / Road A425	C	197	227	2.1	294	307	0.8	234	256	1.4	325	311	0.8	334	283	2.9	312	305	0.4
Theatre Street Saltisford	Turn	B - Theatre Street / Road	C	257	175	5.6	413	389	1.2	301	243	3.5	346	281	3.7	306	288	1.0	270	218	3.3
Theatre Street Saltisford	Turn	B - Theatre Street / Road	A	115	114	0.1	159	112	4.0	113	118	0.4	141	109	2.9	118	98	1.9	97	96	0.1
Theatre Street Saltisford	Turn	C - Saltisford / Road A425	A	365	425	3.0	348	330	1.0	392	475	4.0	359	357	0.1	408	369	2.0	290	413	6.6
Theatre Street Saltisford	Turn	C - Saltisford / Road A425	B	179	100	6.7	326	231	5.7	233	211	1.5	305	241	3.9	348	327	1.1	274	268	0.4
Cape Road Car Park Entrance	Link	Cape Road Car Park Entrance		82	39	5.5	297	226	4.4	137	130	0.6	31	29	0.5	40	36	0.6	36	29	1.2
Cape Road Car Park Exit	Link	Cape Road Car Park Exit		12	10	0.7	40	50	1.5	126	129	0.3	168	160	0.6	171	172	0.1	91	84	0.8
Barrack St top entrance	Link	Barrack St top entrance		54	34	2.9	43	40	0.6	38	35	0.5	5	4	0.5	3	4	0.4	4	3	0.6
Barrack St top exit	Link	Barrack St top exit		1	2	0.8	12	13	0.0	19	18	0.2	60	56	0.4	37	36	0.1	18	16	0.4
Barrack St bottom entrance	Link	Barrack St bottom entrance		54	59	0.7	43	56	1.8	38	46	1.1	5	6	0.2	3	5	0.7	4	7	1.0
Barrack St bottom exit	Link	Barrack St bottom exit		4	6	1.1	15	45	5.5	17	28	2.3	60	70	1.2	37	47	1.6	17	20	0.8
					273			275			278			275			276			276	
					244			239			256			258			252			251	
					89.38%			**86.91%**			**92.09%**			**93.82%**			**91.30%**			**90.94%**	
				204	74.7%		206	74.9%		223	80.2%		217	78.9%		223	80.8%		218	79.0%	
				233	85.3%		224	81.5%		243	87.4%		245	89.1%		240	87.0%		235	85.1%	
				244	89.4%		239	86.9%		256	92.1%		258	93.8%		252	91.3%		251	90.9%	
				256	93.8%		255	92.7%		271	97.5%		262	95.3%		259	93.8%		258	93.5%	
				263	96.3%		263	95.6%		274	98.6%		267	97.1%		266	96.4%		266	96.4%	
				268	98.2%		266	96.7%		275	98.9%		271	98.5%		269	97.5%		269	97.5%	
				268	98.2%		267	97.1%		276	99.3%		272	98.9%		272	98.6%		273	98.9%	
				271	99.3%		270	98.2%		278	100.0%		274	99.6%		273	98.9%		274	99.3%	

LINK FLOW CALIBRATION TABLES

		07:00:00			08:00:00			09:00:00			16:00:00			17:00:00			18:00:00		
Link		OBS	MOD	GEH	OBS	MOD	GEH	OBS	MOD	GEH	OBS	MOD	GEH	OBS	MOD	GEH	OBS	MOD	GEH
2796:2830y	Stratford Road	347	278	3.9	698	525	7.0	427	418	0.5	340	364	1.3	455	462	0.3	334	369	1.9
2830y:2796	Stratford Road	343	369	1.4	364	384	1.0	281	303	1.3	520	445	3.4	604	515	3.8	271	268	0.2
2432:2431	West Street	335	324	0.6	499	472	1.2	424	381	2.1	387	393	0.3	449	498	2.3	376	357	1.0
2431:2432	West Street	235	226	0.6	305	404	5.2	306	337	1.8	506	410	4.5	553	505	2.1	404	390	0.7
2052:2023	A - Cape Rd South	349	148	12.8	516	262	12.9	297	172	8.1	237	289	3.2	287	331	2.5	211	193	1.3
2022:2023	B - Millers Rd	171	195	1.8	330	354	1.3	293	306	0.7	353	380	1.4	430	426	0.2	224	323	6.0
2050:2023	C - Cape Rd North	171	229	4.1	248	526	14.1	199	249	3.3	338	257	4.7	371	296	4.1	199	208	0.7
1830z:1831z	A - Coventry Road	554	569	0.6	375	511	6.4	458	480	1.0	394	456	3.0	414	480	3.1	426	480	2.5
1832:1831z	B - Coton End	373	342	1.6	375	480	5.1	487	456	1.4	469	436	1.5	507	457	2.3	479	476	0.1
1834:1831z	C - Weston Close	16	14	0.5	20	20	0.0	34	37	0.4	21	21	0.1	30	29	0.2	31	26	1.0
1836:1831z	D - St Johns	526	520	0.3	611	644	1.3	631	752	4.6	894	824	2.4	985	962	0.7	862	867	0.2
1720:1717	A - All Saints Road	57	67	1.3	153	168	1.2	105	116	1.1	90	99	0.9	118	111	0.7	75	77	0.2
2228u:1717	B - Emscote Road East	395	418	1.1	655	647	0.3	579	601	0.9	686	653	1.3	767	715	1.9	621	579	1.7
1718:1717	C - Emscote Road West	290	270	1.2	600	623	0.9	618	624	0.3	673	648	1.0	818	812	0.2	669	676	0.3
2298y:1686	A - Greville Road	337	215	7.3	401	310	4.8	395	290	5.7	349	359	0.5	394	417	1.1	336	363	1.4
2303z:1686	B - Emscote Road East	681	664	0.7	1051	1066	0.5	905	860	1.5	1169	971	6.0	1170	1060	3.3	998	828	5.6
3224y:1686	C - Bridge Street	28	25	0.6	37	38	0.1	25	23	0.4	31	28	0.6	21	19	0.5	31	25	1.1
2258y:1686	D - Emscote Road West	365	318	2.6	721	743	0.8	648	685	1.4	769	736	1.2	875	907	1.1	712	732	0.8
2539:2493	A - Bread & Meat Close	19	21	0.5	10	11	0.2	38	41	0.5	26	27	0.2	45	42	0.4	30	30	0.0
2492:2493	B - Friars Street	106	98	0.8	182	205	1.6	175	174	0.1	332	255	4.5	442	335	5.4	389	307	4.4
2494:2493	C - Crompton Street	24	43	3.3	37	70	4.5	28	43	2.5	22	34	2.3	41	43	0.3	39	44	0.7
2498:2493	D - Hampton Street	323	247	4.5	438	396	2.1	297	242	3.4	203	212	0.6	234	227	0.4	259	227	2.0
2186:2187	A - Cape Road	136	155	1.6	157	302	9.6	216	317	6.2	220	288	4.2	262	325	3.7	171	273	6.9
2176:2187	B - Northgate East	333	366	1.8	443	512	3.2	383	396	0.6	534	483	2.3	522	475	2.1	463	435	1.3
3354y:2187	C - Northgate West	462	513	2.3	546	600	2.3	476	570	4.1	534	527	0.3	607	600	0.3	474	545	3.1
2187:2176	A - Northgate	566	542	1.0	638	667	1.1	578	666	3.5	678	597	3.2	815	721	3.4	615	652	1.5
3358z:2176	C - The Butts	344	368	1.3	468	512	2.0	400	395	0.3	557	485	3.2	551	475	3.4	484	435	2.3
3365:2066	A - Albert Street	94	30	8.1	217	140	5.8	167	69	9.1	168	27	14.2	229	83	11.7	145	40	10.9
3325:2066	B - Saltisford East	333	379	2.4	460	569	4.8	323	416	4.8	485	511	1.1	469	453	0.8	422	472	2.4
2680y:2066	C - Saltisford West	522	529	0.3	483	505	1.0	542	668	5.1	570	625	2.2	678	704	1.0	649	686	1.4
2137:2065	A - Ansell Way	50	45	0.7	71	74	0.3	51	52	0.2	134	127	0.6	111	107	0.4	48	47	0.2
2680y:2065	B - Saltisford East	365	386	1.1	500	600	4.3	352	434	4.1	512	505	0.3	484	473	0.5	446	487	1.9
2802z:2065	C - Vittle Drive	76	71	0.6	107	109	0.2	147	139	0.6	270	256	0.9	314	301	0.7	315	286	1.7
3345z:2065	D - Saltisford West	564	558	0.2	589	611	0.9	544	695	6.1	513	548	1.5	591	588	0.1	597	630	1.3
2189:3353y	A - Saltisford	448	516	3.1	463	447	0.8	485	588	4.4	495	464	1.4	580	473	4.7	455	521	3.0
2187:3355y	B - Northgate	252	293	2.5	345	456	5.5	322	402	4.2	448	448	0.0	430	439	0.4	371	433	3.1
2192:698	D - Barrack Street	73	11	9.7	186	184	0.2	100	51	5.6	156	100	4.9	123	163	3.3	100	59	4.6
3325:2067	A - Saltisford North	588	542	1.9	659	615	1.7	675	720	1.7	719	647	2.8	896	767	4.5	775	712	2.3
3361:2067	C - Saltisford South	408	401	0.3	599	696	3.8	407	500	4.4	568	589	0.9	569	571	0.1	478	523	2.0
3359y:2161	A - Priory Road	171	143	2.2	220	178	3.0	243	168	5.2	274	155	8.1	312	233	4.8	272	191	5.3
1836:2162	B - St Johns	817	723	3.4	649	736	3.3	769	742	1.0	683	649	1.3	761	711	1.8	746	713	1.2
2159:2161	D - Smith Street	428	482	2.5	498	651	6.4	470	717	10.1	750	768	0.7	795	863	2.4	698	769	2.6
2207:2205	A - Theatre street North	151	122	2.4	270	334	3.7	233	283	3.1	340	375	1.9	421	471	2.4	343	377	1.8
2202:2205	B - New Bridge Street	29	18	2.3	54	36	2.7	96	35	7.6	108	48	6.7	85	48	4.5	63	32	4.5
2217z:2205	C - Theatre Street South	355	314	2.2	544	608	2.7	307	351	2.4	336	330	0.4	370	377	0.3	320	293	1.6
2037:2038	A - Wedgnock Lane North	339	287	3.0	543	485	2.6	430	345	4.3	572	506	2.8	551	580	1.2	435	382	2.6
2045:2038	B - Cape Road	183	140	3.4	270	228	2.6	209	170	2.9	380	439	2.9	446	380	3.3	213	273	3.8
3335y:2038	C - Wedgnock Lane South	496	398	4.6	811	959	5.0	474	439	1.7	465	389	3.7	523	526	0.1	384	371	0.7
2417:2419	B - A425 Castle Hill	968	932	1.2	1320	1356	1.0	1171	1172	0.0	1548	1457	2.4	1661	1580	2.0	1408	1342	1.8
2425:2419	C - A429 Jury Street	475	382	4.5	473	492	0.9	467	455	0.5	469	447	1.0	489	489	0.0	530	474	2.5
1816:1815cca	A - A429 Coventry Road North	992	957	1.1	988	1057	2.2	699	722	0.8	704	659	1.7	851	817	1.2	667	628	1.5
1814:1815ccb	B - Spinney Hill	527	449	3.5	745	720	0.9	518	502	0.7	742	679	2.4	714	670	1.7	538	632	3.9
1817:1815ccc	C - A429 Coventry Road South	446	402	2.1	513	570	2.4	401	375	1.3	834	736	3.5	818	767	1.8	626	669	1.7
1818:1815ccd	D - Primrose Hill	434	405	1.4	615	537	3.2	406	393	0.6	487	449	1.7	595	533	2.6	412	407	0.2
2218:2224	A - A429 St Nicholas Church Street	805	787	0.7	708	925	7.6	804	872	2.4	818	715	3.7	907	842	2.2	842	778	2.3
3327:2221	B - A425 Banbury Road	718	633	3.3	1013	1026	0.4	752	746	0.2	1134	1085	1.5	1170	1202	0.9	929	949	0.7
2844y:2276x	C - D4187 Mill Street	6	11	1.6	1	5	2.2	16	10	1.8	9	7	0.8	5	6	0.3	12	11	0.3
2275x:2277w	D - A425 Castle Hill	683	515	6.9	785	702	3.0	541	501	1.7	596	553	1.8	629	583	1.9	550	545	0.2
691:678	Banbury Road North	1181	978	6.2	1306	1365	1.6	938	924	0.5	992	879	3.7	1118	1028	2.7	811	884	2.5
692:688	Myton Road	313	276	2.2	532	549	0.7	366	394	1.4	619	580	1.6	659	619	1.6	445	446	0.0
693:674	Banbury Road South	561	491	3.1	853	819	1.2	485	471	0.7	678	686	0.3	734	776	1.5	566	584	0.8
690:676	Bridge End	11	10	0.2	26	26	0.0	20	19	0.1	23	22	0.2	13	12	0.2	11	9	0.5
3352z:3351z	School Entrance to Banbury Rd (S)	10	11	0.4	252	255	0.2	33	34	0.2	171	177	0.5	67	64	0.4	10	10	0.1
3356z:3351z	Banbury Rd (S) to School	57	60	0.4	227	219	0.5	13	16	0.7	44	49	0.7	12	14	0.6	12	15	0.7
3352z:3351z	School Entrance to Banbury Rd (N)	10	11	0.4	252	255	0.2	33	34	0.2	171	177	0.5	67	64	0.4	10	10	0.1
2412:3351z	Banbury Rd (N) to School Entrance	36	37	0.2	82	84	0.2	3	8	2.2	28	24	0.7	11	12	0.3	8	8	0.1
2826:2827	Myton Rd (W) to School	47	41	0.9	76	66	1.1	8	12	1.2	27	22	0.9	25	27	0.4	23	21	0.4
2533y:2827	Myton Rd (E) to School	33	34	0.1	74	52	2.8	4	4	0.1	33	33	0.1	15	15	0.0	14	17	0.7
700:2826	School Entrance to Myton Rd (W)	50	48	0.3	141	145	0.3	3	0	2.0	114	117	0.3	63	60	0.4	26	0	7.2
700:2826	School Entrance to Myton Rd (E)	50	48	0.3	141	145	0.3	3	0	2.0	114	117	0.3	63	60	0.4	26	0	7.2
621:3354z	Myton Rd (W) to School	60	52	1.1	139	119	1.8	42	43	0.2	33	29	0.7	16	18	0.6	10	10	0.1
2826:3354z	Myton Rd (E) to School	42	43	0.1	75	55	2.5	15	16	0.2	35	35	0.1	24	24	0.1	7	9	0.7
3353z:621	School Entrance to Myton Rd (W)	27	23	0.8	201	153	3.6	59	85	3.0	171	168	0.2	68	66	0.2	27	22	0.9
3353z:621	School Entrance to Myton Rd (E)	27	23	0.8	201	153	3.6	59	85	3.0	171	168	0.2	68	66	0.2	27	22	0.9
3368y:2792z	FROM BANBURY ROAD (N) TO GALLOWS HILL	646	562	3.4	796	818	0.8	469	483	0.7	478	423	2.6	448	406	2.0	286	286	0.0
2801z:2800z	FROM BANBURY ROAD (N) TO BANBURY ROAD (S)	139	121	1.6	273	274	0.1	133	131	0.2	380	337	2.3	375	352	1.2	204	238	2.3
2799z:2800z	FROM BANBURY ROAD (S) TO BANBURY ROAD (N)	358	337	1.1	1019	996	0.7	362	364	0.1	273	244	1.8	295	278	1.0	265	207	3.8
2799z:2800z	FROM BANBURY ROAD (S) TO GALLOWS HILL	358	337	1.1	1019	996	0.7	362	364	0.1	273	244	1.8	295	278	1.0	265	207	3.8
2800y:2800z	FROM GALLOWS HILL TO BANBURY ROAD (S)	404	341	3.3	538	518	0.9	258	247	0.7	693	631	2.4	761	720	1.5	623	534	3.7
2800y:2800z	FROM GALLOWS HILL TO BANBURY ROAD (N)	404	341	3.3	538	518	0.9	258	247	0.7	693	631	2.4	761	720	1.5	623	534	3.7
1801:1976	Wharf Street	50	58	1.1	101	110	0.8	68	66	0.3	64	50	1.9	90	99	0.9	57	101	4.9
1973:1976	Wharf Street	33	28	1.0	117	98	1.8	55	50	0.7	67	60	0.8	70	71	0.1	55	38	2.5
1849:1976	Broad Street	19	21	0.4	51	53	0.2	22	30	1.5	28	30	0.4	18	19	0.2	18	20	0.4
1976:1973	Wharf Street	61	76	1.8	104	136	2.9	80	89	0.9	78	73	0.5	95	108	1.2	64	115	5.4
1972:1973	Emscote Road	234	321	5.2	461	426	1.7	417	426	0.4	501	438	2.9	576	430	6.5	491	389	4.9
1845:1973	Emscote Road	369	278	5.1	356	373	0.9	423	493	3.3	455	467	0.5	486	550	2.8	484	536	2.3
1710:1712	Emscote Road	476	435	1.9	681	675	0.2	626	616	0.4	737	619	4.5	732	654	3.0	655	552	4.2
1713:1712	Tesco	109	105	0.3	156	159	0.2	221	224	0.2	356	320	2.0	429	391	1.9	421	347	3.8
1714:1712	Emscote Road	421	313	5.6	926	761	5.7	758	711	1.8	863	718	5.2	928	887	1.4	673	732	2.2
2509:2467z		160	253	6.5	287	381	5.1	130	198	5.3	260	250	0.6	327	326	0.1	206	218	0.8
2467z:2509		243	187	3.8	366	339	1.4	218	217	0.1	177	241	4.4	228	323	5.7	198	309	7.0
2055:2570		688	637	2.0	885	959	2.4	636	685	1.9	1357	1304	1.5	1426	1426	0.0	842	978	4.5
2570:2055		2107	1869	5.3	2657	2771	2.2	1983	1944	0.9	1915	1807	2.5	2165	2250	1.8	1588	1646	1.5
3362x:2076	Cape Road Northbound	126	149	2.0	222	262	2.6	195	172	1.7	348	291	3.2	362	331	1.6	171	192	1.6
2076:3362x	Cape Road Southbound	244	140	7.5	489	371	5.7	331	251	4.7	309	242	4.1	354	306	2.6	199	246	3.1
2445:2425	A - Chruch Street	9	25	3.8	27	32	1.0	31	35	0.6	48	45	0.5	48	44	0.6	39	37	0.4
2419:2425	B - Jury Street	252	274	1.4	275	366	5.1	345	402	2.9	439	511	3.3	532	604	3.0	430	547	5.3
2842w:2425	D - High Street	355	394	2.0	436	471	1.7	368	436	3.4	331	444	5.8	413	472	2.8	359	463	5.1
1894:1897	A - Guys Cross Park Road	376	353	1.2	705	683	0.8	327	376	2.6	253	297	2.6	226	264	2.4	206	290	5.4
682:1898	B - Lakin Road	79	52	3.3	95	91	0.4	102	97	0.5	164	136	2.3	221	196	1.8	91	60	3.6
682:1897	B - Lakin Road	49	62	1.8	61	64	0.3	65	60	0.6	179	191	0.9	144	149	0.4	73	76	0.4
1898:1897	C - Millers Road	209	145	4.9	367	348	1.0	226	185	2.8	283	269	0.9	307	306	0.1	189	180	0.7
1826:1827	A - Coventry Road North	573	581	0.3	418	457	1.8	421	440	0.9	283	407	6.7	355	437	4.1	335	426	4.6
1826:1827		573	581	0.3	418	457	1.8	421	440	0.9	283	407	6.7	355	437	4.1	335	426	4.6
3319:1827	C - Coventry Road South	421	422	0.0	465	512	2.1	421	452	1.5	584	584	0.0	690	617	2.9	529	560	1.3
3319:1827		421	422	0.0	465	512	2.1	421	452	1.5	584	584	0.0	690	617	2.9	529	560	1.3
685z:1827	D - Lakin Road	96	91	0.6	142	135	0.6	114	115	0.1	169	135	2.8	184	170	1.1	127	0	15.9
685z:1827		96	91	0.6	142	135	0.6	114	115	0.1	169	135	2.8	184	170	1.1	127	0	15.9
2834:1820	A - Coventry Road North	910	883	0.9	849	957	3.6	657	692	1.3	597	616	0.8	582	617	1.4	490	554	2.8
2834:1820		910	883	0.9	849	957	3.6	657	692	1.3	597	616	0.8	582	617	1.4	490	554	2.8
1874:1820	B - Nelson Lane	105	92	1.3	235	228	0.4	100	133	3.1	136	137	0.1	144	178	2.6	111	208	7.7
1874:1820		105	92	1.3	235	228	0.4	100	133	3.1	136	137	0.1	144	178	2.6	111	208	7.7
1822:1820	C - Coventry Road South	467	424	2.0	636	683	1.8	437	422	0.7	930	893	1.2	953	947	0.2	663	671	0.3
1822:1820		467	424	2.0	636	683	1.8	437	422	0.7	930	893	1.2	953	947	0.2	663	671	0.3
3334y:1760	A - Charles Street	92	58	3.9	331	263	3.9	211	179	2.3	235	248	0.8	314	330	0.9	186	177	0.7
3334y:1760		92	58	3.9	331	263	3.9	211	179	2.3	235	248	0.8	314	330	0.9	186	177	0.7
2254y:1760	B - Emscote Road East	398	419	1.0	672	601	2.8	580	577	0.1	609	580	1.2	672	631	1.6	582	540	1.8
2254y:1760		398	419	1.0	672	601	2.8	580	577	0.1	609	580	1.2	672	631	1.6	582	540	1.8
2228t:1760	C - Emscote Road West	245	236	0.6	418	405	0.6	460	480	0.9	480	437	2.0	573	543	1.3	539	548	0.4
2228t:1760		245	236	0.6	418	405	0.6	460	480	0.9	480	437	2.0	573	543	1.3	539	548	0.4
2573:2850y	A - Birmingham Road North	120	129	0.8	203	212	0.6	194	196	0.2	6	6	0.0	3	4	0.3	6	7	0.3
3184y:2850y	B - IBM South Access	8	6	1.0	2	0	1.9	4	3	0.5	56	83	3.2	131	156	2.1	58	50	1.2
3185z:2850y		18	18	0.0	15	17	0.5	12	16	1.0	0	0		2	2	0.1	0	0	
2036:2387	A -	504	289	10.8	697	526	6.9	470	389	3.9	544	450	4.2	545	503	1.8	344	330	0.7
2036:2387		504	289	10.8	697	526	6.9	470	389	3.9	544	450	4.2	545	503	1.8	344	330	0.7
2388:2387	B - IBM North Access	22	30	1.5	19	26	1.4	18	22	1.0	152	143	0.7	158	169	0.8	106	119	1.2
2388:2387		22	30	1.5	19	26	1.4	18	22	1.0	152	143	0.7	158	169	0.8	106	119	1.2
2037:2387	C -	314	254	3.5	543	568	1.1	326	354	1.5	448	395	2.6	606	550	2.3	452	362	4.5
2037:2387		314	254	3.5	543	568	1.1	326	354	1.5	448	395	2.6	606	550	2.3	452	362	4.5
2056:2055	A - Birmingham Road East	793	706	3.2	1002	1009	0.2	725	743	0.7	1430	1294	3.7	1420	1373	1.3	996	1003	0.2
2405:2055	B - Budbrooke Road	56	60	0.5	104	99	0.5	89	88	0.2	130	143	1.1	134	152	1.5	83	102	2.0
2570:2055	C - Birmingham Road West	2107	1869	5.3	2657	2771	2.2	1983	1944	0.9	1915	1807	2.5	2165	2250	1.8	1588	1646	1.5
2570:2571	A - A425 Birmingham Road East	722	635	3.3	973	958	0.5	657	685	1.1	1414	1301	3.1	1442	1426	0.4	979	979	0.0
3120:2571	B - Eastley Crescent	38	49	1.7	42	43	0.2	18	20	0.4	14	17	0.7	19	20	0.2	24	31	1.4
3185z:2571	C - A425 Birmingham Road West	1075	941	4.2	1325	1394	1.9	1045	971	2.3	1009	919	2.9	1171	1145	0.8	810	822	0.4
2605:2602z	A - Birmingham Road East	627	558	2.8	832	846	0.5	673	673	0.0	1170	1069	3.0	1333	1326	0.2	928	957	0.9
2610:2602z	B - Old Budbrooke Road	202	169	2.5	329	307	1.2	230	214	1.1	238	205	2.2	309	291	1.0	284	221	3.9
2606:2602z	C - Birmingham Road West	953	813	4.7	1006	1025	0.6	620	649	1.1	544	562	0.7	679	710	1.2	704	748	1.6
2586:2585	A - A46 Southbound Off Slip	518	432	4.0	718	636	3.1	573	514	2.5	454	450	0.2	644	631	0.5	381	375	0.3
2576:2591	B - Birmingham Road East	739	657	3.1	974	970	0.1	671	682	0.4	1492	1293	5.3	1445	1419	0.7	1005	992	0.4
2594:2593z	C - A46 Northbound Off Slip	558	480	3.4	838	733	3.8	527	486	1.8	512	518	0.3	601	583	0.8	403	395	0.4
2604:2599	D - Birmingham Road West	1084	925	5.0	1280	1290	0.3	827	836	0.3	737	728	0.3	927	928	0.0	921	909	0.4
2044:2057aa	A - Wegnock Lane	377	322	2.9	540	554	0.6	407	386	1.1	636	704	2.6	616	707	3.5	440	508	3.1
2273y:2057ab	B - Birmingham Road East	456	429	1.3	577	602	1.0	429	474	2.1	728	628	3.8	715	629	3.3	643	619	1.0
2272x:2057ac	C - Birmingham Road West	1067	947	3.8	1324	1412	2.4	1088	1014	2.3	1005	925	2.6	1157	1149	0.2	836	873	1.3
2628:2625	A46 NB	1895	1876	0.4	2675	2675	0.0	1857	1865	0.2	2114	2098	0.4	2502	2503	0.0	2084	2085	0.0
2624:2627	A46 SB	2002	1950	1.2	2431	2431	0.0	1771	1791	0.5	2082	2037	1.0	2433	2427	0.1	1934	1948	0.3
2209:2210a	A - North Rock / Road A425	225	272	3.0	336	402	3.4	283	345	3.5	372	428	2.8	365	405	2.1	348	408	3.1
2208:2210b	B - Theatre Street / Road	372	289	4.5	572	501	3.1	414	361	2.7	487	390	4.6	424	386	1.9	367	314	2.9
2069:2210c	C - Saltisford / Road A425	544	525	0.8	674	560	4.6	625	685	2.3	664	598	2.6	756	696	2.2	564	681	4.7
2082:3329z	Cape Road Car Park Entrance	82	39	5.5	297	226	4.4	137	130	0.6	31	29	0.5	40	36	0.6	36	29	1.2
3341:3340	Cape Road Car Park Exit	12	10	0.7	40	50	1.5	126	129	0.3	168	160	0.6	171	172	0.1	91	84	0.8
2199z:2200	Barrack St top entrance	54	34	2.9	43	40	0.6	38	35	0.5	5	4	0.5	3	4	0.4	4	3	0.6
2216:2217	Barrack St top exit	1	2	0.8	12	13	0.0	19	18	0.2	60	56	0.4	37	36	0.1	18	16	0.4
2208:2213	Barrack St bottom entrance	54	59	0.7	43	56	1.8	38	46	1.1	5	6	0.2	3	5	0.7	4	7	1.0
2213:2208	Barrack St bottom exit	4	6	1.1	15	45	5.5	17	28	2.3	60	70	1.2	37	47	1.6	17	20	0.8
			156			156			156			155			156			155	
			141			140			145			146			152			139	
			90.38%			**89.74%**			**92.95%**			**94.19%**			**97.44%**			**89.68%**	
		109	69.9%		117	75.0%		127	81.4%		122	78.2%		135	86.5%		114	73.1%	
		132	84.6%		131	84.0%		137	87.8%		136	87.2%		145	92.9%		127	81.4%	
		141	90.4%		140	89.7%		145	92.9%		146	93.6%		152	97.4%		139	89.1%	
		146	93.6%		147	94.2%		151	96.8%		150	96.2%		154	98.7%		146	93.6%	
		149	95.5%		152	97.4%		152	97.4%		153	98.1%		155	99.4%		148	94.9%	
		151	96.8%		153	98.1%		153	98.1%		153	98.1%		155	99.4%		152	97.4%	
		152	97.4%		153	98.1%		155	99.4%		154	98.7%		155	99.4%		152	97.4%	
		153	98.1%		154	98.7%		155	99.4%		154	98.7%		155	99.4%		152	97.4%	

	07:00:00			08:00:00			09:00:00			16:00:00			17:00:00			18:00:00		
	OBS	MOD	% Pass	OBS	MOD	% Pass	OBS	MOD	% Pass	OBS	MOD	% Pass	OBS	MOD	% Pass	OBS	MOD	% Pass
Low	137	130	**95%**	123	109	**89%**	141	133	**94%**	126	121	**96%**	119	115	**97%**	133	123	**92%**
Med	19	18	**95%**	33	30	**91%**	15	15	**100%**	29	27	**93%**	37	37	**100%**	22	20	**91%**
High	0	0	**0%**	0	0	**0%**	0	0	**0%**	0	0	**0%**	0	0	**0%**	0	0	**0%**
all	156	148	**95%**	156	139	**89%**	156	148	**95%**	155	148	**95%**	156	152	**97%**	155	143	**92%**

Appendix B

Link Flow Validation Table

Link Flow Validation

Count Ref	Date	Mvt	07:00:00 OBS	07:00:00 MOD	07:00:00 GEH	08:00:00 OBS	08:00:00 MOD	08:00:00 GEH	09:00:00 OBS	09:00:00 MOD	09:00:00 GEH	16:00:00 OBS	16:00:00 MOD	16:00:00 GEH	17:00:00 OBS	17:00:00 MOD	17:00:00 GEH	18:00:00 OBS	18:00:00 MOD	18:00:00 GEH
A425 Myton Road	05-Aug	EB	327	287	2.3	730	615	4.4	395	415	1.0	547	485	2.7	445	480	1.6	439	461	1.0
A425 Myton Road	05-Aug	WB	324	311	0.8	584	487	4.2	323	326	0.1	484	477	0.3	573	571	0.1	518	440	3.6
A425 Saltisford	05-Aug	NB	349	432	4.2	483	602	5.1	388	473	4.1	733	647	3.3	689	620	2.7	499	609	4.7
A425 Saltisford	05-Aug	SB	543	570	1.1	641	604	1.5	528	695	6.8	511	555	1.9	568	588	0.8	513	630	4.9
A429 Coventry Road	05-Aug	NB	462	422	1.9	471	512	1.9	363	452	4.4	625	584	1.7	555	617	2.6	467	560	4.1
A429 Coventry Road	05-Aug	SB	564	605	1.7	415	483	3.2	419	470	2.4	407	470	3.0	450	486	1.7	404	452	2.3
A445 Emscote Road	05-Aug	NB	225	278	3.3	368	373	0.2	441	493	2.4	490	467	1.1	586	550	1.5	490	536	2.0
A445 Emscote Road	05-Aug	SB	378	367	0.6	419	459	1.9	429	460	1.5	477	458	0.9	480	470	0.4	484	468	0.7
A4189 Friars Street	05-Aug	EB	338	247	5.3	472	396	3.6	305	242	3.8	225	212	0.9	257	227	1.9	239	227	0.8
A4189 Friars Street	05-Aug	WB	108	94	1.4	206	193	0.9	185	170	1.1	367	247	6.8	440	345	4.8	350	308	2.3
Banbury Road N of Gallows Hill	05-Aug	SB	857	684	6.2	1044	1,092	1.5	510	614	4.4	798	761	1.3	702	758	2.1	478	523	2.0
Banbury Road N of Gallows Hill	05-Aug	NB	557	550	0.3	959	1,029	2.2	444	472	1.3	750	728	0.8	801	781	0.7	609	587	0.9
D4100 Cape Road	05-Aug	NB	126	149	2.0	222	262	2.6	195	172	1.7	348	291	3.2	362	331	1.6	171	192	1.6
D4100 Cape Road	05-Aug	SB	244	140	7.5	489	371	5.7	331	251	4.7	309	242	4.1	354	306	2.6	199	246	3.1
				14			14			14			14			14			14	
				11			12			13			13			14			14	
				78.57%			**85.71%**			**92.86%**			**92.86%**			**100.00%**			**100.00%**	
			9	64.3%		8	57.1%		8	57.1%		10	71.4%		13	92.9%		9	64.3%	
			10	71.4%		10	71.4%		9	64.3%		13	92.9%		13	92.9%		12	85.7%	
			11	78.6%		12	85.7%		13	92.9%		13	92.9%		14	100.0%		14	100.0%	
			12	85.7%		14	100.0%		13	92.9%		13	92.9%		14	100.0%		14	100.0%	
			13	92.9%		14	100.0%		14	100.0%		14	100.0%		14	100.0%		14	100.0%	
			14	100.0%		14	100.0%		14	100.0%		14	100.0%		14	100.0%		14	100.0%	
			14	100.0%		14	100.0%		14	100.0%		14	100.0%		14	100.0%		14	100.0%	
			14	100.0%		14	100.0%		14	100.0%		14	100.0%		14	100.0%		14	100.0%	

Appendix C

Journey Time Validation Tables

SECTIONAL ANALYSIS

07:00:00

AM	OBS	MOD	DIFF	% DIFF	DMRB Criteria
Route 2 EB Sec 1	00:00:30	00:00:23	00:00:07	-25%	PASS
Route 2 EB Sec 2	00:01:20	00:01:13	00:00:07	-9%	PASS
Route 2 EB Sec 3	00:00:15	00:00:20	00:00:05	36%	PASS
Route 2 EB Sec 4	00:00:44	00:00:38	00:00:05	-12%	PASS
Route 2 EB Sec 5	00:00:10	00:00:11	00:00:01	10%	PASS
Route 2 EB Sec 6	00:01:12	00:01:04	00:00:09	-12%	PASS
Route 2 EB Sec 7	00:00:52	00:00:30	00:00:22	-42%	PASS
Route 2 EB Sec 8	00:00:27	00:00:20	00:00:07	-26%	PASS
Route 2 EB Sec 9	00:01:33	00:01:48	00:00:15	16%	PASS
Route 2 EB Sec 10	00:00:18	00:00:11	00:00:07	-39%	PASS
Route 2 EB Sec 11	00:00:45	00:00:35	00:00:10	-23%	PASS
Route 2 WB Sec 11	00:00:40	00:00:34	00:00:05	-14%	PASS
Route 2 WB Sec 10	00:00:45	00:00:23	00:00:22	-48%	PASS
Route 2 WB Sec 9	00:00:41	00:00:29	00:00:12	-28%	PASS
Route 2 WB Sec 8	00:00:18	00:00:15	00:00:02	-13%	PASS
Route 2 WB Sec 7	00:00:45	00:00:42	00:00:02	-5%	PASS
Route 2 WB Sec 6	00:00:52	00:00:50	00:00:02	-3%	PASS
Route 2 WB Sec 5	00:00:10	00:00:10	00:00:00	-2%	PASS
Route 2 WB Sec 4	00:00:33	00:00:26	00:00:07	-22%	PASS
Route 2 WB Sec 3	00:00:35	00:00:09	00:00:26	-75%	PASS
Route 2 WB Sec 2	00:01:14	00:00:15	00:00:59	-80%	PASS
Route 2 WB Sec 1	00:00:32	00:01:20	00:00:49	155%	PASS

Count	22
PASS	100%
FAIL	0%

16:00:00

PM	OBS	MOD	DIFF	% DIFF	DMRB Criteria
Route 2 EB Sec 1	00:00:30	00:00:22	00:00:07	-24%	PASS
Route 2 EB Sec 2	00:01:10	00:01:02	00:00:08	-11%	PASS
Route 2 EB Sec 3	00:00:16	00:00:15	00:00:01	-4%	PASS
Route 2 EB Sec 4	00:00:44	00:00:37	00:00:07	-15%	PASS
Route 2 EB Sec 5	00:00:12	00:00:11	00:00:01	-9%	PASS
Route 2 EB Sec 6	00:01:16	00:01:09	00:00:07	-9%	PASS
Route 2 EB Sec 7	00:00:34	00:00:40	00:00:06	16%	PASS
Route 2 EB Sec 8	00:00:22	00:01:08	00:00:46	206%	PASS
Route 2 EB Sec 9	00:02:30	00:01:33	00:00:57	-38%	PASS
Route 2 EB Sec 10	00:00:19	00:00:11	00:00:08	-42%	PASS
Route 2 EB Sec 11	00:00:45	00:00:34	00:00:10	-23%	PASS
Route 2 WB Sec 11	00:00:51	00:00:38	00:00:13	-26%	PASS
Route 2 WB Sec 10	00:00:42	00:00:25	00:00:17	-41%	PASS
Route 2 WB Sec 9	00:00:37	00:00:35	00:00:03	-7%	PASS
Route 2 WB Sec 8	00:00:20	00:00:23	00:00:03	15%	PASS
Route 2 WB Sec 7	00:01:07	00:00:55	00:00:12	-18%	PASS
Route 2 WB Sec 6	00:02:21	00:02:30	00:00:09	7%	PASS
Route 2 WB Sec 5	00:00:14	00:00:11	00:00:02	-17%	PASS
Route 2 WB Sec 4	00:00:45	00:00:28	00:00:17	-38%	PASS
Route 2 WB Sec 3	00:00:37	00:00:09	00:00:28	-76%	PASS
Route 2 WB Sec 2	00:01:11	00:00:18	00:00:53	-75%	PASS
Route 2 WB Sec 1	00:00:31	00:01:27	00:00:55	179%	PASS

Count	22
PASS	100%
FAIL	0%

Full Route Analysis

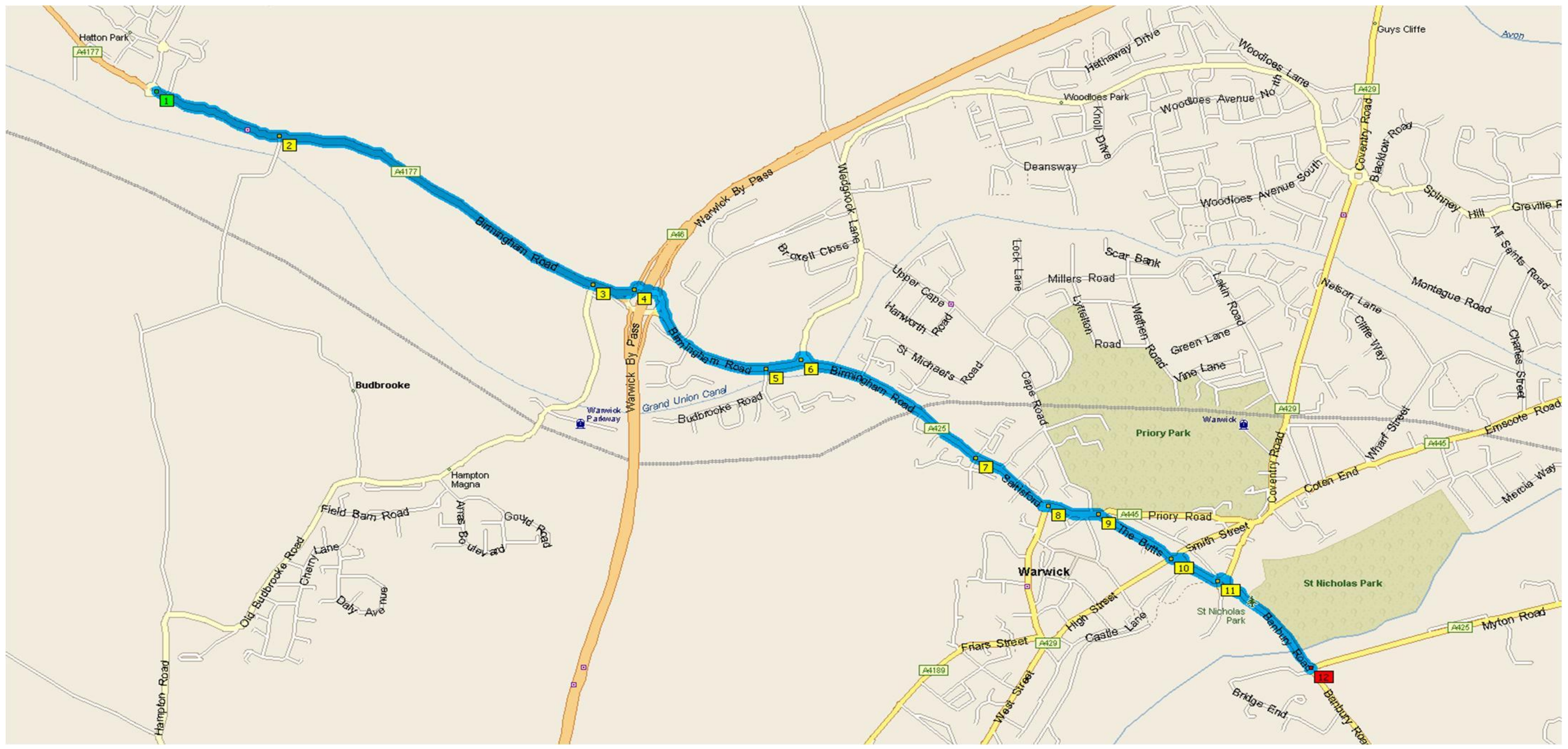
Route EB	00:08:06	00:07:13	00:00:53	-11%	PASS
Route WB	00:07:03	00:05:34	00:01:29	-21%	FAIL

Route 2 EB	00:08:38	00:07:44	00:00:54	-10%	PASS
Route 2 WB	00:09:16	00:07:58	00:01:18	-14%	PASS

Amended Route Analysis

Route EB 1	00:02:59	00:02:45	00:00:14	-8%	PASS
Route WB 1	00:03:03	00:02:20	00:00:44	-24%	PASS
Route EB 2	00:03:55	00:03:24	00:00:31	-13%	PASS
Route WB 2	00:03:59	00:03:14	00:00:45	-19%	PASS

Route EB 1	00:02:52	00:02:28	00:00:23	-14%	PASS
Route WB 1	00:03:17	00:02:32	00:00:46	-23%	PASS
Route EB 2	00:05:46	00:05:16	00:00:30	-9%	PASS
Route WB 2	00:05:58	00:05:26	00:00:33	-9%	PASS



SECTIONAL ANALYSIS

08:00:00					
AM	OBS	MOD	DIFF	% DIFF	DMRB Criteria
Route 2 EB Sec 1	00:00:36	00:00:34	00:00:02	-6%	PASS
Route 2 EB Sec 2	00:02:26	00:02:54	00:00:27	19%	PASS
Route 2 EB Sec 3	00:00:37	00:00:38	00:00:01	4%	PASS
Route 2 EB Sec 4	00:01:08	00:00:48	00:00:20	-29%	PASS
Route 2 EB Sec 5	00:00:26	00:00:14	00:00:12	-46%	PASS
Route 2 EB Sec 6	00:04:38	00:01:57	00:02:41	-58%	FAIL
Route 2 EB Sec 7	00:02:21	00:01:51	00:00:30	-21%	PASS
Route 2 EB Sec 8	00:01:47	00:01:51	00:00:04	3%	PASS
Route 2 EB Sec 9	00:02:47	00:03:43	00:00:56	33%	PASS
Route 2 EB Sec 10	00:00:30	00:00:11	00:00:19	-63%	PASS
Route 2 EB Sec 11	00:01:04	00:00:46	00:00:17	-27%	PASS
Route 2 WB Sec 11	00:00:44	00:00:36	00:00:08	-18%	PASS
Route 2 WB Sec 10	00:00:52	00:00:28	00:00:24	-46%	PASS
Route 2 WB Sec 9	00:00:49	00:00:38	00:00:10	-21%	PASS
Route 2 WB Sec 8	00:00:20	00:00:23	00:00:03	14%	PASS
Route 2 WB Sec 7	00:00:58	00:00:50	00:00:08	-14%	PASS
Route 2 WB Sec 6	00:01:05	00:00:55	00:00:09	-14%	PASS
Route 2 WB Sec 5	00:00:11	00:00:10	00:00:01	-7%	PASS
Route 2 WB Sec 4	00:00:36	00:00:27	00:00:09	-24%	PASS
Route 2 WB Sec 3	00:00:39	00:00:09	00:00:30	-78%	PASS
Route 2 WB Sec 2	00:01:06	00:00:16	00:00:51	-76%	PASS
Route 2 WB Sec 1	00:00:39	00:01:23	00:00:44	115%	PASS
				Count	22
				PASS	95%
				FAIL	5%

17:00:00					
PM	OBS	MOD	DIFF	% DIFF	DMRB Criteria
Route 2 EB Sec 1	00:00:37	00:00:23	00:00:14	-38%	PASS
Route 2 EB Sec 2	00:01:19	00:01:04	00:00:15	-19%	PASS
Route 2 EB Sec 3	00:00:22	00:00:17	00:00:05	-23%	PASS
Route 2 EB Sec 4	00:00:45	00:00:39	00:00:06	-14%	PASS
Route 2 EB Sec 5	00:00:12	00:00:11	00:00:00	-4%	PASS
Route 2 EB Sec 6	00:01:19	00:01:20	00:00:01	1%	PASS
Route 2 EB Sec 7	00:00:40	00:00:59	00:00:18	45%	PASS
Route 2 EB Sec 8	00:00:39	00:01:39	00:01:00	152%	PASS
Route 2 EB Sec 9	00:03:29	00:01:57	00:01:32	-44%	FAIL
Route 2 EB Sec 10	00:00:20	00:00:11	00:00:09	-45%	PASS
Route 2 EB Sec 11	00:00:46	00:00:35	00:00:11	-24%	PASS
Route 2 WB Sec 11	00:01:22	00:00:38	00:00:44	-54%	PASS
Route 2 WB Sec 10	00:00:40	00:00:26	00:00:14	-35%	PASS
Route 2 WB Sec 9	00:00:50	00:00:34	00:00:17	-33%	PASS
Route 2 WB Sec 8	00:00:21	00:00:29	00:00:08	36%	PASS
Route 2 WB Sec 7	00:00:52	00:00:53	00:00:01	1%	PASS
Route 2 WB Sec 6	00:02:22	00:02:33	00:00:12	8%	PASS
Route 2 WB Sec 5	00:00:13	00:00:11	00:00:02	-13%	PASS
Route 2 WB Sec 4	00:00:59	00:00:29	00:00:30	-50%	PASS
Route 2 WB Sec 3	00:00:34	00:00:09	00:00:25	-74%	PASS
Route 2 WB Sec 2	00:01:18	00:00:21	00:00:58	-74%	PASS
Route 2 WB Sec 1	00:00:34	00:01:28	00:00:55	163%	PASS
				Count	22
				PASS	95%
				FAIL	5%

