Appendix B

Part 1 – Original Business Case Appendices

Appendix A

Warwickshire County Council

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Warwick CV34 4SX
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COMMUNITIES

Monica Fogarty
Strategic Director

Graeme Fitton BSc, MSc, CEng, MICE
Head of Transport & Highways

NOTES

1. The Contractor will mark out the crossing and the Engineer will check the positions of the street equipment before anything is installed.
2. The minimum horizontal clearance between the kerb face and street equipment is 450mm but 600mm for traffic signals equipment.
3. The dropped kerbs at the crossing facilities shall be flush and by no means greater than 6mm upstand.
4. The gradient for the footway at the dropped kerbs shall not be greater than 1:20.
5. Existing road markings to be removed as necessary, new lining to tie-in with existing.
6. Anti-slip lids must have a skid resistance value greater than 70 in dry conditions.
7. Blue Polypropylene 8mm draw rope to be provided in all ducts.
8. All ducts to be trimmed flush with internal access chamber side walls.
9. All dimensions in millimetres unless stated otherwise

Rev	Date	By	Ch'k	Ap'd	Amendment

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.

TITLE

Coton Arches Roundabout, Nuneaton

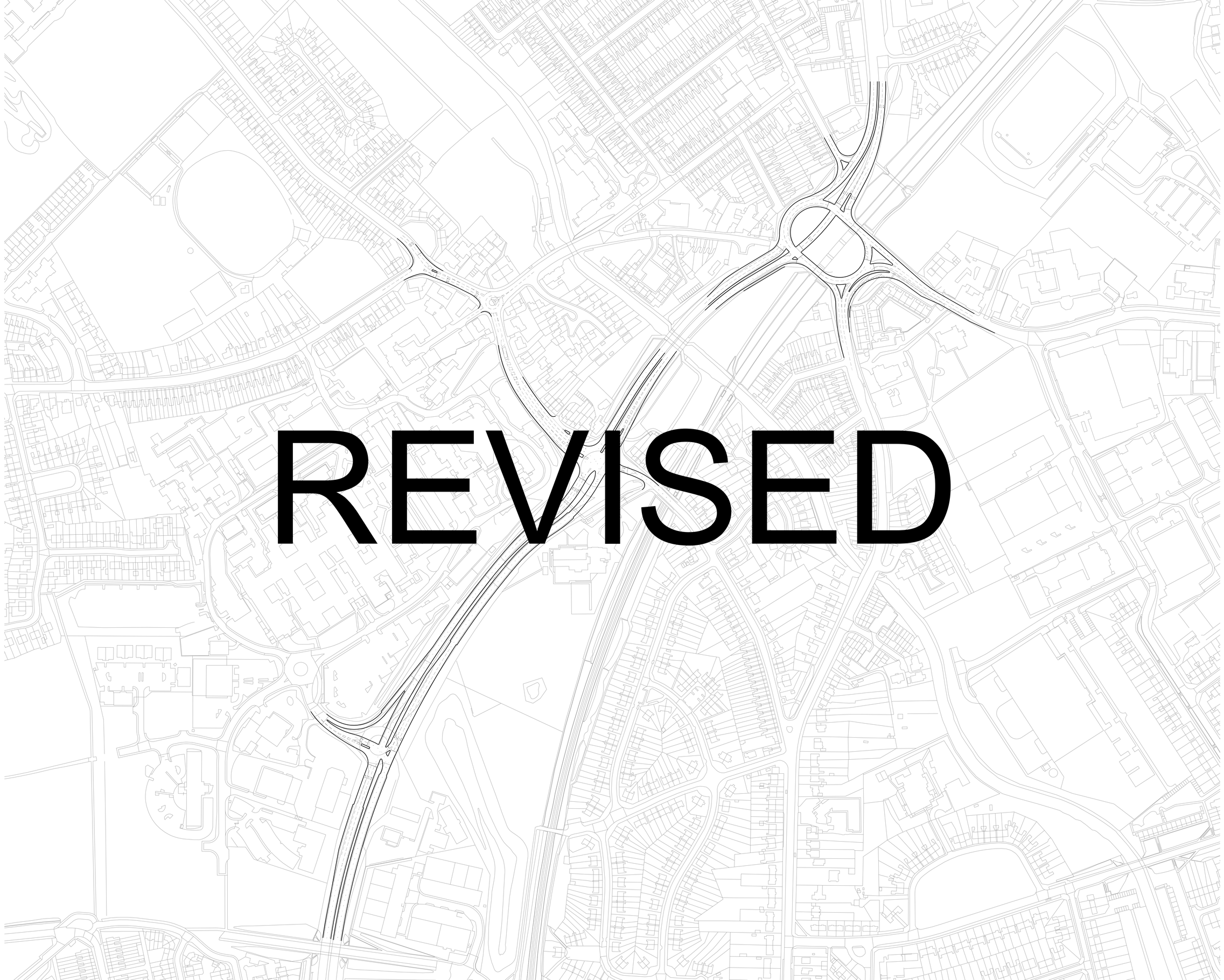
Roundabout Signalisation

DRN	CK'D	AP'D
MO'C	CKD	APD

DATE
05 November 2014

SCALE
1:500 @ A1_L

DRG. NO.
TCIS / 143 / 001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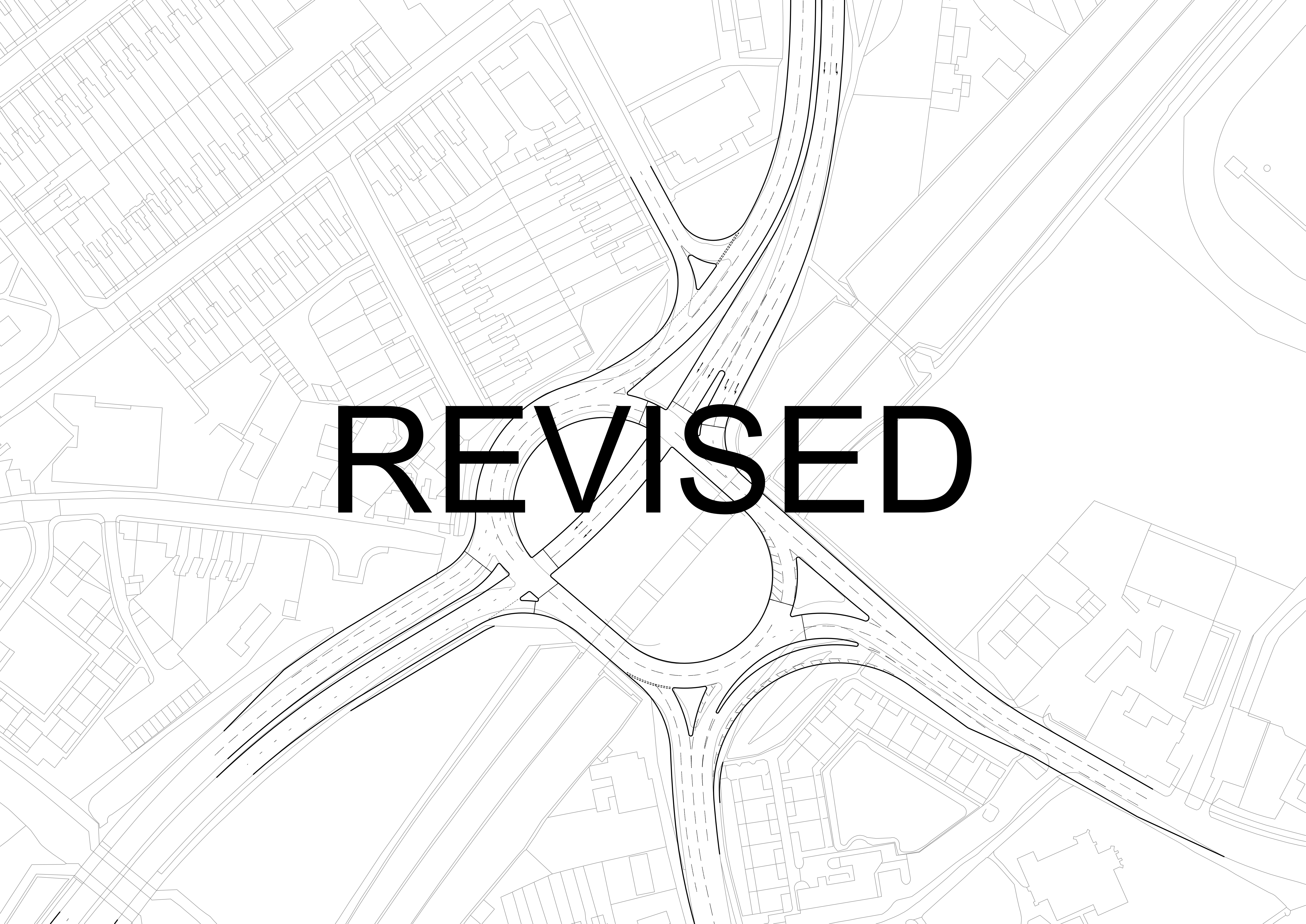
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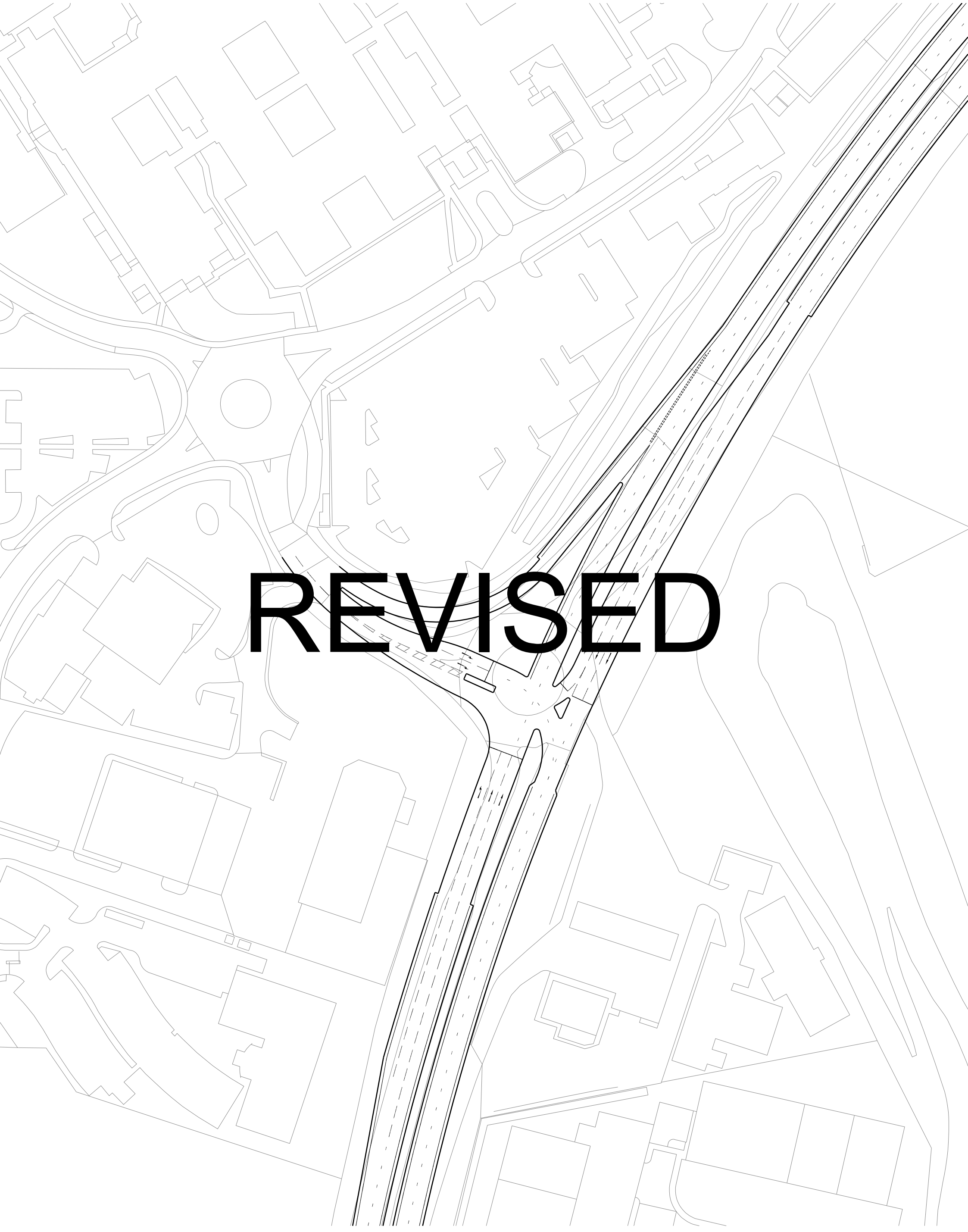
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Appendix B

IAN POWELL BSc(Hons) MCIEH
ASSISTANT DIRECTOR

PLANNING & PUBLIC PROTECTION
Town Hall, Nuneaton
Warwickshire, CV11 5AA

Our Ref:

Your Ref:

Date: Tuesday 25th March 2014

If calling please ask for: Kelly Ford

Telephone: (024) 7637 6376
Fax No: (024) 7637 6340
Typetalk Registered
DX Nuneaton 16458

Kelly.ford@nuneatonandbedworth.gov.uk
Direct Dialling: (024) 7637 6335

Dear Sir/ Madam,

A444 Corridor (Nuneaton Town Centre to Griff Roundabout) Improvements

I am writing to support the application for the scheme of improvements proposed at A444 Coton Arches Roundabout, A444/B4112 College Street Roundabout, B4112 College Street/Bull Ring junction, B4112 Heath End Road/Greenmoor Road and A444/Eliot Way (George Eliot Hospital) in Nuneaton. The improvements are required to address significant levels of congestion on the Nuneaton town centre to Griff roundabout stretch of the A444 and will mitigate the impacts of proposals contained in the Nuneaton and Bedworth Borough Plan Preferred Options document. The improvements will therefore support the delivery of future housing within the Borough and enable economic growth.

Yours sincerely

Kelly Ford
Head of Planning Policy & Economic Development

Appendix C

COTON ARCHES PROJECT: BUDGETARY ESTIMATE — OCTOBER 2014

DESCRIPTION	COST (£)
WORKS	
Highway Works	1,030,000
Traffic Control and Information Systems	245,000
Sub-total	1,275,000
Contingencies on Sub-total (at 44% for Inception Stage)	561,000
Works Total	**1,836,000**
DESIGN & PROCUREMENT	
Highway Design, Engineering Client and Procurement Functions	166,000
Traffic Control and Information Systems Design	20,000
Sub-total	186,000
Contingencies on Sub-total (at 44% for Inception Stage)	82,000
Design & Procurement Total	**268,000**
DESIGN PHASE ENABLING WORK & SERVICES	
Surveys, Site Investigations, Consultation Costs, TROs and Legal Work	32,000
Sub-total	32,000
Contingencies on Sub-total (at 44% for Inception Stage)	14,000
Design Phase Enabling Work & Services Total	**46,000**
STATUTORY UNDERTAKER DIVERSIONS & PROTECTION WORKS	
Electricity, Gas, Water, Telecommunications and Other Services	510,000
Sub-total	510,000
Contingencies on Sub-total (at 44% for Inception Stage)	224,000
Design Phase Enabling Work & Services Total	**734,000**
CONSTRUCTION SUPERVISION	
Project Manager, Supervisor, Quantity Surveyor and Clerk of Works Services	89,000
Traffic Control and Information Systems Installation Supervision and Commissioning	15,000
Sub-total	104,000
Contingencies on Sub-total (at 44% for Inception Stage)	46,000
Construction Supervision Total	**150,000**
PROJECT TOTAL	**3,034,000**