Full Route Analysis

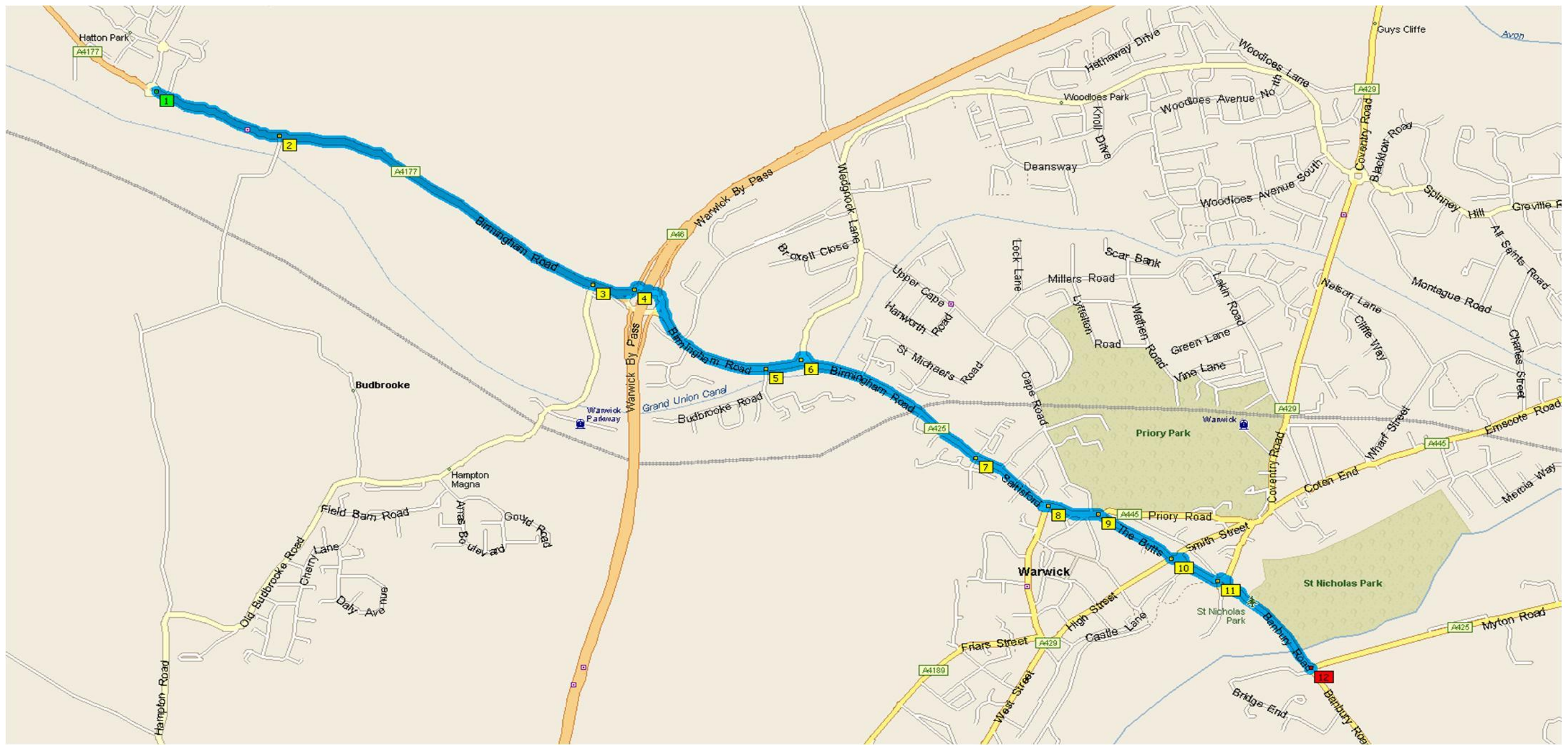
Route EB	00:18:22	00:15:29	00:02:53	-16%	FAIL
Route WB	00:07:57	00:06:15	00:01:43	-21%	FAIL

Route 2 EB	00:10:28	00:09:14	00:01:14	-12%	PASS
Route 2 WB	00:10:06	00:08:12	00:01:54	-19%	FAIL

Amended Route Analysis

Route EB 1	00:05:14	00:05:09	00:00:05	-2%	PASS
Route WB 1	00:03:11	00:02:25	00:00:46	-24%	PASS
Route EB 2	00:08:30	00:08:23	00:00:07	-1%	PASS
Route WB 2	00:04:46	00:03:50	00:00:56	-20%	PASS

Route EB 1	00:03:15	00:02:34	00:00:41	-21%	PASS
Route WB 1	00:03:38	00:02:38	00:00:59	-27%	PASS
Route EB 2	00:07:13	00:06:40	00:00:33	-8%	PASS
Route WB 2	00:06:28	00:05:33	00:00:55	-14%	PASS



SECTIONAL ANALYSIS

09:00:00					
AM	**OBS**	**MOD**	**DIFF**	**% DIFF**	**DMRB Criteria**
Route 2 EB Sec 1	00:00:29	00:00:23	00:00:07	-23%	PASS
Route 2 EB Sec 2	00:01:20	00:01:05	00:00:15	-19%	PASS
Route 2 EB Sec 3	00:00:21	00:00:15	00:00:07	-32%	PASS
Route 2 EB Sec 4	00:00:51	00:00:37	00:00:13	-26%	PASS
Route 2 EB Sec 5	00:00:10	00:00:12	00:00:01	14%	PASS
Route 2 EB Sec 6	00:01:32	00:01:09	00:00:22	-24%	PASS
Route 2 EB Sec 7	00:00:32	00:00:40	00:00:08	26%	PASS
Route 2 EB Sec 8	00:00:25	00:00:28	00:00:03	12%	PASS
Route 2 EB Sec 9	00:01:54	00:02:59	00:01:05	57%	FAIL
Route 2 EB Sec 10	00:00:21	00:00:11	00:00:10	-48%	PASS
Route 2 EB Sec 11	00:00:44	00:00:34	00:00:10	-23%	PASS
Route 2 WB Sec 11	00:00:39	00:00:36	00:00:02	-6%	PASS
Route 2 WB Sec 10	00:00:38	00:00:24	00:00:14	-36%	PASS
Route 2 WB Sec 9	00:00:36	00:00:29	00:00:07	-21%	PASS
Route 2 WB Sec 8	00:00:20	00:00:19	00:00:01	-4%	PASS
Route 2 WB Sec 7	00:00:53	00:00:41	00:00:12	-22%	PASS
Route 2 WB Sec 6	00:00:59	00:00:50	00:00:09	-15%	PASS
Route 2 WB Sec 5	00:00:11	00:00:10	00:00:01	-12%	PASS
Route 2 WB Sec 4	00:00:36	00:00:26	00:00:10	-28%	PASS
Route 2 WB Sec 3	00:00:27	00:00:09	00:00:19	-68%	PASS
Route 2 WB Sec 2	00:01:09	00:00:15	00:00:54	-79%	PASS
Route 2 WB Sec 1	00:00:31	00:01:22	00:00:50	161%	PASS
				Count	22
				PASS	95%
				FAIL	5%

18:00:00					
PM	**OBS**	**MOD**	**DIFF**	**% DIFF**	**DMRB Criteria**
Route 2 EB Sec 1	00:00:34	00:00:23	00:00:11	-33%	PASS
Route 2 EB Sec 2	00:01:14	00:01:04	00:00:10	-13%	PASS
Route 2 EB Sec 3	00:00:12	00:00:15	00:00:03	28%	PASS
Route 2 EB Sec 4	00:00:43	00:00:37	00:00:06	-14%	PASS
Route 2 EB Sec 5	00:00:11	00:00:11	00:00:00	-1%	PASS
Route 2 EB Sec 6	00:01:11	00:01:09	00:00:02	-3%	PASS
Route 2 EB Sec 7	00:00:30	00:00:32	00:00:02	6%	PASS
Route 2 EB Sec 8	00:00:19	00:00:46	00:00:26	137%	PASS
Route 2 EB Sec 9	00:01:08	00:01:37	00:00:29	42%	PASS
Route 2 EB Sec 10	00:00:19	00:00:11	00:00:08	-43%	PASS
Route 2 EB Sec 11	00:00:40	00:00:34	00:00:06	-15%	PASS
Route 2 WB Sec 11	00:00:45	00:00:38	00:00:08	-17%	PASS
Route 2 WB Sec 10	00:00:40	00:00:23	00:00:17	-44%	PASS
Route 2 WB Sec 9	00:00:36	00:00:28	00:00:08	-22%	PASS
Route 2 WB Sec 8	00:00:17	00:00:24	00:00:06	37%	PASS
Route 2 WB Sec 7	00:00:48	00:00:50	00:00:02	4%	PASS
Route 2 WB Sec 6	00:00:58	00:00:57	00:00:01	-2%	PASS
Route 2 WB Sec 5	00:00:11	00:00:10	00:00:02	-14%	PASS
Route 2 WB Sec 4	00:00:39	00:00:27	00:00:12	-31%	PASS
Route 2 WB Sec 3	00:00:24	00:00:09	00:00:15	-63%	PASS
Route 2 WB Sec 2	00:01:13	00:00:16	00:00:57	-78%	PASS
Route 2 WB Sec 1	00:00:33	00:01:25	00:00:52	156%	PASS
				Count	22
				PASS	100%
				FAIL	0%

Full Route Analysis

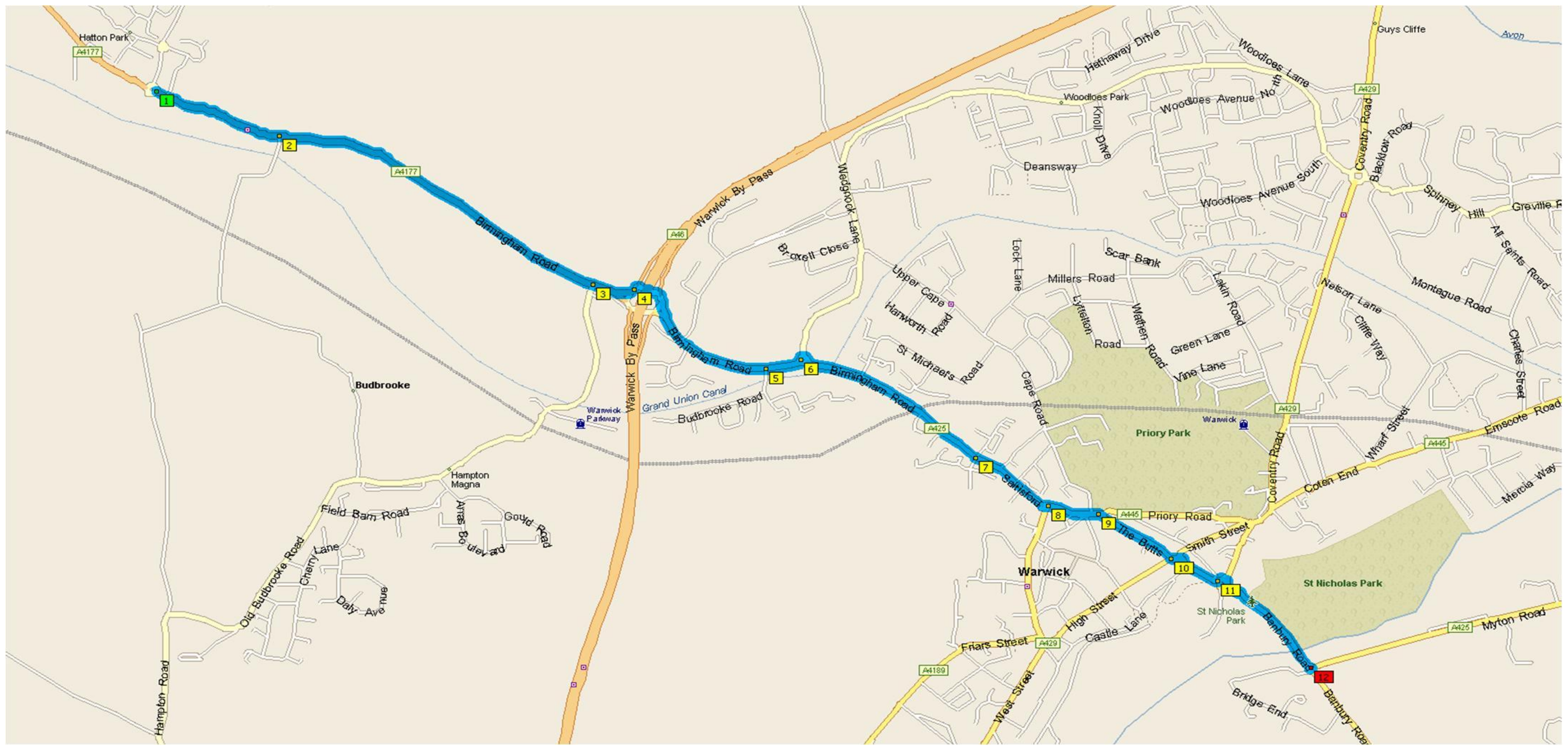
Route EB	00:08:39	00:08:33	00:00:06	-1%	PASS
Route WB	00:07:00	00:05:40	00:01:19	-19%	FAIL

Route 2 EB	00:07:00	00:07:17	00:00:16	4%	PASS
Route 2 WB	00:07:05	00:06:06	00:00:59	-14%	PASS

Amended Route Analysis

Route EB 1	00:03:12	00:02:31	00:00:41	-21%	PASS
Route WB 1	00:02:55	00:02:21	00:00:34	-20%	PASS
Route EB 2	00:03:56	00:04:53	00:00:57	24%	PASS
Route WB 2	00:04:05	00:03:19	00:00:45	-19%	PASS

Route EB 1	00:02:52	00:02:28	00:00:24	-14%	PASS
Route WB 1	00:03:00	00:02:27	00:00:33	-18%	PASS
Route EB 2	00:04:08	00:04:48	00:00:40	16%	PASS
Route WB 2	00:04:05	00:03:39	00:00:26	-11%	PASS



Appendix D

NTEM Factors

D1 NTEM West Midlands Factor Table

Region: West Midlands	Urban				All Urban Roads	Rural				All	All Roads
	Urban Mway	Urban Trunk	Urban Principal	Urban Minor		Rural Mway	Rural Trunk	Rural Principal	Rural Minor	Rural Roads	All Roads
2003	1	1	1	1	1	1	1	1	1	1	1
2004	1.00565	1.00407	1.00327	1.00407	1.00407	1.00565	1.00487	1.00407	1.00487	1.00487	1.00487
2005	1.01134	1.00816	1.00656	1.00816	1.00816	1.01134	1.00976	1.00816	1.00976	1.00976	1.00976
2006	1.01706	1.01227	1.00985	1.01227	1.01227	1.01706	1.01467	1.01227	1.01467	1.01467	1.01467
2007	1.02281	1.01640	1.01316	1.01640	1.01640	1.02281	1.01961	1.01640	1.01961	1.01961	1.01961
2008	1.02859	1.02054	1.01648	1.02054	1.02054	1.02859	1.02458	1.02054	1.02458	1.02458	1.02458
2009	1.03441	1.02470	1.01980	1.02470	1.02470	1.03441	1.02956	1.02470	1.02956	1.02956	1.02956
2010	1.04026	1.02887	1.02314	1.02887	1.02887	1.04026	1.03457	1.02887	1.03457	1.03457	1.03457
2011	1.04614	1.03306	1.02649	1.03306	1.03306	1.04614	1.03961	1.03306	1.03961	1.03961	1.03961
2012	1.05205	1.03727	1.02985	1.03727	1.03727	1.05205	1.04467	1.03727	1.04467	1.04467	1.04467
2013	1.05800	1.04150	1.03322	1.04150	1.04150	1.05800	1.04976	1.04150	1.04976	1.04976	1.04976
2014	1.06398	1.04574	1.03661	1.04574	1.04574	1.06398	1.05487	1.04574	1.05487	1.05487	1.05487
2015	1.07000	1.05000	1.04000	1.05000	1.05000	1.07000	1.06000	1.05000	1.06000	1.06000	1.06000
2016	1.09020	1.06322	1.05499	1.06500	1.06588	1.08849	1.07501	1.06233	1.07323	1.07501	1.07501
2017	1.11077	1.07662	1.07019	1.08021	1.08199	1.10731	1.09023	1.07480	1.08663	1.09023	1.09023
2018	1.13174	1.09018	1.08562	1.09564	1.09835	1.12644	1.10566	1.08742	1.10019	1.10566	1.10566
2019	1.15310	1.10391	1.10127	1.11129	1.11496	1.14591	1.12131	1.10019	1.11393	1.12131	1.12131
2020	1.17486	1.11781	1.11714	1.12716	1.13181	1.16572	1.13719	1.11310	1.12783	1.13719	1.13719
2021	1.19704	1.13189	1.13324	1.14327	1.14892	1.18587	1.15329	1.12617	1.14191	1.15329	1.15329
2022	1.21963	1.14615	1.14957	1.15960	1.16630	1.20636	1.16962	1.13939	1.15616	1.16962	1.16962
2023	1.24265	1.16058	1.16614	1.17616	1.18393	1.22721	1.18618	1.15277	1.17059	1.18618	1.18618
2024	1.26610	1.17520	1.18295	1.19296	1.20183	1.24842	1.20297	1.16631	1.18521	1.20297	1.20297
2025	1.29000	1.19000	1.20000	1.21000	1.22000	1.27000	1.22000	1.18000	1.20000	1.22000	1.22000
2026	1.30785	1.20511	1.21422	1.22601	1.23513	1.28695	1.23513	1.19510	1.21600	1.23602	1.23602
2027	1.32594	1.22041	1.22860	1.24224	1.25044	1.30412	1.25044	1.21039	1.23222	1.25225	1.25225
2028	1.34428	1.23590	1.24316	1.25867	1.26595	1.32152	1.26595	1.22588	1.24866	1.26869	1.26869
2029	1.36288	1.25159	1.25789	1.27533	1.28164	1.33915	1.28164	1.24157	1.26531	1.28535	1.28535
2030	1.38174	1.26748	1.27279	1.29221	1.29754	1.35702	1.29754	1.25746	1.28219	1.30223	1.30223
2031	1.40085	1.28357	1.28787	1.30931	1.31362	1.37513	1.31362	1.27355	1.29929	1.31933	1.31933
2032	1.42023	1.29986	1.30313	1.32663	1.32991	1.39347	1.32991	1.28985	1.31661	1.33665	1.33665
2033	1.43988	1.31637	1.31857	1.34419	1.34640	1.41207	1.34640	1.30635	1.33417	1.35420	1.35420
2034	1.45980	1.33308	1.33419	1.36198	1.36310	1.43091	1.36310	1.32307	1.35197	1.37198	1.37198
2035	1.48000	1.35000	1.35000	1.38000	1.38000	1.45000	1.38000	1.34000	1.37000	1.39000	1.39000

Appendix E

Warwick Bluetooth Survey – Data Analysis

Warwickshire County Council

Warwick Bluetooth Survey

Data Analysis Report

211439-19.R012

Draft 1 | 3 April 2013

Job number 211439-19

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ARUP

Contents

1 Introduction

Arup have been commissioned by Warwickshire County Council (WCC) to assess the outputs of a recent town-wide origin and destination survey undertaken through the collection of Bluetooth signals across the network.

This report details the methodology and results of the survey which was undertaken between the 7th of July 2012 and 13th July 2012 around Warwick town, including analysis of the outputs. The survey was carried out across two concentric cordons, with one inner town and one outer town cordon boundary having been defined.

The purpose of two cordons was to ascertain the types of trip pattern undertaken across the entire area and allow through trips (trips travelling through the entire network) to be captured and enumerated at the same time. The Bluetooth survey was carried out by Sky High Traffic on behalf of WCC.

This report offers an overall conclusion on the robustness of the data and the impact of traffic on Warwick.

1.1 Report Structure

The remainder of this report is set out as follows:

- **Section 2** – Outlines the study objectives
- **Section 3** – Summarises the Survey Methodology
- **Section 4** – Analysis of Results
- **Section 5** – Results & Findings
- **Section 6** – Summary & Conclusions

2 Study Objectives

The objectives of this study are outlined as follows:

- To identify the number of vehicles travelling to, from and through Warwick town.
- To identify how many of these vehicles are associated with local through traffic or long distance through traffic.
- To find totals for all movement identified in Table 1.
- To determine the sample rate at each cordon site by period.
- To make an assessment of all of the above for the following time periods;
    - 07:00– 10:00
    - 10:00 – 15:00
    - 15:00 – 16:00
    - 16:00 – 19:00.

- To produce an initial periodic matrix of movements that can later be factored to produce a Prior Matrix for the purpose of O-D Matrix Estimation of the study area.

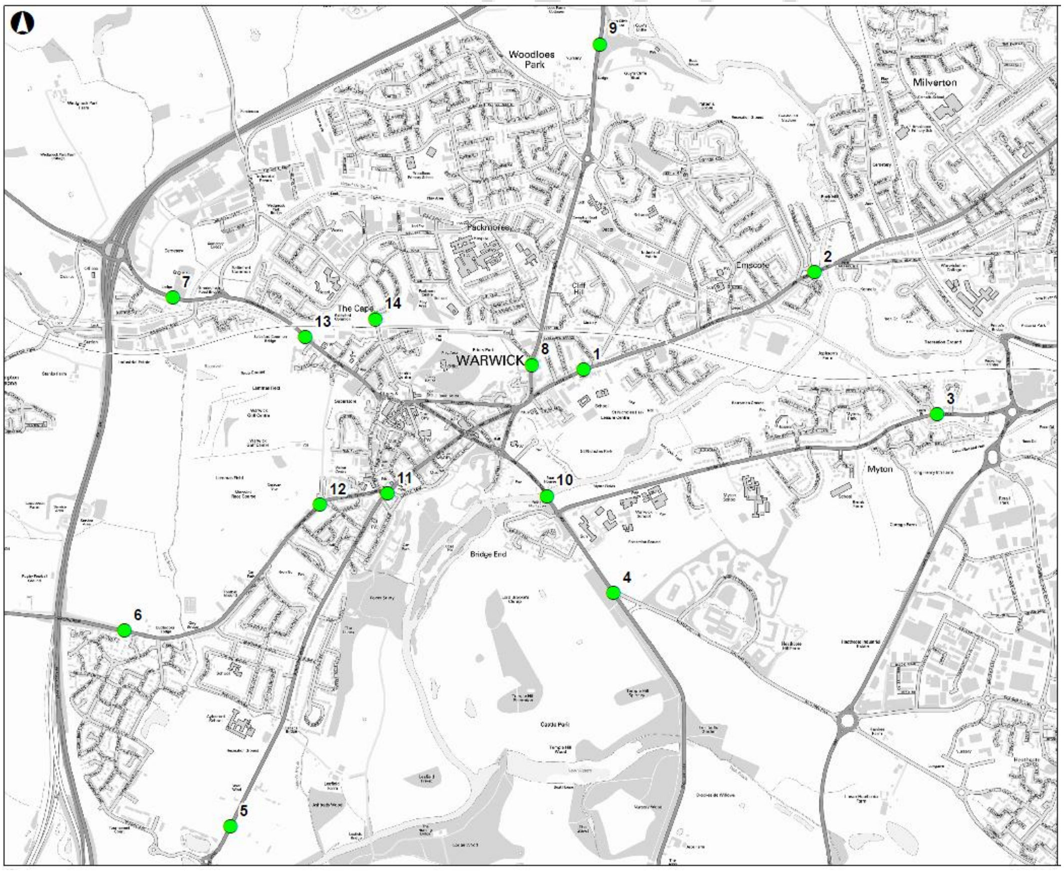
3 Survey Methodology

3.1 Area of Survey

In order to identify the vehicular movements within and through Warwick town, the location of two cordons, used for a previous study undertaken by Warwickshire County Council which can be found in Appendix A, were chosen for the purposes of this assessment. The benefit of using the existing cordon locations is that it allows comparisons to be made against the old information when examining the newly collected data.

The following Figure 1 shows the cordon location points. The Outer cordon encompasses the wider area of Warwick and is made up of sites, 2, 3, 4, 5, 6, 7 & 9. The Inner cordon encompasses Warwick town centre and is made up of the sites, 1, 8, 10, 11, 12, 13 & 14.

Figure 1 Cordon Location Plot



The cordon points cover all of the major routes into and out of Warwick. Importantly, there are no gaps in the cordon as this could result in some vehicle route patterns being incorrectly categorised.

3.2 Data Capture Methodology

In order track vehicle movements through the cordons, it was identified that Bluetooth Vehicle Tracking could provide an efficient solution. The main advantages of capturing traffic data via Bluetooth is that data can be collected over a 24 hour period for a large number of days. Other advantages include, poor weather conditions will not affect the quality of the data and covert recording maintains driver normality.

Fourteen Bluetooth scanning units were placed at the cordon point locations illustrated in the previous Figure 1. These scanning units were positioned at the roadside, for example on street lighting columns. Once the units were active they scanned for any active Bluetooth devices with a set range of the unit and logged the unique Bluetooth device identification code with a date and time.

3.3 Survey Dates & Times

To capture a typical week with average traffic flows and traffic behaviour, the survey commenced at 00:00 on the 7th of July 2012 and ran until 00:00 14th July 2012. These dates covered a weekend and full working week. The survey was undertaken in July, which is a neutral month, to provide the best representation of normal traffic conditions around Warwick.

3.4 Raw Survey Data

A review was carried out of the raw Bluetooth cordon data after the survey was completed. The review was undertaken in order establish that the data was recorded correctly and individual trips were identified clearly. The figure below shows a sample of the raw data recorded by the scanning units.

Figure 2 Sample of Raw Bluetooth data

SiteId	**"MAC000149201"**
SiteName	"149201"
SiteDescription	"Coten End"
SiteLatitude	52.28492
SiteLongitude	-1.5769
Data Start	2012-07-07 00:00:00
Data End	2012-07-08 00:00:00
RecTime	VehicleId
07/07/2012 00:00	470DFB00E80E
07/07/2012 00:00	BE71FC439398
07/07/2012 00:01	65234100CCF2
07/07/2012 00:02	288AF44D8900
07/07/2012 00:03	A5EC798E5D68
07/07/2012 00:04	F310BD0066C4
07/07/2012 00:06	AE075A00D9F8

The review identified issues with the following sites;

- Site 11 - failed to record any data until it commenced recording at 16:14 on the 9th of July.

- Site 7 - on the 13th of July stopped recording as a result of an inquisitive street lighting engineer removed the scanning unit. **[WCC to confirm]**

The review also identified a limitation of the Bluetooth data in so far as that, in order to establish trip direction, two cordon points must be passed by a vehicle containing a unique Bluetooth device ID.

Unfortunately, no information as to the direction in which the vehicle is travelling is recorded. The lack of information regarding the direction of travel makes identifying any movement which only crosses one cordon point impossible. The movements affected are listed below;

- Local town centre trips stopping in the Warwick wider area;
- Warwick wider area trips stopping in Warwick town centre;
- Warwick wider area trips leaving Warwick;
- Trips entering the Warwick wider area.

4 Survey Analysis

4.1 Identifying Unique Vehicle Trips

Each Bluetooth scanning unit records vehicles in time stamp order, which as a result produces a list of multiple Record Times and Vehicle ID's shown in the previous Figure 2. The following tasks were carried out to convert these data lists into unique vehicle trip so it can be classified against a trip type during the later stages of the analysis.

The first stage was to identify a unique vehicle trip the raw survey data for each of the 14 cordon points was separated into the following time periods;

- 07:00 – 10:00
- 10:00 – 15:00
- 15:00 – 16:00
- 16:00 – 19:00

In order that it could be guaranteed that a trip which spent the majority of its time travelling within the respective period, but started or ended outside of that period, where included within the analysis, an hour either side of the time period was included at this stage. The purpose of this stage is to ensure that a trip which starts or ends outside the assessment time period but spends the majority of transit time within the assessment period, is not discounted. For example, if only trips captured as commencing between 07:00 to 10:00 were assessed then a trip which started at 06:45 to 08:30 would not be included despite the majority of transit time occurring within the 07:00 to 08:00 hour.

Each site was then combined and ordered chronologically. A list of unique vehicles was established using the vehicle ID assigned by the Bluetooth survey data. This enabled the entire journey for each unique vehicle within the period to be plotted. A maximum of 20 cordon points passed were plotted since this was considered acceptable as any trip passing more than 20 sites would be considered illogical. There could be instances where it would be reasonable to assume that more than 20 cordon points would be passed within a time period, for example a Bus serving the Warwick & the wider area. However it was accepted that buses would represent a small percentage of overall trips captured and thus, not significant to the overall analysis.

4.2 Processing & Categorising the Data

Each vehicle trip was subject to a set of conditions to remove any illogical data and to ensure that the most likely vehicle movement was identified and assigned to a viable trip movement classification. These conditions were as follows;

- Any unique trip containing a time interval of greater than 25 minutes between crossing two cordon points would be identified as the start of a new trip. This provides a reasonable amount of time for a through trip to travel through the cordons within the busiest period and not be incorrectly classified as a new trip.

- Any unique trip recorded at the same site location within a 15 second period would have the double counted record removed. This would ensure that a logical trip pattern would be assigned at a later stage of the analysis. 15 seconds was considered an appropriate amount of time on review of the road network.

- Any unique trip, separated out into individual start times was then removed if majority of the trip transit time was spent outside the time period being assessed. This ensures that a trip would not be assigned an incorrect trip pattern by only assessing a trip from the point at which the period starts or ends.

4.3 Identifying Trip Movements

There are 11 possible movements required to be identified from the analysis of the two cordons shown in Figure 3. The following Figure 3 and Table 1 describe the 11 possible movements and the combination of Entry/Exit and Outer/Inner cordon points that classify each movement.

Figure 3 possible trip movements

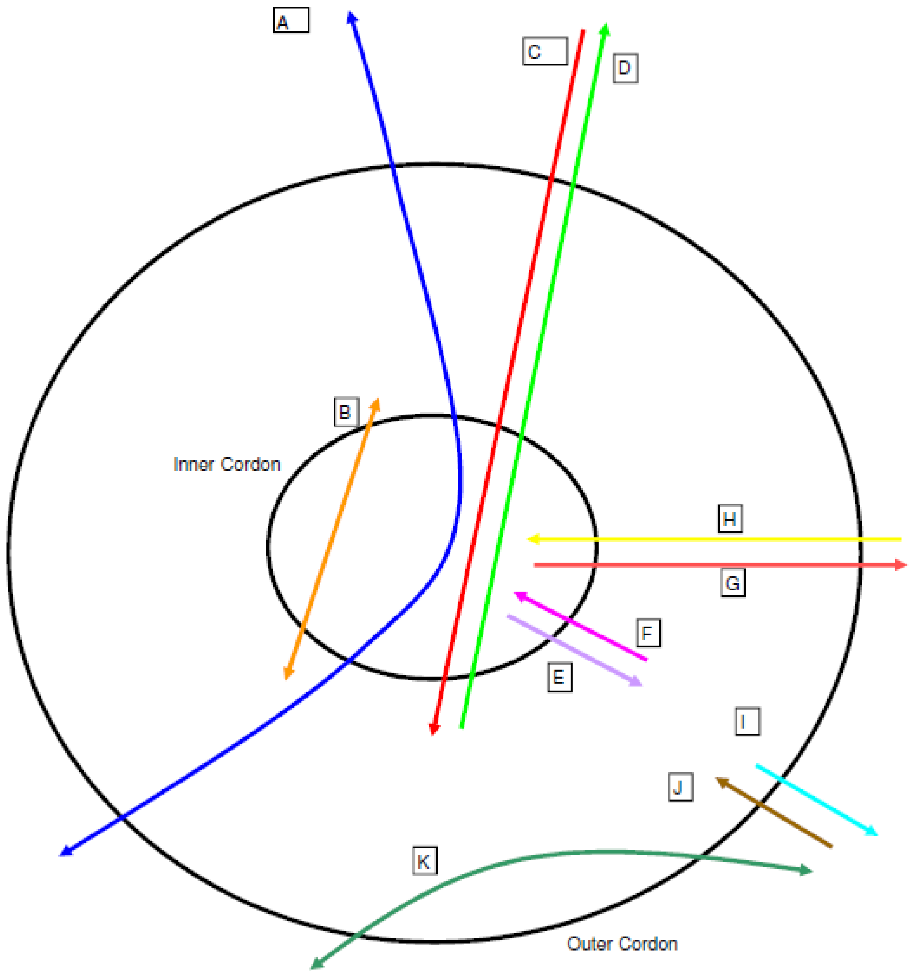


Table 1 Table of possible movements

ID	**Movement**	**Entry** Outer	**Entry** Inner	**Exit** Inner	**Exit** Outer
A	Long distance town centre trips	✓	✓	✓	✓
B	Local town centre through trips		✓	✓	
C	Long distance town centre through trips starting outside the outer cordon and stopping within the Warwick wider area	✓	✓	✓	
D	Long distance town centre through trips starting within the Warwick wider area and stopping outside the outer cordon		✓	✓	✓
E	Local town centre trips stopping in the Warwick wider area.			✓	

F	Warwick wider area trips stopping in Warwick town centre.		✓		
G	Town centre traffic travelling long distance to outside the outer cordon.			✓	✓
H	Long distance trips arriving in Warwick town centre	✓	✓		
I	Warwick wider area trips leaving Warwick				✓
J	Trips entering the Warwick wider area	✓			
K	Warwick wider are through trips	✓			✓

To establish the trip patterns detailed above, a concatenation of the site type for each unique vehicle trip was made. This concatenation was used to match the movement against each unique trip.

4.4 Data Errors

For movements which only require one cordon point to be recorded, E, F, I and J it was not possible to establish the direction of travel across an individual cordon point as this data was not recorded by the Bluetooth survey. To overcome this issue a directional factor was determined for each period using the automatic traffic counters ATC's for each period assessed.

Table 2 Average ATC directional split at Inner & Outer cordon sites.

	0700-1000		**1000-1500**		**1500-1600**		**1600-1900**	
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
Average Inner Cordon Sites	59%	41%	51%	49%	50%	50%	45%	55%
Average Outer Cordon Sites	45%	55%	49%	51%	52%	48%	53%	47%

As explained above part of identifying the 11 possible movement types the process uses a concatenation of the site type for each unique vehicle. This concatenation was used to match the movement against each unique trip. However not every concatenation provided a logical trip movement for example "Outer Inner Inner Outer Outer" would be considered an illogical movement type and would not be classified. It was clear to see that this trip should be classified as trip type A (Long distance town centre trips), as it includes the correct cordon sites to be passed "Outer Inner Inner Outer".To make sure that these trips were not unfairly excluded from the analysis a list of unmatched concatenations were extracted and matched manually were logical trip patterns occurred.

4.5 Data Factoring

Origin and destination matrices were produced using the trip origin and destination cordon points for each individual trip identified within each time period. To factor up these matrices to the ATC count data collected, the matrices were converted into proportional matrices. An average row and column total was calculated and the sum of all ATC cordon sites inbound and outbound were calculated and applied to the respective average row and column total. This enabled each matrix to be factored to the sum of the inbound and outbound cordon counts. The Factored matrices are included within Appendix B.

5 Results & Findings

5.1 Robustness of Results

Table 3 percentage of matched movements to ATC count

Survey Day	0700-1000	1000-1500	1500-1600	1600-1900
Saturday	7%	18%	17%	12%
Sunday	5%	15%	12%	10%
Monday	10%	18%	25%	22%
Tuesday	20%	17%	26%	21%
Wednesday	21%	18%	26%	21%
Thursday	18%	18%	21%	18%
Friday	16%	16%	22%	19%

The previous Table shows the sample of total number of matched movements as a percentage of the total ATC counts carried out for each period on Monday the 9th of July 2012 for all inner and outer cordon sites. The Saturday, Sunday & the Monday 0700-1000 time periods demonstrate a reduced percentage when compared to the remainder of the week which can be explained by site 11 not having been operational during this time.

The results demonstrate that when all the sites were active a sample rate of 17% or more was achieved across all time periods. These results are considered reasonable when relying on vehicles with Bluetooth devices within their vehicles and therefore represent a robust picture for Tuesday & Wednesday and the majority of Thursday.

5.2 Results

Appendix C provides a full summary for each individual movement for each day across the 4 time periods; all movements are expressed as vehicles. Additionally values are broken down as a portion of all movements across the time period and can be used to identify the predominant movement types

The results below are taken from the weekday (Tuesday) and weekend (Saturday) traffic data. The Tuesday provided a good sample as all sites were fully operational across all time periods and an adjustment was made to account for site 11 not working on the Saturday. The tables provide an insight into the nature of traffic using the Warwick road network. The table below is a summary of all movement types on Tuesday the 10th July 2012.

Table 4 Traffic Movements Identified Tuesday 10/07/2012

ID	Movement	Period			
		0700-1000	1000-1500	1500-1600	1600-1900
A	Long distance town centre trips	8%	6%	5%	6%
B	Local town centre through trips	8%	8%	7%	8%
C	Long distance town centre through trips starting outside the outer cordon and stopping within the Warwick wider area	8%	6%	5%	6%
D	Long distance town centre through trips starting within the Warwick wider area and stopping outside the outer cordon	5%	5%	4%	5%
E	Local town centre trips stopping in the Warwick wider area.	5%	8%	9%	8%
F	Warwick wider area trips stopping in Warwick town centre.	7%	9%	9%	6%
G	Town centre traffic travelling long distance to outside the outer cordon.	5%	5%	5%	6%
H	Long distance trips arriving in Warwick town centre	7%	6%	3%	5%
I	Warwick wider area trips leaving Warwick	22%	20%	23%	20%
J	Trips entering the Warwick wider area	18%	18%	25%	23%
K	Warwick wider are through trips	8%	7%	6%	8%

The table above provides some interesting statistics, particularly when examining the volumes of the movements entering the outer cordon (A+C+H+J+K). The largest trip proportions are those stopping in the wider Warwick area but that never enters the town centre. This particular movement could be attributed to school, hospital and supermarket drop-off and pickup trips. The 15:00 – 16:00 hour has a higher percentage of trips entering the Warwick wider area which could occur as a result of this being the period in which the majority of School related trips occur during the PM period..

The Long distance trips entering the outer and inner cordon then exiting via the inner and outer cordon (movement type A) make up between 6 -8% of all trips identified across each of the time periods. The most noticeable change occurs within the 1500-1600 period for long distance trips arriving in Warwick town centre. They range between 5%-7% for the other periods however this drops to 3% which could be as a result of the increase in school pickup trips.

Table 5 Traffic passing through the inner cordon Tuesday 10/07/2012

ID	Movement	Period			
		0700-1000	1000-1500	1500-1600	1600-1900
A	Long distance town centre trips	29%	25%	25%	24%
B	Local town centre through trips	26%	31%	34%	33%
C + D	Warwick wider area to Warwick outside or outside to Warwick wider area.	45%	44%	41%	43%

Traffic passing through the inner cordon 'through town centre' trips comprise of 29% of all movements. The relative proportions of these through trips are detailed in the table above. It can be seen that long distance traffic makes up a significant proportion of through town centre trips in all periods however it should be noted that around 75% of through trips are generated locally within the wider Warwick area.

Table 6 Traffic entering the outer cordon Tuesday 10/07/2012

ID	Movement	Period			
		0700-1000	1000-1500	1500-1600	1600-1900
A	Long distance town centre trips	16%	15%	10%	12%
C	Long distance town centre through trips starting outside the outer cordon and stopping within the Warwick wider area	9%	9%	7%	7%
H	Long distance trips arriving in Warwick town centre	14%	15%	10%	13%
J	Trips entering the Warwick wider area	42%	43%	61%	54%
K	Warwick wider are through trips	18%	18%	12%	14%

The table above shows that the proportions of long distance traffic passing through the town centre are similar to those of traffic stopping in the Warwick wider area having passed through the town centre. The largest proportions are those of traffic stopping in the wider Warwick area, trip type J.

Table 7 Traffic Movements Identified 07/07/2012 (Weekend)

ID	Movement	Period			
		0700-1000	1000-1500	1500-1600	1600-1900
A	Long distance town centre trips	6%	5%	4%	4%
B	Local town centre through trips	11%	12%	8%	11%
C	Long distance town centre through trips starting outside the outer cordon and stopping within the Warwick wider area	8%	7%	4%	7%
D	Long distance town centre through trips starting within the Warwick wider area and stopping outside the outer cordon	7%	6%	4%	6%
E	Local town centre trips stopping in the Warwick wider area.	7%	11%	13%	12%
F	Warwick wider area trips stopping in Warwick town centre.	10%	12%	13%	9%
G	Town centre traffic travelling long distance to outside the outer cordon.	4%	4%	4%	4%
H	Long distance trips arriving in Warwick town centre	5%	5%	3%	4%
I	Warwick wider area trips leaving Warwick	19%	17%	20%	18%
J	Trips entering the Warwick wider area	15%	15%	22%	19%
K	Warwick wider are through trips	9%	6%	5%	5%

The table above details the trip movements identified on the Saturday 07th July 2012. Again trips entering and leaving the Warwick wider area (I + J) make up a large proportion of the trip movement types. Trip type B Local town centre through trips appear to increase when compared with the weekday trip type and could be attributed to local residents residing within the outer cordon travelling through Warwick as for recreational trips instead of trips to their workplace or school.

6 Summary & Conclusions

6.1 Summary

A comprehensive Bluetooth survey recording all vehicles using Bluetooth devices was successfully undertaken over a 7 day period between 7th of July 2012 and 13th July 2012 around Warwick and the Town centre. Some minor problems occurred with data collection at 1 of the 14 cordon sites however this only affected 2 days of the survey. The data was successfully used to identify the different trip movements that occurred between the 2 cordons. The data was also used to produce origin and destination matrices for each of the time periods specified in the requirements of the survey.

6.2 Conclusion

The results section has clearly identified that the majority of trip movements occurring between the 2 cordons are Warwick wider area trips leaving Warwick and Trips entering the Warwick wider area. These movements only require trips to be picked up crossing one cordon point while the total number of both these movements can be considered robust, the directional split should be treated with caution. The split was calculated form the average inbound and outbound ATC counts carried out on the first day of the survey. Interestingly the percentage between the reaming movement types did not change greatly between periods and indicates that the trip movement's types were stable throughout the day. The Monday results between 07:00 and 10:00 don't appear to conform with the majority of data collected over the course of the week with very low A, B, C, D & K trips being recorded. These results could be explained by site 11 coming back into operation on this day. The results show that of the 29% through town centre trips, around 75% are generated locally within the Warwick Wider area and any scheme to reduce and/or manage traffic in the town centre should recognise this.

Appendix B

Cordon Matrices

07/07/2012 (Saturday)

0700-1000	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	0	12	2	4	6	0	4	8	2	7	0	3	1	2
2	27	30	4	2	12	3	14	6	12	4	0	0	4	0
3	1	4	25	5	6	2	6	2	3	19	0	3	5	2
4	1	2	4	1	1	1	8	5	7	25	0	3	3	0
5	3	3	4	1	16	0	0	2	2	7	0	1	0	0
6	2	3	8	2	3	5	1	1	0	5	0	7	1	2
7	2	13	5	3	1	0	15	2	2	5	0	3	6	6
8	0	3	4	7	0	0	0	9	11	11	0	0	1	1
9	3	16	0	12	0	0	3	18	27	18	0	2	1	0
10	4	5	17	21	5	3	6	7	10	17	0	0	3	5
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	7	3	4	0	2	2	6	0	1	3	0	10	7	4
13	5	7	5	2	2	0	33	0	2	11	0	6	12	2
14	3	0	4	7	5	0	9	2	0	5	0	3	1	1

0700-1000	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Column To	Average Row & Col
1	0	0.013621	0.00227	0.00454	0.00681	0	0.00454	0.009081	0.00227	0.007946	0	0.003405	0.001135	0.00227	0.057889	0.061862
2	0.030646992	0.034052	0.00454	0.00227	0.013621	0.003405	0.015891	0.00681	0.013621	0.00454	0	0	0.00454	0	0.133939	0.124291
3	0.001135074	0.00454	0.028377	0.005675	0.00681	0.00227	0.00681	0.00227	0.003405	0.021566	0	0.003405	0.005675	0.00227	0.094211	0.095914
4	0.001135074	0.00227	0.00454	0.001135	0.001135	0.001135	0.009081	0.005675	0.007946	0.028377	0	0.003405	0.003405	0	0.06924	0.072645
5	0.003405221	0.003405	0.00454	0.001135	0.018161	0	0	0.00227	0.00227	0.007946	0	0.001135	0	0	0.044268	0.055619
6	0.002270148	0.003405	0.009081	0.00227	0.003405	0.005675	0.001135	0.001135	0	0.005675	0	0.007946	0.001135	0.00227	0.045403	0.031782
7	0.002270148	0.014756	0.005675	0.003405	0.001135	0	0.017026	0.00227	0.00227	0.005675	0	0.003405	0.00681	0.00681	0.07151	0.095346
8	0	0.003405	0.00454	0.007946	0	0	0	0.010216	0.012486	0.012486	0	0	0.001135	0.001135	0.053348	0.061862
9	0.003405221	0.018161	0	0.013621	0	0	0.003405	0.020431	0.030647	0.020431	0	0.00227	0.001135	0	0.113507	0.101589
10	0.004540295	0.005675	0.019296	0.023837	0.005675	0.003405	0.00681	0.007946	0.011351	0.019296	0	0	0.003405	0.005675	0.116913	0.136209
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0.007945516	0.003405	0.00454	0	0.00227	0.00227	0.00681	0	0.001135	0.003405	0	0.011351	0.007946	0.00454	0.055619	0.051078
13	0.005675369	0.007946	0.005675	0.00227	0.00227	0	0.037457	0	0.00227	0.012486	0	0.00681	0.013621	0.00227	0.098751	0.074915
14	0.003405221	0	0.00454	0.007946	0.005675	0	0.010216	0.00227	0	0.005675	0	0.003405	0.001135	0.001135	0.045403	0.03689
Column Total	0.065834279	0.114642	0.097616	0.07605	0.066969	0.018161	0.119183	0.070375	0.089671	0.155505	0	0.046538	0.051078	0.028377		
Average Row & Col	0.061861521	0.124291	0.095914	0.072645	0.055619	0.031782	0.095346	0.061862	0.101589	0.136209	0	0.051078	0.074915	0.03689		

1000-1500	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	10	78	9	17	37	12	28	21	17	31	0	8	6	7
2	82	80	14	9	30	13	38	11	44	13	0	8	7	9
3	5	26	105	27	27	13	30	7	7	78	0	15	16	8
4	13	10	20	2	5	2	22	16	29	47	0	4	7	7
5	21	33	20	5	34	6	4	6	5	27	0	5	7	0
6	17	20	15	5	7	8	8	9	3	12	0	25	6	6
7	9	27	27	11	3	2	45	3	10	20	0	12	7	9
8	17	17	6	15	3	3	3	43	41	19	0	3	5	5
9	14	48	18	23	6	3	11	48	49	53	0	1	2	5
10	21	15	88	67	14	6	31	24	34	44	0	11	24	14
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	14	20	12	4	9	18	18	3	5	7	0	44	6	11
13	14	11	31	13	9	3	110	4	6	19	0	24	25	4
14	6	9	23	3	3	0	12	3	5	15	0	6	4	0

1000-1500	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Column To	Average Row & Col
1	0.011350738	0.088536	0.010216	0.019296	0.041998	0.013621	0.031782	0.023837	0.019296	0.035187	0	0.009081	0.00681	0.007946	0.318956	0.297389
2	0.09307605	0.090806	0.015891	0.010216	0.034052	0.014756	0.043133	0.012486	0.049943	0.014756	0	0.009081	0.007946	0.010216	0.406356	0.426788
3	0.005675369	0.029512	0.119183	0.030647	0.030647	0.014756	0.034052	0.007946	0.007946	0.088536	0	0.017026	0.018161	0.009081	0.413167	0.426788
4	0.014755959	0.011351	0.022701	0.00227	0.005675	0.00227	0.024972	0.018161	0.032917	0.053348	0	0.00454	0.007946	0.007946	0.208854	0.218502
5	0.023836549	0.037457	0.022701	0.005675	0.038593	0.00681	0.00454	0.00681	0.005675	0.030647	0	0.005675	0.007946	0	0.196368	0.204313
6	0.019296254	0.022701	0.017026	0.005675	0.007946	0.009081	0.009081	0.010216	0.003405	0.013621	0	0.028377	0.00681	0.00681	0.160045	0.130533
7	0.010215664	0.030647	0.030647	0.012486	0.003405	0.00227	0.051078	0.003405	0.011351	0.022701	0	0.013621	0.007946	0.010216	0.209989	0.309308
8	0.019296254	0.019296	0.00681	0.017026	0.003405	0.003405	0.003405	0.048808	0.046538	0.021566	0	0.003405	0.005675	0.005675	0.204313	0.214529
9	0.015891033	0.054484	0.020431	0.026107	0.00681	0.003405	0.012486	0.054484	0.055619	0.060159	0	0.001135	0.00227	0.005675	0.318956	0.3042
10	0.023836549	0.017026	0.099886	0.07605	0.015891	0.00681	0.035187	0.027242	0.038593	0.049943	0	0.012486	0.027242	0.015891	0.446084	0.441544
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0.015891033	0.022701	0.013621	0.00454	0.010216	0.020431	0.020431	0.003405	0.005675	0.007946	0	0.049943	0.00681	0.012486	0.194098	0.19126
13	0.015891033	0.012486	0.035187	0.014756	0.010216	0.003405	0.124858	0.00454	0.00681	0.021566	0	0.027242	0.028377	0.00454	0.309875	0.224177
14	0.006810443	0.010216	0.026107	0.003405	0.003405	0	0.013621	0.003405	0.005675	0.017026	0	0.00681	0.00454	0	0.101022	0.098751
Column Total	0.275822928	0.447219	0.440409	0.22815	0.212259	0.101022	0.408627	0.224745	0.289444	0.437003	0	0.188422	0.138479	0.096481		
Average Row & Col	0.29738933	0.426788	0.426788	0.218502	0.204313	0.130533	0.309308	0.214529	0.3042	0.441544	0	0.19126	0.224177	0.098751		

1500-1600	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	1	10	1	5	4	0	1	3	2	5	0	1	0	0
2	16	14	2	0	3	3	10	1	3	3	0	1	3	1
3	0	1	19	1	4	1	5	0	2	19	0	3	3	6
4	6	2	2	2	1	0	6	10	6	5	0	0	0	0
5	7	3	4	0	3	0	0	3	2	3	0	1	0	0
6	2	2	2	0	1	0	0	0	0	0	0	2	1	0
7	0	13	3	2	0	0	8	2	2	3	0	1	1	1
8	2	3	2	3	2	0	1	5	6	4	0	2	0	1
9	3	6	5	5	1	0	1	11	10	6	0	0	1	2
10	4	2	17	10	4	1	8	6	10	12	0	3	5	1
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	4	3	0	0	5	6	0	1	0	0	7	4	1
13	2	7	4	4	0	0	25	3	2	6	0	1	4	1
14	3	0	1	0	0	0	0	1	0	3	0	1	0	0

1500-1600	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Column To	Average Row & Col
1	0.001135074	0.011351	0.001135	0.005675	0.00454	0	0.001135	0.003405	0.00227	0.005675	0	0.001135	0	0	0.037457	0.044835
2	0.01816118	0.015891	0.00227	0	0.003405	0.003405	0.011351	0.001135	0.003405	0.003405	0	0.001135	0.003405	0.001135	0.068104	0.072077
3	0	0.001135	0.021566	0.001135	0.00454	0.001135	0.005675	0	0.00227	0.021566	0	0.003405	0.003405	0.00681	0.072645	0.073212
4	0.006810443	0.00227	0.00227	0.00227	0.001135	0	0.00681	0.011351	0.00681	0.005675	0	0	0	0	0.045403	0.040863
5	0.007945516	0.003405	0.00454	0	0.003405	0	0	0.003405	0.00227	0.003405	0	0.001135	0	0	0.029512	0.027809
6	0.002270148	0.00227	0.00227	0	0.001135	0	0	0	0	0	0	0.00227	0.001135	0	0.011351	0.011351
7	0	0.014756	0.003405	0.00227	0	0	0.009081	0.00227	0.00227	0.003405	0	0.001135	0.001135	0.001135	0.040863	0.060726
8	0.002270148	0.003405	0.00227	0.003405	0.00227	0	0.001135	0.005675	0.00681	0.00454	0	0.00227	0	0.001135	0.035187	0.043133
9	0.003405221	0.00681	0.005675	0.005675	0.001135	0	0.001135	0.012486	0.011351	0.00681	0	0	0.001135	0.00227	0.057889	0.055051
10	0.004540295	0.00227	0.019296	0.011351	0.00454	0.001135	0.009081	0.00681	0.011351	0.013621	0	0.003405	0.005675	0.001135	0.094211	0.086266
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0.00454	0.003405	0	0	0.005675	0.00681	0	0.001135	0	0	0.007946	0.00454	0.001135	0.035187	0.030647
13	0.002270148	0.007946	0.00454	0.00454	0	0	0.028377	0.003405	0.00227	0.00681	0	0.001135	0.00454	0.001135	0.066969	0.04597
14	0.003405221	0	0.001135	0	0	0	0	0.001135	0	0.003405	0	0.001135	0	0	0.010216	0.013053
Column Total	0.052213394	0.07605	0.07378	0.036322	0.026107	0.011351	0.08059	0.051078	0.052213	0.07832	0	0.026107	0.024972	0.015891		
Average Row & Col	0.044835414	0.072077	0.073212	0.040863	0.027809	0.011351	0.060726	0.043133	0.055051	0.086266	0	0.030647	0.04597	0.013053		

1600-1900	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	1	34	0	14	8	3	8	11	4	13	0	5	3	0
2	42	50	9	5	9	6	15	10	23	6	0	6	8	3
3	4	6	44	6	10	6	14	9	6	49	0	6	7	4
4	1	4	5	0	4	1	8	10	4	24	0	0	3	2
5	13	14	15	1	14	0	1	7	3	11	0	6	1	0
6	3	4	7	2	1	8	5	2	2	4	0	14	2	3
7	4	13	2	8	0	0	21	0	3	5	0	4	10	1
8	18	10	9	6	2	1	4	28	30	10	0	0	1	3
9	7	20	6	7	5	3	2	26	27	18	0	1	1	1
10	11	8	22	23	16	1	11	13	15	23	0	2	5	2
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	7	6	6	0	1	9	3	3	2	4	0	15	3	7
13	8	14	13	5	1	2	74	2	3	14	0	7	20	2
14	3	5	6	1	2	0	3	2	0	6	0	8	1	3

1600-1900	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Column To	Average Row & Col
1	0.001135074	0.038593	0	0.015891	0.009081	0.003405	0.009081	0.012486	0.00454	0.014756	0	0.005675	0.003405	0	0.118048	0.128263
2	0.047673099	0.056754	0.010216	0.005675	0.010216	0.00681	0.017026	0.011351	0.026107	0.00681	0	0.00681	0.009081	0.003405	0.217934	0.215664
3	0.004540295	0.00681	0.049943	0.00681	0.011351	0.00681	0.015891	0.010216	0.00681	0.055619	0	0.00681	0.007946	0.00454	0.194098	0.178774
4	0.001135074	0.00454	0.005675	0	0.00454	0.001135	0.009081	0.011351	0.00454	0.027242	0	0	0.003405	0.00227	0.074915	0.081725
5	0.014755959	0.015891	0.017026	0.001135	0.015891	0	0.001135	0.007946	0.003405	0.012486	0	0.00681	0.001135	0	0.097616	0.090238
6	0.003405221	0.00454	0.007946	0.00227	0.001135	0.009081	0.005675	0.00227	0.00227	0.00454	0	0.015891	0.00227	0.003405	0.064699	0.055051
7	0.004540295	0.014756	0.00227	0.009081	0	0	0.023837	0	0.003405	0.005675	0	0.00454	0.011351	0.001135	0.08059	0.136209
8	0.020431328	0.011351	0.010216	0.00681	0.00227	0.001135	0.00454	0.031782	0.034052	0.011351	0	0	0.001135	0.003405	0.138479	0.139047
9	0.007945516	0.022701	0.00681	0.007946	0.005675	0.003405	0.00227	0.029512	0.030647	0.020431	0	0.001135	0.001135	0.001135	0.140749	0.139614
10	0.012485812	0.009081	0.024972	0.026107	0.018161	0.001135	0.012486	0.014756	0.017026	0.026107	0	0.00227	0.005675	0.00227	0.172531	0.192395
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0.007945516	0.00681	0.00681	0	0.001135	0.010216	0.003405	0.003405	0.00227	0.00454	0	0.017026	0.003405	0.007946	0.074915	0.079455
13	0.00908059	0.015891	0.014756	0.005675	0.001135	0.00227	0.083995	0.00227	0.003405	0.015891	0	0.007946	0.022701	0.00227	0.187287	0.130533
14	0.003405221	0.005675	0.00681	0.001135	0.00227	0	0.003405	0.00227	0	0.00681	0	0.009081	0.001135	0.003405	0.045403	0.040295
Column Total	0.138479001	0.213394	0.163451	0.088536	0.08286	0.045403	0.191827	0.139614	0.138479	0.212259	0	0.083995	0.07378	0.035187		
Average Row & Col	0.128263337	0.215664	0.178774	0.081725	0.090238	0.055051	0.136209	0.139047	0.139614	0.192395	0	0.079455	0.130533	0.040295		

08/07/2012 (Sunday)

0700-1000	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	0	10	0	4	4	1	1	3	1	4	0	3	1	1
2	10	16	4	0	4	0	5	0	9	4	0	0	0	0
3	3	5	17	1	0	0	4	3	2	8	0	1	1	0
4	2	0	1	0	1	0	4	2	7	9	0	1	2	1
5	2	5	5	1	7	0	0	0	0	5	0	2	1	0
6	1	2	3	1	2	5	2	0	0	1	0	9	4	2
7	2	5	6	1	1	0	7	3	2	5	0	2	4	0
8	5	0	8	3	3	0	0	6	8	2	0	0	1	0
9	1	3	6	2	0	0	0	8	7	5	0	0	0	1
10	2	2	24	5	1	1	5	2	8	9	0	0	0	5
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	2	0	2	0	0	2	2	1	0	2	0	4	1	2
13	2	0	6	0	0	4	17	1	1	5	0	4	6	2
14	0	1	5	0	1	0	0	2	0	0	0	4	1	0

0700-1000	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Column To	Average Row & Col
1	0	0.021231	0	0.008493	0.008493	0.002123	0.002123	0.006369	0.002123	0.008493	0	0.006369	0.002123	0.002123	0.070064	0.069002
2	0.021231	0.03397	0.008493	0	0.008493	0	0.010616	0	0.019108	0.008493	0	0	0	0	0.110403	0.107219
3	0.006369	0.010616	0.036093	0.002123	0	0	0.008493	0.006369	0.004246	0.016985	0	0.002123	0.002123	0	0.095541	0.140127
4	0.004246	0	0.002123	0	0.002123	0	0.008493	0.004246	0.014862	0.019108	0	0.002123	0.004246	0.002123	0.063694	0.050955
5	0.004246	0.010616	0.010616	0.002123	0.014862	0	0	0	0	0.010616	0	0.004246	0.002123	0	0.059448	0.055202
6	0.002123	0.004246	0.006369	0.002123	0.004246	0.010616	0.004246	0	0	0.002123	0	0.019108	0.008493	0.004246	0.067941	0.047771
7	0.004246	0.010616	0.012739	0.002123	0.002123	0	0.014862	0.006369	0.004246	0.010616	0	0.004246	0.008493	0	0.080679	0.090234
8	0.010616	0	0.016985	0.006369	0.006369	0	0	0.012739	0.016985	0.004246	0	0	0.002123	0	0.076433	0.071125
9	0.002123	0.006369	0.012739	0.004246	0	0	0	0.016985	0.014862	0.010616	0	0	0	0.002123	0.070064	0.082803
10	0.004246	0.004246	0.050955	0.010616	0.002123	0.002123	0.010616	0.004246	0.016985	0.019108	0	0	0	0.010616	0.135881	0.130573
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0.004246	0	0.004246	0	0	0.004246	0.004246	0.002123	0	0.004246	0	0.008493	0.002123	0.004246	0.038217	0.050955
13	0.004246	0	0.012739	0	0	0.008493	0.036093	0.002123	0.002123	0.010616	0	0.008493	0.012739	0.004246	0.101911	0.07431
14	0	0.002123	0.010616	0	0.002123	0	0	0.004246	0	0	0	0.008493	0.002123	0	0.029724	0.029724
Column Total	0.067941	0.104034	0.184713	0.038217	0.050955	0.027601	0.099788	0.065817	0.095541	0.125265	0	0.063694	0.046709	0.029724		
Average Row & Col	0.069002	0.107219	0.140127	0.050955	0.055202	0.047771	0.090234	0.071125	0.082803	0.130573	0	0.050955	0.07431	0.029724		

1000-1500	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	2	49	4	20	22	10	19	16	8	20	0	6	4	2
2	46	82	14	8	30	11	34	5	42	18	0	7	6	6
3	10	20	105	10	11	9	31	8	13	54	0	13	16	7
4	12	6	7	0	6	2	21	7	21	42	0	3	8	10
5	20	28	12	4	31	0	3	8	4	18	0	9	2	0
6	7	16	14	6	9	14	11	1	3	17	0	27	8	2
7	12	29	18	20	4	0	36	2	11	24	0	7	10	6
8	19	13	17	14	5	0	3	26	21	11	0	3	2	0
9	8	34	17	14	5	3	7	35	39	43	0	1	1	5
10	15	12	83	45	17	6	33	20	35	48	0	9	16	11
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	13	9	15	0	0	12	13	5	0	16	0	35	8	5
13	18	17	31	8	3	5	106	5	8	32	0	16	38	4
14	2	9	12	4	1	3	6	3	0	4	0	11	3	2

1000-1500	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Column To	Average Row & Col
1	0.004246	0.104034	0.008493	0.042463	0.046709	0.021231	0.04034	0.03397	0.016985	0.042463	0	0.012739	0.008493	0.004246	0.386412	0.388535
2	0.097665	0.174098	0.029724	0.016985	0.063694	0.023355	0.072187	0.010616	0.089172	0.038217	0	0.014862	0.012739	0.012739	0.656051	0.671975
3	0.021231	0.042463	0.22293	0.021231	0.023355	0.019108	0.065817	0.016985	0.027601	0.11465	0	0.027601	0.03397	0.014862	0.651805	0.696391
4	0.025478	0.012739	0.014862	0	0.012739	0.004246	0.044586	0.014862	0.044586	0.089172	0	0.006369	0.016985	0.021231	0.307856	0.316348
5	0.042463	0.059448	0.025478	0.008493	0.065817	0	0.006369	0.016985	0.008493	0.038217	0	0.019108	0.004246	0	0.295117	0.300425
6	0.014862	0.03397	0.029724	0.012739	0.019108	0.029724	0.023355	0.002123	0.006369	0.036093	0	0.057325	0.016985	0.004246	0.286624	0.22293
7	0.025478	0.061571	0.038217	0.042463	0.008493	0	0.076433	0.004246	0.023355	0.050955	0	0.014862	0.021231	0.012739	0.380042	0.532909
8	0.04034	0.027601	0.036093	0.029724	0.010616	0	0.006369	0.055202	0.044586	0.023355	0	0.006369	0.004246	0	0.284501	0.291932
9	0.016985	0.072187	0.036093	0.029724	0.010616	0.006369	0.014862	0.07431	0.082803	0.091295	0	0.002123	0.002123	0.010616	0.450106	0.442675
10	0.031847	0.025478	0.176221	0.095541	0.036093	0.012739	0.070064	0.042463	0.07431	0.101911	0	0.019108	0.03397	0.023355	0.7431	0.739915
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0.027601	0.019108	0.031847	0	0	0.025478	0.027601	0.010616	0	0.03397	0	0.07431	0.016985	0.010616	0.278132	0.295117
13	0.038217	0.036093	0.065817	0.016985	0.006369	0.010616	0.225053	0.010616	0.016985	0.067941	0	0.03397	0.080679	0.008493	0.617834	0.438429
14	0.004246	0.019108	0.025478	0.008493	0.002123	0.006369	0.012739	0.006369	0	0.008493	0	0.023355	0.006369	0.004246	0.127389	0.127389
Column Total	0.390658	0.687898	0.740977	0.324841	0.305732	0.159236	0.685775	0.299363	0.435244	0.73673	0	0.312102	0.259023	0.127389		
Average Row & Col	0.388535	0.671975	0.696391	0.316348	0.300425	0.22293	0.532909	0.291932	0.442675	0.739915	0	0.295117	0.438429	0.127389		

1500-1600	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	1	10	1	3	2	1	3	4	1	3	0	0	1	0
2	4	15	1	3	2	1	9	2	11	4	0	5	1	2
3	3	4	20	2	4	0	4	0	2	7	0	2	2	1
4	5	0	0	0	3	2	6	2	4	13	0	0	3	1
5	3	4	1	0	6	0	1	1	0	2	0	2	0	0
6	1	5	4	1	4	0	2	1	1	2	0	3	2	0
7	3	6	0	9	1	0	6	0	2	6	0	0	1	4
8	3	2	3	5	1	0	0	4	9	1	0	1	1	0
9	0	8	1	3	1	1	0	6	9	11	0	1	0	1
10	4	2	24	14	6	4	7	4	16	3	0	4	5	1
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	6	1	2	0	0	5	0	0	0	3	0	7	1	1
13	7	3	7	3	1	0	22	2	1	10	0	5	8	1
14	0	1	2	0	0	0	0	0	0	1	0	2	2	0

1500-1600	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Column To	Average Row & Col
1	0.002123	0.021231	0.002123	0.006369	0.004246	0.002123	0.006369	0.008493	0.002123	0.006369	0	0	0.002123	0	0.063694	0.07431
2	0.008493	0.031847	0.002123	0.006369	0.004246	0.002123	0.019108	0.004246	0.023355	0.008493	0	0.010616	0.002123	0.004246	0.127389	0.12845
3	0.006369	0.008493	0.042463	0.004246	0.008493	0	0.008493	0	0.004246	0.014862	0	0.004246	0.004246	0.002123	0.10828	0.124204
4	0.010616	0	0	0	0.006369	0.004246	0.012739	0.004246	0.008493	0.027601	0	0	0.006369	0.002123	0.082803	0.087049
5	0.006369	0.008493	0.002123	0	0.012739	0	0.002123	0.002123	0	0.004246	0	0.004246	0	0	0.042463	0.05414
6	0.002123	0.010616	0.008493	0.002123	0.008493	0	0.004246	0.002123	0.002123	0.004246	0	0.006369	0.004246	0	0.055202	0.042463
7	0.006369	0.012739	0	0.019108	0.002123	0	0.012739	0	0.004246	0.012739	0	0	0.002123	0.008493	0.080679	0.104034
8	0.006369	0.004246	0.006369	0.010616	0.002123	0	0	0.008493	0.019108	0.002123	0	0.002123	0.002123	0	0.063694	0.059448
9	0	0.016985	0.002123	0.006369	0.002123	0.002123	0	0.012739	0.019108	0.023355	0	0.002123	0	0.002123	0.089172	0.104034
10	0.008493	0.004246	0.050955	0.029724	0.012739	0.008493	0.014862	0.008493	0.03397	0.006369	0	0.008493	0.010616	0.002123	0.199575	0.169851
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0.012739	0.002123	0.004246	0	0	0.010616	0	0	0	0.006369	0	0.014862	0.002123	0.002123	0.055202	0.061571
13	0.014862	0.006369	0.014862	0.006369	0.002123	0	0.046709	0.004246	0.002123	0.021231	0	0.010616	0.016985	0.002123	0.14862	0.102972
14	0	0.002123	0.004246	0	0	0	0	0	0	0.002123	0	0.004246	0.004246	0	0.016985	0.021231
Column Total	0.084926	0.129512	0.140127	0.091295	0.065817	0.029724	0.127389	0.055202	0.118896	0.140127	0	0.067941	0.057325	0.025478		
Average Row & Col	0.07431	0.12845	0.124204	0.087049	0.05414	0.042463	0.104034	0.059448	0.104034	0.169851	0	0.061571	0.102972	0.021231		

1600-1900	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	1	32	1	6	10	6	3	3	5	8	0	0	6	0
2	25	32	7	5	11	6	11	3	21	9	0	3	1	4
3	1	4	17	5	13	2	13	5	6	35	0	5	2	4
4	7	3	5	1	14	7	40	12	30	41	0	3	9	10
5	6	15	6	5	9	3	4	1	3	2	0	3	3	0
6	4	8	4	1	5	5	0	2	0	4	0	14	1	3
7	4	14	6	4	4	2	22	2	5	6	0	3	4	1
8	7	3	1	9	2	0	2	28	14	6	0	0	0	0
9	7	16	3	14	5	2	4	9	22	9	0	1	1	5
10	11	7	29	35	21	7	47	20	39	38	0	3	24	5
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	1	6	2	1	1	3	7	2	1	2	0	15	3	4
13	5	6	5	9	3	3	28	1	0	14	0	8	5	2
14	0	2	3	2	1	1	4	0	1	2	0	4	0	1

1600-1900	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Column To	Average Row & Col
1	0.002123	0.067941	0.002123	0.012739	0.021231	0.012739	0.006369	0.006369	0.010616	0.016985	0	0	0.012739	0	0.171975	0.169851
2	0.053079	0.067941	0.014862	0.010616	0.023355	0.012739	0.023355	0.006369	0.044586	0.019108	0	0.006369	0.002123	0.008493	0.292994	0.303609
3	0.002123	0.008493	0.036093	0.010616	0.027601	0.004246	0.027601	0.010616	0.012739	0.07431	0	0.010616	0.004246	0.008493	0.237792	0.213376
4	0.014862	0.006369	0.010616	0.002123	0.029724	0.014862	0.084926	0.025478	0.063694	0.087049	0	0.006369	0.019108	0.021231	0.386412	0.296178
5	0.012739	0.031847	0.012739	0.010616	0.019108	0.006369	0.008493	0.002123	0.006369	0.004246	0	0.006369	0.006369	0	0.127389	0.16879
6	0.008493	0.016985	0.008493	0.002123	0.010616	0.010616	0	0.004246	0	0.008493	0	0.029724	0.002123	0.006369	0.10828	0.104034
7	0.008493	0.029724	0.012739	0.008493	0.008493	0.004246	0.046709	0.004246	0.010616	0.012739	0	0.006369	0.008493	0.002123	0.163482	0.278132
8	0.014862	0.006369	0.002123	0.019108	0.004246	0	0.004246	0.059448	0.029724	0.012739	0	0	0	0	0.152866	0.169851
9	0.014862	0.03397	0.006369	0.029724	0.010616	0.004246	0.008493	0.019108	0.046709	0.019108	0	0.002123	0.002123	0.010616	0.208068	0.260085
10	0.023355	0.014862	0.061571	0.07431	0.044586	0.014862	0.099788	0.042463	0.082803	0.080679	0	0.006369	0.050955	0.010616	0.607219	0.490446
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0.002123	0.012739	0.004246	0.002123	0.002123	0.006369	0.014862	0.004246	0.002123	0.004246	0	0.031847	0.006369	0.008493	0.101911	0.116773
13	0.010616	0.012739	0.010616	0.019108	0.006369	0.006369	0.059448	0.002123	0	0.029724	0	0.016985	0.010616	0.004246	0.18896	0.157113
14	0	0.004246	0.006369	0.004246	0.002123	0.002123	0.008493	0	0.002123	0.004246	0	0.008493	0	0.002123	0.044586	0.063694
Column Total	0.167728	0.314225	0.18896	0.205945	0.210191	0.099788	0.392781	0.186837	0.312102	0.373673	0	0.131635	0.125265	0.082803		
Average Row & Col	0.169851	0.303609	0.213376	0.296178	0.16879	0.104034	0.278132	0.169851	0.260085	0.490446	0	0.116773	0.157113	0.063694		

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0700-1000	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	1	12	1	0	7	3	3	3	2	2	0	0	0	0
2	12	15	3	3	9	4	6	3	7	2	0	1	4	5
3	2	1	20	1	5	0	2	1	0	14	0	0	2	2
4	1	0	0	0	0	1	3	4	2	14	0	0	2	4
5	3	2	7	2	13	1	3	2	0	6	0	1	2	0
6	4	3	3	0	2	2	0	1	0	1	0	2	1	0
7	3	11	0	3	0	0	9	2	1	5	0	4	22	2
8	1	3	2	5	2	0	1	12	13	7	0	0	0	0
9	2	9	2	20	5	0	7	7	21	15	0	2	1	3
10	4	0	9	9	4	2	7	6	6	6	0	2	1	2
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	1	3	1	0	0	1	0	0	0	5	0	4	3	2
13	2	4	2	0	1	1	12	0	2	5	0	2	6	0
14	1	0	2	4	1	0	3	0	0	1	0	3	1	1

0700-1000	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Column To	Average Row & Col
1	0.001712	0.020548	0.001712	0	0.011986	0.005137	0.005137	0.005137	0.003425	0.003425	0	0	0	0	0.058219	0.060788
2	0.020548	0.025685	0.005137	0.005137	0.015411	0.006849	0.010274	0.005137	0.011986	0.003425	0	0.001712	0.006849	0.008562	0.126712	0.117295
3	0.003425	0.001712	0.034247	0.001712	0.008562	0	0.003425	0.001712	0	0.023973	0	0	0.003425	0.003425	0.085616	0.087329
4	0.001712	0	0	0	0	0.001712	0.005137	0.006849	0.003425	0.023973	0	0	0.003425	0.006849	0.053082	0.066781
5	0.005137	0.003425	0.011986	0.003425	0.02226	0.001712	0.005137	0.003425	0	0.010274	0	0.001712	0.003425	0	0.071918	0.077911
6	0.006849	0.005137	0.005137	0	0.003425	0.003425	0	0.001712	0	0.001712	0	0.003425	0.001712	0	0.032534	0.02911
7	0.005137	0.018836	0	0.005137	0	0	0.015411	0.003425	0.001712	0.008562	0	0.006849	0.037671	0.003425	0.106164	0.101027
8	0.001712	0.005137	0.003425	0.008562	0.003425	0	0.001712	0.020548	0.02226	0.011986	0	0	0	0	0.078767	0.074486
9	0.003425	0.015411	0.003425	0.034247	0.008562	0	0.011986	0.011986	0.035959	0.025685	0	0.003425	0.001712	0.005137	0.160959	0.126712
10	0.006849	0	0.015411	0.015411	0.006849	0.003425	0.011986	0.010274	0.010274	0.010274	0	0.003425	0.001712	0.003425	0.099315	0.120719
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0.001712	0.005137	0.001712	0	0	0.001712	0	0	0	0.008562	0	0.006849	0.005137	0.003425	0.034247	0.035103
13	0.003425	0.006849	0.003425	0	0.001712	0.001712	0.020548	0	0.003425	0.008562	0	0.003425	0.010274	0	0.063356	0.070205
14	0.001712	0	0.003425	0.006849	0.001712	0	0.005137	0	0	0.001712	0	0.005137	0.001712	0.001712	0.02911	0.032534
Column Total	0.063356	0.107877	0.089041	0.080479	0.083904	0.025685	0.09589	0.070205	0.092466	0.142123	0	0.035959	0.077055	0.035959		
Average Row & Col	0.060788	0.117295	0.087329	0.066781	0.077911	0.02911	0.101027	0.074486	0.126712	0.120719	0	0.035103	0.070205	0.032534		

1000-1500	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	8	58	3	9	19	10	17	17	11	11	0	3	5	9
2	56	87	8	18	25	11	33	24	51	20	0	5	8	12
3	8	9	75	15	13	8	23	19	5	68	0	7	16	9
4	8	3	2	0	1	5	27	26	28	62	0	3	4	8
5	13	23	16	8	47	4	9	13	5	33	0	4	17	4
6	16	12	9	5	8	13	9	3	3	10	0	23	4	5
7	24	43	15	15	3	2	78	7	9	29	0	17	105	7
8	10	19	9	33	7	1	2	64	34	37	0	2	0	1
9	18	48	14	50	10	0	11	38	80	76	0	2	4	6
10	17	6	53	56	10	6	24	33	36	42	0	4	16	17
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	5	10	8	3	4	13	9	1	2	11	0	20	8	6
13	12	12	14	6	3	2	102	1	6	12	0	8	25	4
14	5	8	12	12	4	0	14	8	8	12	0	7	4	5

1000-1500	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Column To	Average Row & Col
1	0.013699	0.099315	0.005137	0.015411	0.032534	0.017123	0.02911	0.02911	0.018836	0.018836	0	0.005137	0.008562	0.015411	0.308219	0.325342
2	0.09589	0.148973	0.013699	0.030822	0.042808	0.018836	0.056507	0.041096	0.087329	0.034247	0	0.008562	0.013699	0.020548	0.613014	0.59589
3	0.013699	0.015411	0.128425	0.025685	0.02226	0.013699	0.039384	0.032534	0.008562	0.116438	0	0.011986	0.027397	0.015411	0.47089	0.439212
4	0.013699	0.005137	0.003425	0	0.001712	0.008562	0.046233	0.044521	0.047945	0.106164	0	0.005137	0.006849	0.013699	0.303082	0.348459
5	0.02226	0.039384	0.027397	0.013699	0.080479	0.006849	0.015411	0.02226	0.008562	0.056507	0	0.006849	0.02911	0.006849	0.335616	0.299658
6	0.027397	0.020548	0.015411	0.008562	0.013699	0.02226	0.015411	0.005137	0.005137	0.017123	0	0.039384	0.006849	0.008562	0.205479	0.166952
7	0.041096	0.07363	0.025685	0.025685	0.005137	0.003425	0.133562	0.011986	0.015411	0.049658	0	0.02911	0.179795	0.011986	0.606164	0.609589
8	0.017123	0.032534	0.015411	0.056507	0.011986	0.001712	0.003425	0.109589	0.058219	0.063356	0	0.003425	0	0.001712	0.375	0.404966
9	0.030822	0.082192	0.023973	0.085616	0.017123	0	0.018836	0.065068	0.136986	0.130137	0	0.003425	0.006849	0.010274	0.611301	0.543664
10	0.02911	0.010274	0.090753	0.09589	0.017123	0.010274	0.041096	0.056507	0.061644	0.071918	0	0.006849	0.027397	0.02911	0.547945	0.63613
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0.008562	0.017123	0.013699	0.005137	0.006849	0.02226	0.015411	0.001712	0.003425	0.018836	0	0.034247	0.013699	0.010274	0.171233	0.175514
13	0.020548	0.020548	0.023973	0.010274	0.005137	0.003425	0.174658	0.001712	0.010274	0.020548	0	0.013699	0.042808	0.006849	0.354452	0.362158
14	0.008562	0.013699	0.020548	0.020548	0.006849	0	0.023973	0.013699	0.013699	0.020548	0	0.011986	0.006849	0.008562	0.169521	0.164384
Column Total	0.342466	0.578767	0.407534	0.393836	0.263699	0.128425	0.613014	0.434932	0.476027	0.724315	0	0.179795	0.369863	0.159247		
Average Row & Col	0.325342	0.59589	0.439212	0.348459	0.299658	0.166952	0.609589	0.404966	0.543664	0.63613	0	0.175514	0.362158	0.164384		

1500-1600	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	6	19	1	3	3	2	1	6	8	5	0	2	3	1
2	15	21	3	3	7	0	5	5	16	3	0	7	2	2
3	1	6	38	5	1	5	12	1	0	18	0	1	6	0
4	2	3	4	5	0	1	15	5	29	22	0	1	3	6
5	1	7	6	0	9	5	0	2	2	1	0	1	4	1
6	2	5	4	2	1	3	0	0	1	3	0	4	0	3
7	3	8	2	9	0	0	26	1	0	15	0	2	33	0
8	5	7	4	9	1	0	1	20	14	12	0	0	1	1
9	3	12	2	11	3	0	6	3	22	16	0	0	0	3
10	7	2	20	25	5	4	14	7	16	14	0	3	2	1
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	5	0	1	1	1	4	1	2	0	2	0	12	11	2
13	0	2	4	3	1	1	22	0	0	3	0	1	5	2
14	3	1	3	3	1	1	3	0	1	5	0	5	1	0

1500-1600	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Column To	Average Row & Col
1	0.010274	0.032534	0.001712	0.005137	0.005137	0.003425	0.001712	0.010274	0.013699	0.008562	0	0.003425	0.005137	0.001712	0.10274	0.096747
2	0.025685	0.035959	0.005137	0.005137	0.011986	0	0.008562	0.008562	0.027397	0.005137	0	0.011986	0.003425	0.003425	0.152397	0.155822
3	0.001712	0.010274	0.065068	0.008562	0.001712	0.008562	0.020548	0.001712	0	0.030822	0	0.001712	0.010274	0	0.160959	0.159247
4	0.003425	0.005137	0.006849	0.008562	0	0.001712	0.025685	0.008562	0.049658	0.037671	0	0.001712	0.005137	0.010274	0.164384	0.149829
5	0.001712	0.011986	0.010274	0	0.015411	0.008562	0	0.003425	0.003425	0.001712	0	0.001712	0.006849	0.001712	0.066781	0.061644
6	0.003425	0.008562	0.006849	0.003425	0.001712	0.005137	0	0	0.001712	0.005137	0	0.006849	0	0.005137	0.047945	0.046233
7	0.005137	0.013699	0.003425	0.015411	0	0	0.044521	0.001712	0	0.025685	0	0.003425	0.056507	0	0.169521	0.175514
8	0.008562	0.011986	0.006849	0.015411	0.001712	0	0.001712	0.034247	0.023973	0.020548	0	0	0.001712	0.001712	0.128425	0.108733
9	0.005137	0.020548	0.003425	0.018836	0.005137	0	0.010274	0.005137	0.037671	0.027397	0	0	0	0.005137	0.138699	0.162671
10	0.011986	0.003425	0.034247	0.042808	0.008562	0.006849	0.023973	0.011986	0.027397	0.023973	0	0.005137	0.003425	0.001712	0.205479	0.204623
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0.008562	0	0.001712	0.001712	0.001712	0.006849	0.001712	0.003425	0	0.003425	0	0.020548	0.018836	0.003425	0.071918	0.069349
13	0	0.003425	0.006849	0.005137	0.001712	0.001712	0.037671	0	0	0.005137	0	0.001712	0.008562	0.003425	0.075342	0.098459
14	0.005137	0.001712	0.005137	0.005137	0.001712	0.001712	0.005137	0	0.001712	0.008562	0	0.008562	0.001712	0	0.046233	0.041952
Column Total	0.090753	0.159247	0.157534	0.135274	0.056507	0.044521	0.181507	0.089041	0.186644	0.203767	0	0.066781	0.121575	0.037671		
Average Row & Col	0.096747	0.155822	0.159247	0.149829	0.061644	0.046233	0.175514	0.108733	0.162671	0.204623	0	0.069349	0.098459	0.041952		

1600-1900	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	3	35	7	17	21	4	5	9	2	17	10	2	2	4
2	35	51	8	5	15	17	20	18	58	4	15	3	13	4
3	3	11	71	9	8	15	26	11	5	33	16	21	10	3
4	15	2	12	1	7	8	33	21	50	46	9	3	12	13
5	15	15	14	6	26	6	0	4	10	10	24	4	5	5
6	4	8	6	8	4	24	6	3	2	13	2	9	3	5
7	10	24	19	23	2	6	98	2	10	32	3	14	78	6
8	10	9	5	17	2	0	9	24	29	16	1	0	0	3
9	7	44	13	24	5	0	9	14	45	44	3	6	2	3
10	5	8	35	65	24	14	48	37	48	44	16	10	23	10
11	13	8	18	4	20	6	4	4	9	8	796	8	0	0
12	8	0	8	0	7	13	6	3	4	3	1	31	8	7
13	5	10	3	1	1	2	129	0	4	11	5	12	23	2
14	4	2	9	8	6	6	36	3	8	27	0	16	3	0

1600-1900	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Column To	Average Row & Col
1	0.005137	0.059932	0.011986	0.02911	0.035959	0.006849	0.008562	0.015411	0.003425	0.02911	0.017123	0.003425	0.003425	0.006849	0.236301	0.235445
2	0.059932	0.087329	0.013699	0.008562	0.025685	0.02911	0.034247	0.030822	0.099315	0.006849	0.025685	0.005137	0.02226	0.006849	0.455479	0.422089
3	0.005137	0.018836	0.121575	0.015411	0.013699	0.025685	0.044521	0.018836	0.008562	0.056507	0.027397	0.035959	0.017123	0.005137	0.414384	0.402397
4	0.025685	0.003425	0.020548	0.001712	0.011986	0.013699	0.056507	0.035959	0.085616	0.078767	0.015411	0.005137	0.020548	0.02226	0.39726	0.359589
5	0.025685	0.025685	0.023973	0.010274	0.044521	0.010274	0	0.006849	0.017123	0.017123	0.041096	0.006849	0.008562	0.008562	0.246575	0.25
6	0.006849	0.013699	0.010274	0.013699	0.006849	0.041096	0.010274	0.005137	0.003425	0.02226	0.003425	0.015411	0.005137	0.008562	0.166096	0.186644
7	0.017123	0.041096	0.032534	0.039384	0.003425	0.010274	0.167808	0.003425	0.017123	0.054795	0.005137	0.023973	0.133562	0.010274	0.559932	0.64726
8	0.017123	0.015411	0.008562	0.02911	0.003425	0	0.015411	0.041096	0.049658	0.027397	0.001712	0	0	0.005137	0.214041	0.238014
9	0.011986	0.075342	0.02226	0.041096	0.008562	0	0.015411	0.023973	0.077055	0.075342	0.005137	0.010274	0.003425	0.005137	0.375	0.430651
10	0.008562	0.013699	0.059932	0.111301	0.041096	0.023973	0.082192	0.063356	0.082192	0.075342	0.027397	0.017123	0.039384	0.017123	0.662671	0.595034
11	0.02226	0.013699	0.030822	0.006849	0.034247	0.010274	0.006849	0.006849	0.015411	0.013699	1.363014	0.013699	0	0	1.537671	1.54024
12	0.013699	0	0.013699	0	0.011986	0.02226	0.010274	0.005137	0.006849	0.005137	0.001712	0.053082	0.013699	0.011986	0.169521	0.203767
13	0.008562	0.017123	0.005137	0.001712	0.001712	0.003425	0.22089	0	0.006849	0.018836	0.008562	0.020548	0.039384	0.003425	0.356164	0.333904
14	0.006849	0.003425	0.015411	0.013699	0.010274	0.010274	0.061644	0.005137	0.013699	0.046233	0	0.027397	0.005137	0	0.219178	0.16524
Column Total	0.234589	0.388699	0.390411	0.321918	0.253425	0.207192	0.734589	0.261986	0.486301	0.527397	1.542808	0.238014	0.311644	0.111301		
Average Row & Col	0.235445	0.422089	0.402397	0.359589	0.25	0.186644	0.64726	0.238014	0.430651	0.595034	1.54024	0.203767	0.333904	0.16524		

10/07/2012 (Tuesday)

0700-1000	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	0	35	3	11	13	4	4	9	13	12	15	2	3	1
2	37	52	10	7	14	11	11	16	34	11	13	2	6	8
3	3	9	58	9	8	3	12	10	4	19	3	2	10	2
4	1	4	12	5	6	0	17	17	24	64	5	3	16	9
5	8	23	8	7	29	1	4	13	2	10	27	4	9	3
6	9	14	11	11	15	19	7	3	6	22	8	31	7	7
7	8	35	22	49	4	2	43	7	7	34	8	10	101	32
8	11	15	12	18	0	2	3	35	19	23	4	0	0	1
9	6	49	7	80	3	1	9	40	53	89	5	2	5	14
10	7	5	29	41	7	3	28	24	28	32	15	5	15	11
11	9	10	12	7	22	2	2	6	4	17	10	3	6	0
12	2	4	10	5	5	6	11	0	0	12	2	19	16	9
13	2	5	6	10	5	1	76	0	1	15	2	5	21	0
14	2	5	1	11	14	2	6	2	0	11	2	6	4	4

0700-1000	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Column To	Average Row & Col
1	0	0.013683	0.001173	0.0043	0.005082	0.001564	0.001564	0.003518	0.005082	0.004691	0.005864	0.000782	0.001173	0.000391	0.048866	0.044957
2	0.014464	0.020328	0.003909	0.002737	0.005473	0.0043	0.0043	0.006255	0.013292	0.0043	0.005082	0.000782	0.002346	0.003127	0.090696	0.097146
3	0.001173	0.003518	0.022674	0.003518	0.003127	0.001173	0.004691	0.003909	0.001564	0.007428	0.001173	0.000782	0.003909	0.000782	0.059421	0.068999
4	0.000391	0.001564	0.004691	0.001955	0.002346	0	0.006646	0.006646	0.009382	0.02502	0.001955	0.001173	0.006255	0.003518	0.07154	0.088741
5	0.003127	0.008991	0.003127	0.002737	0.011337	0.000391	0.001564	0.005082	0.000782	0.003909	0.010555	0.001564	0.003518	0.001173	0.057858	0.057271
6	0.003518	0.005473	0.0043	0.0043	0.005864	0.007428	0.002737	0.001173	0.002346	0.0086	0.003127	0.012119	0.002737	0.002737	0.066458	0.044371
7	0.003127	0.013683	0.0086	0.019156	0.001564	0.000782	0.01681	0.002737	0.002737	0.013292	0.003127	0.003909	0.039484	0.01251	0.141517	0.116302
8	0.0043	0.005864	0.004691	0.007037	0	0.000782	0.001173	0.013683	0.007428	0.008991	0.001564	0	0	0.000391	0.055903	0.063526
9	0.002346	0.019156	0.002737	0.031274	0.001173	0.000391	0.003518	0.015637	0.020719	0.034793	0.001955	0.000782	0.001955	0.005473	0.141908	0.10907
10	0.002737	0.001955	0.011337	0.016028	0.002737	0.001173	0.010946	0.009382	0.010946	0.01251	0.005864	0.001955	0.005864	0.0043	0.097733	0.121384
11	0.003518	0.003909	0.004691	0.002737	0.0086	0.000782	0.000782	0.002346	0.001564	0.006646	0.003909	0.001173	0.002346	0	0.043002	0.044762
12	0.000782	0.001564	0.003909	0.001955	0.001955	0.002346	0.0043	0	0	0.004691	0.000782	0.007428	0.006255	0.003518	0.039484	0.038116
13	0.000782	0.001955	0.002346	0.003909	0.001955	0.000391	0.029711	0	0.000391	0.005864	0.000782	0.001955	0.00821	0	0.058249	0.071931
14	0.000782	0.001955	0.000391	0.0043	0.005473	0.000782	0.002346	0.000782	0	0.0043	0.000782	0.002346	0.001564	0.001564	0.027365	0.033425
Column Total	0.041048	0.103597	0.078577	0.105942	0.056685	0.022283	0.091087	0.071149	0.076231	0.145035	0.046521	0.036747	0.085614	0.039484		
Average Row & Col	0.044957	0.097146	0.068999	0.088741	0.057271	0.044371	0.116302	0.063526	0.10907	0.121384	0.044762	0.038116	0.071931	0.033425		

1000-1500	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	8	46	0	16	20	4	7	18	8	15	11	2	1	5
2	55	69	9	12	21	14	21	13	49	14	21	4	6	11
3	1	11	60	14	6	4	22	14	8	33	16	5	14	9
4	4	6	11	3	3	2	14	25	25	42	10	3	6	7
5	14	15	16	10	40	4	3	9	5	20	31	9	13	2
6	17	18	10	1	4	9	8	8	6	12	5	19	1	2
7	9	25	16	10	4	2	82	6	8	29	9	6	86	10
8	14	24	12	21	6	2	6	49	37	30	8	2	0	1
9	6	67	6	57	9	3	14	31	41	51	19	3	4	10
10	7	10	33	43	8	5	16	27	27	30	20	4	11	11
11	14	21	22	14	26	2	3	8	6	22	16	4	5	0
12	8	8	5	2	3	12	14	4	3	11	5	25	14	9
13	6	3	18	7	2	4	94	1	6	14	7	7	27	1
14	4	9	11	8	4	0	9	3	3	19	0	7	2	1

1000-1500	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Column To	Average Row & Col
1	0.003127	0.017983	0	0.006255	0.007819	0.001564	0.002737	0.007037	0.003127	0.005864	0.0043	0.000782	0.000391	0.001955	0.06294	0.064113
2	0.021501	0.026974	0.003518	0.004691	0.00821	0.005473	0.00821	0.005082	0.019156	0.005473	0.00821	0.001564	0.002346	0.0043	0.124707	0.127248
3	0.000391	0.0043	0.023456	0.005473	0.002346	0.001564	0.0086	0.005473	0.003127	0.012901	0.006255	0.001955	0.005473	0.003518	0.084832	0.087177
4	0.001564	0.002346	0.0043	0.001173	0.001173	0.000782	0.005473	0.009773	0.009773	0.016419	0.003909	0.001173	0.002346	0.002737	0.06294	0.074081
5	0.005473	0.005864	0.006255	0.003909	0.015637	0.001564	0.001173	0.003518	0.001955	0.007819	0.012119	0.003518	0.005082	0.000782	0.074668	0.067826
6	0.006646	0.007037	0.003909	0.000391	0.001564	0.003518	0.003127	0.003127	0.002346	0.004691	0.001955	0.007428	0.000391	0.000782	0.046912	0.036552
7	0.003518	0.009773	0.006255	0.003909	0.001564	0.000782	0.032056	0.002346	0.003127	0.011337	0.003518	0.002346	0.03362	0.003909	0.118061	0.120211
8	0.005473	0.009382	0.004691	0.00821	0.002346	0.000782	0.002346	0.019156	0.014464	0.011728	0.003127	0.000782	0	0.000391	0.082877	0.083659
9	0.002346	0.026192	0.002346	0.022283	0.003518	0.001173	0.005473	0.012119	0.016028	0.019937	0.007428	0.001173	0.001564	0.003909	0.125489	0.108092
10	0.002737	0.003909	0.012901	0.01681	0.003127	0.001955	0.006255	0.010555	0.010555	0.011728	0.007819	0.001564	0.0043	0.0043	0.098514	0.116106
11	0.005473	0.00821	0.0086	0.005473	0.010164	0.000782	0.001173	0.003127	0.002346	0.0086	0.006255	0.001564	0.001955	0	0.063722	0.066654
12	0.003127	0.003127	0.001955	0.000782	0.001173	0.004691	0.005473	0.001564	0.001173	0.0043	0.001955	0.009773	0.005473	0.003518	0.048084	0.043589
13	0.002346	0.001173	0.007037	0.002737	0.000782	0.001564	0.036747	0.000391	0.002346	0.005473	0.002737	0.002737	0.010555	0.000391	0.077013	0.075645
14	0.001564	0.003518	0.0043	0.003127	0.001564	0	0.003518	0.001173	0.001173	0.007428	0	0.002737	0.000782	0.000391	0.031274	0.031079
Column Total	0.065285	0.129789	0.089523	0.085223	0.060985	0.026192	0.122361	0.084441	0.090696	0.133698	0.069586	0.039093	0.074277	0.030884		
Average Row & Col	0.064113	0.127248	0.087177	0.074081	0.067826	0.036552	0.120211	0.083659	0.108092	0.116106	0.066654	0.043589	0.075645	0.031079		