Appendix D

Project Title: **A444 Corridor Improvement, Coton Arches Roundabout to George Eliot Hospital**
Client: **Warwickshire County Council**
Risk Review Date: 11th March 2014

Risk Description					Pre -		Pre-Mitigation Quantitative Evaluation								Post -	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			£17,622.50	Risk Owner - Manager	Current Control Measures	Action Owner	Target Completion Date	Notes
								Opt	ML	Pess	Opt	ML	Pess					Opt	ML	Pess	Opt	ML	Pess						
Double-click to Sort	*Double-click to Sort*	*Double-click to Sort*	*Double-click to Sort*	*Double-click to Sort*																								
1	11/3/14	Delay in negotiations for NR to be satisfied that there is no risk to their constructions	There is a risk that Network Rail may not give permissions in time and WCC may need to change working practices	Increase in cost and time	20%	2	Probability: Based on previous experience of working with NR Cost: May need to change working practices, special equipment may be needed e.g. Mini diggers (foundry job as reference) Time: Previous experience of working with NR	5,000	10,000	15,000	5	10	20	10%	1	Probability: Based on previous experience of working with NR Cost: May need to change working practices, special equipment may be needed e.g. Mini diggers (foundry job as reference) Time: Previous experience of working with NR	5,000	10,000	15,000	5	10	20	1,000	Alan Law	1. Early engagement with NR	Alan Law	31/12/2014	this risk remains, however time impact and risk reduced based on prfoessional opinion
2	11/3/14	Design not yet complete	There is a risk that WCC may need to purchase private land	Increased cost, may have to raise CPO causing time delay	5%	1	Probability: Land to redesign onto if required, therefore very low probability Cost/Time: Not assessed as unknown if we need to assess it	0	0	0	0	0	0	5%	1	Probability: Land to redesign onto if required, therefore very low probability Cost/Time: Not assessed as unknown if we need to assess it	0	0	0	0	0	0	0	Alan Law		Alan Law		I believe this risk to be closed
3	11/3/14	The scheme includes tree removal risk of (bats and bird nesting season Mar-Sept), canal 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, time and cost impact. Tree preservation orders	10%	1	Probability: no new road and no new structures Cost: transport newts and other relocation costs e.g. habitat creation Time: Pess will be newts and is dependent on time of year abd nesting time of birds. ML - plan ahead and program work accordingly	1,250	2,500	3,750	0	80	180	5%	1	Site cleared, surveys completed and creatures moved	0	250	1,250	0	1	1	25	Alan Law	1. Need to programme around bird nesting season Mar - Sept 2. Complete surveys as early as possible 3. Discussion with County Ecologist for advise on best way to proceed	Alan Law	31/07/2014	really not sure if this is a risk, especially now scope has been reduced, I suppose bird nesting could be an issue. it would seem sensible to reduce the costs and time impact here to reflect the smaller scheme (25% of original - £3m now, £12m for full scheme)
4	11/3/14	Geotechnical 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)	15%	1	Probability: Low as only a few areas Cost: material costs based [illegible] for carriageway. Best [illegible]s that CBR is high [illegible]h >2 Time: [illegible]oing process in desig[illegible]no time impact	0	1,250	[illegible]50	0	0	0	[illegible]5%	1	Ground investi[illegible]s will b[illegible] completed a[illegible]ndition wi[illegible] be known. [illegible]get on sit[illegible] and find po[illegible]y of soft areas, the[illegible] probability and impa[illegible]duced	0	[illegible]00	1,250	0	[illegible]	[illegible]	31	Alan Law	1. G[illegible] investigations	Alan Law	31/05/2014	it would seem sensible to reduce the costs and time impact here to reflect the smaller scheme (25% of original - £3m now, £12m for full scheme)