1500-1600	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	5	21	0	3	7	2	4	9	7	6	7	0	1	0
2	10	26	6	2	8	1	10	8	15	4	3	3	4	1
3	1	2	34	8	4	2	7	4	4	7	7	1	7	2
4	1	1	1	5	0	0	7	12	20	11	5	3	3	4
5	5	3	6	0	4	1	2	3	0	1	12	3	2	2
6	0	4	2	1	0	4	1	0	1	2	4	8	1	1
7	2	8	5	4	0	0	28	2	6	11	1	1	15	3
8	5	4	0	9	3	0	2	15	17	9	2	2	0	1
9	3	23	1	23	1	3	3	8	15	11	1	1	2	1
10	1	2	4	10	6	3	14	11	15	22	10	3	10	3
11	5	5	3	0	10	3	3	7	5	4	5	2	1	0
12	1	2	1	2	1	1	5	0	1	1	1	5	4	7
13	4	5	3	1	0	1	26	0	2	3	0	3	3	0
14	3	3	5	5	2	0	2	1	3	10	1	2	1	2

1500-1600	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Column To	Average Row & Col
1	0.001955	0.00821	0	0.001173	0.002737	0.000782	0.001564	0.003518	0.002737	0.002346	0.002737	0	0.000391	0	0.028147	0.023065
2	0.003909	0.010164	0.002346	0.000782	0.003127	0.000391	0.003909	0.003127	0.005864	0.001564	0.001173	0.001173	0.001564	0.000391	0.039484	0.041048
3	0.000391	0.000782	0.013292	0.003127	0.001564	0.000782	0.002737	0.001564	0.001564	0.002737	0.002737	0.000391	0.002737	0.000782	0.035184	0.03147
4	0.000391	0.000391	0.000391	0.001955	0	0	0.002737	0.004691	0.007819	0.0043	0.001955	0.001173	0.001173	0.001564	0.028538	0.028538
5	0.001955	0.001173	0.002346	0	0.001564	0.000391	0.000782	0.001173	0	0.000391	0.004691	0.001173	0.000782	0.000782	0.017201	0.017592
6	0	0.001564	0.000782	0.000391	0	0.001564	0.000391	0	0.000391	0.000782	0.001564	0.003127	0.000391	0.000391	0.011337	0.009773
7	0.000782	0.003127	0.001955	0.001564	0	0	0.010946	0.000782	0.002346	0.0043	0.000391	0.000391	0.005864	0.001173	0.03362	0.039093
8	0.001955	0.001564	0	0.003518	0.001173	0	0.000782	0.005864	0.006646	0.003518	0.000782	0.000782	0	0.000391	0.026974	0.029124
9	0.001173	0.008991	0.000391	0.008991	0.000391	0.001173	0.001173	0.003127	0.005864	0.0043	0.000391	0.000391	0.000782	0.000391	0.037529	0.040461
10	0.000391	0.000782	0.001564	0.003909	0.002346	0.001173	0.005473	0.0043	0.005864	0.0086	0.003909	0.001173	0.003909	0.001173	0.044566	0.04222
11	0.001955	0.001955	0.001173	0	0.003909	0.001173	0.001173	0.002737	0.001955	0.001564	0.001955	0.000782	0.000391	0	0.020719	0.021892
12	0.000391	0.000782	0.000391	0.000782	0.000391	0.000391	0.001955	0	0.000391	0.000391	0.000391	0.001955	0.001564	0.002737	0.01251	0.013487
13	0.001564	0.001955	0.001173	0.000391	0	0.000391	0.010164	0	0.000782	0.001173	0	0.001173	0.001173	0	0.019937	0.020524
14	0.001173	0.001173	0.001955	0.001955	0.000782	0	0.000782	0.000391	0.001173	0.003909	0.000391	0.000782	0.000391	0.000782	0.015637	0.013096
Column Total	0.017983	0.042611	0.027756	0.028538	0.017983	0.00821	0.044566	0.031274	0.043393	0.039875	0.023065	0.014464	0.02111	0.010555		
Average Row & Col	0.023065	0.041048	0.03147	0.028538	0.017592	0.009773	0.039093	0.029124	0.040461	0.04222	0.021892	0.013487	0.020524	0.013096		

1600-1900	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	2	38	3	5	6	8	5	5	6	15	16	3	4	2
2	29	63	6	12	17	18	32	13	58	10	24	3	6	6
3	0	3	90	18	7	18	26	15	6	31	20	13	7	8
4	10	5	13	5	10	3	42	24	54	63	12	4	7	10
5	15	12	13	6	20	9	3	8	1	6	15	9	0	2
6	3	5	3	0	2	11	1	0	4	5	3	19	4	2
7	8	26	21	19	2	4	91	3	7	27	6	18	97	8
8	8	20	8	11	2	3	9	45	38	24	4	1	0	3
9	9	56	13	25	1	1	7	24	48	43	5	8	3	2
10	11	7	41	44	17	13	46	24	31	45	31	8	15	16
11	10	12	15	5	28	2	2	6	6	23	15	7	0	3
12	3	3	5	1	6	16	2	0	0	3	4	17	14	5
13	6	6	8	4	4	1	120	1	6	14	4	16	32	4
14	3	3	4	11	4	6	18	4	11	19	2	11	4	0

1600-1900	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Column To	Average Row & Col
1	0.000782	0.014855	0.001173	0.001955	0.002346	0.003127	0.001955	0.001955	0.002346	0.005864	0.006255	0.001173	0.001564	0.000782	0.04613	0.045934
2	0.011337	0.024629	0.002346	0.004691	0.006646	0.007037	0.01251	0.005082	0.022674	0.003909	0.009382	0.001173	0.002346	0.002346	0.116106	0.108679
3	0	0.001173	0.035184	0.007037	0.002737	0.007037	0.010164	0.005864	0.002346	0.012119	0.007819	0.005082	0.002737	0.003127	0.102424	0.09871
4	0.003909	0.001955	0.005082	0.001955	0.003909	0.001173	0.016419	0.009382	0.02111	0.024629	0.004691	0.001564	0.002737	0.003909	0.102424	0.083659
5	0.005864	0.004691	0.005082	0.002346	0.007819	0.003518	0.001173	0.003127	0.000391	0.002346	0.005864	0.003518	0	0.000782	0.046521	0.047889
6	0.001173	0.001955	0.001173	0	0.000782	0.0043	0.000391	0	0.001564	0.001955	0.001173	0.007428	0.001564	0.000782	0.024238	0.034206
7	0.003127	0.010164	0.00821	0.007428	0.000782	0.001564	0.035575	0.001173	0.002737	0.010555	0.002346	0.007037	0.03792	0.003127	0.131744	0.14484
8	0.003127	0.007819	0.003127	0.0043	0.000782	0.001173	0.003518	0.017592	0.014855	0.009382	0.001564	0.000391	0	0.001173	0.068804	0.068022
9	0.003518	0.021892	0.005082	0.009773	0.000391	0.000391	0.002737	0.009382	0.018765	0.01681	0.001955	0.003127	0.001173	0.000782	0.095778	0.101837
10	0.0043	0.002737	0.016028	0.017201	0.006646	0.005082	0.017983	0.009382	0.012119	0.017592	0.012119	0.003127	0.005864	0.006255	0.136435	0.13233
11	0.003909	0.004691	0.005864	0.001955	0.010946	0.000782	0.000782	0.002346	0.002346	0.008991	0.005864	0.002737	0	0.001173	0.052385	0.057662
12	0.001173	0.001173	0.001955	0.000391	0.002346	0.006255	0.000782	0	0	0.001173	0.001564	0.006646	0.005473	0.001955	0.030884	0.04222
13	0.002346	0.002346	0.003127	0.001564	0.001564	0.000391	0.046912	0.000391	0.002346	0.005473	0.001564	0.006255	0.01251	0.001564	0.08835	0.0819
14	0.001173	0.001173	0.001564	0.0043	0.001564	0.002346	0.007037	0.001564	0.0043	0.007428	0.000782	0.0043	0.001564	0	0.039093	0.033425
Column Total	0.045739	0.101251	0.094996	0.064894	0.049257	0.044175	0.157936	0.06724	0.107897	0.128225	0.06294	0.053557	0.07545	0.027756		
Average Row & Col	0.045934	0.108679	0.09871	0.083659	0.047889	0.034206	0.14484	0.068022	0.101837	0.13233	0.057662	0.04222	0.0819	0.033425		

11/07/2012 (Wednesday)

0700-1000	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	2	26	1	15	12	4	4	9	19	20	13	2	3	3
2	23	66	9	3	14	8	14	14	41	9	7	3	11	7
3	5	13	64	12	12	2	15	5	8	27	15	6	5	8
4	6	10	16	11	2	3	20	29	15	63	7	2	9	7
5	18	11	9	13	34	0	2	12	1	17	27	7	7	3
6	6	11	14	11	14	12	17	5	6	19	6	18	8	7
7	11	35	25	38	7	4	57	11	6	50	6	4	85	21
8	14	14	6	25	4	0	3	37	22	20	5	4	0	1
9	11	75	6	93	15	0	9	33	51	114	8	1	6	25
10	10	11	32	32	3	5	25	22	31	17	23	4	10	9
11	13	14	6	12	12	5	2	8	2	22	17	1	3	0
12	4	8	8	2	5	5	11	1	1	12	4	11	13	5
13	5	5	9	7	0	0	76	1	1	29	1	1	17	0
14	1	1	9	12	5	1	8	2	3	12	0	8	0	3

0700-1000	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Column To	Average Row & Col
1	0.000742	0.009651	0.000371	0.005568	0.004454	0.001485	0.001485	0.003341	0.007053	0.007424	0.004826	0.000742	0.001114	0.001114	0.049369	0.048627
2	0.008537	0.024499	0.003341	0.001114	0.005197	0.00297	0.005197	0.005197	0.015219	0.003341	0.002598	0.001114	0.004083	0.002598	0.085004	0.098181
3	0.001856	0.004826	0.023756	0.004454	0.004454	0.000742	0.005568	0.001856	0.00297	0.010022	0.005568	0.002227	0.001856	0.00297	0.073125	0.076281
4	0.002227	0.003712	0.005939	0.004083	0.000742	0.001114	0.007424	0.010765	0.005568	0.023385	0.002598	0.000742	0.003341	0.002598	0.074239	0.0902
5	0.006682	0.004083	0.003341	0.004826	0.012621	0	0.000742	0.004454	0.000371	0.00631	0.010022	0.002598	0.002598	0.001114	0.059762	0.055679
6	0.002227	0.004083	0.005197	0.004083	0.005197	0.004454	0.00631	0.001856	0.002227	0.007053	0.002227	0.006682	0.00297	0.002598	0.057164	0.037676
7	0.004083	0.012992	0.00928	0.014105	0.002598	0.001485	0.021158	0.004083	0.002227	0.01856	0.002227	0.001485	0.031552	0.007795	0.13363	0.115627
8	0.005197	0.005197	0.002227	0.00928	0.001485	0	0.001114	0.013734	0.008166	0.007424	0.001856	0.001485	0	0.000371	0.057535	0.063846
9	0.004083	0.02784	0.002227	0.034521	0.005568	0	0.003341	0.012249	0.018931	0.042316	0.00297	0.000371	0.002227	0.00928	0.165924	0.121381
10	0.003712	0.004083	0.011878	0.011878	0.001114	0.001856	0.00928	0.008166	0.011507	0.00631	0.008537	0.001485	0.003712	0.003341	0.08686	0.123422
11	0.004826	0.005197	0.002227	0.004454	0.004454	0.001856	0.000742	0.00297	0.000742	0.008166	0.00631	0.000371	0.001114	0	0.04343	0.047513
12	0.001485	0.00297	0.00297	0.000742	0.001856	0.001856	0.004083	0.000371	0.000371	0.004454	0.001485	0.004083	0.004826	0.001856	0.033408	0.030067
13	0.001856	0.001856	0.003341	0.002598	0	0	0.028211	0.000371	0.000371	0.010765	0.000371	0.000371	0.00631	0	0.056422	0.061062
14	0.000371	0.000371	0.003341	0.004454	0.001856	0.000371	0.00297	0.000742	0.001114	0.004454	0	0.00297	0	0.001114	0.024128	0.030438
Column Total	0.047884	0.111359	0.079436	0.106162	0.051596	0.018189	0.097624	0.070156	0.076837	0.159985	0.051596	0.026726	0.065702	0.036748		
Average Row & Col	0.048627	0.098181	0.076281	0.0902	0.055679	0.037676	0.115627	0.063846	0.121381	0.123422	0.047513	0.030067	0.061062	0.030438		

1000-1500	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	2	57	0	18	32	9	4	17	9	17	28	4	5	10
2	52	77	19	14	19	5	20	12	41	21	21	2	7	8
3	3	12	72	12	12	11	29	10	7	38	17	7	21	4
4	4	5	11	1	4	3	12	25	25	47	6	2	5	4
5	23	13	12	1	43	1	12	15	3	12	50	7	6	2
6	6	7	9	3	1	9	3	9	2	10	6	26	3	3
7	24	38	23	26	7	8	58	5	11	34	5	12	95	12
8	13	26	15	15	3	2	3	36	36	26	11	1	2	7
9	10	56	9	49	11	0	16	32	61	49	7	3	0	6
10	11	8	38	52	22	8	28	32	25	52	23	4	17	4
11	14	23	20	5	23	5	3	6	5	21	34	2	6	0
12	5	17	5	1	4	8	10	5	4	8	10	23	9	1
13	9	12	12	4	1	1	117	1	3	24	8	3	30	0
14	12	10	10	11	5	4	15	3	2	13	4	7	0	9

1000-1500	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Column To	Average Row & Col
1	0.000742	0.021158	0	0.006682	0.011878	0.003341	0.001485	0.00631	0.003341	0.00631	0.010393	0.001485	0.001856	0.003712	0.078693	0.074239
2	0.019302	0.028582	0.007053	0.005197	0.007053	0.001856	0.007424	0.004454	0.015219	0.007795	0.007795	0.000742	0.002598	0.00297	0.11804	0.126021
3	0.001114	0.004454	0.026726	0.004454	0.004454	0.004083	0.010765	0.003712	0.002598	0.014105	0.00631	0.002598	0.007795	0.001485	0.094655	0.094655
4	0.001485	0.001856	0.004083	0.000371	0.001485	0.001114	0.004454	0.00928	0.00928	0.017446	0.002227	0.000742	0.001856	0.001485	0.057164	0.067929
5	0.008537	0.004826	0.004454	0.000371	0.015961	0.000371	0.004454	0.005568	0.001114	0.004454	0.01856	0.002598	0.002227	0.000742	0.074239	0.071826
6	0.002227	0.002598	0.003341	0.001114	0.000371	0.003341	0.001114	0.003341	0.000742	0.003712	0.002227	0.009651	0.001114	0.001114	0.036006	0.031737
7	0.008909	0.014105	0.008537	0.009651	0.002598	0.00297	0.021529	0.001856	0.004083	0.012621	0.001856	0.004454	0.035264	0.004454	0.132888	0.127691
8	0.004826	0.009651	0.005568	0.005568	0.001114	0.000742	0.001114	0.013363	0.013363	0.009651	0.004083	0.000371	0.000742	0.002598	0.072754	0.074981
9	0.003712	0.020787	0.003341	0.018189	0.004083	0	0.005939	0.011878	0.022643	0.018189	0.002598	0.001114	0	0.002227	0.114699	0.10078
10	0.004083	0.00297	0.014105	0.019302	0.008166	0.00297	0.010393	0.011878	0.00928	0.019302	0.008537	0.001485	0.00631	0.001485	0.120267	0.129176
11	0.005197	0.008537	0.007424	0.001856	0.008537	0.001856	0.001114	0.002227	0.001856	0.007795	0.012621	0.000742	0.002227	0	0.06199	0.073682
12	0.001856	0.00631	0.001856	0.000371	0.001485	0.00297	0.003712	0.001856	0.001485	0.00297	0.003712	0.008537	0.003341	0.000371	0.040831	0.039532
13	0.003341	0.004454	0.004454	0.001485	0.000371	0.000371	0.04343	0.000371	0.001114	0.008909	0.00297	0.001114	0.011136	0	0.083519	0.079993
14	0.004454	0.003712	0.003712	0.004083	0.001856	0.001485	0.005568	0.001114	0.000742	0.004826	0.001485	0.002598	0	0.003341	0.038976	0.03248
Column Total	0.069785	0.134001	0.094655	0.078693	0.069414	0.027468	0.122494	0.077209	0.08686	0.138085	0.085375	0.038233	0.076466	0.025984		
Average Row & Col	0.074239	0.126021	0.094655	0.067929	0.071826	0.031737	0.127691	0.074981	0.10078	0.129176	0.073682	0.039532	0.079993	0.03248		

1500-1600	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	1	13	3	9	5	1	2	6	4	3	6	5	4	2
2	9	26	4	3	7	0	11	5	8	3	2	1	0	1
3	2	5	26	6	6	2	9	9	7	9	5	1	6	0
4	4	5	5	4	3	1	11	5	23	16	1	0	3	0
5	14	4	2	0	7	3	2	0	4	7	7	0	2	0
6	3	0	0	0	1	8	4	0	0	8	3	7	2	0
7	2	6	3	4	1	4	31	1	5	14	3	8	27	1
8	2	10	0	7	0	0	3	15	7	8	0	0	1	2
9	4	13	1	14	1	0	3	4	19	16	1	2	0	3
10	4	4	17	11	6	5	6	10	12	18	11	1	8	6
11	4	3	2	5	10	1	1	4	3	10	9	0	2	0
12	2	1	4	2	1	2	2	0	1	2	3	5	11	3
13	1	3	2	3	0	1	27	0	0	11	4	9	11	1
14	3	0	2	9	2	0	5	1	2	7	0	6	0	2

1500-1600	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Column To	Average Row & Col
1	0.000371	0.004826	0.001114	0.003341	0.001856	0.000371	0.000742	0.002227	0.001485	0.001114	0.002227	0.001856	0.001485	0.000742	0.023756	0.022086
2	0.003341	0.009651	0.001485	0.001114	0.002598	0	0.004083	0.001856	0.00297	0.001114	0.000742	0.000371	0	0.000371	0.029696	0.032108
3	0.000742	0.001856	0.009651	0.002227	0.002227	0.000742	0.003341	0.003341	0.002598	0.003341	0.001856	0.000371	0.002227	0	0.034521	0.030438
4	0.001485	0.001856	0.001856	0.001485	0.001114	0.000371	0.004083	0.001856	0.008537	0.005939	0.000371	0	0.001114	0	0.030067	0.029324
5	0.005197	0.001485	0.000742	0	0.002598	0.001114	0.000742	0	0.001485	0.002598	0.002598	0	0.000742	0	0.019302	0.018931
6	0.001114	0	0	0	0.000371	0.00297	0.001485	0	0	0.00297	0.001114	0.002598	0.000742	0	0.013363	0.011878
7	0.000742	0.002227	0.001114	0.001485	0.000371	0.001485	0.011507	0.000371	0.001856	0.005197	0.001114	0.00297	0.010022	0.000371	0.040831	0.042131
8	0.000742	0.003712	0	0.002598	0	0	0.001114	0.005568	0.002598	0.00297	0	0	0.000371	0.000742	0.020416	0.021344
9	0.001485	0.004826	0.000371	0.005197	0.000371	0	0.001114	0.001485	0.007053	0.005939	0.000371	0.000742	0	0.001114	0.030067	0.032665
10	0.001485	0.001485	0.00631	0.004083	0.002227	0.001856	0.002227	0.003712	0.004454	0.006682	0.004083	0.000371	0.00297	0.002227	0.044172	0.046585
11	0.001485	0.001114	0.000742	0.001856	0.003712	0.000371	0.000371	0.001485	0.001114	0.003712	0.003341	0	0.000742	0	0.020045	0.02023
12	0.000742	0.000371	0.001485	0.000742	0.000371	0.000742	0.000742	0	0.000371	0.000742	0.001114	0.001856	0.004083	0.001114	0.014477	0.01559
13	0.000371	0.001114	0.000742	0.001114	0	0.000371	0.010022	0	0	0.004083	0.001485	0.003341	0.004083	0.000371	0.027097	0.02784
14	0.001114	0	0.000742	0.003341	0.000742	0	0.001856	0.000371	0.000742	0.002598	0	0.002227	0	0.000742	0.014477	0.011136
Column Total	0.020416	0.034521	0.026355	0.028582	0.01856	0.010393	0.04343	0.022272	0.035264	0.048998	0.020416	0.016704	0.028582	0.007795		
Average Row & Col	0.022086	0.032108	0.030438	0.029324	0.018931	0.011878	0.042131	0.021344	0.032665	0.046585	0.02023	0.01559	0.02784	0.011136		

1600-1900	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	3	35	5	13	5	7	7	3	12	19	17	4	2	3
2	43	74	4	4	18	5	21	11	64	13	11	3	4	7
3	4	10	65	15	8	9	22	6	9	21	16	15	7	11
4	10	5	12	7	6	8	51	22	48	63	20	7	13	11
5	16	18	10	2	17	5	4	6	3	12	19	3	3	6
6	4	7	7	3	8	22	7	2	2	7	3	13	2	5
7	13	25	16	21	7	9	106	1	5	26	5	17	75	8
8	8	17	5	14	7	1	2	26	44	15	4	2	0	0
9	13	38	8	26	9	2	9	23	39	34	7	3	1	4
10	6	6	49	50	10	15	45	34	51	52	33	12	17	21
11	6	15	7	1	24	2	1	1	11	9	14	3	3	1
12	7	2	4	5	3	12	13	1	1	5	7	24	4	5
13	8	3	5	6	3	5	124	1	3	7	2	9	27	6
14	2	4	6	17	0	5	17	3	7	14	2	10	2	0

1600-1900	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Column To	Average Row & Col
1	0.001114	0.012992	0.001856	0.004826	0.001856	0.002598	0.002598	0.001114	0.004454	0.007053	0.00631	0.001485	0.000742	0.001114	0.050111	0.051596
2	0.015961	0.027468	0.001485	0.001485	0.006682	0.001856	0.007795	0.004083	0.023756	0.004826	0.004083	0.001114	0.001485	0.002598	0.104677	0.100408
3	0.001485	0.003712	0.024128	0.005568	0.00297	0.003341	0.008166	0.002227	0.003341	0.007795	0.005939	0.005568	0.002598	0.004083	0.080921	0.078137
4	0.003712	0.001856	0.004454	0.002598	0.002227	0.00297	0.018931	0.008166	0.017817	0.023385	0.007424	0.002598	0.004826	0.004083	0.105048	0.086674
5	0.005939	0.006682	0.003712	0.000742	0.00631	0.001856	0.001485	0.002227	0.001114	0.004454	0.007053	0.001114	0.001114	0.002227	0.046028	0.046214
6	0.001485	0.002598	0.002598	0.001114	0.00297	0.008166	0.002598	0.000742	0.000742	0.002598	0.001114	0.004826	0.000742	0.001856	0.03415	0.036934
7	0.004826	0.00928	0.005939	0.007795	0.002598	0.003341	0.039347	0.000371	0.001856	0.009651	0.001856	0.00631	0.02784	0.00297	0.123979	0.141611
8	0.00297	0.00631	0.001856	0.005197	0.002598	0.000371	0.000742	0.009651	0.016333	0.005568	0.001485	0.000742	0	0	0.053823	0.052895
9	0.004826	0.014105	0.00297	0.009651	0.003341	0.000742	0.003341	0.008537	0.014477	0.012621	0.002598	0.001114	0.000371	0.001485	0.080178	0.095583
10	0.002227	0.002227	0.018189	0.01856	0.003712	0.005568	0.016704	0.012621	0.018931	0.019302	0.012249	0.004454	0.00631	0.007795	0.148849	0.129547
11	0.002227	0.005568	0.002598	0.000371	0.008909	0.000742	0.000371	0.000371	0.004083	0.003341	0.005197	0.001114	0.001114	0.000371	0.036377	0.047884
12	0.002598	0.000742	0.001485	0.001856	0.001114	0.004454	0.004826	0.000371	0.000371	0.001856	0.002598	0.008909	0.001485	0.001856	0.034521	0.04046
13	0.00297	0.001114	0.001856	0.002227	0.001114	0.001856	0.046028	0.000371	0.001114	0.002598	0.000742	0.003341	0.010022	0.002227	0.07758	0.068486
14	0.000742	0.001485	0.002227	0.00631	0	0.001856	0.00631	0.001114	0.002598	0.005197	0.000742	0.003712	0.000742	0	0.033036	0.032851
Column Total	0.053081	0.09614	0.075353	0.0683	0.046399	0.039718	0.159243	0.051967	0.110987	0.110245	0.059391	0.046399	0.059391	0.032665		
Average Row & Col	0.051596	0.100408	0.078137	0.086674	0.046214	0.036934	0.141611	0.052895	0.095583	0.129547	0.047884	0.04046	0.068486	0.032851		

12/07/2012 (Thursday)

0700-1000	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	1	31	5	16	15	6	0	15	13	15	14	2	5	0
2	20	58	9	6	19	5	0	17	40	10	11	2	8	3
3	1	15	67	7	7	1	0	7	15	20	14	3	29	8
4	7	4	21	13	3	1	0	20	19	77	5	4	32	12
5	10	18	14	8	33	4	0	10	4	14	23	5	3	5
6	11	14	15	15	9	20	0	3	5	25	6	18	17	9
7	0	1	0	0	0	0	6	0	0	0	0	0	1	0
8	8	22	6	23	4	0	0	40	23	17	3	1	1	1
9	6	87	4	69	3	0	0	43	60	78	8	1	4	16
10	8	1	33	42	10	4	0	29	20	15	12	0	34	6
11	5	15	28	4	12	1	0	4	9	26	11	4	8	0
12	3	8	15	7	6	3	0	0	2	11	9	28	21	9
13	4	19	32	46	4	1	0	7	2	54	5	8	52	3
14	7	3	4	12	4	2	0	4	4	23	2	13	6	0

0700-1000	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Column To	Average Row & Col
1	0.000417	0.012938	0.002087	0.006678	0.00626	0.002504	0	0.00626	0.005426	0.00626	0.005843	0.000835	0.002087	0	0.057596	0.047788
2	0.008347	0.024207	0.003756	0.002504	0.00793	0.002087	0	0.007095	0.016694	0.004174	0.004591	0.000835	0.003339	0.001252	0.086811	0.105175
3	0.000417	0.00626	0.027963	0.002922	0.002922	0.000417	0	0.002922	0.00626	0.008347	0.005843	0.001252	0.012104	0.003339	0.080968	0.09328
4	0.002922	0.001669	0.008765	0.005426	0.001252	0.000417	0	0.008347	0.00793	0.032137	0.002087	0.001669	0.013356	0.005008	0.090985	0.101419
5	0.004174	0.007513	0.005843	0.003339	0.013773	0.001669	0	0.004174	0.001669	0.005843	0.009599	0.002087	0.001252	0.002087	0.063022	0.058431
6	0.004591	0.005843	0.00626	0.00626	0.003756	0.008347	0	0.001252	0.002087	0.010434	0.002504	0.007513	0.007095	0.003756	0.069699	0.044866
7	0	0.000417	0	0	0	0	0.002504	0	0	0	0	0	0.000417	0	0.003339	0.002922
8	0.003339	0.009182	0.002504	0.009599	0.001669	0	0	0.016694	0.009599	0.007095	0.001252	0.000417	0.000417	0.000417	0.062187	0.072621
9	0.002504	0.036311	0.001669	0.028798	0.001252	0	0	0.017947	0.025042	0.032554	0.003339	0.000417	0.001669	0.006678	0.15818	0.124165
10	0.003339	0.000417	0.013773	0.017529	0.004174	0.001669	0	0.012104	0.008347	0.00626	0.005008	0	0.01419	0.002504	0.089316	0.125
11	0.002087	0.00626	0.011686	0.001669	0.005008	0.000417	0	0.001669	0.003756	0.010851	0.004591	0.001669	0.003339	0	0.053005	0.05217
12	0.001252	0.003339	0.00626	0.002922	0.002504	0.001252	0	0	0.000835	0.004591	0.003756	0.011686	0.008765	0.003756	0.050918	0.044032
13	0.001669	0.00793	0.013356	0.019199	0.001669	0.000417	0	0.002922	0.000835	0.022538	0.002087	0.003339	0.021703	0.001252	0.098915	0.095576
14	0.002922	0.001252	0.001669	0.005008	0.001669	0.000835	0	0.001669	0.001669	0.009599	0.000835	0.005426	0.002504	0	0.035058	0.032554
Column Total	0.03798	0.123539	0.105593	0.111853	0.05384	0.020033	0.002504	0.083055	0.09015	0.160684	0.051336	0.037145	0.092237	0.03005		
Average Row & Col	0.047788	0.105175	0.09328	0.101419	0.058431	0.044866	0.002922	0.072621	0.124165	0.125	0.05217	0.044032	0.095576	0.032554		

1000-1500	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	0	47	2	15	15	5	0	16	16	20	25	4	17	6
2	50	81	14	9	25	11	0	23	56	13	26	7	9	8
3	6	18	81	19	16	5	0	13	9	51	27	11	28	16
4	11	9	10	7	8	4	0	27	24	52	8	3	33	8
5	12	25	9	12	40	5	0	14	4	21	50	12	8	3
6	12	16	4	8	6	7	0	4	1	9	9	31	15	3
7	0	0	0	0	0	0	6	0	0	0	0	0	0	0
8	20	23	15	21	4	1	0	61	40	33	6	4	6	2
9	15	57	13	44	13	4	0	39	61	58	16	3	9	6
10	4	14	49	53	17	7	0	36	25	56	27	6	49	10
11	17	18	15	6	32	7	0	12	7	20	30	16	7	5
12	11	6	9	2	10	13	0	3	6	6	16	31	16	6
13	14	24	37	27	8	2	0	4	10	33	13	14	67	8
14	11	11	10	17	6	3	0	11	2	25	0	9	7	2

1000-1500	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Column To	Average Row & Col
1	0	0.019616	0.000835	0.00626	0.00626	0.002087	0	0.006678	0.006678	0.008347	0.010434	0.001669	0.007095	0.002504	0.078464	0.077421
2	0.020868	0.033806	0.005843	0.003756	0.010434	0.004591	0	0.009599	0.023372	0.005426	0.010851	0.002922	0.003756	0.003339	0.138564	0.142112
3	0.002504	0.007513	0.033806	0.00793	0.006678	0.002087	0	0.005426	0.003756	0.021285	0.011269	0.004591	0.011686	0.006678	0.125209	0.118531
4	0.004591	0.003756	0.004174	0.002922	0.003339	0.001669	0	0.011269	0.010017	0.021703	0.003339	0.001252	0.013773	0.003339	0.085142	0.092654
5	0.005008	0.010434	0.003756	0.005008	0.016694	0.002087	0	0.005843	0.001669	0.008765	0.020868	0.005008	0.003339	0.001252	0.089733	0.086603
6	0.005008	0.006678	0.001669	0.003339	0.002504	0.002922	0	0.001669	0.000417	0.003756	0.003756	0.012938	0.00626	0.001252	0.05217	0.041528
7	0	0	0	0	0	0	0.002504	0	0	0	0	0	0	0	0.002504	0.002504
8	0.008347	0.009599	0.00626	0.008765	0.001669	0.000417	0	0.025459	0.016694	0.013773	0.002504	0.001669	0.002504	0.000835	0.098497	0.104132
9	0.00626	0.02379	0.005426	0.018364	0.005426	0.001669	0	0.016277	0.025459	0.024207	0.006678	0.001252	0.003756	0.002504	0.141068	0.125
10	0.001669	0.005843	0.020451	0.02212	0.007095	0.002922	0	0.015025	0.010434	0.023372	0.011269	0.002504	0.020451	0.004174	0.147329	0.156511
11	0.007095	0.007513	0.00626	0.002504	0.013356	0.002922	0	0.005008	0.002922	0.008347	0.012521	0.006678	0.002922	0.002087	0.080134	0.092863
12	0.004591	0.002504	0.003756	0.000835	0.004174	0.005426	0	0.001252	0.002504	0.002504	0.006678	0.012938	0.006678	0.002504	0.056344	0.059683
13	0.005843	0.010017	0.015442	0.011269	0.003339	0.000835	0	0.001669	0.004174	0.013773	0.005426	0.005843	0.027963	0.003339	0.108932	0.111018
14	0.004591	0.004591	0.004174	0.007095	0.002504	0.001252	0	0.004591	0.000835	0.010434	0	0.003756	0.002922	0.000835	0.047579	0.04111
Column Total	0.076377	0.145659	0.111853	0.100167	0.083472	0.030885	0.002504	0.109766	0.108932	0.165693	0.105593	0.063022	0.113105	0.034641		
Average Row & Col	0.077421	0.142112	0.118531	0.092654	0.086603	0.041528	0.002504	0.104132	0.125	0.156511	0.092863	0.059683	0.111018	0.04111		

1500-1600	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	4	10	1	3	6	3	0	7	2	2	3	4	1	1
2	9	15	5	2	6	4	0	5	18	4	7	2	4	0
3	2	8	33	5	6	1	0	4	2	6	9	0	12	1
4	3	1	2	4	0	0	0	4	15	15	0	1	5	0
5	3	5	7	1	10	5	0	1	1	2	5	0	4	3
6	0	5	3	1	2	7	0	2	0	2	0	5	2	1
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	9	5	4	8	0	2	0	16	9	7	2	0	1	0
9	0	11	1	10	1	0	0	5	10	11	1	0	1	0
10	4	2	11	12	3	3	0	9	11	11	7	3	11	2
11	3	6	4	3	23	1	0	2	1	6	8	2	0	0
12	0	1	2	0	1	1	0	1	1	1	3	7	6	3
13	2	8	6	9	2	1	0	2	0	10	2	1	8	1
14	1	2	3	1	5	1	0	1	1	4	1	1	5	1

1500-1600	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Column To	Average Row & Col
1	0.001669	0.004174	0.000417	0.001252	0.002504	0.001252	0	0.002922	0.000835	0.000835	0.001252	0.001669	0.000417	0.000417	0.019616	0.018155
2	0.003756	0.00626	0.002087	0.000835	0.002504	0.001669	0	0.002087	0.007513	0.001669	0.002922	0.000835	0.001669	0	0.033806	0.033389
3	0.000835	0.003339	0.013773	0.002087	0.002504	0.000417	0	0.001669	0.000835	0.002504	0.003756	0	0.005008	0.000417	0.037145	0.035684
4	0.001252	0.000417	0.000835	0.001669	0	0	0	0.001669	0.00626	0.00626	0	0.000417	0.002087	0	0.020868	0.022746
5	0.001252	0.002087	0.002922	0.000417	0.004174	0.002087	0	0.000417	0.000417	0.000835	0.002087	0	0.001669	0.001252	0.019616	0.023372
6	0	0.002087	0.001252	0.000417	0.000835	0.002922	0	0.000835	0	0.000835	0	0.002087	0.000835	0.000417	0.012521	0.012312
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0.003756	0.002087	0.001669	0.003339	0	0.000835	0	0.006678	0.003756	0.002922	0.000835	0	0.000417	0	0.026294	0.025459
9	0	0.004591	0.000417	0.004174	0.000417	0	0	0.002087	0.004174	0.004591	0.000417	0	0.000417	0	0.021285	0.025459
10	0.001669	0.000835	0.004591	0.005008	0.001252	0.001252	0	0.003756	0.004591	0.004591	0.002922	0.001252	0.004591	0.000835	0.037145	0.035476
11	0.001252	0.002504	0.001669	0.001252	0.009599	0.000417	0	0.000835	0.000417	0.002504	0.003339	0.000835	0	0	0.024624	0.022329
12	0	0.000417	0.000835	0	0.000417	0.000417	0	0.000417	0.000417	0.000417	0.001252	0.002922	0.002504	0.001252	0.011269	0.01106
13	0.000835	0.003339	0.002504	0.003756	0.000835	0.000417	0	0.000835	0	0.004174	0.000835	0.000417	0.003339	0.000417	0.021703	0.023372
14	0.000417	0.000835	0.001252	0.000417	0.002087	0.000417	0	0.000417	0.000417	0.001669	0.000417	0.000417	0.002087	0.000417	0.011269	0.008347
Column Total	0.016694	0.032972	0.034224	0.024624	0.027129	0.012104	0	0.024624	0.029633	0.033806	0.020033	0.010851	0.025042	0.005426		
Average Row & Col	0.018155	0.033389	0.035684	0.022746	0.023372	0.012312	0	0.025459	0.025459	0.035476	0.022329	0.01106	0.023372	0.008347		

1600-1900	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	1	27	4	15	14	3	0	14	10	14	15	3	10	3
2	35	53	3	8	6	20	0	14	58	15	14	6	14	5
3	5	5	47	13	9	11	0	8	3	32	28	12	20	4
4	5	3	14	3	3	5	0	29	49	68	16	6	46	14
5	15	14	6	0	13	8	0	9	4	5	24	5	13	5
6	5	9	3	1	2	24	0	1	1	2	4	21	10	3
7	0	0	0	0	0	0	3	0	0	0	0	0	0	0
8	8	10	2	14	4	0	0	46	37	18	2	1	2	1
9	11	48	8	16	2	1	0	19	40	47	3	0	8	6
10	11	6	35	55	9	14	0	15	43	42	25	8	42	15
11	13	10	11	7	16	10	0	5	10	11	22	7	15	0
12	5	2	10	2	4	20	0	2	1	10	8	27	14	10
13	14	14	17	32	2	4	0	6	10	42	7	22	65	4
14	7	16	8	11	3	10	0	2	5	17	2	6	4	0

1600-1900	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Column To	Average Row & Col
1	0.000417	0.011269	0.001669	0.00626	0.005843	0.001252	0	0.005843	0.004174	0.005843	0.00626	0.001252	0.004174	0.001252	0.055509	0.055927
2	0.014608	0.02212	0.001252	0.003339	0.002504	0.008347	0	0.005843	0.024207	0.00626	0.005843	0.002504	0.005843	0.002087	0.104758	0.097663
3	0.002087	0.002087	0.019616	0.005426	0.003756	0.004591	0	0.003339	0.001252	0.013356	0.011686	0.005008	0.008347	0.001669	0.08222	0.076169
4	0.002087	0.001252	0.005843	0.001252	0.001252	0.002087	0	0.012104	0.020451	0.028381	0.006678	0.002504	0.019199	0.005843	0.108932	0.091402
5	0.00626	0.005843	0.002504	0	0.005426	0.003339	0	0.003756	0.001669	0.002087	0.010017	0.002087	0.005426	0.002087	0.050501	0.043406
6	0.002087	0.003756	0.001252	0.000417	0.000835	0.010017	0	0.000417	0.000417	0.000835	0.001669	0.008765	0.004174	0.001252	0.035893	0.045075
7	0	0	0	0	0	0	0.001252	0	0	0	0	0	0	0	0.001252	0.001252
8	0.003339	0.004174	0.000835	0.005843	0.001669	0	0	0.019199	0.015442	0.007513	0.000835	0.000417	0.000835	0.000417	0.060518	0.065735
9	0.004591	0.020033	0.003339	0.006678	0.000835	0.000417	0	0.00793	0.016694	0.019616	0.001252	0	0.003339	0.002504	0.087229	0.100167
10	0.004591	0.002504	0.014608	0.022955	0.003756	0.005843	0	0.00626	0.017947	0.017529	0.010434	0.003339	0.017529	0.00626	0.133556	0.134182
11	0.005426	0.004174	0.004591	0.002922	0.006678	0.004174	0	0.002087	0.004174	0.004591	0.009182	0.002922	0.00626	0	0.057179	0.064065
12	0.002087	0.000835	0.004174	0.000835	0.001669	0.008347	0	0.000835	0.000417	0.004174	0.003339	0.011269	0.005843	0.004174	0.047997	0.049875
13	0.005843	0.005843	0.007095	0.013356	0.000835	0.001669	0	0.002504	0.004174	0.017529	0.002922	0.009182	0.027129	0.001669	0.09975	0.104758
14	0.002922	0.006678	0.003339	0.004591	0.001252	0.004174	0	0.000835	0.002087	0.007095	0.000835	0.002504	0.001669	0	0.03798	0.033598
Column Total	0.056344	0.090568	0.070117	0.073873	0.036311	0.054257	0.001252	0.070952	0.113105	0.134808	0.070952	0.051753	0.109766	0.029215		
Average Row & Col	0.055927	0.097663	0.076169	0.091402	0.043406	0.045075	0.001252	0.065735	0.100167	0.134182	0.064065	0.049875	0.104758	0.033598		

13/07/2012 (Friday)

0700-1000	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	3	25	1	11	11	5	0	11	8	5	7	5	3	4
2	36	49	4	10	14	5	0	13	29	8	6	5	15	11
3	3	8	45	5	11	5	0	5	7	24	12	4	9	9
4	5	2	7	2	4	1	0	34	24	46	6	3	21	11
5	16	28	3	10	25	0	0	9	1	6	18	7	10	3
6	7	5	14	7	6	11	0	2	0	12	9	19	18	6
7	0	0	0	0	0	0	2	0	0	0	0	0	0	0
8	12	14	3	24	3	0	0	19	24	16	6	2	2	7
9	1	52	8	64	3	0	0	23	37	81	6	0	6	18
10	2	2	25	37	6	2	0	17	22	16	8	5	21	7
11	5	10	11	6	14	1	0	7	5	21	12	5	7	0
12	4	8	13	5	2	4	0	1	1	10	4	18	23	4
13	7	11	30	36	7	1	0	6	1	50	2	11	59	4
14	2	5	5	14	2	4	0	3	4	17	2	13	7	0

0700-1000	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Column To	Average Row & Col
1	0.001518	0.012652	0.000506	0.005567	0.005567	0.00253	0	0.005567	0.004049	0.00253	0.003543	0.00253	0.001518	0.002024	0.050101	0.051113
2	0.018219	0.024798	0.002024	0.005061	0.007085	0.00253	0	0.006579	0.014676	0.004049	0.003036	0.00253	0.007591	0.005567	0.103745	0.107287
3	0.001518	0.004049	0.022773	0.00253	0.005567	0.00253	0	0.00253	0.003543	0.012146	0.006073	0.002024	0.004555	0.004555	0.074393	0.07996
4	0.00253	0.001012	0.003543	0.001012	0.002024	0.000506	0	0.017206	0.012146	0.023279	0.003036	0.001518	0.010628	0.005567	0.084008	0.100455
5	0.008097	0.01417	0.001518	0.005061	0.012652	0	0	0.004555	0.000506	0.003036	0.009109	0.003543	0.005061	0.001518	0.068826	0.061741
6	0.003543	0.00253	0.007085	0.003543	0.003036	0.005567	0	0.001012	0	0.006073	0.004555	0.009615	0.009109	0.003036	0.058704	0.039221
7	0	0	0	0	0	0	0.001012	0	0	0	0	0	0	0	0.001012	0.001012
8	0.006073	0.007085	0.001518	0.012146	0.001518	0	0	0.009615	0.012146	0.008097	0.003036	0.001012	0.001012	0.003543	0.066802	0.071356
9	0.000506	0.026316	0.004049	0.032389	0.001518	0	0	0.01164	0.018725	0.040992	0.003036	0	0.003036	0.009109	0.151316	0.116903
10	0.001012	0.001012	0.012652	0.018725	0.003036	0.001012	0	0.008603	0.011134	0.008097	0.004049	0.00253	0.010628	0.003543	0.086032	0.121964
11	0.00253	0.005061	0.005567	0.003036	0.007085	0.000506	0	0.003543	0.00253	0.010628	0.006073	0.00253	0.003543	0	0.052632	0.051113
12	0.002024	0.004049	0.006579	0.00253	0.001012	0.002024	0	0.000506	0.000506	0.005061	0.002024	0.009109	0.01164	0.002024	0.049089	0.049089
13	0.003543	0.005567	0.015182	0.018219	0.003543	0.000506	0	0.003036	0.000506	0.025304	0.001012	0.005567	0.029858	0.002024	0.113866	0.107794
14	0.001012	0.00253	0.00253	0.007085	0.001012	0.002024	0	0.001518	0.002024	0.008603	0.001012	0.006579	0.003543	0	0.039474	0.040992
Column Total	0.052126	0.11083	0.085526	0.116903	0.054656	0.019737	0.001012	0.075911	0.08249	0.157895	0.049595	0.049089	0.101721	0.04251		
Average Row & Col	0.051113	0.107287	0.07996	0.100455	0.061741	0.039221	0.001012	0.071356	0.116903	0.121964	0.051113	0.049089	0.107794	0.040992		

1000-1500	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	9	55	5	21	15	7	0	32	7	18	22	10	17	3
2	62	74	9	9	14	11	0	27	68	16	25	7	18	7
3	5	10	84	15	12	11	0	9	9	48	24	7	23	16
4	15	5	16	5	2	2	0	15	23	52	16	5	26	8
5	22	21	13	6	37	3	0	14	8	22	37	7	9	5
6	9	17	13	5	1	10	0	0	5	8	10	22	15	2
7	0	0	0	0	0	0	1	0	0	0	0	0	1	0
8	18	20	17	22	11	3	0	60	40	22	7	2	0	3
9	11	67	19	30	11	4	0	46	65	42	16	3	9	8
10	7	12	52	45	9	10	0	23	30	29	16	7	35	16
11	16	26	19	8	22	5	0	11	8	17	37	6	17	4
12	9	5	6	5	9	13	0	6	2	5	11	31	23	10
13	33	32	29	26	5	7	0	5	12	35	16	14	76	1
14	10	16	22	13	9	3	0	8	11	21	2	10	6	5

1000-1500	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Column To	Average Row & Col
1	0.004555	0.027834	0.00253	0.010628	0.007591	0.003543	0	0.016194	0.003543	0.009109	0.011134	0.005061	0.008603	0.001518	0.111842	0.113107
2	0.031377	0.037449	0.004555	0.004555	0.007085	0.005567	0	0.013664	0.034413	0.008097	0.012652	0.003543	0.009109	0.003543	0.175607	0.178897
3	0.00253	0.005061	0.04251	0.007591	0.006073	0.005567	0	0.004555	0.004555	0.024291	0.012146	0.003543	0.01164	0.008097	0.138158	0.146002
4	0.007591	0.00253	0.008097	0.00253	0.001012	0.001012	0	0.007591	0.01164	0.026316	0.008097	0.00253	0.013158	0.004049	0.096154	0.101215
5	0.011134	0.010628	0.006579	0.003036	0.018725	0.001518	0	0.007085	0.004049	0.011134	0.018725	0.003543	0.004555	0.00253	0.103239	0.091346
6	0.004555	0.008603	0.006579	0.00253	0.000506	0.005061	0	0	0.00253	0.004049	0.005061	0.011134	0.007591	0.001012	0.059211	0.052126
7	0	0	0	0	0	0	0.000506	0	0	0	0	0	0.000506	0	0.001012	0.000759
8	0.009109	0.010121	0.008603	0.011134	0.005567	0.001518	0	0.030364	0.020243	0.011134	0.003543	0.001012	0	0.001518	0.113866	0.121711
9	0.005567	0.033907	0.009615	0.015182	0.005567	0.002024	0	0.023279	0.032895	0.021255	0.008097	0.001518	0.004555	0.004049	0.16751	0.15663
10	0.003543	0.006073	0.026316	0.022773	0.004555	0.005061	0	0.01164	0.015182	0.014676	0.008097	0.003543	0.017713	0.008097	0.147267	0.158401
11	0.008097	0.013158	0.009615	0.004049	0.011134	0.00253	0	0.005567	0.004049	0.008603	0.018725	0.003036	0.008603	0.002024	0.09919	0.110071
12	0.004555	0.00253	0.003036	0.00253	0.004555	0.006579	0	0.003036	0.001012	0.00253	0.005567	0.015688	0.01164	0.005061	0.06832	0.067308
13	0.0167	0.016194	0.014676	0.013158	0.00253	0.003543	0	0.00253	0.006073	0.017713	0.008097	0.007085	0.038462	0.000506	0.147267	0.143219
14	0.005061	0.008097	0.011134	0.006579	0.004555	0.001518	0	0.004049	0.005567	0.010628	0.001012	0.005061	0.003036	0.00253	0.068826	0.05668
Column Total	0.114372	0.182186	0.153846	0.106275	0.079453	0.04504	0.000506	0.129555	0.145749	0.169534	0.120951	0.066296	0.13917	0.044534		
Average Row & Col	0.113107	0.178897	0.146002	0.101215	0.091346	0.052126	0.000759	0.121711	0.15663	0.158401	0.110071	0.067308	0.143219	0.05668		

1500-1600	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	6	15	1	6	3	3	0	6	2	5	9	5	3	0
2	15	18	7	1	10	2	0	5	16	3	4	3	5	2
3	0	1	49	1	2	3	0	4	5	8	4	4	10	3
4	3	4	9	2	1	1	0	7	18	16	6	3	13	2
5	8	5	4	1	10	1	0	5	3	7	13	4	6	3
6	1	4	0	1	3	6	0	1	1	1	1	6	1	1
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	3	4	4	6	1	0	0	18	9	6	7	0	1	1
9	4	8	2	4	1	0	0	13	18	18	3	1	4	1
10	1	3	8	12	2	3	0	10	21	19	9	2	13	3
11	3	4	8	2	5	2	0	4	2	6	12	2	4	0
12	4	3	3	0	1	3	0	1	0	0	1	12	7	8
13	3	7	9	6	3	0	0	0	5	18	4	7	13	2
14	1	3	5	4	2	0	0	0	1	2	1	5	0	1

1500-1600	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Column To	Average Row & Col
1	0.003036	0.007591	0.000506	0.003036	0.001518	0.001518	0	0.003036	0.001012	0.00253	0.004555	0.00253	0.001518	0	0.032389	0.029352
2	0.007591	0.009109	0.003543	0.000506	0.005061	0.001012	0	0.00253	0.008097	0.001518	0.002024	0.001518	0.00253	0.001012	0.046053	0.043016
3	0	0.000506	0.024798	0.000506	0.001012	0.001518	0	0.002024	0.00253	0.004049	0.002024	0.002024	0.005061	0.001518	0.047571	0.051366
4	0.001518	0.002024	0.004555	0.001012	0.000506	0.000506	0	0.003543	0.009109	0.008097	0.003036	0.001518	0.006579	0.001012	0.043016	0.033148
5	0.004049	0.00253	0.002024	0.000506	0.005061	0.000506	0	0.00253	0.001518	0.003543	0.006579	0.002024	0.003036	0.001518	0.035425	0.028846
6	0.000506	0.002024	0	0.000506	0.001518	0.003036	0	0.000506	0.000506	0.000506	0.000506	0.003036	0.000506	0.000506	0.013664	0.012905
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0.001518	0.002024	0.002024	0.003036	0.000506	0	0	0.009109	0.004555	0.003036	0.003543	0	0.000506	0.000506	0.030364	0.033907
9	0.002024	0.004049	0.001012	0.002024	0.000506	0	0	0.006579	0.009109	0.009109	0.001518	0.000506	0.002024	0.000506	0.038968	0.04504
10	0.000506	0.001518	0.004049	0.006073	0.001012	0.001518	0	0.005061	0.010628	0.009615	0.004555	0.001012	0.006579	0.001518	0.053644	0.054403
11	0.001518	0.002024	0.004049	0.001012	0.00253	0.001012	0	0.002024	0.001012	0.003036	0.006073	0.001012	0.002024	0	0.027328	0.032389
12	0.002024	0.001518	0.001518	0	0.000506	0.001518	0	0.000506	0	0	0.000506	0.006073	0.003543	0.004049	0.021761	0.024545
13	0.001518	0.003543	0.004555	0.003036	0.001518	0	0	0	0.00253	0.009109	0.002024	0.003543	0.006579	0.001012	0.038968	0.039727
14	0.000506	0.001518	0.00253	0.002024	0.001012	0	0	0	0.000506	0.001012	0.000506	0.00253	0	0.000506	0.012652	0.013158
Column Total	0.026316	0.03998	0.055162	0.023279	0.022267	0.012146	0	0.037449	0.051113	0.055162	0.037449	0.027328	0.040486	0.013664		
Average Row & Col	0.029352	0.043016	0.051366	0.033148	0.028846	0.012905	0	0.033907	0.04504	0.054403	0.032389	0.024545	0.039727	0.013158		

1600-1900	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	2	21	2	15	4	4	0	15	10	21	12	6	6	5
2	56	87	12	5	6	6	0	18	52	18	25	10	11	10
3	3	8	56	13	6	6	0	4	15	67	18	14	25	6
4	7	9	10	3	7	7	0	39	39	135	13	4	45	15
5	9	13	4	12	177	4	0	4	6	29	42	43	10	3
6	9	7	4	1	4	25	0	2	1	12	9	24	11	4
7	0	0	0	0	0	0	1	0	0	0	0	0	0	0
8	6	9	1	13	4	0	0	64	29	27	9	4	4	0
9	9	32	7	14	9	0	0	78	111	50	45	9	9	13
10	5	5	25	45	9	6	0	16	20	146	24	8	43	7
11	8	5	9	5	10	5	0	3	2	17	39	6	10	2
12	8	5	3	3	4	8	0	5	3	5	9	35	11	7
13	22	16	21	13	10	9	0	6	7	77	27	51	174	11
14	3	12	8	12	5	4	0	2	12	18	2	13	8	1

1600-1900	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Column To	Average Row & Col
1	0.001012	0.010628	0.001012	0.007591	0.002024	0.002024	0	0.007591	0.005061	0.010628	0.006073	0.003036	0.003036	0.00253	0.062247	0.06832
2	0.02834	0.044028	0.006073	0.00253	0.003036	0.003036	0	0.009109	0.026316	0.009109	0.012652	0.005061	0.005567	0.005061	0.159919	0.137905
3	0.001518	0.004049	0.02834	0.006579	0.003036	0.003036	0	0.002024	0.007591	0.033907	0.009109	0.007085	0.012652	0.003036	0.121964	0.101974
4	0.003543	0.004555	0.005061	0.001518	0.003543	0.003543	0	0.019737	0.019737	0.06832	0.006579	0.002024	0.022773	0.007591	0.168522	0.123229
5	0.004555	0.006579	0.002024	0.006073	0.089575	0.002024	0	0.002024	0.003036	0.014676	0.021255	0.021761	0.005061	0.001518	0.180162	0.154605
6	0.004555	0.003543	0.002024	0.000506	0.002024	0.012652	0	0.001012	0.000506	0.006073	0.004555	0.012146	0.005567	0.002024	0.057186	0.049848
7	0	0	0	0	0	0	0.000506	0	0	0	0	0	0	0	0.000506	0.000506
8	0.003036	0.004555	0.000506	0.006579	0.002024	0	0	0.032389	0.014676	0.013664	0.004555	0.002024	0.002024	0	0.086032	0.107794
9	0.004555	0.016194	0.003543	0.007085	0.004555	0	0	0.039474	0.056174	0.025304	0.022773	0.004555	0.004555	0.006579	0.195344	0.175354
10	0.00253	0.00253	0.012652	0.022773	0.004555	0.003036	0	0.008097	0.010121	0.073887	0.012146	0.004049	0.021761	0.003543	0.18168	0.248229
11	0.004049	0.00253	0.004555	0.00253	0.005061	0.00253	0	0.001518	0.001012	0.008603	0.019737	0.003036	0.005061	0.001012	0.061235	0.099949
12	0.004049	0.00253	0.001518	0.001518	0.002024	0.004049	0	0.00253	0.001518	0.00253	0.004555	0.017713	0.005567	0.003543	0.053644	0.084261
13	0.011134	0.008097	0.010628	0.006579	0.005061	0.004555	0	0.003036	0.003543	0.038968	0.013664	0.02581	0.088057	0.005567	0.224696	0.205213
14	0.001518	0.006073	0.004049	0.006073	0.00253	0.002024	0	0.001012	0.006073	0.009109	0.001012	0.006579	0.004049	0.000506	0.050607	0.046559
Column Total	0.074393	0.115891	0.081984	0.077935	0.129049	0.04251	0.000506	0.129555	0.155364	0.314777	0.138664	0.114879	0.185729	0.04251		
Average Row & Col	0.06832	0.137905	0.101974	0.123229	0.154605	0.049848	0.000506	0.107794	0.175354	0.248229	0.099949	0.084261	0.205213	0.046559		

Appendix C

Trip Movements

Appendix C **Traffic Movements Identified**

Saturday

07/07/2012		0700-1000		1000-1500		1500-1600		1600-1900	
		Total	Period	Total	Period	Total	Period	Total	Period
OuterInnerInnerOuter	A	133	7%	414	6%	71	4%	193	5%
InnerInner	B	144	7%	502	7%	85	5%	229	6%
OuterInnerInner	C	80	4%	250	4%	50	3%	118	3%
InnerInnerOuter	D	87	4%	305	5%	79	4%	141	4%
Inner (Outbound)	E	147	7%	635	9%	218	12%	421	11%
Inner (Inbound)	F	214	11%	675	10%	217	12%	344	9%
InnerOuter	G	118	6%	528	8%	71	4%	226	6%
OuterInner	H	122	6%	413	6%	76	4%	216	6%
Outer (Outbound)	I	437	22%	1341	20%	415	23%	782	21%
Outer (Inbound)	J	359	18%	1193	18%	445	25%	866	23%
OuterOuter	K	154	8%	514	8%	85	5%	219	6%
		1995		6770		1812		3755	

07/07/2012 (Saturday)

ID	Movement	Period			
		0700-1000	1000-1500	1500-1600	1600-1900
A	Long distance town centre trips	7%	6%	4%	5%
B	Local town centre through trips	7%	7%	5%	6%
C	Long distance town centre through trips starting outside the outer cordon and stopping within the Warwick wider area	4%	4%	3%	3%
D	Long distance town centre through trips starting within the Warwick wider area and stopping outside the outer cordon	4%	5%	4%	4%
E	Local town centre trips stopping in the Warwick wider area.	7%	9%	12%	11%
F	Warwick wider area trips stopping in Warwick town centre.	11%	10%	12%	9%
G	Town centre traffic travelling long distance to outside the outer cordon.	6%	8%	4%	6%
H	Long distance trips arriving in Warwick town centre	6%	6%	4%	6%
I	Warwick wider area trips leaving Warwick	22%	20%	23%	21%
J	Trips entering the Warwick wider area	18%	18%	25%	23%
K	Warwick wider are through trips	8%	8%	5%	6%

Sunday

08/07/2012		0700-1000		1000-1500		1500-1600		1600-1900	
		Total	Period	Total	Period	Total	Period	Total	Period
OuterInnerInnerOuter	A	60	4%	392	7%	75	7%	263	9%
InnerInner	B	78	5%	407	7%	91	9%	206	7%
OuterInnerInner	C	37	2%	205	4%	44	4%	120	4%
InnerInnerOuter	D	49	3%	279	5%	61	6%	151	5%
Inner (Outbound)	E	148	9%	452	8%	87	9%	322	11%
Inner (Inbound)	F	217	13%	479	9%	86	8%	262	9%
InnerOuter	G	78	5%	378	7%	94	9%	200	7%
OuterInner	H	65	4%	331	6%	58	6%	148	5%
Outer (Outbound)	I	447	27%	1096	20%	162	16%	491	17%
Outer (Inbound)	J	368	23%	974	18%	174	17%	544	19%
OuterOuter	K	81	5%	442	8%	86	8%	165	6%
		1628		5435		1018		2872	

08/07/2012 (Sunday)

ID	Movement	Period			
		0700-1000	1000-1500	1500-1600	1600-1900
A	Long distance town centre trips	4%	7%	7%	9%
B	Local town centre through trips	5%	7%	9%	7%
C	Long distance town centre through trips starting outside the outer cordon and stopping within the Warwick wider area	2%	4%	4%	4%
D	Long distance town centre through trips starting within the Warwick wider area and stopping outside the outer cordon	3%	5%	6%	5%
E	Local town centre trips stopping in the Warwick wider area.	9%	8%	9%	11%
F	Warwick wider area trips stopping in Warwick town centre.	13%	9%	8%	9%
G	Town centre traffic travelling long distance to outside the outer cordon.	5%	7%	9%	7%
H	Long distance trips arriving in Warwick town centre	4%	6%	6%	5%
I	Warwick wider area trips leaving Warwick	27%	20%	16%	17%
J	Trips entering the Warwick wider area	23%	18%	17%	19%
K	Warwick wider are through trips	5%	8%	8%	6%

Monday

09/07/2012		0700-1000		1000-1500		1500-1600		1600-1900	
		Total	Period	Total	Period	Total	Period	Total	Period
OuterInnerInnerOuter	A	91	2%	441	7%	148	6%	371	6%
InnerInner	B	67	2%	420	6%	144	6%	773	12%
OuterInnerInner	C	64	2%	338	5%	84	3%	361	6%
InnerInnerOuter	D	41	1%	257	4%	78	3%	328	5%
Inner (Outbound)	E	318	9%	543	8%	234	9%	593	9%
Inner (Inbound)	F	464	13%	577	9%	233	9%	483	7%
InnerOuter	G	75	2%	397	6%	117	5%	366	6%
OuterInner	H	89	2%	485	7%	108	4%	270	4%
Outer (Outbound)	I	1309	35%	1336	21%	580	23%	1208	18%
Outer (Inbound)	J	1078	29%	1188	18%	623	25%	1338	20%
OuterOuter	K	97	3%	498	8%	161	6%	460	7%
		3693		6480		2510		6551	

09/07/2012 (Monday)

ID	Movement	Period			
		0700-1000	1000-1500	1500-1600	1600-1900
A	Long distance town centre trips	2%	7%	6%	6%
B	Local town centre through trips	2%	6%	6%	12%
C	Long distance town centre through trips starting outside the outer cordon and stopping within the Warwick wider area	2%	5%	3%	6%
D	Long distance town centre through trips starting within the Warwick wider area and stopping outside the outer cordon	1%	4%	3%	5%
E	Local town centre trips stopping in the Warwick wider area.	9%	8%	9%	9%
F	Warwick wider area trips stopping in Warwick town centre.	13%	9%	9%	7%
G	Town centre traffic travelling long distance to outside the outer cordon.	2%	6%	5%	6%
H	Long distance trips arriving in Warwick town centre	2%	7%	4%	4%
I	Warwick wider area trips leaving Warwick	35%	21%	23%	18%
J	Trips entering the Warwick wider area	29%	18%	25%	20%
K	Warwick wider are through trips	3%	8%	6%	7%

Tuesday

10/07/2012		0700-1000		1000-1500		1500-1600		1600-1900	
		Total	Period	Total	Period	Total	Period	Total	Period
OuterInnerInnerOuter	A	422	8%	388	6%	136	5%	371	6%
InnerInner	B	388	8%	486	8%	184	7%	497	8%
OuterInnerInner	C	410	8%	375	6%	120	5%	376	6%
InnerInnerOuter	D	260	5%	321	5%	104	4%	282	5%
Inner (Outbound)	E	245	5%	487	8%	217	9%	477	8%
Inner (Inbound)	F	357	7%	518	9%	216	9%	388	6%
InnerOuter	G	252	5%	314	5%	114	5%	348	6%
OuterInner	H	363	7%	364	6%	80	3%	279	5%
Outer (Outbound)	I	1111	22%	1221	20%	579	23%	1255	20%
Outer (Inbound)	J	914	18%	1086	18%	621	25%	1389	23%
OuterOuter	K	384	8%	437	7%	160	6%	501	8%
		5106		5997		2531		6163	

10/07/2012 (Tuesday)

ID	Movement	Period			
		0700-1000	1000-1500	1500-1600	1600-1900
A	Long distance town centre trips	8%	6%	5%	6%
B	Local town centre through trips	8%	8%	7%	8%
C	Long distance town centre through trips starting outside the outer cordon and stopping within the Warwick wider area	8%	6%	5%	6%
D	Long distance town centre through trips starting within the Warwick wider area and stopping outside the outer cordon	5%	5%	4%	5%
E	Local town centre trips stopping in the Warwick wider area.	5%	8%	9%	8%
F	Warwick wider area trips stopping in Warwick town centre.	7%	9%	9%	6%
G	Town centre traffic travelling long distance to outside the outer cordon.	5%	5%	5%	6%
H	Long distance trips arriving in Warwick town centre	7%	6%	3%	5%
I	Warwick wider area trips leaving Warwick	22%	20%	23%	20%
J	Trips entering the Warwick wider area	18%	18%	25%	23%
K	Warwick wider are through trips	8%	7%	6%	8%

Wednesday

11/07/2012		0700-1000		1000-1500		1500-1600		1600-1900	
		Total	Period	Total	Period	Total	Period	Total	Period
OuterInnerInnerOuter	A	436	8%	414	7%	131	5%	396	7%
InnerInner	B	404	8%	546	9%	214	8%	433	7%
OuterInnerInner	C	444	9%	399	6%	129	5%	362	6%
InnerInnerOuter	D	266	5%	330	5%	105	4%	341	6%
Inner (Outbound)	E	233	4%	496	8%	201	8%	479	8%
Inner (Inbound)	F	339	7%	527	8%	201	8%	390	7%
InnerOuter	G	240	5%	348	6%	104	4%	326	5%
OuterInner	H	343	7%	388	6%	89	4%	273	5%
Outer (Outbound)	I	1113	21%	1263	20%	572	23%	1197	20%
Outer (Inbound)	J	916	18%	1123	18%	614	24%	1325	22%
OuterOuter	K	470	9%	433	7%	160	6%	460	8%
		5204		6268		2520		5982	

11/07/2012 (Wednesday)

ID	Movement	Period			
		0700-1000	1000-1500	1500-1600	1600-1900
A	Long distance town centre trips	8%	7%	5%	7%
B	Local town centre through trips	8%	9%	8%	7%
C	Long distance town centre through trips starting outside the outer cordon and stopping within the Warwick wider area	9%	6%	5%	6%
D	Long distance town centre through trips starting within the Warwick wider area and stopping outside the outer cordon	5%	5%	4%	6%
E	Local town centre trips stopping in the Warwick wider area.	4%	8%	8%	8%
F	Warwick wider area trips stopping in Warwick town centre.	7%	8%	8%	7%
G	Town centre traffic travelling long distance to outside the outer cordon.	5%	6%	4%	5%
H	Long distance trips arriving in Warwick town centre	7%	6%	4%	5%
I	Warwick wider area trips leaving Warwick	21%	20%	23%	20%
J	Trips entering the Warwick wider area	18%	18%	24%	22%
K	Warwick wider are through trips	9%	7%	6%	8%

Thursday

12/07/2012		0700-1000		1000-1500		1500-1600		1600-1900	
		Total	Period	Total	Period	Total	Period	Total	Period
OuterInnerInnerOuter	A	280	6%	316	5%	85	4%	204	4%
InnerInner	B	530	11%	768	12%	177	8%	606	11%
OuterInnerInner	C	355	8%	452	7%	83	4%	389	7%
InnerInnerOuter	D	323	7%	352	6%	88	4%	295	6%
Inner (Outbound)	E	310	7%	683	11%	289	13%	616	12%
Inner (Inbound)	F	452	10%	726	12%	288	13%	502	9%
InnerOuter	G	172	4%	262	4%	77	4%	217	4%
OuterInner	H	256	5%	332	5%	56	3%	216	4%
Outer (Outbound)	I	867	19%	1065	17%	438	20%	932	18%
Outer (Inbound)	J	714	15%	947	15%	469	22%	1032	19%
OuterOuter	K	399	9%	396	6%	116	5%	284	5%
		4658		6299		2166		5293	

12/07/2012 (Thursday)

ID	Movement	Period			
		0700-1000	1000-1500	1500-1600	1600-1900
A	Long distance town centre trips	6%	5%	4%	4%
B	Local town centre through trips	11%	12%	8%	11%
C	Long distance town centre through trips starting outside the outer cordon and stopping within the Warwick wider area	8%	7%	4%	7%
D	Long distance town centre through trips starting within the Warwick wider area and stopping outside the outer cordon	7%	6%	4%	6%
E	Local town centre trips stopping in the Warwick wider area.	7%	11%	13%	12%
F	Warwick wider area trips stopping in Warwick town centre.	10%	12%	13%	9%
G	Town centre traffic travelling long distance to outside the outer cordon.	4%	4%	4%	4%
H	Long distance trips arriving in Warwick town centre	5%	5%	3%	4%
I	Warwick wider area trips leaving Warwick	19%	17%	20%	18%
J	Trips entering the Warwick wider area	15%	15%	22%	19%
K	Warwick wider are through trips	9%	6%	5%	5%

Friday

13/07/2012		0700-1000		1000-1500		1500-1600		1600-1900	
		Total	Period	Total	Period	Total	Period	Total	Period
OuterInnerInnerOuter	A	233	6%	181	3%	52	2%	107	2%
InnerInner	B	460	11%	713	12%	217	9%	892	15%
OuterInnerInner	C	285	7%	304	5%	81	4%	377	6%
InnerInnerOuter	D	258	6%	334	5%	105	5%	188	3%
Inner (Outbound)	E	322	8%	734	12%	310	14%	713	12%
Inner (Inbound)	F	470	11%	779	13%	310	13%	582	10%
InnerOuter	G	158	4%	283	5%	57	2%	181	3%
OuterInner	H	278	7%	308	5%	65	3%	208	3%
Outer (Outbound)	I	772	19%	1107	18%	472	21%	1054	18%
Outer (Inbound)	J	635	15%	984	16%	506	22%	1166	19%
OuterOuter	K	261	6%	411	7%	119	5%	524	9%
		4132		6138		2294		5992	

13/07/2012 (Friday)

ID	Movement	Period			
		0700-1000	1000-1500	1500-1600	1600-1900
A	Long distance town centre trips	6%	3%	2%	2%
B	Local town centre through trips	11%	12%	9%	15%
C	Long distance town centre through trips starting outside the outer cordon and stopping within the Warwick wider area	7%	5%	4%	6%
D	Long distance town centre through trips starting within the Warwick wider area and stopping outside the outer cordon	6%	5%	5%	3%
E	Local town centre trips stopping in the Warwick wider area.	8%	12%	14%	12%
F	Warwick wider area trips stopping in Warwick town centre.	11%	13%	13%	10%
G	Town centre traffic travelling long distance to outside the outer cordon.	4%	5%	2%	3%
H	Long distance trips arriving in Warwick town centre	7%	5%	3%	3%
I	Warwick wider area trips leaving Warwick	19%	18%	21%	18%
J	Trips entering the Warwick wider area	15%	16%	22%	19%
K	Warwick wider are through trips	6%	7%	5%	9%

Traffic passing through the inner cordon

07/07/2012 (Saturday)

ID	Movement	Period							
			0700-1000		1000-1500		1500-1600		1600-1900
A	Long distance town centre trips	133	30%	414	28%	71	25%	193	28%
B	Local town centre through trips	144	32%	502	34%	85	30%	229	34%
C + D	Warwick wider area to Warwick outside or outside to Warwick wider area.	167	38%	555	38%	129	45%	259	38%
		444	100%	1471	100%	285	100%	681	100%

08/07/2012 (Sunday)

ID	Movement	Period							
			0700-1000		1000-1500		1500-1600		1600-1900
A	Long distance town centre trips	60	27%	392	31%	75	28%	263	36%
B	Local town centre through trips	78	35%	407	32%	91	34%	206	28%
C + D	Warwick wider area to Warwick outside or outside to Warwick wider area.	86	38%	484	38%	105	39%	271	37%
		224	100%	1283	100%	271	100%	740	100%

09/07/2012 (Monday)

ID	Movement	Period							
			0700-1000		1000-1500		1500-1600		1600-1900
A	Long distance town centre trips	91	35%	441	30%	148	33%	371	20%
B	Local town centre through trips	67	25%	420	29%	144	32%	773	42%
C + D	Warwick wider area to Warwick outside or outside to Warwick wider area.	105	40%	595	41%	162	36%	689	38%
		263	100%	1456	100%	454	100%	1833	100%

10/07/2012 (Tuesday)

ID	Movement	Period							
			0700-1000		1000-1500		1500-1600		1600-1900
A	Long distance town centre trips	422	29%	388	25%	136	25%	371	24%
B	Local town centre through trips	388	26%	486	31%	184	34%	497	33%
C + D	Warwick wider area to Warwick outside or outside to Warwick wider area.	670	45%	696	44%	224	41%	658	43%
		1480	100%	1570	100%	544	100%	1526	100%

11/07/2012 (Wednesday)

ID	Movement	Period							
			0700-1000		1000-1500		1500-1600		1600-1900
A	Long distance town centre trips	436	28%	414	25%	131	23%	396	26%
B	Local town centre through trips	404	26%	546	32%	214	37%	433	28%
C + D	Warwick wider area to Warwick outside or outside to Warwick wider area.	710	46%	729	43%	234	40%	703	46%
		1550	100%	1689	100%	579	100%	1532	100%

12/07/2012 (Thursday)

ID	Movement	Period							
			0700-1000		1000-1500		1500-1600		1600-1900
A	Long distance town centre trips	280	19%	316	17%	85	20%	204	14%
B	Local town centre through trips	530	36%	768	41%	177	41%	606	41%
C + D	Warwick wider area to Warwick outside or outside to Warwick wider area.	678	46%	804	43%	171	39%	684	46%
		1488	100%	1888	100%	433	100%	1494	100%

13/07/2012 (Friday)

ID	Movement	Period							
			0700-1000		1000-1500		1500-1600		1600-1900
A	Long distance town centre trips	233	19%	181	12%	52	11%	107	7%
B	Local town centre through trips	460	37%	713	47%	217	48%	892	57%
C + D	Warwick wider area to Warwick outside or outside to Warwick wider area.	543	44%	638	42%	186	41%	565	36%
		1236	100%	1532	100%	455	100%	1564	100%

Traffic entering the outer cordon

07/07/2012 (Saturday)

ID	Movement	Period							
			0700-1000		1000-1500		1500-1600		1600-1900
A	Long distance town centre trips	133	16%	414	15%	71	10%	193	12%
C	Long distance town centre through trips starting outside the outer cordon and stopping within the Warwick wider area	80	9%	250	9%	50	7%	118	7%
H	Long distance trips arriving in Warwick town centre	122	14%	413	15%	76	10%	216	13%
J	Trips entering the Warwick wider area	359	42%	1193	43%	445	61%	866	54%
K	Warwick wider are through trips	154	18%	514	18%	85	12%	219	14%
		848	100%	2784	100%	727	100%	1612	100%

08/07/2012 (Sunday)

ID	Movement	Period							
			0700-1000		1000-1500		1500-1600		1600-1900
A	Long distance town centre trips	60	10%	392	17%	75	17%	263	21%
C	Long distance town centre through trips starting outside the outer cordon and stopping within the Warwick wider area	37	6%	205	9%	44	10%	120	10%
H	Long distance trips arriving in Warwick town centre	65	11%	331	14%	58	13%	148	12%
J	Trips entering the Warwick wider area	368	60%	974	42%	174	40%	544	44%
K	Warwick wider are through trips	81	13%	442	19%	86	20%	165	13%
		611	100%	2344	100%	437	100%	1240	100%

09/07/2012 (Monday)

ID	Movement	Period							
			0700-1000		1000-1500		1500-1600		1600-1900
A	Long distance town centre trips	91	6%	441	15%	148	13%	371	13%
C	Long distance town centre through trips starting outside the outer cordon and stopping within the Warwick wider area	64	5%	338	11%	84	7%	361	13%
H	Long distance trips arriving in Warwick town centre	89	6%	485	16%	108	10%	270	10%
J	Trips entering the Warwick wider area	1078	76%	1188	40%	623	55%	1338	48%
K	Warwick wider are through trips	97	7%	498	17%	161	14%	460	16%
		1419	100%	2950	100%	1124	100%	2800	100%

10/07/2012 (Tuesday)

ID	Movement	Period							
			0700-1000		1000-1500		1500-1600		1600-1900
A	Long distance town centre trips	422	17%	388	15%	136	12%	371	13%
C	Long distance town centre through trips starting outside the outer cordon and stopping within the Warwick wider area	410	16%	375	14%	120	11%	376	13%
H	Long distance trips arriving in Warwick town centre	363	15%	364	14%	80	7%	279	10%
J	Trips entering the Warwick wider area	914	37%	1086	41%	621	56%	1389	48%
K	Warwick wider are through trips	384	15%	437	16%	160	14%	501	17%
		2493	100%	2650	100%	1117	100%	2916	100%

11/07/2012 (Wednesday)

ID	Movement	Period							
			0700-1000		1000-1500		1500-1600		1600-1900
A	Long distance town centre trips	436	17%	414	15%	131	12%	396	14%
C	Long distance town centre through trips starting outside the outer cordon and stopping within the Warwick wider area	444	17%	399	14%	129	11%	362	13%
H	Long distance trips arriving in Warwick town centre	343	13%	388	14%	89	8%	273	10%
J	Trips entering the Warwick wider area	916	35%	1123	41%	614	55%	1325	47%
K	Warwick wider are through trips	470	18%	433	16%	160	14%	460	16%
		2609	100%	2757	100%	1123	100%	2816	100%

12/07/2012 (Thursday)

ID	Movement	Period							
			0700-1000		1000-1500		1500-1600		1600-1900
A	Long distance town centre trips	280	14%	316	13%	85	11%	204	10%
C	Long distance town centre through trips starting outside the outer cordon and stopping within the Warwick wider area	355	18%	452	18%	83	10%	389	18%
H	Long distance trips arriving in Warwick town centre	256	13%	332	14%	56	7%	216	10%
J	Trips entering the Warwick wider area	714	36%	947	39%	469	58%	1032	49%
K	Warwick wider are through trips	399	20%	396	16%	116	14%	284	13%
		2004	100%	2443	100%	809	100%	2125	100%

13/07/2012 (Friday)

ID	Movement	Period							
			0700-1000		1000-1500		1500-1600		1600-1900
A	Long distance town centre trips	233	14%	181	8%	52	6%	107	4%
C	Long distance town centre through trips starting outside the outer cordon and stopping within the Warwick wider area	285	17%	304	14%	81	10%	377	16%
H	Long distance trips arriving in Warwick town centre	278	16%	308	14%	65	8%	208	9%
J	Trips entering the Warwick wider area	635	38%	984	45%	506	61%	1166	49%
K	Warwick wider are through trips	261	15%	411	19%	119	14%	524	22%
		1692	100%	2188	100%	823	100%	2382	100%

File Note

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Project title	A46/A4177 Assessment	Job number	232815-02
cc		File reference	232815-02.TN002
Prepared by	James Edwards	Date	27 March 2014
Subject	Warwick PARAMICS Modelling - A46/A4177 Assessment Overview		

1.1 Introduction

This note has been produced to summarise the findings of the A46/A4177 scheme testing, this analysis has been extracted from the associated option test report which it is anticipated will be completed and available mid-April.

The scenarios that have been tested are as follows:

1. Warwick Town 2016 Reference
2. Warwick Town 2016 Scheme
3. Warwick Town 2021 Reference
4. Warwick Town 2021 Scheme

Results have been collected and analysed for the entire model AM and PM model periods as well as the respective peak hours (08:00 to 09:00 and 17:00 to 18:00).

Analysis has been undertaken to ascertain queuing and demand levels for all of the key junctions within the study area as well as the impact on delay along key routes within the model.

Key junctions within the survey data have been identified as being those which are most important to the study; these are also the junctions that have been used for the purposes of identifying the peak hours, namely:

- A46 SB Off-slip/ A425
- A425 SB On-slip/ A46
- A425/ IBM access
- A425/ Wedgnock Lane

Analysis of the aforementioned junctions has also been supplemented with analysis of the potential impacts on delay along the corridor alongside the queuing and throughput impacts.

File Note

232815-02 27 March 2014

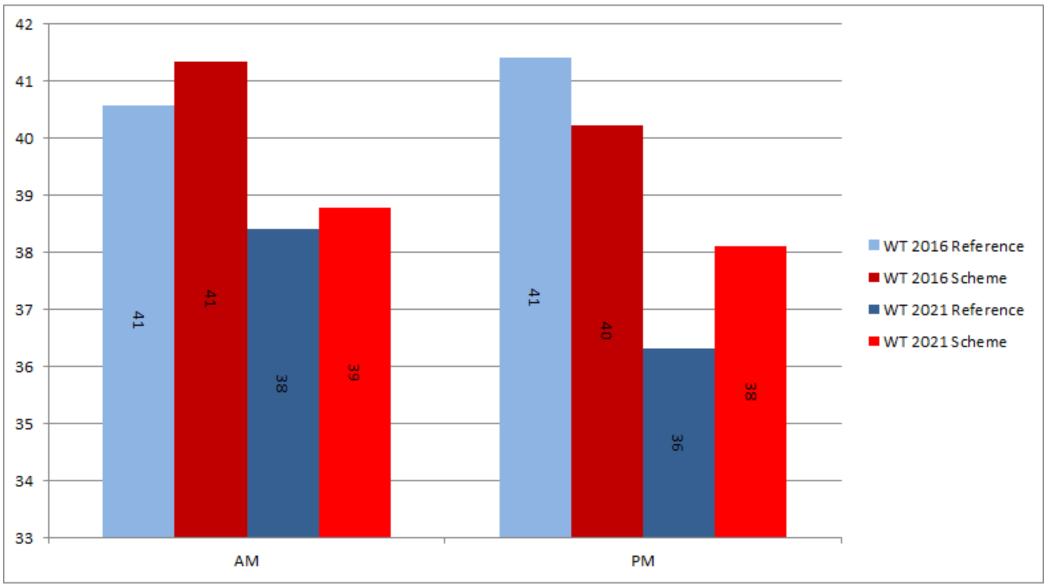
1.2 Network Wide Statistics

The following sections set out the changes in network wide statistics between the Reference and the Scheme for the 2016 and 2021 scenario outputs.

1.2.1 Average Journey Speed

Analysis of the average journey speed (Km/H) within the Reference and the Scheme scenarios has been presented for the 2016 and 2021 AM and PM periods within the following Figure 1:

Figure 1 –Average speed per vehicle (km/h), 2016 and 2021

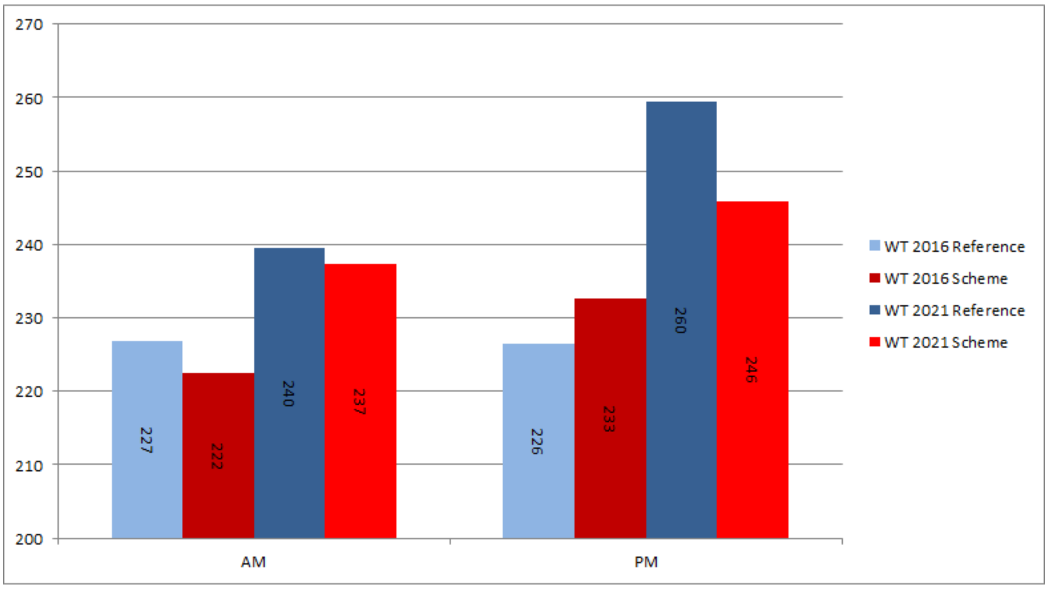


Analysis of the above figure shows that the average journey speeds are improved by 1-2% during the AM peak period by implementation of the scheme in 2016 and 2021. During the PM peak period, the average journey speeds are reduced by approximately 3% in 2016 assuming implementation of the scheme. However, by 2021, implementation of the scheme results in a 5% improvement in average vehicle speeds in the same period. It is clear from the above figure that vehicle speeds are generally lower during the PM peak period with respect to the AM peak period across the analysis years. This general reduction in average speeds is also prevalent when comparing the 2021 scenarios to the 2016 scenarios. This can be expected as the amount of vehicles on the road network will increase over time.

1.2.2 Average Journey Time (Seconds)

Analysis of the average journey times across the four scenarios has been presented for the 2016 and 2021 AM and PM periods within the following Figure 2:

Figure 2 –Average journey time (seconds), 2016 and 2021



Analysis of Figure 2 indicates there a general improvement in journey times with the implementation of the scheme in both 2016 and 2021. The exception to this is during the 2016 PM period where an approximate 3% increase in average journey time is expected assuming implementation of the scheme. Conversely, by 2021 a greater than 5% reduction in average journey times is expected during the same period.

1.2.3 Average Journey Distance

Analysis of the average journey distances across the four scenarios has been presented for the 2016 and 2021 AM and PM periods within the following Figure 3.

1.2.4 Completed Trips

Analysis of the number of completed trips across the four scenarios has been presented for the 2016 and 2021 AM and PM periods within the following Figure 4.

Analysis of Figure 4 indicates that there is a general slight increase in the number of vehicle trips completed across the AM and PM peak period in 2016 and 2021 assuming implementation of the scheme. The exception to this is during the PM peak period in 2016 where a negligible 0.1% decrease in completed trips is expected. These results appear to indicate that implementation of the scheme will allow the network to accommodate more trips by offering additional capacity.

Figure 3Figure 3 indicates implementation of the scheme has a negligible effect on the average journey times across the AM and PM peak periods in both 2016 and 2021.

1.2.5 Completed Trips

Analysis of the number of completed trips across the four scenarios has been presented for the 2016 and 2021 AM and PM periods within the following Figure 4.

Analysis of Figure 4 indicates that there is a general slight increase in the number of vehicle trips completed across the AM and PM peak period in 2016 and 2021 assuming implementation of the scheme. The exception to this is during the PM peak period in 2016 where a negligible 0.1% decrease in completed trips is expected. These results appear to indicate that implementation of the scheme will allow the network to accommodate more trips by offering additional capacity.

Figure 3 – Average journey distance (km), 2016 and 2021

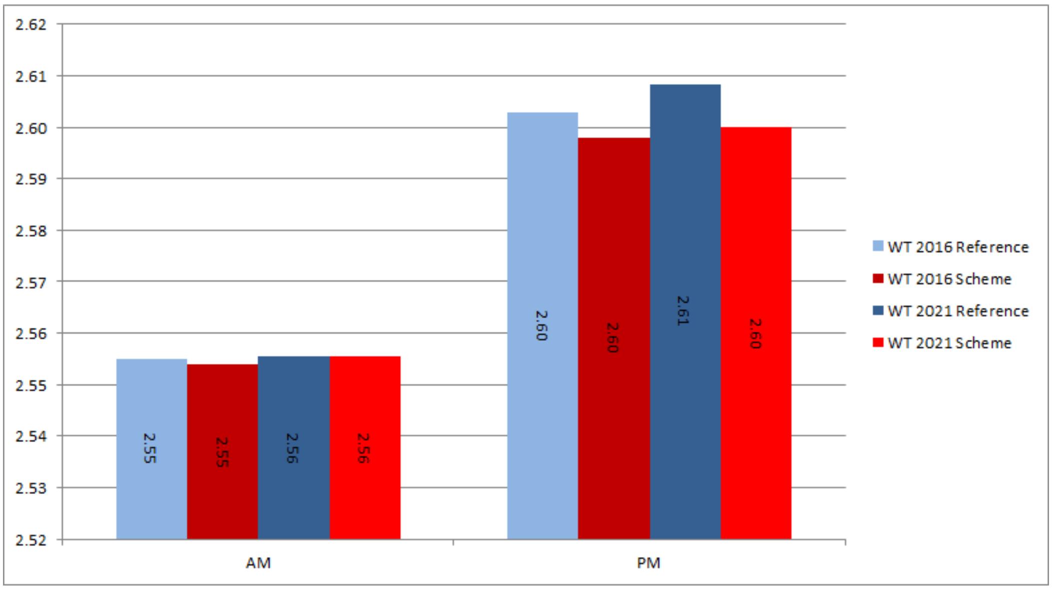
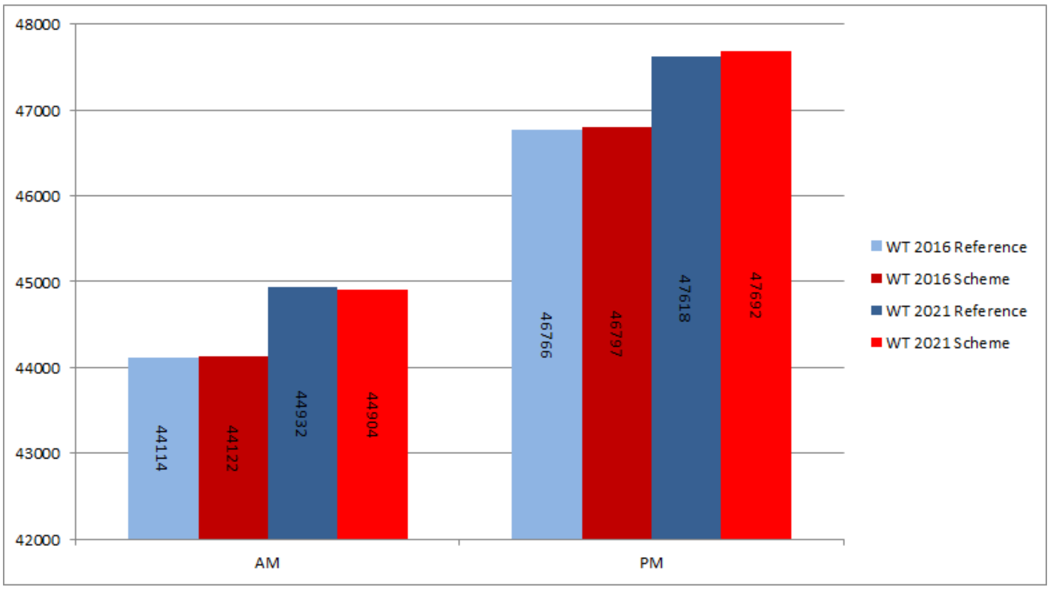


Figure 4 – Completed trips, 2016 and 2021



Because of the need for a cut off period it is never possible that 100% of the demand assigned within the model network will be a completed trip by the end of the model period. Some trips will have only just started when the model ends whilst some may be released onto the network later due to congestion effects.

To understand how much demand is either unreleased or left on the network at the end of the simulation period the number of completed trips has been compared against the total demand levels assigned within the model. This information has been presented within the following Table 1:

Table 1 - Completed Trips Analysis (2016 and 2021)

	AM (07:00 to 10:00)			PM (16:00 to 19:00)		
	Demand	**Completed Trips**	**Completed %**	**Demand**	**Completed Trips**	**Completed %**
WT 2016 Reference	44697	44114	98.7%	47533	46766	98.4%
WT 2016 Scheme	44697	44122	98.7%	47533	46797	98.5%
WT 2021Reference	45545	44932	98.7%	48508	47618	98.2%
WT 2021 Scheme	45545	44904	98.6%	48508	47692	98.3%

The previous table illustrates that the number of trips that are completed during the AM and PM model period, as a percentage of the overall demand levels assigned to the model network, remains largely unchanged across the scenarios.

1.3 Summary

From the above analysis it can be seen that implementation of the scheme at the A46/ A4177/ A425 junction results in a general improvement of network wide statistics.

1.4 Stage 2 Analysis: Queuing

The second stage of analysis involved comparing the performance of the scheme with the maximum perceived extant levels assigned. The purpose of this stage of testing is to ascertain the performance of each scenario in terms of both queuing and delay across both AM and PM model periods. Furthermore, the extant levels that have been assigned to each scenario have been assigned on the basis of being the greatest possible level of extent that can be accommodated without queue propagation onto the A46 mainline. Assessing in the context of greater demand levels will allow any wider benefits to be identified whilst the higher levels of demand should make any potential issues more easily identifiable.

As a result the following scenarios have been used as the basis of this element of the assessment:

- Warwick Town 2016 Reference
- Warwick Town 2016 Scheme
- Warwick Town 2021 Reference
- Warwick Town 2021 Scheme

Results have been collected and analysed for the entire model AM and PM model periods as well as the respective peak hours (08:00 to 09:00 and 17:00 to 18:00).

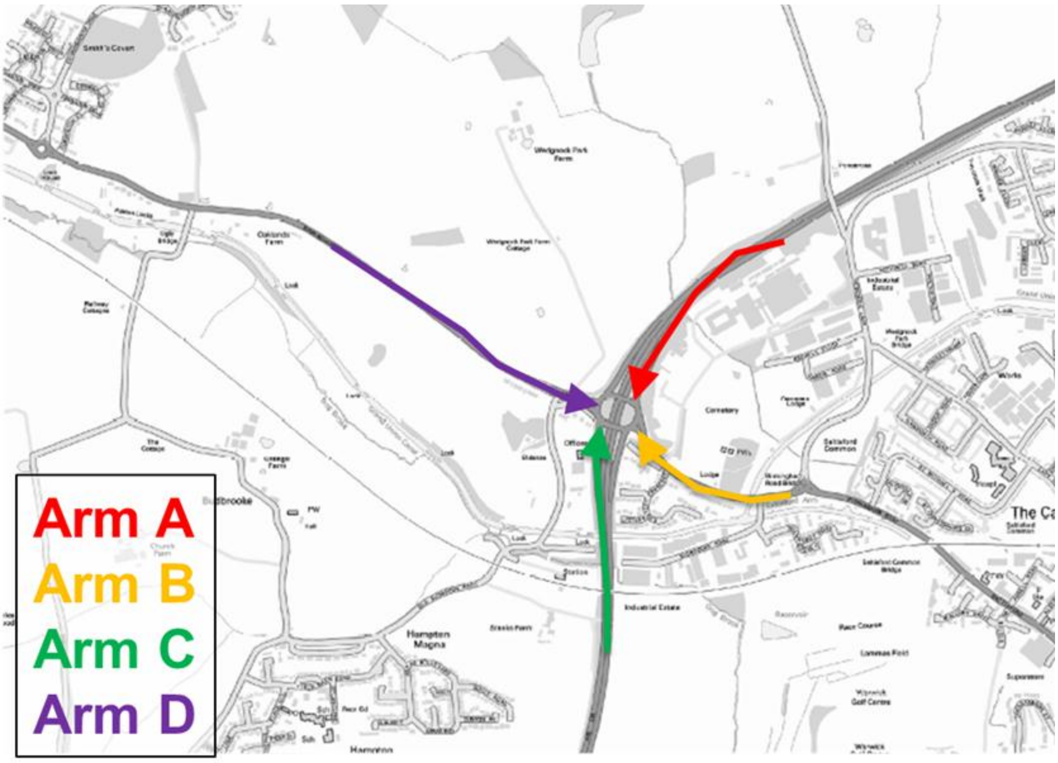
The queuing analysis has focussed on the following approaches to the A46/A425/A4177 Roundabout:

- A46 SB Off-slip/ A425
- A425 SB On-slip/ A46
- A425/ IBM access
- A425/ Wedgnock Lane

Analysis of the aforementioned junctions has also been supplemented with analysis of the potential impacts on delay along the corridor alongside the queuing and throughput impacts.

Queue routes have been defined within PARAMICS for the each of the approaches of the Junction shown in Figure 5:

Figure 5 – Junction location plot with approach arms



1.4.1 Arm A: A46 SB off-slip

Analysis has been undertaken to ascertain the difference in queuing and throughput levels at the A46 SB off-slip. The outcome of this analysis for all scenarios is shown in Figure 6 to Figure 9.

Figure 6 illustrates that average maximum queue lengths are considerably lower than the slip length in both design years when the scheme is implemented.

Assuming the scheme is not implemented, by 2016 the queue already exceeds the slip length of 460m. By 2021, the queue is expected to exceed the slip length by nearly 600m and by 1100m in 10% of cases. If the scheme was implemented there is expected to be approximately 350m of excess capacity in the slip lane in both 2016 and 2021. This indicates that the alterations to the junction will take the capacity beyond 2021.

Figure 6 – A46 SB Off-slip/ A425 Average Max Queue Length (Metres) 'All Scenarios' (0700-1000)

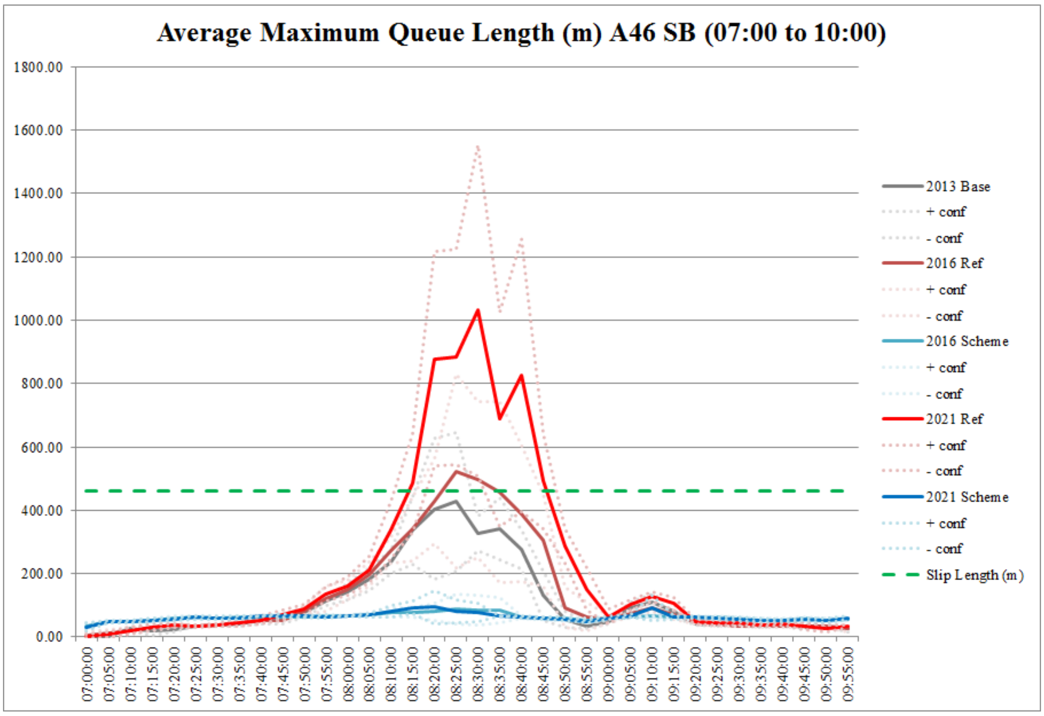


Figure 7 - A46 SB Off-slip/ A425 Average Max Queue Length (Metres) 'All Scenarios' (1600-1900)

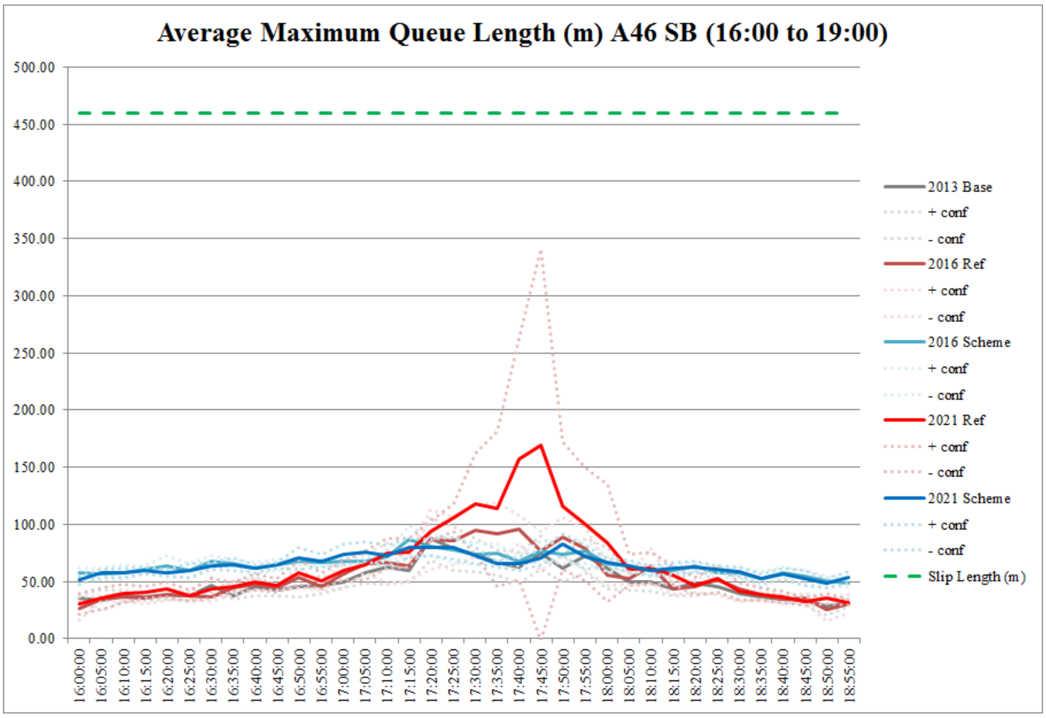


Figure 7 shows that for all scenarios the queue in the PM peak period is not expected to exceed the slip length. This is to be expected as the flows along the A46 at this junction are tidal in that all flows are towards Warwick in the AM and away in the PM. It can be seen that the 2021 Scheme scenario results in the longest expected queue which is expected to be a maximum of approximately 350m (shown in the confidence interval line).

Figure 8 - A46 SB Off-slip/ A425 Average Max Queue Length (vehicles) ‘All Scenarios’ (0700-1000)

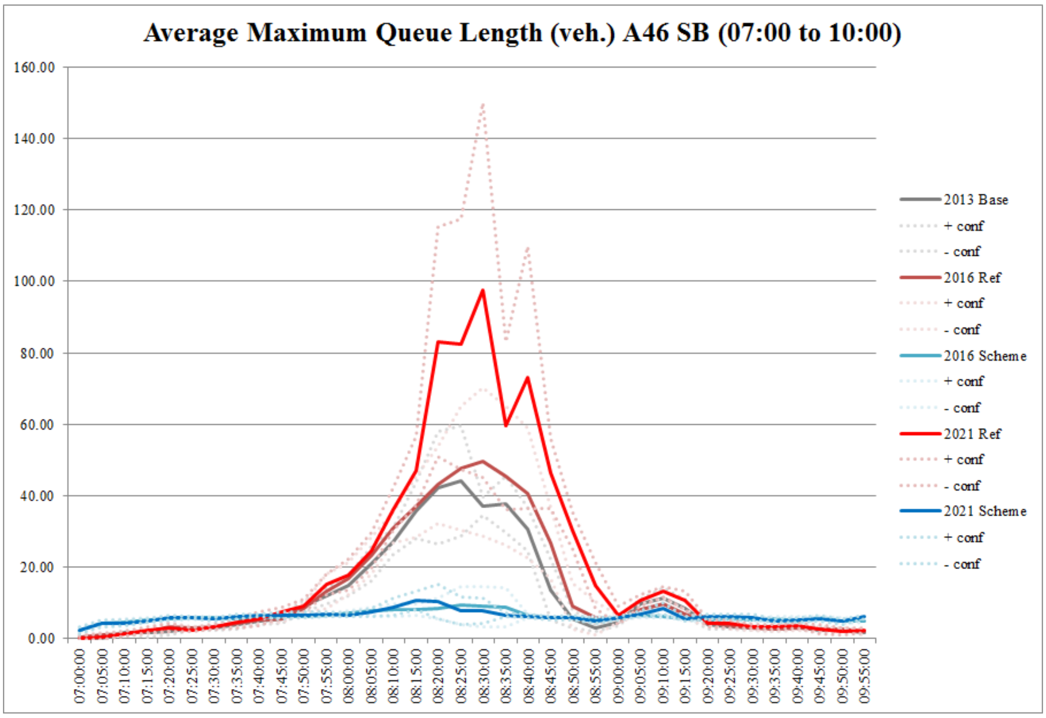
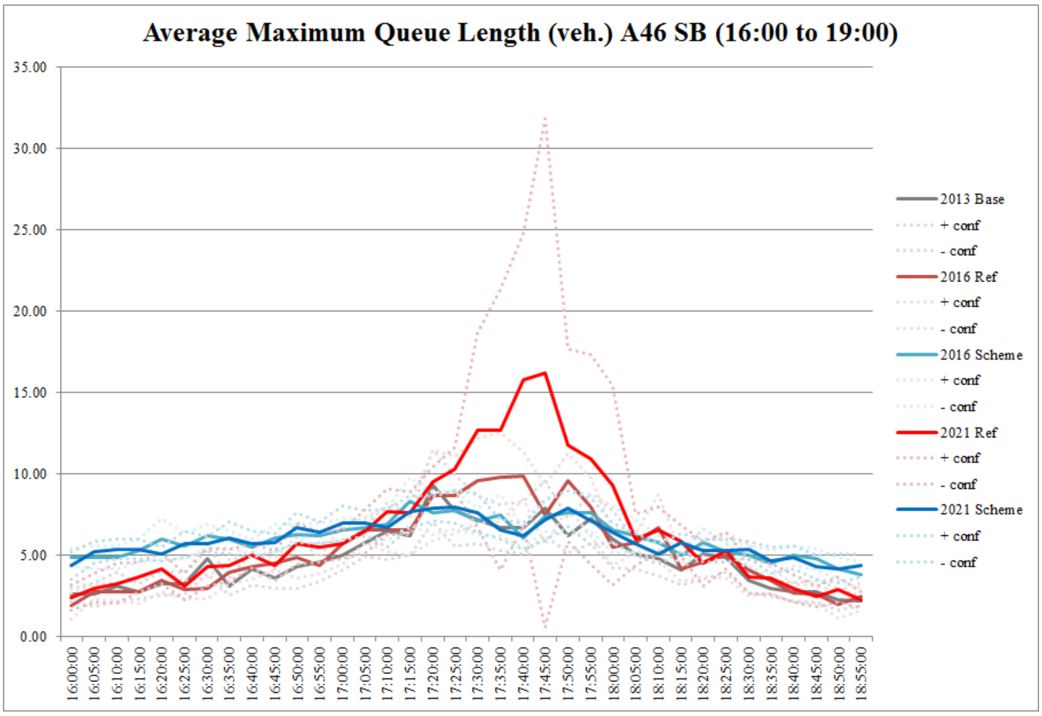


Figure 9 - A46 SB Off-slip/ A425 Average Max Queue Length (vehicles) ‘All Scenarios’ (1600-1900)



1.4.2 Arm B A425 WB

Figure 10 - A425 WB / A46 On-slip Average Max Queue Length (Metres) ‘All Scenarios’ (0700-1000)

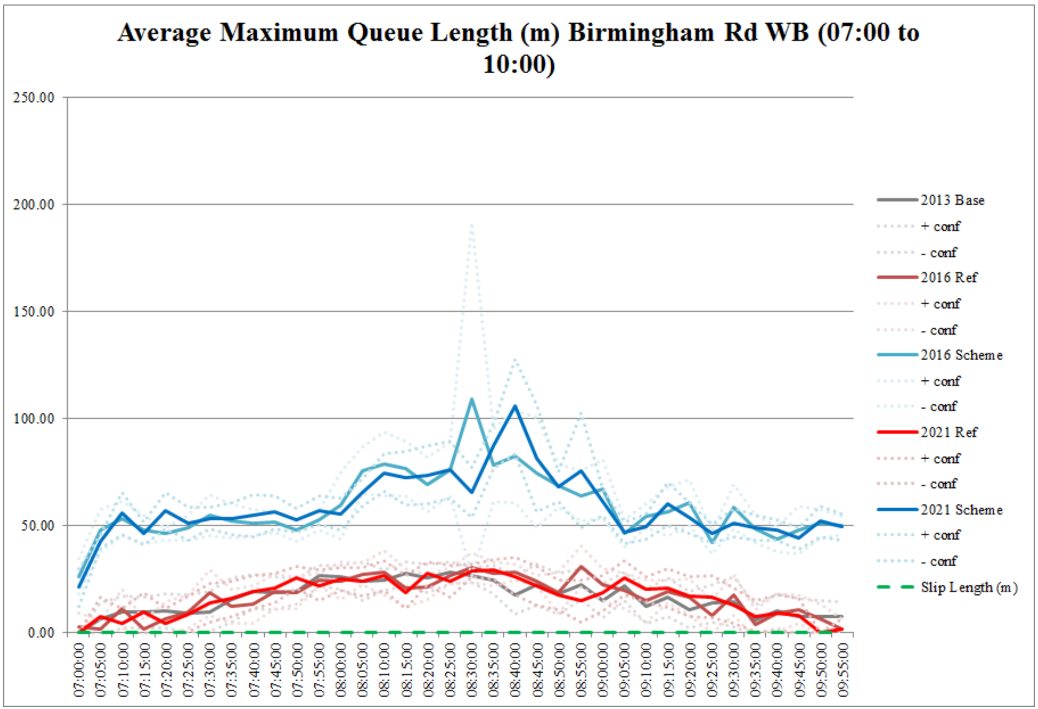
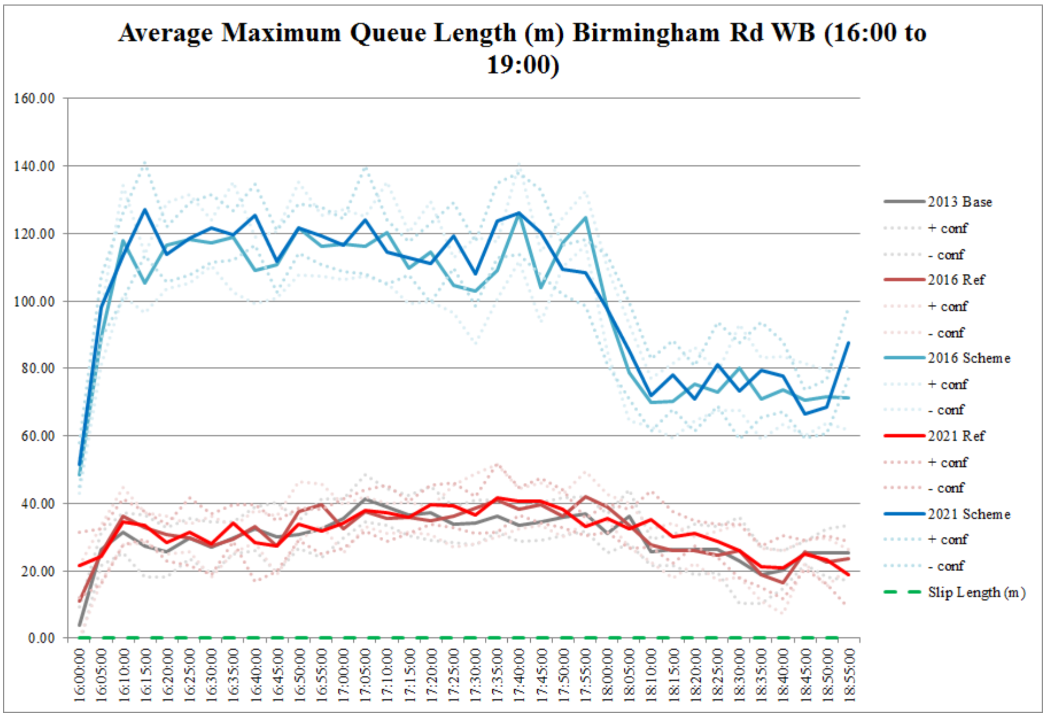


Figure 11 - A425 WB / A46 On-slip Average Max Queue Length (Metres) ‘All Scenarios’ (1600-1900)



1.4.3 Arm B A425 WB

Figure 10 illustrates that implementation of the scheme results in longer queue lengths during the AM peak period in 2016 and 2021. The distance to the closest upstream junction that allows a small amount of residents to access Birmingham Road is approximate 95m. Given the maximum queue expected in 2016 and 2021 is approximately 110 and 106m respectively, this junction could be blocked for short periods during the AM peak period. However there is currently “keep clear” signage painted on the road to allow residents to access the residential area/ Birmingham Road should this occur.

Figure 11 again indicates that the queues on the westbound approach of Birmingham Road are expected to be longer assuming the scheme is implemented in 2016 and 2021. Whilst in the AM peak period, the maximum peak period is expected to be approximately 110m, during the PM peak period, this is expected to be nearly 130m. This longer queue in the PM peak period is to be expected due to the tidal flow of traffic which is heading out from Warwick town centre in the afternoon as people leave work etc.

This length of queue is not expected to be an issue as mentioned previously the “keep clear” signage ensures the small amount of residents that need to access the upstream junction are able to do so.

Figure 12 - A425 WB / A46 On-slip Average Max Queue Length (Vehicles) ‘All Scenarios’ (0700-1000)

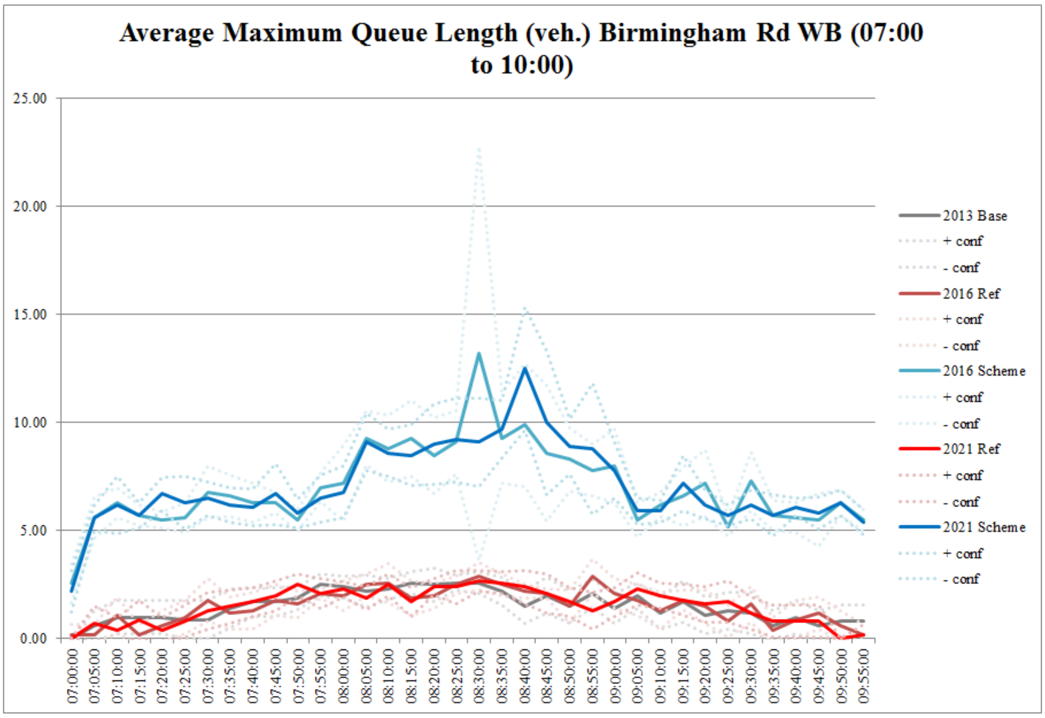
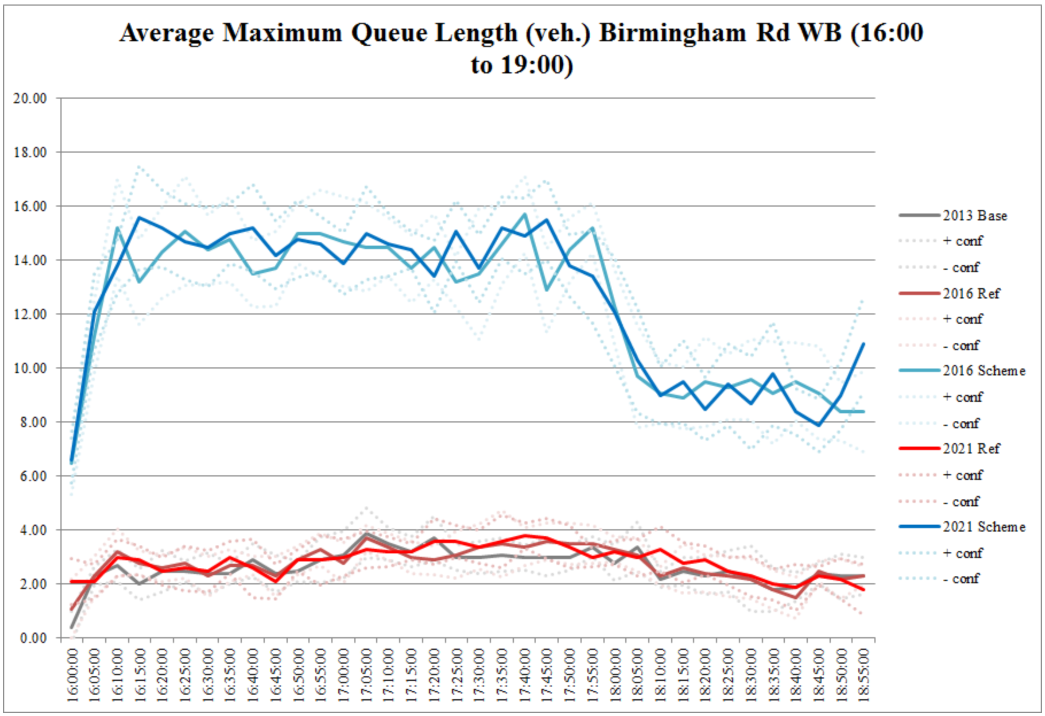


Figure 13 - A425 WB / A46 On-slip Average Max Queue Length (Vehicles) 'All Scenarios' (1600-1900)



1.4.4 Arm C A46 NB off-slip

Figure 14 - A46 NB off-slip /A4177 Average Max Queue Length (Metres) 'All Scenarios' (0700-1000)

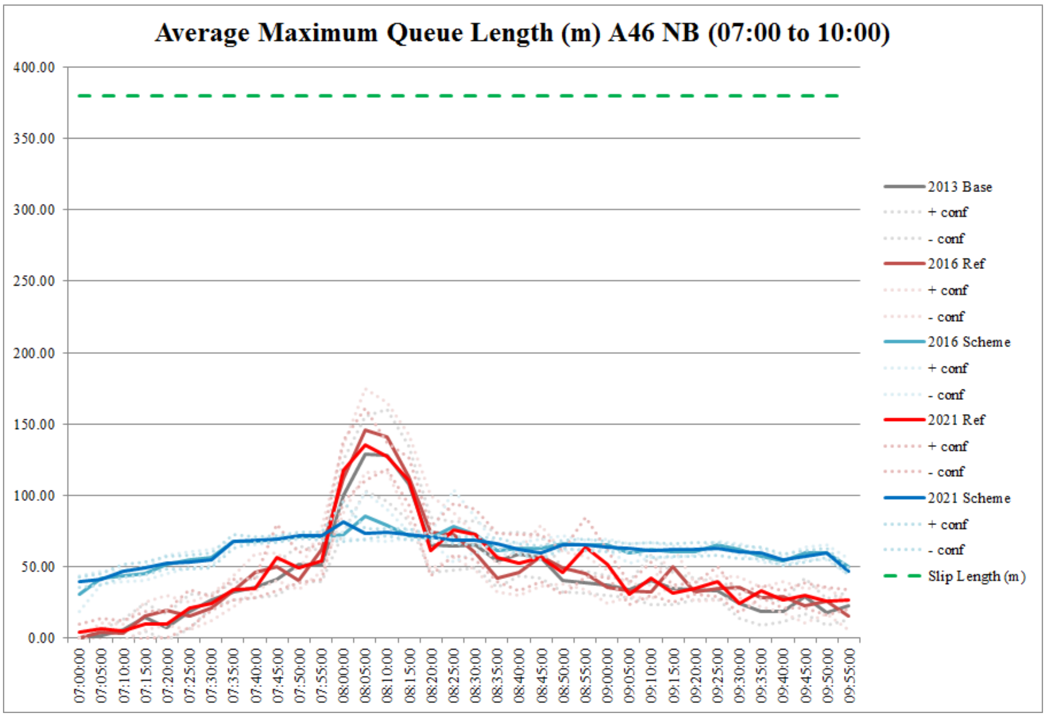


Figure 14 shows during the AM peak period, the maximum queue length expected in 2016 and 2021 is approximately 40% less should the scheme be implemented. However, given the 380m slip length, there is not expected to be any overflow of the queue onto the A46 NB under any of the scenarios.

Figure 15 - A46 NB off-slip /A4177 Average Max Queue Length (Metres) 'All Scenarios' (1600-1900)

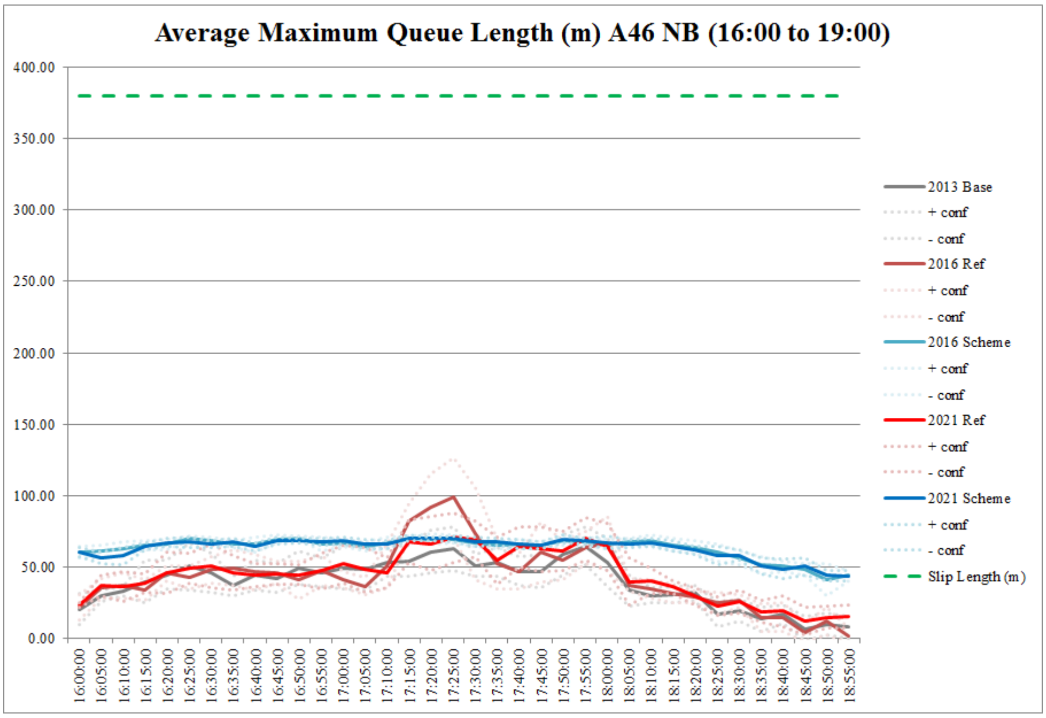
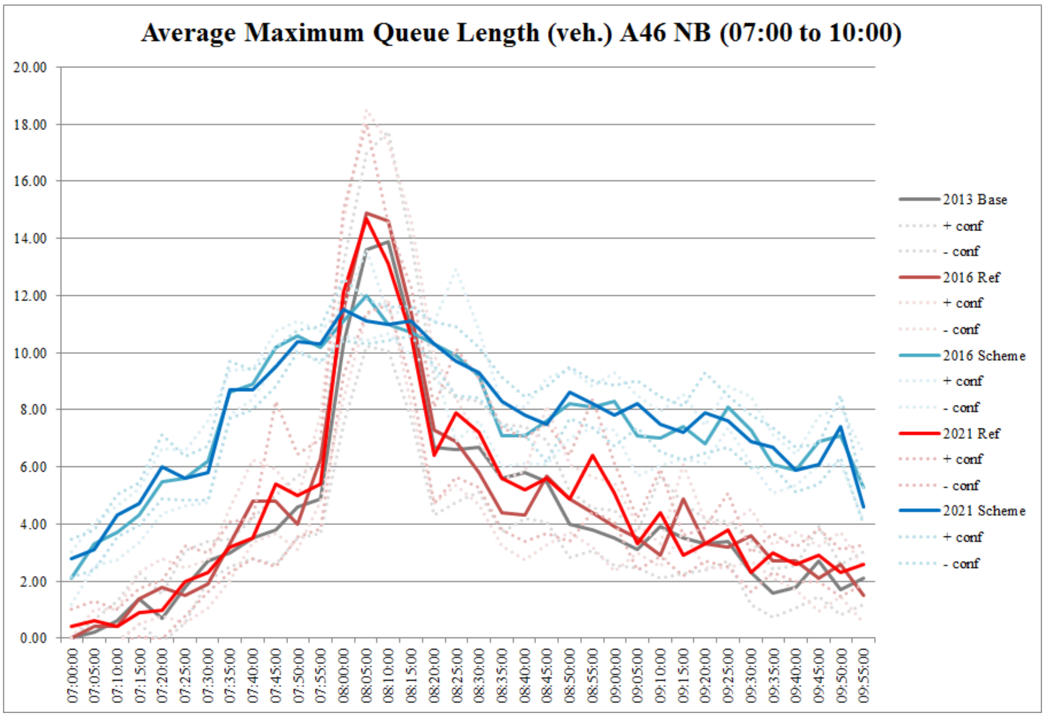


Figure 15 depicts a similar scenario in the PM peak period as to the AM peak period. Whilst the maximum queue lengths of the scheme scenarios are expected to be less than without the scheme, there is not expected to be any queuing or lane overflow issues in any scenario.

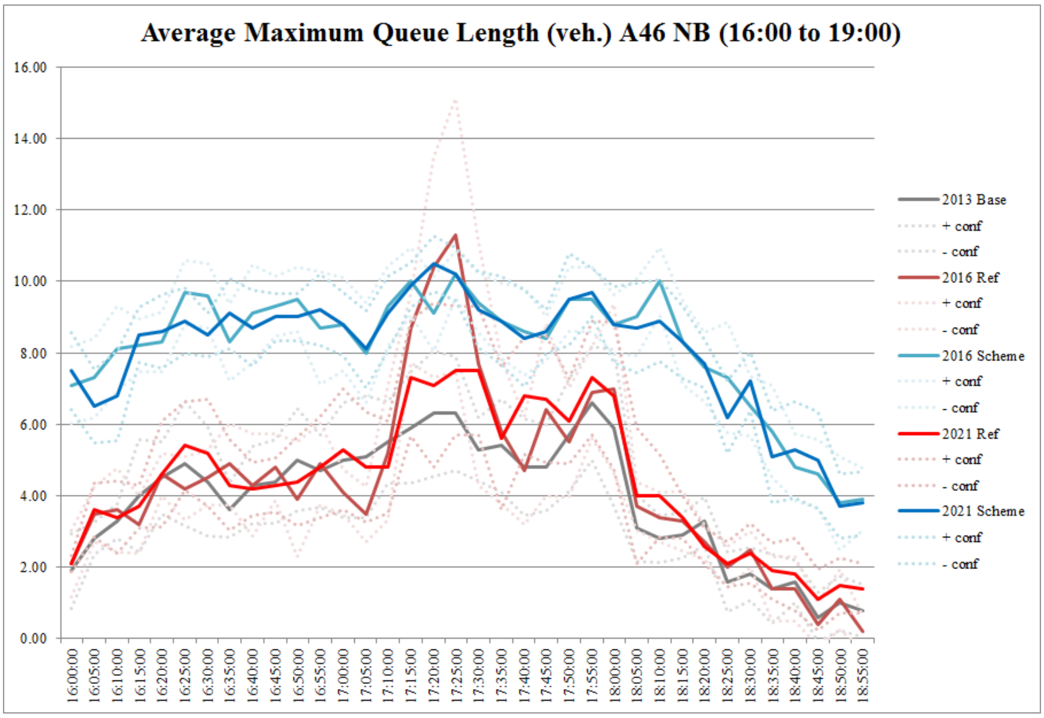
Figure 16 - A46 NB off-slip /A4177 Average Max Queue Length (Vehicles) 'All Scenarios' (0700-1000)



File Note

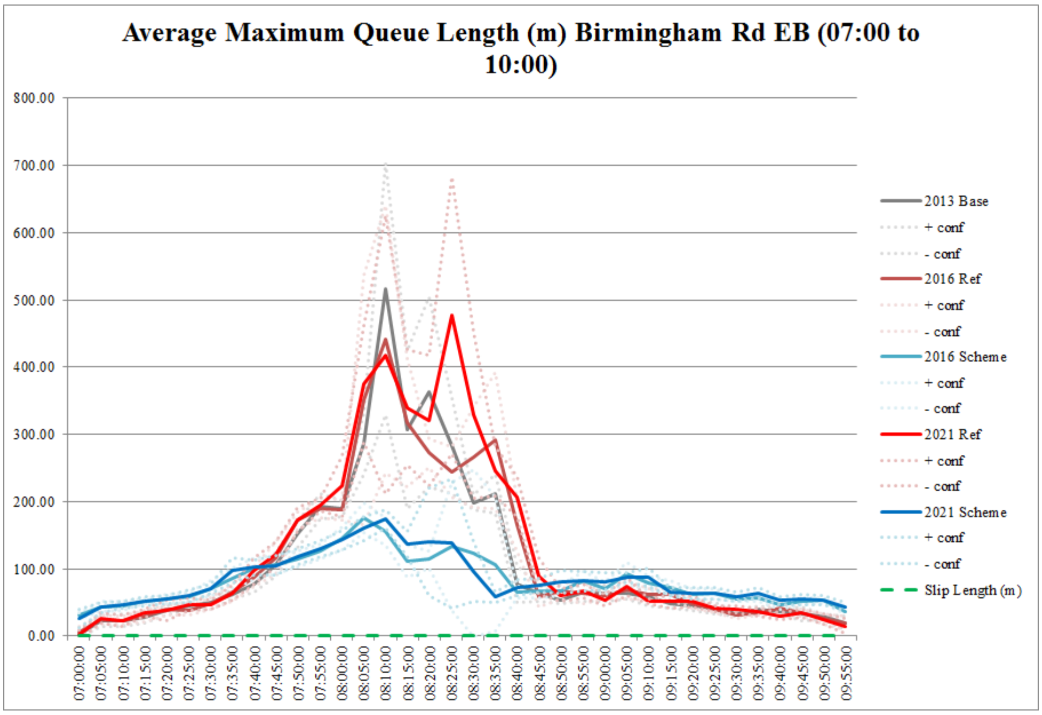
232815-02 27 March 2014

Figure 17 - A46 NB off-slip /A4177 Average Max Queue Length (Vehicles) ‘All Scenarios’ (1600-1900)



1.4.5 Arm D A4177

Figure 18 - A4177 on-slip/ A46 Average Max Queue Length (Metres) ‘All Scenarios’ (0700-1000)



File Note

232815-02 27 March 2014

Figure 19 - A4177 on-slip/ A46 Average Max Queue Length (Metres) ‘All Scenarios’ (1600-1900)

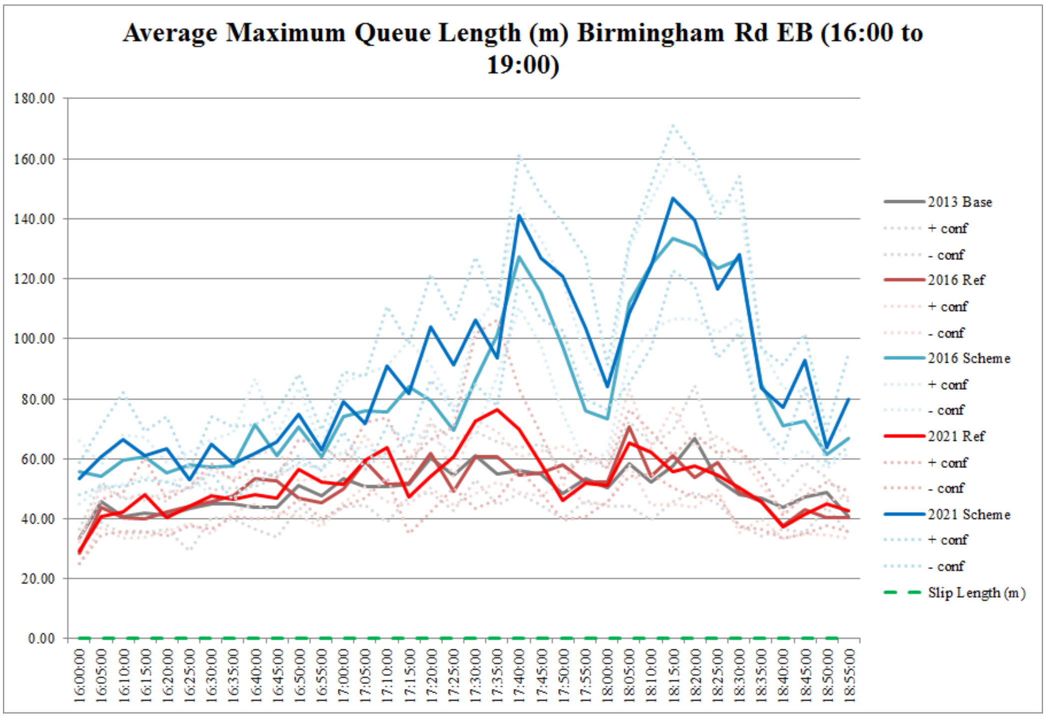


Figure 20 - A4177 on-slip/ A46 Average Max Queue Length (Metres) ‘All Scenarios’ (0700-1000)

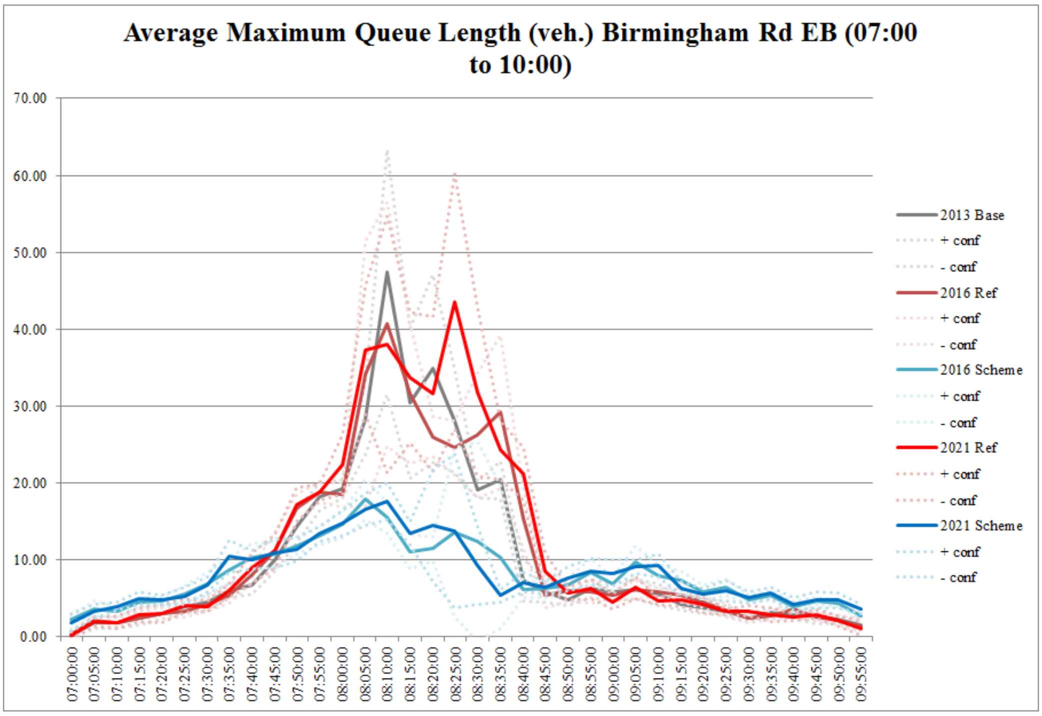
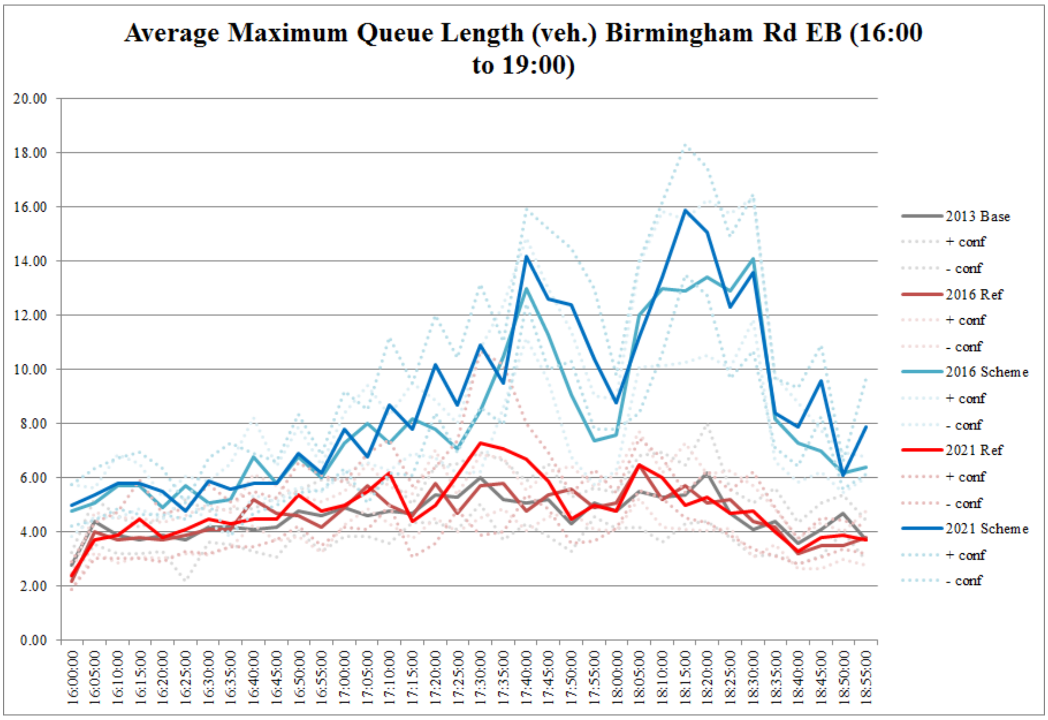


Figure 21 - A4177 on-slip/ A46 Average Max Queue Length (Metres) ‘All Scenarios’ (1600-1900)



Analysis of Figure 18 shows in the AM peak period, whilst the build-up of the queue is relatively equal across all four scenarios, implementation of the scheme results in an approximate 60% improvement in the maximum queues expected. This improvement can be attributed to the addition of a third slip lane for traffic to turn left from the westbound approach onto the A46 (northbound).

Figure 19 shows that implementation of the scheme results in reductions to queue lengths across the whole PM peak period with a maximum improvement of over 300m representing approximately 90% of the reference case queues.

1.5 Delay Analysis

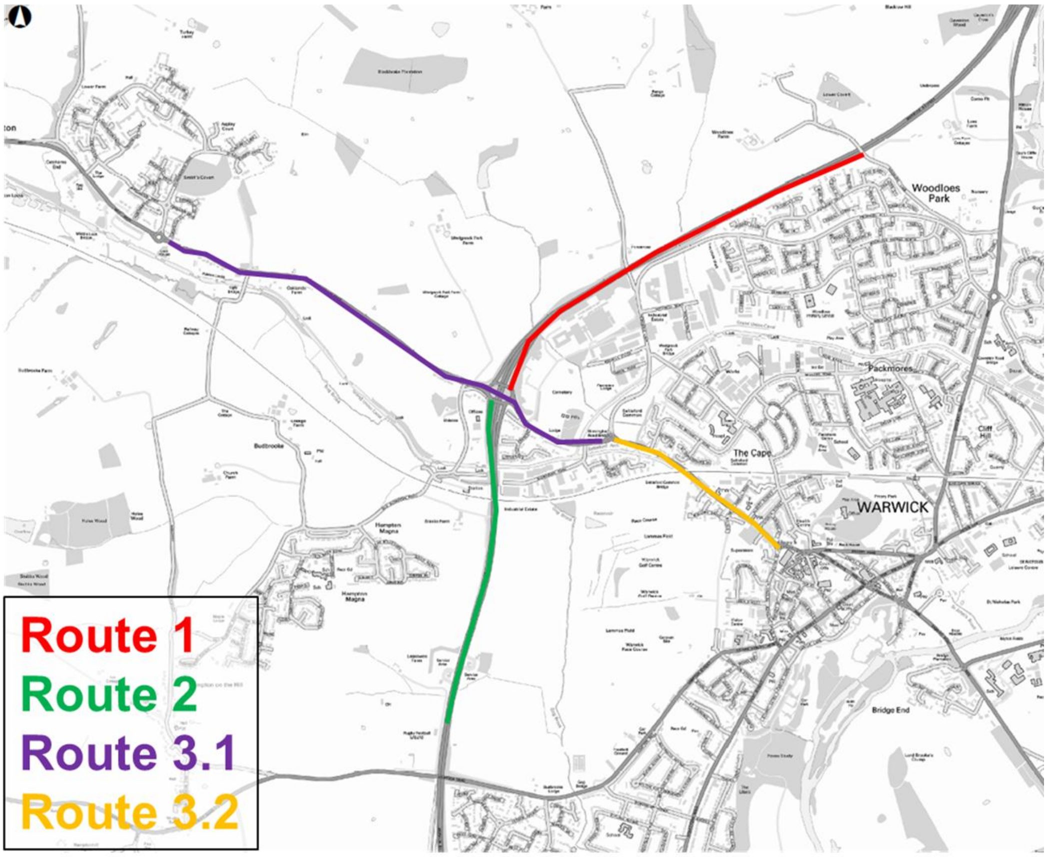
In addition to assessing the impact on junction performance measures that each option has, analysis has been undertaken to ascertain the potential impact on delay within the model that may arise as a result of the implementation of the scheme and associated extant development. Four routes have been identified for the analysis as follows:

- Route 1 – A46 Warwick By-Pass from the Woodloes Lane overpass to the A4177/ A425 junction
- Route 2 – A46 Warwick By-Pass from the A4177/ A425 junction to the south
- Route 3.1 – A4177 Birmingham Road from Charingworth Drive to Wedgnock Lane
- Route 3.2 – A4177 Birmingham Road from Wedgnock Lane to the Saltisford/ Theatre Street roundabout

These routes are illustrated in the following

Figure 22**.**

Figure 22 – Key Delay Routes



Since the flow pattern within the model is tidal, i.e. towards Warwick town centre in the AM and away from the site in the PM, the assessment of delay has been undertaken against the worst case conditions. As a result analysis of the impact on journey times into the Warwick town centre has been undertaken in the AM whilst, correspondingly, an assessment of the impact on delay of journey times out of the site has been undertaken within the PM.

1.6 Route 1 Analysis

Analysis of the impact on A46 southbound delay, across all four scenarios, during the AM peak hour is hour is presented within the following

Figure 23 whilst PM analysis of delay on the M40 northbound direction is presented within Figure 24.

Figure 23 - Route 1 SB AM (0700 to 1000) Average Journey Time (s)

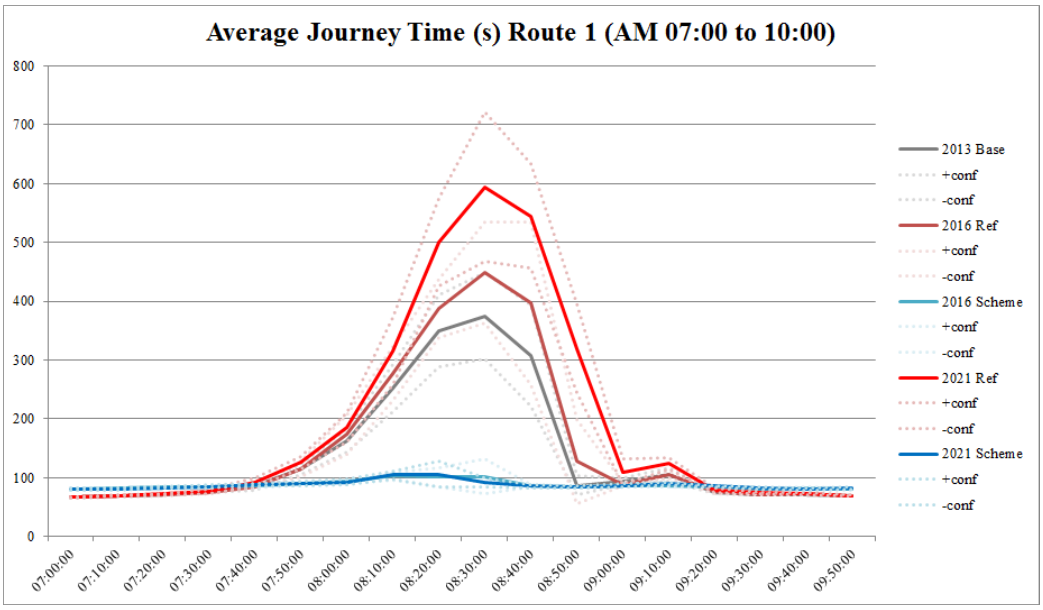
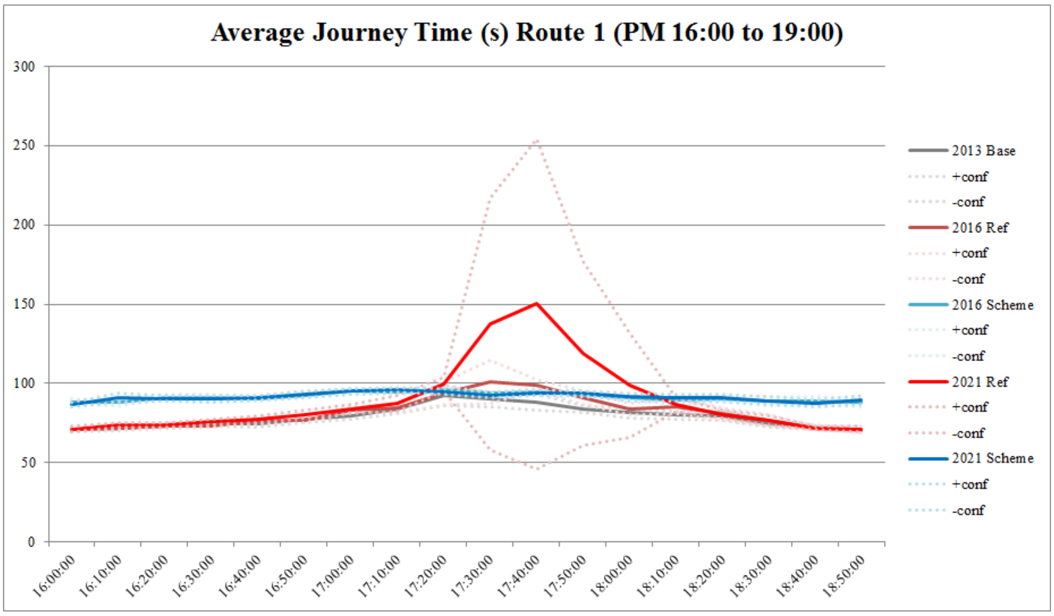


Figure 24 - Route 1 SB PM (1600 to 1900) Average Journey Time (s)



Analysis of

Figure 23 reveals that a significant reduction in AM peak time delay is achieved through the implementation of scheme across years 2016 and 2021. Whilst there is little difference in delay expected between the scenarios from 0700-0745 and 0910-1000, between these periods, the improvement due to the scheme is marked.

During the AM peak period, implementation of the scheme is expected to result in a maximum improvement to delay of approximately 77% and 82% in 2016 and 2021 respectively. This results in a maximum average delay of 103 seconds and 106 seconds in 2016 and 2021 across the link. Conversely, without the scheme, the maximum average delays are expected to be 449 and 594 seconds in 2016 and 2021.

Given the tidal nature of the flow of traffic towards Warwick in the AM and away in the PM peak period, it is logical that the maximum queue expected on route 1 in the evening is approximately 75% less than that in the AM peak period. Further it can be seen that implementation of the scheme results in a reduction in the maximum queue length during this period in 2016 and 2021. By 2021, the maximum expected queue is approximately 150m whilst assuming the scheme is implemented; this is reduced to approximately 90m.

1.7 Route 2 Analysis

Analysis of the impact on A46 northbound delay, across all four scenarios, during the AM peak hour is presented within the following Figure 25 whilst PM analysis of delay is presented within Figure 26.

Figure 25 - Route 2 NB AM (0700 to 1000) Average Journey Time (s)

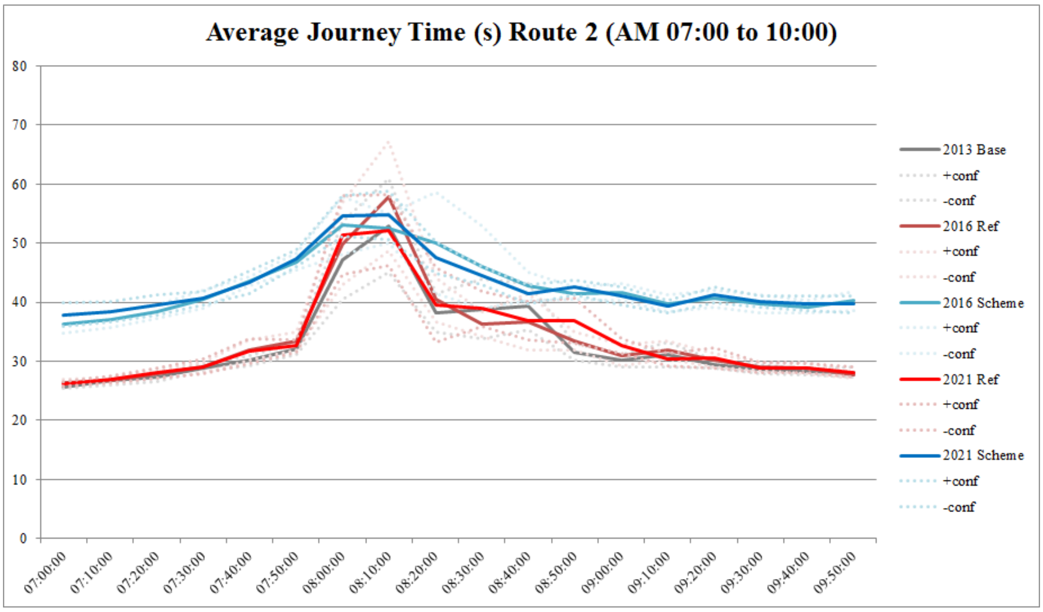
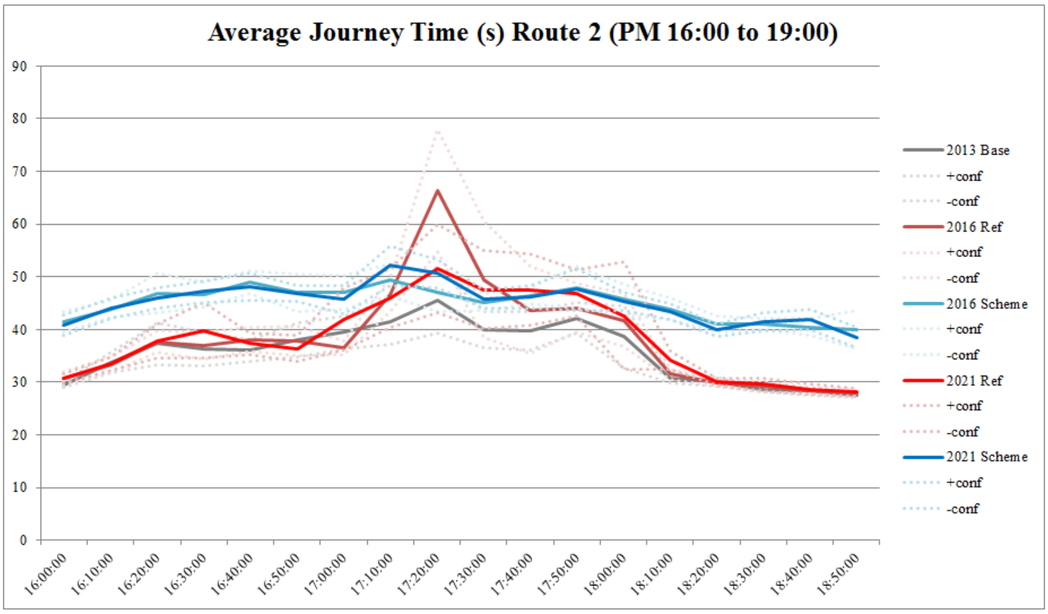


Figure 26 - Route 2 NB PM (1600 to 1900) Average Journey Time (s)



Analysis of Figure 25 reveals the level of traffic through this route has little bearing on the maximum delay expected. This is evident as the maximum delay of approximately 50 seconds remains relatively constant between all scenarios at the absolute peak occulting at approximately 0815. However, during the AM peak period, it is evident that implementation of the scheme results in an approximate 35% increase in delay along the route between the hours of 0700-0750 and 0830-1000. The average delay is approximately 35 seconds and 43 seconds under the reference scenarios and scheme scenarios respectively.

Analysis of Figure 26 reveals that whilst during the build-up and wind down of the delay across the route is approximately 33% higher if the scheme was implemented, the maximum delay is expected under the 2016 reference scenario. This peak delay is expected to occur at approximately 0810 hours and is 58 seconds. Assuming the scheme is implemented, this maximum delay is reduced to 43 and 44 seconds in 2016 and 2021 respectively.

1.8 Route 3.1 EB Analysis

Analysis of the impact on A4177/A425 Eastbound delay, across all four scenarios, during the AM peak hour peak hour is presented within the following Figure 27 whilst PM analysis of delay is presented within

Figure 28.

Figure 27 - Route 3.1 EB AM (0700 to 1000) Average Journey Time (s)

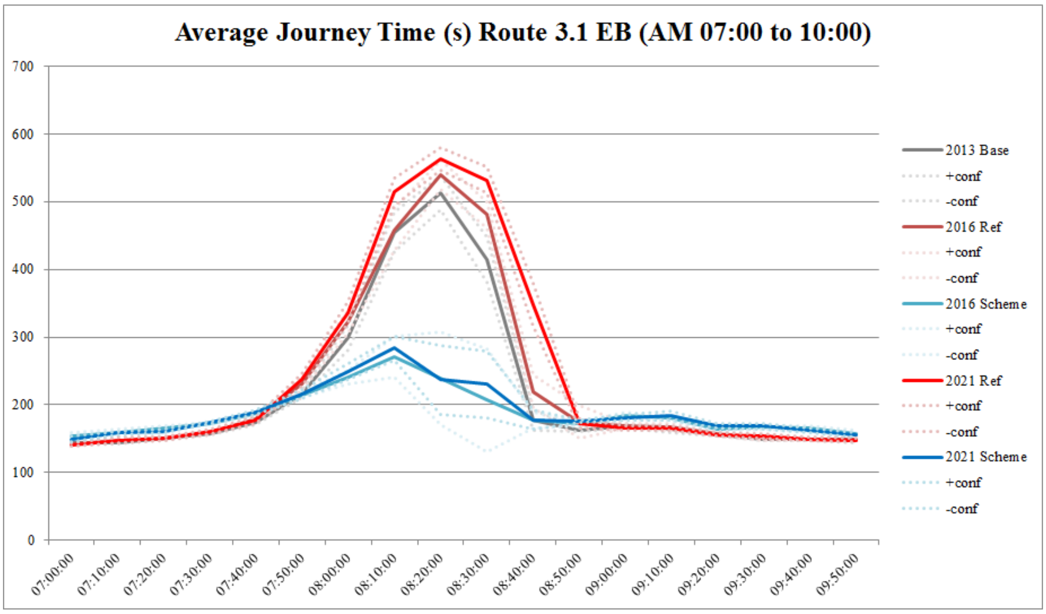
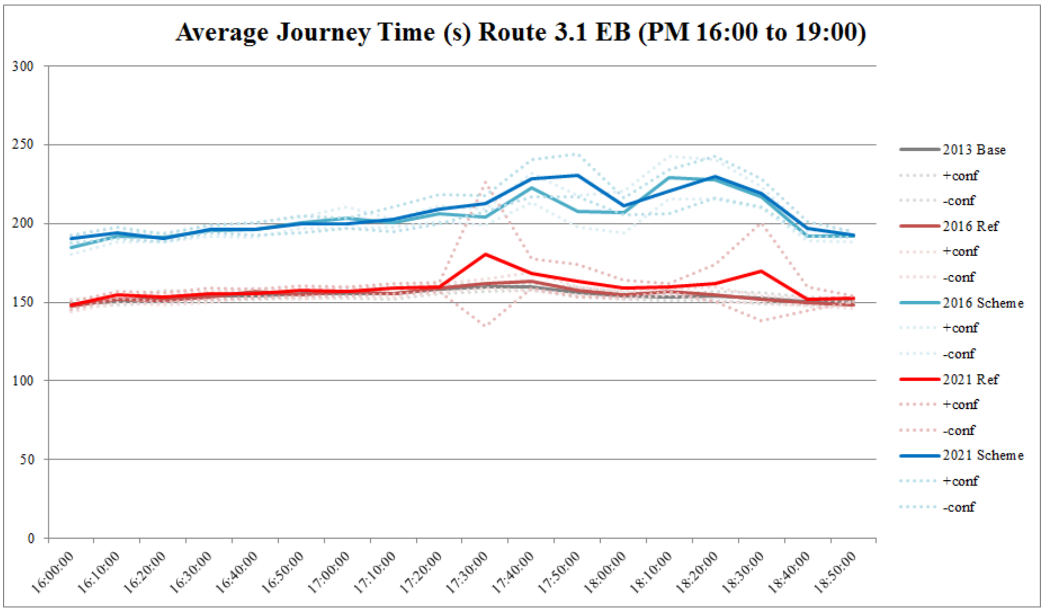


Figure 28 - Route 3.1 EB PM (1600 to 100) Average Journey Time (s)



Analysis of Figure 27 shows whilst the build-up of the peak delay across the route is relatively consistent across the four scenarios, implementation of the scheme results in a marked improvement in the maximum delay experienced in both 2016 and 2021. By 0820 hours, the maximum delay is approximately 540 and 563 seconds in the 2016 reference and 2021 reference scenarios respectively. This delay is reduced by 50% in both years assuming the scheme is introduced.

The results depicted in

Figure 28 indicate that the level of delay is relatively independent of the design year. During the PM peak period, the scheme results in an approximate 40% and 28% increase in delay across the route in 2016 and 2021 respectively. This is to be expected as the improvements are designed to improve conditions for the peak flow of traffic and in the PM peak period, this route is opposing the tidal flow and is heading towards Warwick town centre.

Whilst there is an increase in delay expected during the PM peak period for this route, this increase in relative terms is expected to be approximately 50-66 seconds whilst the time savings in the AM peak period are 269-279 seconds in 2016 and 2021 respectively.

1.9 Route 3.1 WB Analysis

Analysis of the impact on A4177/A425 Westbound delay, across all four scenarios, during the AM peak hour peak hour is presented within the following

Figure 29 whilst PM analysis of delay is presented within Figure 30. The peak flow along this route occurs in the PM peak hour (away from Warwick town centre).

Figure 29 - Route 3.1 WB AM (0700 to 1000) Average Journey Time (s)

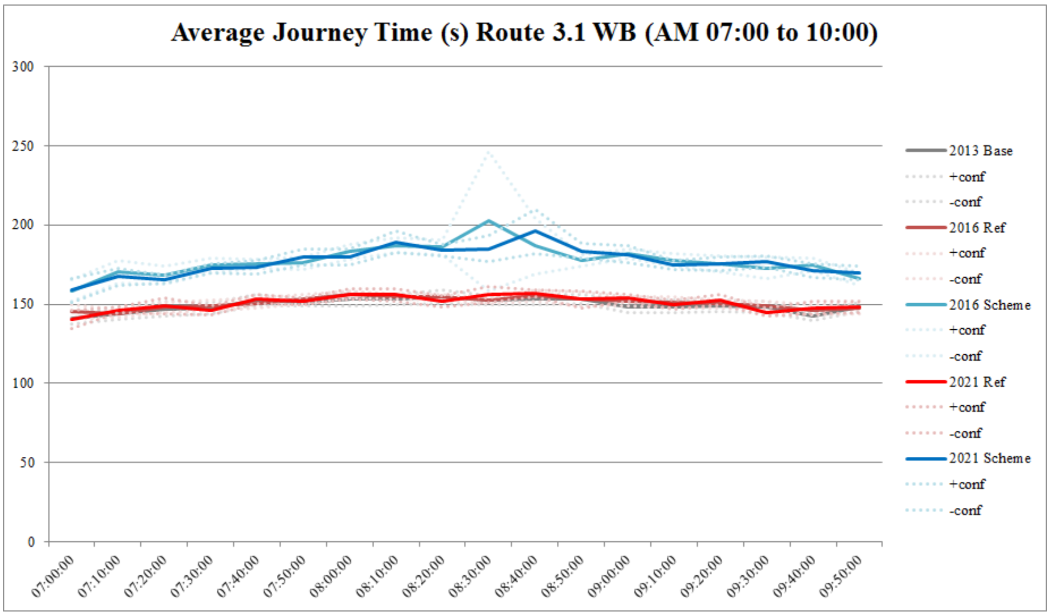
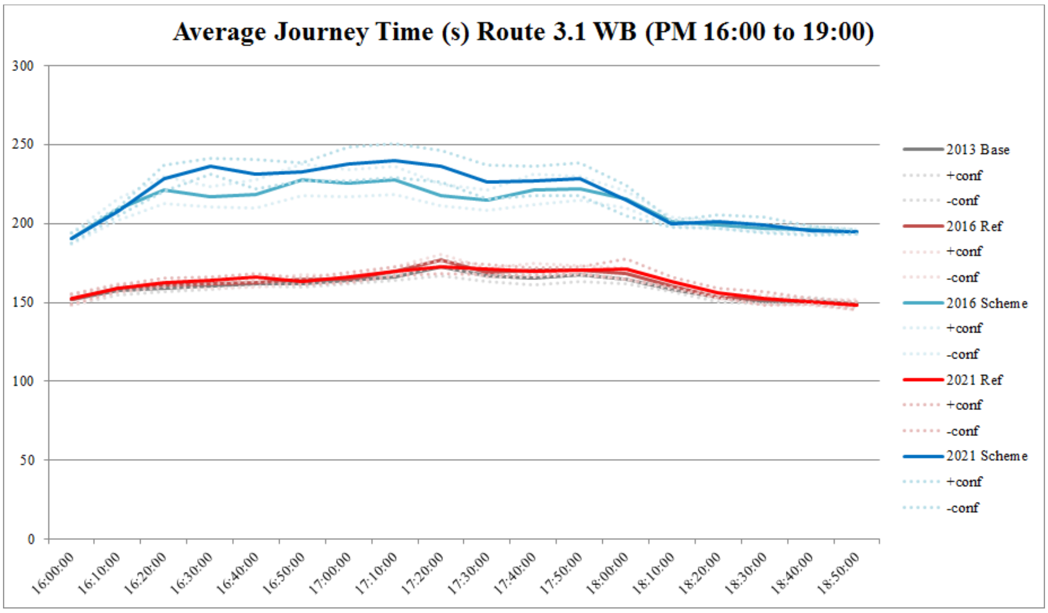


Figure 30 - Route 3.1 WB PM (1600 to 1900) Average Journey Time (s)



Analysis of

Figure 29 again indicates that the level of delay is relatively independent of the design year. The level of delay expected for all scenarios is relatively flat (consistent) across the AM peak period with a maximum delay expected of approximately 200 seconds should the scheme be implemented and 156 seconds should conditions remain the same. This equates to a 30% and 25% increase in 2016 and 2021 respectively.

During the PM peak period, the increase in delay along the route is approximately 29-39% in 2016 and 2021 should the scheme be implemented. This represents a 51-68 second increase in delay.

1.10 Route 3.2 EB Analysis

Analysis of the impact on A4177/A425 Eastbound delay, across all four scenarios, during the AM peak hour is presented within the following Figure 31 whilst PM analysis of delay is presented within Figure 32. The peak flow along this route occurs in the AM peak hour (towards Warwick town centre). The purpose of analysing this route is to determine the downstream effect on traffic conditions given the improvements proposed for the A46/ A4177/ A425 junction.

Figure 31 - Route 3.2 EB AM (0700 to 1000) Average Journey Time (s)

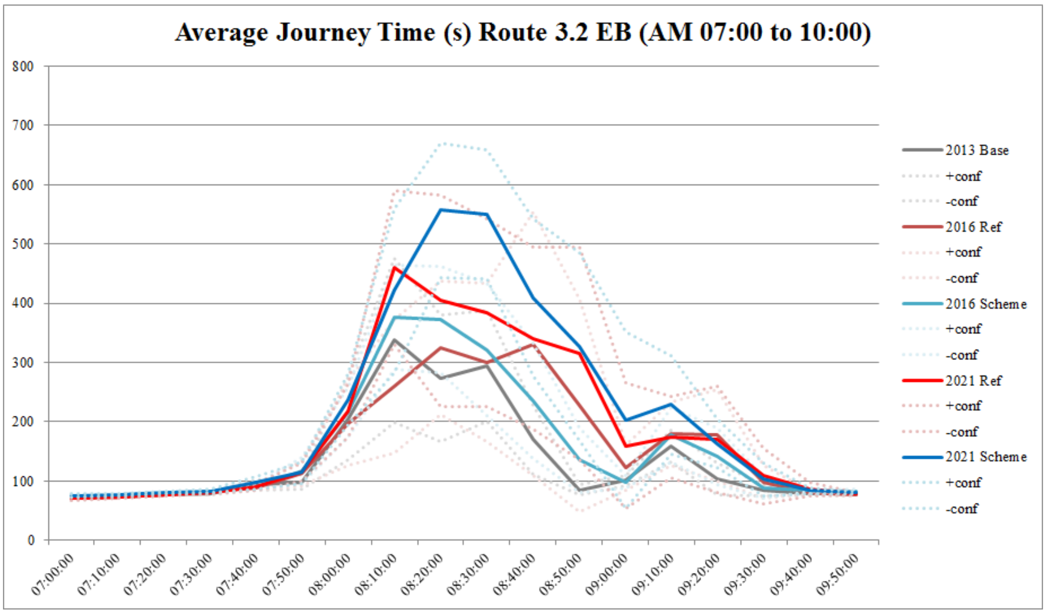
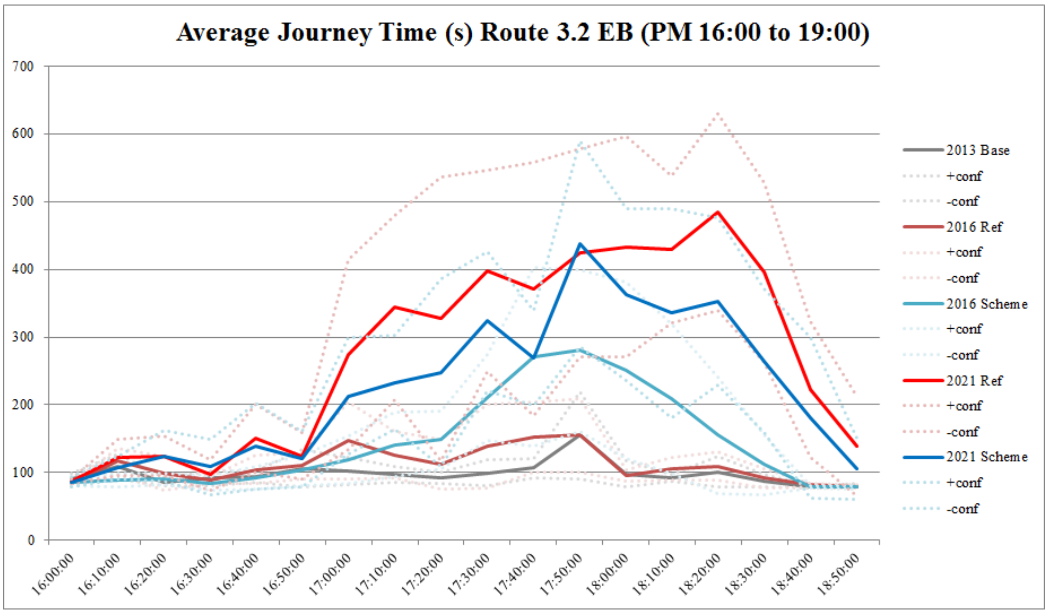


Figure 32 - Route 3.2 EB PM (0700 to 1000) Average Journey Time (s)



Analysis of Figure 31 indicates that the build-up of the delay in the first 50 minutes of the period is relatively consistent across all four scenarios. However, implementation of the scheme results in an approximate 14% and 21% increase in the maximum delay expected in 2016 and 2021. This represents a 45 and 96 second increase in delay across the route in the AM peak period for 2016 and 2021.

Figure 32 shows that whilst the maximum delay is increased in 2016 should the scheme be introduced, by 2021 there is a 10% improvement in the delay experienced across the route.

1.11 Route 3.2 WB Analysis

Analysis of the impact on A4177/A425 Eastbound delay, across all four scenarios, during the AM peak hour is presented within the following Figure 33 whilst PM analysis of delay is presented within Figure 34. The peak flow along this route occurs in the PM peak hour (away from Warwick town centre). The purpose of analysing this route is to determine the downstream effect on traffic conditions given the improvements proposed for the A46/ A4177/ A425 junction.

Figure 33 - Route 3.2 WB AM (0700 to 1000) Average Journey Time (s)

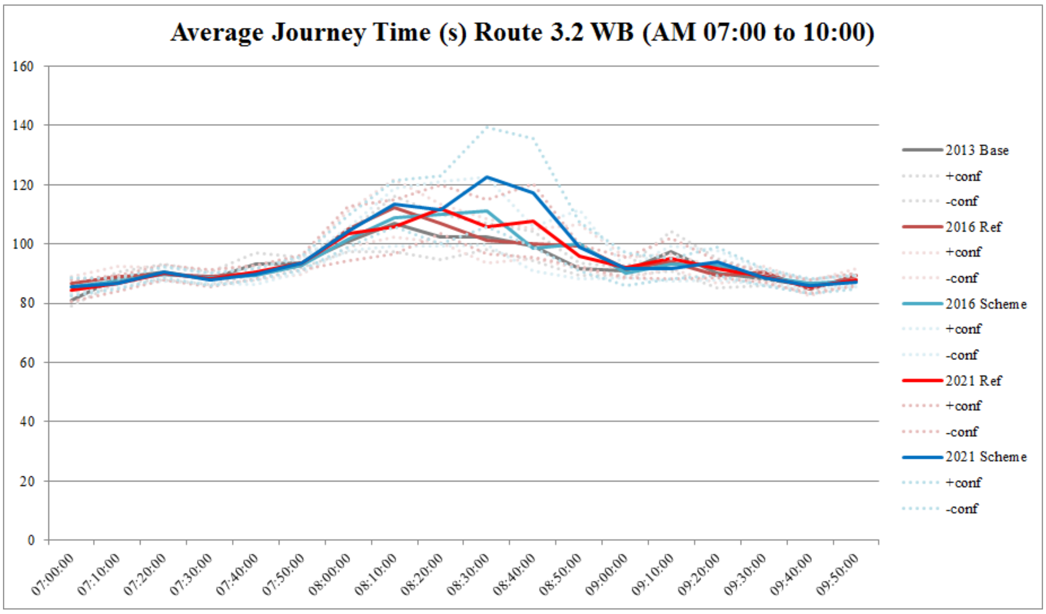
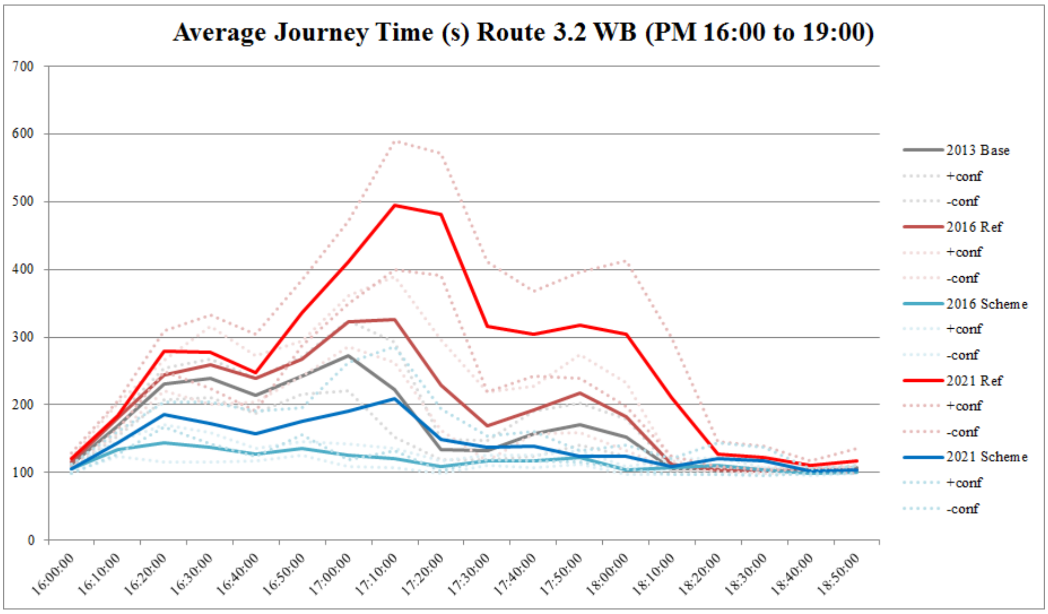


Figure 34 - Route 3.2 WB AM (1600 to 1900) Average Journey Time (s)



The results depicted in Figure 33 show that the delay expected along the route is relatively consistent across the entire AM peak period for all four scenarios. This indicates that the improvements to the scheme upstream of this route have a negligible effect on the delay on the westbound traffic downstream on the A425 Birmingham Road. There is expected to be a 1% decrease in the maximum delay expected in 2016 and a 10% increase in maximum delay expected in 2021 across the route.

Figure 34 shows that implementation of the scheme upstream reduces the delay expected downstream on the A425. This is due to the addition of a left turn pocket for traffic approaching from the east, turning from the A425 to the A46 southbound proposed as part of the scheme. Overall there is expected to be a 56-58% decrease in delay across the route during the PM peak period in 2016 and 2021 respectively.

1.12 Summary

Analysis has been undertaken to ascertain the local and wider network impacts, on both AM and AM conditions, of the implementation of the scheme across the four scenarios. Analysis of the implementation of scheme, reveals that the following effects are likely to occur:

- A significant 346-488 second (77-82%) improvement to the maximum delay is expected along the A46 southbound during the AM peak period
- A 5-54 second (5-36%) improvement to the maximum delay is expected along the A46 southbound during the PM peak period
- An approximate 8% decrease and 5% increase to the maximum delay along the A46 northbound during the AM peak period in 2016 and 2021 is expected
- An approximate 25% decrease and 1% increase to the maximum delay along the A46 northbound during the PM peak period in 2016 and 2021 is expected
- A significant improvement in the delay expected along the A4177 eastbound in the AM peak period of approximately 270 seconds (50%)
- A 50-66 second (30-40%) increase in delay in the PM peak period is expected along the A4177 eastbound in the PM peak period
- A 39-46 second (25-30%) increase in the maximum delay is expected along the A4177/ A425 westbound during the AM peak period and this is relatively consistent across the whole period
- A 51-68 second (29-39%) increase in the maximum delay is expected along the A4177/ A425 westbound during the PM peak period and this is relatively consistent across the whole period
- Whilst the build-up is relatively consistent across the scenarios, a 45-96 second increase in the maximum delay is expected along the A425 Eastbound during the AM peak period
- A 125 second increase and 47 second decrease in the maximum delay is expected along the A425 Eastbound during the PM peak period
- The scheme has little effect on the delay expected across the entire AM peak period A425 Westbound in 2016 and 2021
- A 182-286 second decrease is expected in the maximum delay along the A425 westbound route in the PM peak period

Overall the scheme tends to significantly improve conditions in the direction of peak flow (towards Warwick Town Centre in the AM peak period and away in the PM peak period). These improvements sometimes appear to be at the detriment of opposing flows but it seems that the reductions in delay (in seconds) far outweigh the increases expected both local to the scheme and through the wider network. It should also be recognised that further optimisation of the schemes is possible. Furthermore these junctions would be implemented using SCOOT and MOVA signal control. This type of signal control is difficult to accurately model and it is likely that network improvements could be significantly greater in reality.

DOCUMENT CHECKING (not mandatory for File Note)

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File Note

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Project title	A46/A4177 Assessment	Job number	232815-02
cc	Warwickshire County Council	File reference	232815-02.TN001
Prepared by	James Edwards	Date	27 March 2014
Subject	A46/A4177 - Economic Analysis Overview		

Introduction

A series of outputs have been produced from the Warwick Town PARAMICS models that have been derived to test the scheme proposals. In addition to the standard modelling outputs an economic analysis has also been undertaken using the PARAMICS model outputs.

So that the outline economic analysis could be undertaken quickly and in a manner which was conversant with the modelling approach adopted thus far, it was decided that the assessment would be completed using the PARAMICS PEARS add-on (PARAMICS Economic Assessment of Road Schemes).

PEARS

PEARS (Program for the Economic Assessment of Road Schemes) is an economic assessment package that has been specifically designed for use with the output from traffic microsimulation models. The economic concepts in PEARS are consistent with the Fixed Trip Matrix methodologies of COBA and NESA (as detailed in *DMRB* Volumes 13 and 15).

PEARS carries out trip-based assessments of changes in travel time costs and vehicle operating costs. The costs of a trip-based assessment are derived by aggregating the costs of each individually modelled vehicle on the network. By comparison, traditional link-based assessments (e.g. COBA, NESA) and matrix based assessments (e.g. TUBA) rely on a single travel time and vehicle operating cost for each link or origin/destination movement representative of the whole modelled period and each vehicle classification modelled.

PEARS also includes the calculation and valuation of carbon emissions based on the parameter values and guidance presented in TAG Unit 3.3.5, *The Greenhouse Gases Sub-Objective*. The latest version of PEARS, and the one used for this particular assessment, includes a link to Transport Scotland's emissions software AIRE (Analysis of Instantaneous Road Emissions). This is the tool that was used to calculate the pollutant levels within the assessment.

PEARS does not at present consider accidents and therefore a separate accident assessment is required (usually an 'accident only' COBA or NESA assessment). In addition, at present, PEARS does not consider non-traffic related maintenance.

The results of a PEARS assessment are combined externally with results from the accident and maintenance assessments and input to the Transport Economic Efficiency (TEE) tables in support of the scheme.

Overview

The following section provides an overview of the assumptions that have been adopted within the PEARS assessment as well as, where necessary, providing justification for the rationale of any of those assumptions.

Key Assumptions

Scheme Costs

Based on information provided by WCC, the scheme costs for both the roundabout and signalised options were included at £3.45 million. These prices were based on January 2012 values with an RPI index of 238.0 and are inclusive of a 40% allowance for optimism bias.

The cost profile associated with the delivery of the scheme assumed 100% of the scheme costs would be borne in the 2016 delivery year.

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Scenario Years

The analysis has focussed on 2 test years, 2016 and 2021. The forecasting of these demands has been undertaken in line with national guidance and the factors have been derived through interrogation of the TEMPRO database. The forecasting process has been fully documented within the Local Model Validation and Forecasting Report that has been produced for the Warwick Town model.

Time periods

PEARS guidance states that it is acceptable that an urban junction may be presumed only to accrue significant benefits during peak periods. In this case, it may be reasonable for two 3hr periods only to be modelled, each with a multiplication factor of 253, giving a total of 1,518 annual hours. Thus, the assessment focussed only on the AM (07:00 to 10:00) and PM (16:00 to 19:00) periods annualised by a factor of 253. This approach does mean that the potential benefits that may be accrued within the Saturday period will not be accounted for within the analysis. Similarly any benefits or dis-benefits of implementation within the inter-peak will also be omitted from the economic analysis as a result of this approach.

Assessment Parameters

The opening year of the assessment was assumed to be 2016.

Traffic growth was capped at 2035 since NTEM does not, at this stage, assume any growth beyond this period.

The assessment period was constrained to 30 years as opposed to the 60 years recommended in WebTag, the benefit calculations would therefore continue up to 2046 but it assumes that the benefits from the implementation of the schemes would cease from that point onwards. The PARAMICS model predicts that a large saving in journey times is achieved through the implementation of the scheme and as the forecast period increases the disparity between the Reference Case and Scheme delays also increases. However, this assumes that the benefits continue to be delivered in a manner which is consistent with the 2016 to 2020 benefit accrual. In reality the benefits will begin to diminish towards the end of the life of the scheme and, furthermore it is unlikely that the current scheme will have a lifespan beyond 2046.

The calculation of the fuel costs within the PEARS assessment was based on outputs from the AIRE processor.

Accident and maintenance costs have not been included within the assessment at this time.

Outputs

The outputs from PEARS are presented in the form of TEE tables 15A, 15B and 15C, Further information on the underlying principles of economic assessment can be found in *DMRB* Volumes 13 and 15 and TAG Units 3.5.4 & 3.5.6.

The TEE tables produced for both the signals and roundabout options are presented alongside this Technical Note.

Analysis of the TEE tables reveals an initial BCR of **14.03** based on the application of the aforementioned assessment parameters. The high BCR is most likely affected by the large levels of delay predicted within the reference case network as a result of the lack of the potential for vehicles to reassign to alternative routes in response to the adverse conditions on the A46, thus queuing and delay continue to increase at a constant rate in the Reference Case when, in reality, the effects would most likely be dampened by the effects of route choice and the potential for reassignment away from the congested area of the model, this is further exacerbated by the fact that the A46 accommodate large volumes of traffic which means that the impacts that do occur affect a large number of vehicles.

Table 15A: Economic Efficiency of the Road System (Market Prices)

Scheme Title PEARS Analysis - A425/A46 Improvements (2016 vs. 2021)

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IMPACT	Ref.	Cal'n / Source	Total	Cars	LGVs	OGVs	Private Buses & Coaches	Service Buses
NON-BUSINESS USER BENEFITS								
Travel Time								
Commuting Travel Time	1		£5.12	£4.72	£0.03			£0.37
Other Travel Time	2		£7.54	£6.84	£0.09		£0.00	£0.62
Non-business Travel Time	**3**	**1+2**	**£12.66**					
Vehicle Operating Costs								
Commuter Fuel VOC	4		£0.51	£0.51	£0.00			
Commuter Non-fuel VOC	5		£0.06	£0.06	£0.00			
Other Fuel VOC	6		£0.56	£0.55	£0.01			
Other Non-fuel VOC	7		£0.06	£0.06	£0.00			
Non-business Vehicle Operating Costs	**8**	**4+5+6+7**	**£1.19**					
During Construction and Maintenance								
Commuting: During Construction and Maintenance (*)	*9*							
Other: During Construction and Maintenance (*)	*10*							
NET NON-BUSINESS BENEFITS: COMMUTING	**11**	**1+4+5+9**	**£5.69**					
NET NON-BUSINESS BENEFITS: OTHER	**12**	**2+6+7+10**	**£8.16**					
NET NON-BUSINESS BENEFITS - SUB TOTAL	**13**	**11+12**	**£13.85**					
BUSINESS USER BENEFITS								
User Benefits								
Business Travel Time	**14**		**£10.73**	£8.61	£1.59	£0.14	£0.00	£0.38
Fuel VOC	15		£0.[illegible]2	£0.17	£0.09	£0.06		
Non-fuel VOC	[illegible]6		£0.[illegible]2	£0.33	£0.04	£0.05		
Business Vehicle Operating Costs	**1[illegible]**	**15[illegible]16**	**£0.[illegible]4**					
During Construction (*)	*18*							
During Maintenance (*)	*19*							
During Construction and Maintenance (*)	*20*	**18+19**						
Subtotal	**21**	**14+17+20**	**£11.47**					
Private Sector Provider Impacts								
Revenue (*)	*22*							
Fuel VOC	23		£0.19				£0.00	£0.19
Non-fuel VOC	24		£0.27				£0.00	£0.27
Private Sector Vehicle Operating Costs	**25**	**23+24**	**£0.46**					
Investment Costs (*)	26							
Grant / Subsidy (*)	27							
Subtotal	**28**	**22+25+26+27**	**£0.46**					
Other Business Impacts								
Developer & Other Contributions (*)	*29*							
NET BUSINESS IMPACT	**30**	**21+28+29**	**£11.93**					
TOTAL PRESENT VALUES OF TEE IMPACTS	**31**	**13+30**	**£25.79**					

* Impact calculated external to PEARS & manually input by User. Any manual inputs will require the manual recalculation of the Sub-Totals / Impacts etc. as well as the NPV & BCR etc. in Table 15C.

This analysis is based on Central traffic growth.
Benefits appear as positive numbers, while costs appear as negative numbers.
All entries are in units of 1,000,000 pounds sterling and are discounted to 2002.
Evaluation period 30 years. Scheme opening year 2016.
Current year 2011.

Table 15B: Public Accounts

Scheme Title PEARS Analysis - A425/A46 Improvements (2016 vs. 2021)

IMPACT	**Reference**	**Cal'c / Source**	**Total**
Local Government Funding			
Revenue (*)	32		
Investment Costs (*)	33		
Operating Costs (*)	34		
Maintenance Costs			
Non-Traffic (Group 1) (*)	35		
Traffic Related (Group 2) (*)	36		
Developer & Other Contributions (*)	37		
Grant Subsidy Payment (*)	*38*		
Net Impact	39	Sum(32 to 38)	
Central Government Funding: Transport			
Revenue (*)	40		
Investment Costs	41		£1.79
Operating Costs (*)	42		
Maintenance Costs			
Non-Traffic (Group 1) (*)	43		
Traffic Related (Group 2) (*)	44		
Developer & Other Contributions (*)	45		
Grant Subsidy Payment (*)	46		
Net Impact	47	Sum(40 to 46)	***£1.79***
Central Government Funding : Non-Transport			
Indirect Tax Revenues	48		£0.90
TOTALS			
Broad Transport Budget	49	39+47	**£1.79**
Wider Public Finances	50	48	**£0.90**

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* Impact calculated external to PEARS & manually input by User. Any manual inputs will require the manual recalculation of the Net Impacts / Totals etc. as well as the NPV & BCR etc. in Table 15C.

This analysis is based on Central traffic growth.
Benefits appear as positive numbers, while costs appear as negative numbers.
All entries are in units of 1,000,000 pounds sterling and are discounted to 2002.
Evaluation period 30 years. Scheme opening year 2016.
Current year 2011.

Table 15C: Analysis of Monetised Costs and Benefits (Market Prices)

Scheme Title PEARS Analysis - A425/A46 Improvements (2016 vs. 2021)

IMPACT	**Reference**	**Cal'n / Source**	**Total**
TEE Impacts			
Noise (^)*	51		
Local Air Quality (^)*	52		
Greenhouse Gases (Emissions) (low)			£0.14
Greenhouse Gases (Emissions) (central)	53		**£0.28**
Greenhouse Gases (Emissions) (high)			£0.43
Journey Ambience (^)*	54		
Accident Benefits (*)	55		
Non-Business User Benefits: Commuting	56	11	£5.69
Non-Business User Benefits: Other	57	12	£8.16
Business User & Provider Benefits	58	30	£11.93
Wider Public Finance (Indirect Tax Revenue)	59	-50	£-0.90
Option Values (^)*	60		
Present Value of Benefits (PVB)	61	Sum(51 to 60)	**£25.17**
Broad Transport Budget	62	49	£1.79
Present Value of Costs (PVC)	63	62	**£1.79**
OVERALL IMPACTS			
Net Present Value (NPV)	64	61-63	**£23.38**
Benefit to Cost Ratio (BCR)	65	61/63	**14.03**

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* Impact calculated external to PEARS & manually inputted by User. Any manual inputs will require the manual recalculation of the NPV & BCR etc.

^ Costs & benefits which are regularly or occasionally presented in monetised form in transport appraisals, together with some where monetisation is in prospect.

In addition to the costs & benefits outlined above, there may also be significant others, some of which cannot be presented in monetised form. Where this is the case, the analysis presented above does not provide a good measure of the value for money (VFM) and should not be used as the sole basis for decisions.

This analysis is based on Central traffic growth.
Benefits appear as positive numbers, while costs appear as negative numbers.
All entries are in units of 1,000,000 pounds sterling and are discounted to 2002.
Evaluation period 30 years. Scheme opening year 2016.
Current year 2011.

Appendix G

Scheme Impact Pro Forma for Small Project Bids

Scenario	Input Data / Key Performance Indicators	Unit	AM Peak Hr Weekday	PM Peak Hr Weekday	Inter-Peak Hr Weekday	Nights 19:00-07:00	Sat 07:00-19:00	Sun 07:00-19:00
2021 Ref Case Outputs - Peak Hours	Number of highway trips affected	vehicles	19,611	18,129	14,488	5,650	8,701	11,486
	Total vehicle travelled time	vehicle-hours	1,543	1,366	1,094	427	657	867
	Total vehicle travelled distance	vehicle-km	48,388	46,695	35,719	13,930	21,453	28,318
	Total network delays	vehicle-hours	851	699	586	229	352	465
	Highway peak period conversion factor	-	2.32	2.67	1	0	1	1
	Number of PT passenger trips on affected routes	passenger trips						
	Bus journey time on affected routes	minutes						
	Total PT travelled time	passenger-hrs						
	Total PT travelled distance	passenger-km						
	PT peak period conversion factor	-						
	Number of walking and cycling trips	person trips						
	Mode share in affected area							
	- Walking and cycling	person trips						
	- Bus/BRT	person trips						
	- Rail	person trips						
	- Car	person trips						
	- Total	person trips						

For Small Project Bids

2021 Ref Case Outputs - Peak Hours

	AM Peak Hr	**PM Peak Hr**	**Inter-Peak Hr**
Vehicle Category	**Weekday**	**Weekday**	**Weekday**
Car Work			
Car Non-work Commuting			
Car Non-work Other			
Average Car	88%	88%	91%
LGV	11%	10%	8%
OGV1	1%	1%	1%
OGV2	0%	1%	0%
PSV			
All Total	100%	100%	100%
Public Transport			
Bus Work			
Bus Non-work Commuting			
Bus Non-work Other			
Bus Total	0%	0%	0%
Rail Work			
Rail Non-work Commuting			
Rail Non-work Other			
Rail Total	0%	0%	0%

	AM Peak Hr	**PM Peak Hr**	**Inter-Peak Hr**
Average Network Speed (kph)	**Weekday**	**Weekday**	**Weekday**
Car	54.6	55.5	50.7
LGV	54.8	54.4	49.7
HGV & PSV	55.6	54.4	54.0

Scheme Impact Pro Forma for Small Project Bids

Scenario	Input Data / Key Performance Indicators	Unit	AM Peak Hr	PM Peak Hr	Inter-Peak Hr	Nights	Sat	Sun
			Weekday	Weekday	Weekday	19:00-07:00	07:00-19:00	07:00-19:00
2021 Do Something Outputs - Peak Hours	Number of highway trips affected	vehicles	19,482	18,114	14,404	5,617	8,651	11,419
	Total vehicle travelled time	vehicle-hours	1,458	1,274	1,050	409	631	832
	Total vehicle travelled distance	vehicle-km	48,077	46,318	35,279	13,759	21,189	27,969
	Total network delays	vehicle-km	771	609	548	214	329	434
	Highway peak period conversion factor	-	2.34	2.68	1	0	1	1
	Number of PT passenger trips on affected routes	passenger trips						
	Bus journey time on affected routes	minutes						
	Total PT travelled time	passenger-hrs						
	Total PT travelled distance	passenger-km						
	PT peak period conversion factor	-						
	Number of walking and cycling trips	person trips						
	Mode share in affected area							
	- Walking and cycling	person trips						
	- Bus/BRT	person trips						
	- Rail	person trips						
	- Car	person trips						
	- Total	person trips						

For Small Project Bids

2021 Do Something Outputs - Peak Hours

	AM Peak Hr	PM Peak Hr	Inter-Peak Hr
Vehicle Category	**Weekday**	**Weekday**	**Weekday**
Car Work			
Car Non-work Commuting			
Car Non-work Other			
Average Car	87.71%	88.07%	91.09%
LGV	10.98%	9.79%	8.14%
OGV1	1.09%	1.29%	0.66%
OGV2	0.22%	0.86%	0.11%
PSV			
All Total	100%	100%	100%
Public Transport			
Bus Work			
Bus Non-work Commuting			
Bus Non-work Other			
Bus Total	0%	0%	0%
Rail Work			
Rail Non-work Commuting			
Rail Non-work Other			
Rail Total	0%	0%	0%

	AM Peak Hr	PM Peak Hr	Inter-Peak Hr
Average Network Speed (kph)	**Weekday**	**Weekday**	**Weekday**
Car	55.7	55.2	50.7
LGV	55.3	54.4	50.3
HGV & PSV	56.9	54.4	54.1

Appendix H

Appraisal Summary Table

Date produced:	05/03/2014

Contact:	
Name	
Organisation	Atkins
Role	

Name of scheme:	A425/A46 Stanks Grade Separated Roundabout and Corridor Improvements
Description of scheme:	The scheme is a key element in the A46 Corridor Improvements Package. The scheme comprises of capacity improvements at A425/A46/A4177 Stanks roundabout, A4177 Budbrooke Signals, A425 IBM entrance, A425 Budbrooke Industrial Estate and A425 Wedgenock Lane roundabout.

	Impacts	Summary of key impacts	Assessment: Quantitative	Assessment: Qualitative	Assessment: Monetary £(NPV)	Assessment: Distributional 7-pt scale/ vulnerable grp
Economy	Business users & transport providers	o The scheme will increase capapcity, therefore, reducing congestion. Currently the congestion is a safety concern as queues propagate on to the A46 main carriageway. This is a problem during the AM peak, however, forecasts suggest that this is also likely to be a problem during a longer period in the PM peak. Accident analysis over the last 5 years suggest that a number of rear shunt accidents occured on the slip roads from A46 approaching Stanks rounadabout.	Value of journey time changes(£): Net journey time changes (£): 0 to 2min / 2 to 5min / > 5min	Large Beneficial		
Economy	Reliability impact on Business users	o The reduction of congestion will improve journey times and safety for car users and commuters.		Large Beneficial		
Economy	Regeneration	o The congestion and safety concerns has meant that the IBM site has yet to be expanded, although planning permission was granted. The extra capacity and reduction in congestion is likely to speed up the IBM expansion plans. O The scheme will provide sufficient capacity to accomadate the local growth plans in housing and employment. Additionally, the scheme provides capacity for significant further growth. O We have calculated the net GVA due to employment, which will be generated following the completion of the highway scheme and up until the completion of the employment site. The cumulative GVA which, will be generated between 2015 and 2025 is £31.8m. o The estimated GVA is based on employment figures of 33 during the 6 months of construction, 85 B1 related jobs, 9 B2 related jobs and 4 B8 related jobs.	£31.8m	Moderate Beneficial		
Economy	Wider Impacts	Not Assessed		-		
Environmental	Noise	o Although the level of traffic will change as a result of the scheme it does not increase/decrease by more than 25%, therefore, the level of noise does not change by an amount to be a concern.		Neutral		
Environmental	Air Quality	o Although the will change as a result of the scheme it doe not increase/decrease by more than 10%, therefore, the air quality will not change by a level to be a concern.		Neutral		
Environmental	Greenhouse gases	Not Assessed	Change in non-traded carbon over 60y (CO2e): Change in traded carbon over 60y (CO2e):	-		
Environmental	Landscape	Not Assessed		-		
Environmental	Townscape	Not Assessed		-		
Environmental	Historic Environment	Not Assessed		-		
Environmental	Biodiversity	Not Assessed		-		
Environmental	Water Environment	Not Assessed		-		
Social	Commuting and Other users	o The scheme will help reduce congestion and safety concerns for commuters. A reduction in journey time is forecasted.	Value of journey time changes(£): Net journey time changes (£): 0 to 2min / 2 to 5min / > 5min	Large Beneficial		
Social	Reliability impact on Commuting and Other users	o The reduction in congestion will enable to commuters and other users to keep time more often and from destination.		Large Beneficial		
Social	Physical activity	o A pedestrian bridge crossing will be required to replace the existing pedestrian footway at Budbrooke Industrial Junction. This could potentially alter walking patterns.		Neutral		
Social	Journey quality	o A reduction in congestion will reduce frustration and stress for commuters and other road users.		Moderate Beneficial		
Social	Accidents	o The reduction of congestion will reduce the number of accidents, particularly on the slip roads approaching Stanks roundabout from the A46.		Moderate Beneficial		
Social	Security	o There are no specific changes or concerns with security as a result of the project.		Neutral		
Social	Access to services	o Improved accessibility to Warwick Parkway Railway Station due to widening of Budbroooke Junction. The station has excellent services to Birmingham and London Marleybone.		Slight Beneficial		
Social	Affordability	o Personal affordability will improve slightly as the reduction in congestion will reduce the number of stop/starts required by motorised road users, therefore, reducing fuel consumption costs.		Slight Beneficial		
Social	Severance	o There are no immediate concerns or benefits related to this specific highway scheme		Neutral		
Social	Option and non-use values	o This scheme does not take away from existing or add to the existing level of travel options availaible to current users.		Neutral		
Public Accounts	Cost to Broad Transport Budget	-	-	-		
Public Accounts	Indirect Tax Revenues	-	-	-		

Appendix I

Risk allocation and transfer between the promoter and contractor, contract timescales and implementation timescales

A452/A46 Thickthorn – SEP
A425/A46 Stanks – SEP
A444 Coton Arches – SEP
A426 Avon Mill - SEP

For the above schemes, the preferred balance of risk between the promoter and contractor is as set out between the Employer and Contractor in the NEC3 Engineering and Construction Contract (ECC) Option A Priced Contract with Activity Schedule (June 2005 with June 2006 and September 2011 amendments). The standard conditions of contract (the core clauses) have been amended as follows:

Clause Z1 **Modifications to the core *conditions of contract***

Z1.1 **Identified and defined terms 11**
Add new sub-clause:

11.2 (34) Statutory Bodies are Others which have a statutory right or a right pursuant to a licence granted under statute to enter onto the Site to carry out their business.

Z1.2 **Interpretation and the law 12**
Add new sub-clause:

12.5 In the event of any conflict between

- the terms of core clauses 1 to 9 of this contract,
- the terms of Secondary Option clauses,
- the requirements of statements in Contract Data Parts one and two,
- the Works Information, and
- the Site Information,

the relevant clauses of this contract and/or the relevant documents prevail in the order set out above, save that, if any Z clauses (which form part of the Secondary Option clauses) conflict with the terms of core clauses 1 to 9 of this contract and/or any other parts of the Secondary Option clauses, the Z clauses shall prevail.

Z1.3 **Subcontracting 26**
Add new sub-clause:

26.5 If, in accordance with sub-clause 26.2, the *Project Manager* does not accept a proposed Subcontractor, it is not a compensation event and the *Contractor* is not relieved of any liability or obligation under this contract.

Z1.4 **Subcontracting 26**
Add new sub-clause:

26.6 The *Project Manager* may instruct the *Contractor* to remove a Subcontractor. A reason for removing a Subcontractor is

- inadequate or poor quality workmanship,
- incompetent or negligent performance,
- uncooperative or disruptive working practices or
- failure to operate a quality management system.

If, in accordance with this sub-clause, the *Project Manager* instructs the *Contractor* to remove a Subcontractor, the *Contractor* arranges for the removal of the Subcontractor and proposes an alternative Subcontractor. The *Project Manager*'s instruction to remove a Subcontractor is not a compensation event and the *Contractor* is not relieved of any liability or obligation under this contract.

Z1.5 **Latent Defects 46**

Add new sub-clause:

46.1 Without prejudice to the *Contractor*'s obligations under clause 43, the *Contractor* is liable in respect of any and all Defects not discoverable on inspection or testing for a period of 12 years from the *completion date* for the whole of the *works*.

Z1.6 **Payment 51**

Delete the text at sub-clause 51.1 and substitute with the following:

51.1 The *Project Manager* certifies a payment on or before the date when a payment is due. The first payment is the amount due. Other payments are the change in the amount due since the last payment certificate. A payment is made by the *Contractor* to the *Employer* if the change reduces the amount due. Other payments are made by the *Employer* to the *Contractor*. Payments are in the *currency of this contract* unless otherwise stated in this contact.

Z1.7 **Payment 51**

Delete the text at sub-clause 51.2 and substitute with the following:

51.2 Each certified payment is made on or before the final date for payment. If a certified payment is late, or if a payment is late because the *Project Manager* does not issue a certificate which he should issue, interest is paid on the late payment. Interest is assessed from the date by which the late payment should have been made until the date when the late payment is made, and is included in the first assessment after the late payment is made.

Z1.8 **Defined Cost 52**

Add new sub-clause:

52.2 For elements of Defined Cost calculated at competitively tendered prices, two quotations shall be obtained for competitively tendered amounts below £10,000 and three quotations shall be obtained for competitively tendered amounts of £10,000 and above.

Z1.9 **Compensation events 60**

Delete the text at sub-clause 60.1 (12) and insert 'Not used'.

Z1.10 **Compensation events 60**

Delete the text at sub-clause 60.2 and substitute with the following:

60.2 If the *Contractor*

- encounters physical conditions which in his opinion could not reasonably have been foreseen at the Contract Date by an experienced contractor and

- considers that significant delay will be caused by such physical conditions, he gives notice to the *Project Manager* stating
    - the nature, extent and type of physical conditions encountered
    - the reasons for not foreseeing them at the Contract Date
    - the measures proposed to overcome them
    - the effect if any on the quality or durability of the *works*
    - the effect if any on the Accepted Programme and
    - the forecast Defined Cost of any necessary extra work.

Within the *period for reply* the *Project Manager* either

- notifies the *Contractor* that he has no objections (determined by the *Project Manager* in his sole discretion) to the proposed measures. The *Contractor* then implements such measures and, notwithstanding anything to the contrary in these conditions of contract, shall be responsible for the costs of implementing such measures save to the extent that the *Project Manager* deems them to necessitate a change to the Works Information and the test set out in sub-clause 60.1(1) is met, in which case Clauses 61 to 65 shall apply (save that the notification and quotation have already been submitted); or
- notifies the *Contractor* of his reasons for not accepting the measures (determined in the *Project Manager*'s sole discretion). If the *Project Manager* notifies the *Contractor* of his reasons for not accepting the measures the *Project Manager* and the *Contractor* shall meet within five working days of such notification by the *Project Manager* and the Parties will use their reasonable endeavours to agree alternative measures. In the event that the Parties cannot agree the alternative measures then they shall be determined by the *Project Manager* in his sole discretion and notified to the *Contractor*. The *Contractor* then implements such measures and, notwithstanding anything to the contrary in these conditions of contract, shall be responsible for the costs of implementing such measures save to the extent that the *Project Manager* deems them to necessitate a change to the Works Information and the test set out in sub-clause 60.1(1) is met, in which case Clauses 61 to 65 shall apply.

In judging the physical conditions, the *Contractor* is deemed to have taken into account within his Prices the following actions

- carried out an inspection of the Site, its surroundings and any existing structures or works on, over or under the Site relevant to the construction of the *works*;
- satisfied himself as to the form and nature of the Site in regard to
    - climatic and hydrological conditions
    - likely ground and subsoil conditions
    - the risk of damage to property adjacent to the Site
    - the risk of injury to occupiers of such property
    - likely restrictions or precautions relating to nearby farmland
    - the risk of pollution and damage to the environment
    - likely materials (whether natural or otherwise) to be excavated

    - the risk of the presence of hazardous or toxic substances or waste
    - the risk of injury to Subcontractors or the *Contractor*'s people due to the presence of hazardous or toxic substances or waste and
    - types of Plant and Materials required to construct the *works*;
- satisfied himself as to
    - means of communication with people on the Site
    - access to and through the Site
    - accommodation requirements
    - requirements of Others for access to the Site
    - interference by persons with access to or use of the Site
    - risks of interference by protesters or trespassers and
    - precautions to prevent nuisance or interference by third parties;
- in general obtained for himself
    - all necessary information as to risks and
    - all necessary Site Information

so as to meet his obligation to Provide the Works.

Z1.11 **Assessing compensation events 63**

Delete the text at sub-clause 63.1 and substitute with the following:

63.1 The changes to the Prices are assessed as the effect of the compensation event upon

- the actual Defined Cost of the work already done
- the forecast Defined Cost of the work not yet done and
- the resulting Fee.

The date when the *Project Manager* instructed or should have instructed the *Contractor* to submit quotations divides the work already done from the work not yet done. For compensation events which arise from a *weather measurement* under clause 60.1 (13), there are no changes to the Prices.

Z1.12 **Assessing compensation events 63**

Delete the text at sub-clause 63.5 and substitute with the following:

63.5 If the *Project Manager* has notified the *Contractor* of his decision that the *Contractor* did not give an early warning of a compensation event which an experienced contractor could have given, the event is assessed as if the *Contractor* had given early warning and any payments and/or time extensions are reduced accordingly.

Z1.13 **Assessing compensation events 63**

Delete the text at sub-clause 63.8 and substitute with the following:

63.8 A compensation event which is an instruction to change the Works Information in order to resolve an ambiguity or inconsistency is assessed as if the total of the Prices and the Accepted Programme were, for the original Works Information, based upon an interpretation of the ambiguity or inconsistency which assumed

- the highest total of the Prices and
- the Accepted Programme with the longest duration.

Z1.14 **The *Project Manager*'s assessments 64**
Delete the words 'two weeks' in the fifth line of sub-clause 64.4 and substitute with 'three weeks'.

Z1.15 **Objects and materials within the Site 73**
Delete the text at sub-clause 73.2 and substitute with the following:

73.2 Except where material has been identified as being an object of value or historic interest or of other interest, or the contract defines the material to be retained, the *Contractor* has title to materials from excavation or demolition.

Z1.16 **Termination 90**
Delete the Termination Table under sub-clause 90.2 and substitute with the following Termination Table:

TERMINATION TABLE			
Terminating Party	**Reason**	**Procedure**	**Amount due**
The *Employer*	A reason other than R1-R22 R1-R15, R18 or R22 R17 or R20 R21	P1 and P2 P1, P2 and P3 P1 and P3 P1 and P4	A1, A2 and A4 A1 and A3 A1 and A2 A1 and A2
The *Contractor*	R1-R10, R16 or R19 R17 or R20	P1 and P4 P1 and P4	A1 and A2 A1 and A2

Z1.17 **Reasons for termination 91**
Add new sub-clause:

91.8 The *Employer* may terminate without notice if he becomes aware:
- of the *Contractor*'s involvement in corrupt practices or
- of the *Contractor*'s involvement in collusive activity or
- that the Contractor has submitted false or inaccurate information in his tender submission (R22).

Either Secondary Option X4 (Parent company Guarantee) or X13 (Performance Bond) are used. The other Secondary Options used are X7 (Delay Damages), X16 (Retention) and Y(UK)2 (The Housing Grants, Construction and Regeneration Act 1996).

Appendix J

ID		Task Name	Duration	Start	Finish
1		`	1 day?	Tue 01/04/14	Tue 01/04/14
2		**Management**	**495 days**	**Tue 01/04/14**	**Mon 22/02/16**
3		Monthly reporting to Project Board	495 days	Tue 01/04/14	Mon 22/02/16
4		**Secure Funding**	**28 days**	**Tue 01/04/14**	**Thu 08/05/14**
5		SEP	28 days	Tue 01/04/14	Thu 08/05/14
6		Local Authority/Third Party	28 days	Tue 01/04/14	Thu 08/05/14
7		Liaison with Stakeholders	281 days	Tue 01/04/14	Tue 28/04/15
8					
9		**Secure Land**	**147 days**	**Fri 09/05/14**	**Mon 01/12/14**
10		Identify requirements	3 days	Fri 09/05/14	Tue 13/05/14
11		Obtain land by agreement, OR	125 days	Wed 14/05/14	Tue 04/11/14
12		**CPO process**	**133 days**	**Thu 29/05/14**	**Mon 01/12/14**
13		Prepare land drawings/side roads orders	28 days	Thu 29/05/14	Mon 07/07/14
14		Serve order	28 days	Tue 08/07/14	Thu 14/08/14
15		Receive objections	2 days	Fri 15/08/14	Mon 18/08/14
16		Deal with objections	28 days	Tue 19/08/14	Thu 25/09/14
17		CPO confirmation	5 days	Fri 26/09/14	Thu 02/10/14
18		Notice to Treat	28 days	Fri 03/10/14	Tue 11/11/14
19		Notice of Entry	14 days	Wed 12/11/14	Mon 01/12/14
20					
21		**Utility Process**	**416 days**	**Tue 01/04/14**	**Tue 03/11/15**
22		Obtain existing plant details, C2	25 days	Tue 01/04/14	Mon 05/05/14
23		Agree works required/estimates, C3 & C4	60 days	Tue 06/05/14	Mon 28/07/14
24		Construction notices, C5, C6 & C7	60 days	Tue 29/07/14	Mon 20/10/14
25		Advanced Utility works/diversions	60 days	Tue 21/10/14	Mon 12/01/15
26		Construction phase diversions	100 days	Wed 17/06/15	Tue 03/11/15
27					
28		**Ecology/Environment**	**458 days**	**Fri 09/05/14**	**Tue 09/02/16**
29		Survey/Report	15 days	Fri 09/05/14	Thu 29/05/14
30		Ecology works/monitoring	443 days	Fri 30/05/14	Tue 09/02/16
31					
32		**Road Safety Audits**	**463 days**	**Fri 09/05/14**	**Tue 16/02/16**
33		Stage 1	14 days	Fri 09/05/14	Wed 28/05/14
34		Stage 2	14 days	Thu 26/02/15	Tue 17/03/15
35		Stage 3	5 days	Wed 10/02/16	Tue 16/02/16
36					
37		**Detailed Design**	**230 days**	**Thu 29/05/14**	**Wed 15/04/15**
38		**A4177 Budbrooke Signals**	**20 days**	**Thu 29/05/14**	**Wed 25/06/14**
39		Horizontal/vertical design	5 days	Thu 29/05/14	Wed 04/06/14
40		Traffic signals design/alterations	20 days	Thu 29/05/14	Wed 25/06/14
41		Detailed design & drawings	15 days	Thu 05/06/14	Wed 25/06/14
42		**Stanks Roundabout**	**75 days**	**Thu 26/06/14**	**Wed 08/10/14**
43		Horizontal/vertical design	15 days	Thu 26/06/14	Wed 16/07/14
44		Traffic signals design	40 days	Thu 26/06/14	Wed 20/08/14
45		Detailed design & drawings	60 days	Thu 17/07/14	Wed 08/10/14
46		**IBM Access**	**50 days**	**Thu 09/10/14**	**Wed 17/12/14**
47		Horizontal/vertical design	10 days	Thu 09/10/14	Wed 22/10/14
48		Traffic signals design	20 days	Thu 09/10/14	Wed 05/11/14
49		Detailed design & drawings	40 days	Thu 23/10/14	Wed 17/12/14
50		**Budbrooke Access**	**50 days**	**Thu 18/12/14**	**Wed 25/02/15**
51		Horizontal/vertical design	10 days	Thu 18/12/14	Wed 31/12/14
52		Traffic signals design	20 days	Thu 18/12/14	Wed 14/01/15
53		Detailed design & drawings	40 days	Thu 01/01/15	Wed 25/02/15
54		**Wedgenock Lane Roundabout**	**30 days**	**Thu 26/02/15**	**Wed 08/04/15**
55		Horizontal/vertical design	15 days	Thu 26/02/15	Wed 18/03/15
56		Detailed design & drawings	15 days	Thu 19/03/15	Wed 08/04/15
57		**Tie-ins Between Junctions**	**20 days**	**Thu 19/03/15**	**Wed 15/04/15**
60		MOVA/SCOOT design	30 days	Thu 15/01/15	Wed 25/02/15
61					
62		**Tender Process**	**30 days**	**Wed 18/03/15**	**Tue 28/04/15**
63		**Prepare Tender Documents**	**25 days**	**Wed 18/03/15**	**Tue 21/04/15**
64		Activity Schedule for Framework Contract	25 days	Wed 18/03/15	Tue 21/04/15
65		Appendices to Specificaton	25 days	Wed 18/03/15	Tue 21/04/15
66		Agree Cost under Framework Contract	5 days	Wed 22/04/15	Tue 28/04/15
67					
68		**Contract Period**	**205 days**	**Wed 29/04/15**	**Tue 09/02/16**
69		Award/agree Contract	5 days	Wed 29/04/15	Tue 05/05/15
70		Mobilisation	30 days	Wed 06/05/15	Tue 16/06/15
71		Construction Phase	170 days	Wed 17/06/15	Tue 09/02/16
72					
73		**Scheme Completion & Opening**	1 day	Wed 17/02/16	Wed 17/02/16

Project: A425- A45 Stanks Project Prog
Date: Fri 07/03/14

Task | Split | Progress | Milestone | Summary | Project Summary | External Tasks | External Milestone | Deadline

Part 2 – Updated Transport and Economics Outputs

Tech Note

Project title	A425/A46 Stanks Scheme	Job number	
Cc	Nicola Van der Hoven Nigel Chetwynd Gafoor Din Jevan Sandhu Adrian Hart Mike Peet	File reference	
Prepared by	Alan Law	Date	
Subject	Selecting a preferred option post VE exercise		

1 Introduction

A Value Engineering(VE) process has been undertaken with the aim of reducing the impact of high C3 utilities estimates. A redesign of the scheme resulted in 6 potential options being identified. This technical note provides a summary of the modelling optioneering process undertaken in order to identify a preferred option. This note is based on detailed modelling outputs and analysis with the following documents:

- VM155028_20160106 Stanks – 6 Test Models – Initial Outputs.xls
- VM155020.TN20160106 – Stanks 6 Scenario Assessment Overview

2 Overview

The following scenarios were considered through the modelling optioneering assessment:

- **Reference** – Contains the current road layout with traffic volumes forecast to 2021 levels.
- **Scenario 01** – The Reference Case inclusive of the current corridor. The scheme has been changed from the original SEP scheme proposals in a number of ways but the main differences include the reduction of the two lane section to the west of the A425/Industrial estate junction which is due to be signalised and reconfiguration of that junction from three lane entry to the west with a right turn bay to a two lane entry with the right hand lane for right turning traffic only.
- **Scenario 02** – Scenario 01 with the reconfiguration of the industrial estate (Budbrooke Rd) signals so that two lanes travel WB across the junction (right hand lane is right and straight-on).
- **Scenario 03** – As Scenario 02 but with the inclusion of a two lane merge east of Wedgnock/Birmingham Road junction.
- **Scenario 04** – Scenario 01 without signals at the industrial estate.
- **Scenario 05** – Scenario 02 without signals at the industrial estate.
- **Scenario 06** – Scenario 03 without signals at the industrial estate.

Each of the above options, identified by Design Services, has been subject to the VE process. Cost estimates for each scheme are very similar at circa £6m. A drawing of the preferred option (Scenario 4) is appended to this note.

Tech Note

Modelling Results

Model Stability

S-Paramics software requires that a scenario is run a number of times (each based on a random seed) and then an average of these runs is reported upon. The propensity for a model to fail during these model runs is a primary key indicator of the scenario performance. Each scenario is then reported on in comparison to the reference case scenario.

Supporting evidence identifies inherent instability within Scenarios 02 and 05 and therefore these scenarios should be discounted.

It is notable that only scenario 04 performs as well or better than the Reference Case, all other scenarios suffer a reductions in model stability. All PM period scenarios in which signals have been included at the Budbrookee junction do not return acceptable levels of stability.

Network Statistics

The network statistics provide a number of Key Network Performance Indicator (KPI) comparisons.
In this instance, the comparisons have focussed on the average delay, in seconds, across the entire model period.

Analysis of the average delay reveals that:

- all scenarios which contain the signals at the Budbrooke Rd junction suffer higher levels of delay than the Reference Case during the AM and Scenario 02 and 03 are also higher in the PM period.
- scenario 04 to 06 all return lower levels of delay than the Reference Case during both AM and PM periods.
- removal of the signals also appears to result in average delay levels which are less than those contained in the previous scheme scenario network (scenario 07).

Based on the improvements in delay, relative to the previously proposed layout results, there is a demonstrable benefit arising from the removal of the signals at the Industrial Estate (Budbrooke Rd.

Queue Lengths

Average maximum queue lengths, for the Stanks junction and Wedgnock Lane signals have been assessed.
The following analysis can be drawn from the results:

- all scenarios reduce queuing in the AM period on the A46 sb approach to Stanks compared to Reference Case conditions
- all scenarios reduce queuing in the PM period at the Wedgnock junction compared Reference Case conditions
- scenario 04 performs better than scenario 06

Economic Appraisal

Following the optioneering process, it was clear that scenario 04 out performs all other scenarios. A revised BCR assessment was undertaken on scenario 04 to ascertain the impact of the revised network changes and costs on economic performance.

Based on an assumed scheme cost of £6m, a BCR was calculated at 5.75. This revised BCR is a minor improvement over the previous BCR (5) which was based on an undervalued scheme estimate of approx.. £5m (undervalued due to increased utilities costs).

3 Summary & Conclusions

Based on the above analysis and supporting evidence, Scenario 04 outperforms all other scenarios considered as part of this modelling optioneering process.

The first 3 scenarios assume the implementation of signals at Budbrookee Rd junction (IE access). The results clearly identify that, with reduced approach lanes from the west, all signal layouts at Budbrookee Rd perform poorly compared to the w/o signals scenarios (4-6). It is likely that the original scheme would also have performed better w/o signals, however excessive utilities costs prohibit the delivery of the original layout.

Scenarios 04-06 present layouts w/o signals, of these, scenario 05 should be discounted due to instability resulting from poor operation. Queue length outputs and network statistic highlights that scenario 04 performs better than scenario 06.

The evidence clearly identifies scenario 04 as the preferred option in terms of highway capacity performance, as such, the scheme was subjected to a further iteration of economic appraisal which resulted in a revised BCR value of 5.75 (£6m assumed scheme cost). This is a slight improvement over the previously assessed scheme which returned a BCR of 5 based on a £5m scheme cost.

DOCUMENT CHECKING (not mandatory for File Note)

	Prepared by	Checked by	Approved by
Name	Alan Law		
Signature			

A46/A4177/A425 Stanks Island – Updated Junction Layout Assessment

Project title	Stanks Business Case Refresh	Job number	VM155028
cc	Warwickshire County Council	File reference	VM155020.TN20160106
Prepared by	James Edwards	Date	6 January 2016

Introduction

1. Vectos Microsim (VM) have been asked by Warwickshire County Council (WCC) to assess 6 alternative layouts to the junction proposals along the A4177/A425 between Old Budbrook Road and Wedgnock Road.

2. This Note has been produced to accompany the results extracted from those models which are presented within the accompanying spreadsheet (*VM155028_20160106 Stanks – 6 Test Models – Initial Outputs*).

Scenarios

3. The results spreadsheet provides model outputs for a total of 8 scenarios. A summary of the scenario composition is provided as follows:

- **Reference** – Contains the current road layout with traffic volumes forecast to 2021 levels.
- **Scenario 01** – The Reference Case inclusive of the current corridor proposals as confirmed by WCC. The scheme has been changed from the original SEP scheme proposals in a number of ways but the main differences include the reduction of the two lane section to the west of the A425/Industrial estate junction which is due to be signalised and reconfiguration of that junction from three lane entry to the west with a right turn bay to a two lane entry with the right hand lane for right turning traffic only.
- **Scenario 02** – Scenario 01 with the reconfiguration of the industrial estate signals so that two lanes travel WB across the junction (right hand lane is right and straight-on).
- **Scenario 03** – As Scenario 02 but with the inclusion of a two lane merge east of Wedgnock/Birmingham Road junction.
- **Scenario 04** – Scenario 01 without signals at the industrial estate.
- **Scenario 05** – Scenario 02 without signals at the industrial estate.
- **Scenario 06** – Scenario 03 without signals at the industrial estate.

4. Additionally **Scenario 07** within the results spreadsheet reflects the performance of the most recently assumed scheme layout prior to the inclusion of the changes outlined for Scenario 01.

Results Analysis

5. The following provides a high level overview of the results extracted from the aforementioned model scenarios:

Model Stability

6. It is apparent from the model stability that Scenario 02 and 05 produce very poor levels of stability. This is because the conversion of the right hand lane to accommodate the straight on movement means that vehicles wishing to continue into Warwick along the Birmingham Road will choose to enter into the right hand lane earlier than was previously assumed. The path of these vehicles can easily be blocked by the presence of vehicles wishing to turn right into the industrial estate.

7. With the PM this increases the propensity for queued vehicles to extend back into the single lane section because of the large volumes of traffic exiting Warwick which oppose the right turners into the industrial estate. If this happens at the same time as the signals at the IBM junction release WB traffic it can quickly cause queues which extend back into the main A46 Island.

8. The balance of flows and turning movements at Stanks Island, during the PM peak, are such that the blocking back onto the island can quickly cause the junction to 'lock-up'. Runs from models which have locked-up are discounted on the fact that they do not reflect a realistic scenario, in reality vehicles will squeeze round other cars or let others in out of courtesy to ensure a junction continues to operate. Such, subjective, behaviours are not replicated within Paramics. Thus, whilst it is highly likely that the lock-up overestimates the severity of the problem, a high propensity for model lock-ups is still symptomatic of a significant issue that will require further attention.

9. ***Based solely on the model stability it is recommended that the layouts proposed in Scenario 02 and 05 are discounted as the conversion of the right hand lane to accommodate the straight on movement means that the propensity for traffic to block back into the Stanks Island increases significantly leading to an unacceptable reduction in model stability.***

10. Some instances of model lock-ups are inevitable within the Warwick Town model due to the large volumes of traffic forecast to occur on the model network coupled with the complex layout of some junctions (such as The Butts).

11. As a result, the inherent instability is assumed to be represented by the Reference Case stability levels. It is notable that only Scenario 04 performs as well or better than the Reference Case, all other scenarios suffer reductions. Stability levels lower than 60% to 65% are considered particularly poor and most likely to be classified as unacceptable. In this instance all PM scenarios in which signals have been included within the model at the Industrial estate junction do not return acceptable levels of stability.

Network Stats

12. The network statistics provide a number of Key Network Performance Indicator (KPI) comparisons.

13. In this instance, the comparisons have focussed on the average delay, in seconds, across the entire model period.

14. Analysis of the average delay reveals that all scenarios which contain the signals at the Industrial Estate junction suffer higher levels of delay than the Reference Case during the AM and Scenario 02 and 03 are also higher in the PM period.

15. Furthermore, scenario 04 to 06 all return lower levels of delay than the Reference Case during both AM and PM periods. The removal of the signals also appears to result in average delay levels which are less than those contained in the previous scheme scenario network (scenario 07).

16. ***Based on the improvements in delay, relative to the previously proposed layout results, there is a demonstrable benefit arising from the removal of the signals at the Industrial Estate junction as it reduces delay, overall on the network and, potentially compensates for the additional delay likely to occur as a result of the capacity restriction associated with the removal of the second WB lane west of the Industrial Estate.***

17. Delays are lowest in the AM in Scenario 04 and they are lowest within the PM in Scenario 06 (scenario 05 is discounted due to poor stability). Therefore, in terms of overall network delay, ***either layout proposed in Scenario 04 or Scenario 06 is considered preferable to the other layouts tested.***

Hourly Averages

18. The 'Hourly Averages' tab provides the average maximum queue lengths, in metres, for the two junctions on either side of the corridor.

19. Within the AM peak hour, all scenarios are predicted to reduce queueing levels experienced by vehicles exiting the A46 from the north. However, within Scenarios 01 to 03 this reduction is achieved at the expense of vehicles approaching from the West. The signal configuration of the main Stanks Island better accommodates the movement from the A46 (N) towards Warwick through the synchronisation of the signals.

20. If the exit to the IBM junction is blocked then this quickly extends back to Stanks Island which, in the AM, means that there is restricted capacity for the A4177 WB traffic since any gaps are being filled by vehicles approaching from the A46(N).

21. During the PM all layouts reduce the queueing levels experienced on the Wedgnock Road junction approaches.

22. When comparing Scenario 04 and Scenario 06 it is apparent that there are more 'spikes' in queueing levels in Scenario 06 than 04 and the same is true of the PM queueing levels also. This can be considered to indicate that, in queueing terms, if adopted **Scenario 04 is likely to perform better than Scenario 06.**

Economic Appraisal

23. VM have also undertaken a rerun of the PEARS assessment that was recently completed for the scheme proposals. The assumptions adopted within the updated PEARS assessment are consistent with those reported within the recent SEP submission with the exception of the scheme design which is as per **Scenario 04** and the scheme costs which were assumed to be £6 million.

24. The revised BCR produced as a result of the PEARS rerun was calculated at **5.75** indicating a minor improvement over the previous PEARS run which has most likely occurred as a result of the additional improvement in scheme performance, and associated reduction in mean delay, that has occurred as a result of the removal of the signals.

25. It should be noted that it is also highly likely that an improvement in the BCR would have occurred had the signals been removed from the scheme assumptions recently submitted to the SEP.

Conclusions

26. Based on the analysis set out previously it is reasonable to conclude the following:

- The reduction of the two lane WB section approaching the Birmingham Road/Industrial Estate junction is likely to induce severe impacts with regards the overall network performance.
- Configuration of the signalised junction at the Industrial Estate entrance to accommodate two lanes WB is considered highly undesirable as the modelling indicates that this could increase the risk of exit blocking with regards the signalised IBM junction. If this occurs in the PM period it could significantly affect the performance of Stanks Island and so should therefore be avoided.
- Removing the signals at the Industrial estate entrance improves the overall performance of the scheme considerably. By allowing traffic in the left hand lane to travel through the junction virtually unopposed there is a substantial reduction in the overall delay experienced on the network and the propensity for queue propagation back to Stanks Island is minimised.
- Scenario 04 appears less prone to 'spikes' in queueing levels than Scenario 06 and could therefore be considered the most desirable layout for delivery.

Points of Consideration

27. Some additional points of consideration, not acknowledged within the previous text, have been documented within the following section:

28. It should be acknowledged that whilst the signal times were optimised for Scenario 01 they were not then revised for each alternative scenario. This means that the results from each scenario can be considered to be comparable but it overlooks the potential for scenario specific signal times to be adopted which further reduce the delays reported on within each scenario. However, such changes are likely to induce only small improvements in network

performance and any major issues identified (such as model stability) would be unlikely to be affected by the alterations.

29. There is a noticeable increase in the potential for queues to occur on Old Budbrook Road which has not been reported on within this first sift of analysis. Thus further optimisation of the signals at this junction may also merit further investigation since the formation of the queues appears to be directly related to the new junction layout which restricts capacity in comparison to the layout tested previously.

DOCUMENT CHECKING

	Prepared by	Checked by	Approved by
Name	James Edwards	Alan Law	James Edwards
Date	06/01/2016	07/01/2016	11/02/2016

Table 15A: Economic Efficiency of the Road System (Market Prices)

Scheme Title PEARS Analysis - A425/A46 Improvements (2016 vs. 2021) Jan Revised

IMPACT	Ref.	Cal'n / Source	Total	Cars	LGVs	OGVs	Private Buses & Coaches	Service Buses
NON-BUSINESS USER BENEFITS								
Travel Time								
Commuting Travel Time	1		£6.97	£5.04	£0.04			£1.89
Other Travel Time	2		£10.72	£7.50	£0.12		£0.00	£3.09
Non-business Travel Time	**3**	**1+2**	**£17.69**					
Vehicle Operating Costs								
Commuter Fuel VOC	4		£0.55	£0.54	£0.00			
Commuter Non-fuel VOC	5		£0.02	£0.02	£0.00			
Other Fuel VOC	6		£0.59	£0.58	£0.01			
Other Non-fuel VOC	7		£0.00	£0.01	£-0.01			
Non-business Vehicle Operating Costs	**8**	**4+5+6+7**	**£1.15**					
During Construction and Maintenance								
Commuting: During Construction and Maintenance (*)	*9*							
Other: During Construction and Maintenance (*)	*10*							
NET NON-BUSINESS BENEFITS: COMMUTING	**11**	**1+4+5+9**	**£7.54**					
NET NON-BUSINESS BENEFITS: OTHER	**12**	**2+6+7+10**	**£11.30**					
NET NON-BUSINESS BENEFITS - SUB TOTAL	**13**	**11+12**	**£18.84**					
BUSINESS USER BENEFITS								
User Benefits								
Business Travel Time	**14**		**£10.28**	£6.58	£1.92	£0.26	£0.00	£1.52
Fuel VOC	15		£0.40	£0.18	£0.12	£0.10		
Non-fuel VOC	16		£0.33	£0.31	£-0.04	£0.06		
Business Vehicle Operating Costs	**17**	**15+16**	**£0.73**					
During Construction (*)	*18*							
During Maintenance (*)	*19*							
During Construction and Maintenance (*)	*20*	**18+19**						
Subtotal	**21**	**14+17+20**	**£11.01**					
Private Sector Provider Impacts								
Revenue (*)	*22*							
Fuel VOC	23		£0.81				£0.00	£0.81
Non-fuel VOC	24		£0.93				£0.00	£0.93
Private Sector Vehicle Operating Costs	**25**	**23+24**	**£1.74**					
Investment Costs (*)	26							
Grant / Subsidy (*)	27							
Subtotal	**28**	**22+25+26+27**	**£1.74**					
Other Business Impacts								
Developer & Other Contributions (*)	*29*							
NET BUSINESS IMPACT	**30**	**21+28+29**	**£12.75**					
TOTAL PRESENT VALUES OF TEE IMPACTS	**31**	**13+30**	**£31.59**					

* Impact calculated external to PEARS & manually input by User. Any manual inputs will require the manual recalculation of the Sub-Totals / Impacts etc. as well as the NPV & BCR etc. in Table 15C.

Table 15A: Economic Efficiency of the Road System (Market Prices)

This analysis is based on Central traffic growth.
Benefits appear as positive numbers, while costs appear as negative numbers.
All entries are in units of 1,000,000 pounds sterling and are discounted to 2010.
Evaluation period 30 years. Scheme opening year 2016.
Current year 2014.

Table 15B: Public Accounts

Scheme Title PEARS Analysis - A425/A46 Improvements (2016 vs. 2021) Jan Revised

IMPACT	Reference	Cal'c / Source	Total
Local Government Funding			
Revenue (*)	32		
Investment Costs (*)	33		
Operating Costs (*)	34		
Maintenance Costs			
Non-Traffic (Group 1) (*)	35		
Traffic Related (Group 2) (*)	36		
Developer & Other Contributions (*)	37		
Grant Subsidy Payment (*)	*38*		
Net Impact	39	Sum(32 to 38)	
Central Government Funding: Transport			
Revenue (*)	40		
Investment Costs	41		£5.35
Operating Costs (*)	42		
Maintenance Costs			
Non-Traffic (Group 1) (*)	43		
Traffic Related (Group 2) (*)	44		
Developer & Other Contributions (*)	45		
Grant Subsidy Payment (*)	46		
Net Impact	47	Sum(40 to 46)	***£5.35***
Central Government Funding : Non-Transport			
Indirect Tax Revenues	48		£1.18
TOTALS			
Broad Transport Budget	49	39+47	**£5.35**
Wider Public Finances	50	48	**£1.18**

* Impact calculated external to PEARS & manually input by User. Any manual inputs will require the manual recalculation of the Net Impacts / Totals etc. as well as the NPV & BCR etc. in Table 15C.

This analysis is based on Central traffic growth.
Benefits appear as positive numbers, while costs appear as negative numbers.
All entries are in units of 1,000,000 pounds sterling and are discounted to 2010.
Evaluation period 30 years. Scheme opening year 2016.
Current year 2014.

Table 15C: Analysis of Monetised Costs and Benefits (Market Prices)

Scheme Title PEARS Analysis - A425/A46 Improvements (2016 vs. 2021) Jan Revised

IMPACT	Reference	Cal'n / Source	Total
TEE Impacts			
Noise (^)*	51		
Local Air Quality (^)*	52		
Greenhouse Gases (Emissions) (low)			£0.18
Greenhouse Gases (Emissions) (central)	53		**£0.36**
Greenhouse Gases (Emissions) (high)			£0.54
Journey Ambience (^)*	54		
Accident Benefits (*)	55		
Non-Business User Benefits: Commuting	56	11	£7.54
Non-Business User Benefits: Other	57	12	£11.30
Business User & Provider Benefits	58	30	£12.75
Wider Public Finance (Indirect Tax Revenue)	59	-50	£-1.18
Option Values (^)*	60		
Present Value of Benefits (PVB)	61	Sum(51 to 60)	**£30.77**
Broad Transport Budget	62	49	£5.35
Present Value of Costs (PVC)	63	62	**£5.35**
OVERALL IMPACTS			
Net Present Value (NPV)	64	61-63	**£25.42**
Benefit to Cost Ratio (BCR)	65	61/63	**5.75**

* Impact calculated external to PEARS & manually inputted by User. Any manual inputs will require the manual recalculation of the NPV & BCR etc.

^ Costs & benefits which are regularly or occasionally presented in monetised form in transport appraisals, together with some where monetisation is in prospect.

In addition to the costs & benefits outlined above, there may also be significant others, some of which cannot be presented in monetised form. Where this is the case, the analysis presented above does not provide a good measure of the value for money (VFM) and should not be used as the sole basis for decisions.

This analysis is based on Central traffic growth.
Benefits appear as positive numbers, while costs appear as negative numbers.
All entries are in units of 1,000,000 pounds sterling and are discounted to 2010.
Evaluation period 30 years. Scheme opening year 2016.
Current year 2014.