5	11/3/14	Network disruption during construction. Main route in and out of Nuneaton	There is a risk of significant disruption during construction	Increased levels of pollution, increased congestion and journey times, reputational damage	50%	3	Probab[illegible] Previos expe[illegible] Cost[illegible]er time chan[illegible]TM plan		10,000	[illegible]00	0	2	4	25%	2	Prob[illegible]y: Previous exp[illegible]ce C[illegible] officer time, TM p[illegible]e [illegible]putational impact	0	[illegible]5,000	25,000	0	[illegible]	[illegible]	2,500	Alan Law	1. G[illegible]ommunication plan and e[illegible]ment with public 2. M[illegible]g TM	Alan Law	31/05/2014	changed due to criticality of junction on network
6	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%	1	No c[illegible] time impact to this project as a new project would be implemented. Reputational damage only	0	0	0	0	0	0	5%	1	[illegible] 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	Alan Law		no change?
7	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%	1	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. 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%	1	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. 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	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	no change?
8	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%	1	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	2,500	25,000	0	1	12	5%	1	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, min 0	0	2,500	25,000	0	1	12	458	Alan Law	1. Tolerate the risk			it would seem sensible to reduce the costs and time impact here to reflect the smaller scheme (25% of original - £3m now, £12m for full scheme)
9	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%	3	Probability: 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	2,500	25,000	0	1	5	50%	3	Probability: 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	2,500	25,000	0	1	5	4,583	Alan Law	1. Tolerate the risk			t would seem sensible to reduce the costs and time impact here to reflect the smaller scheme (25% of original - £3m now, £12m for full scheme)
10	11/3/14	C3 and C4 reports exceed bugetary estimates	There is a risk that contingency may not cover cost of diversions of SU's apparatus	Increase cost for schemes		1	Identified as uncertainty								1								0	Alan Law	budgetary estimate is based on 40% of works cost (typical in urban environment) plus 44% contingency (appropriate for inception stage estimates)			not entirely sure why this has no value attached, it seems it is due to it actually being an uncertainty. I would suggest that there are both cost and time risks associated with this

Project Title: **A444 Corridor Improvement, Coton Arches Roundabout to George Eliot Hospital**
Client: **Warwickshire County Council**
Risk Review Date: 11th March 2014

Risk Description					Pre -		Pre-Mitigation Quantitative Evaluation									Post -		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				£17,622.50	Risk Owner - Manager	Current Control Measures	Action Owner	Target Completion Date	Notes
								Opt	ML	Pess	Opt	ML	Pess						Opt	ML	Pess	Opt	ML	Pess								
Double-click to Sort	*Double-click to Sort*	*Double-click to Sort*	*Double-click to Sort*	*Double-click to Sort*																											
17	11/3/14	Construction costs exceed bugetary estimates	There is a risk that contingency may not cover cost of increased construction costs	Increase cost for schemes		1	Identified as uncertainty										1									0	Alan Law	budgetary estimate is based on 40% of works cost (typical in urban environment) plus 44% contingency (appropriate for inception stage estimates). Recent tender returns and construction price rises have been taken into account in the cost estimate			new risk
11	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%	1	Probability: Identify what work needs to be done when. Utilise Consultancies such as Atkins or Watermans for additional resource Cost: Opt and ML - £0 as utilising existing resource. Pess - paying premiums for specialist resource 1 and a bit person for 6 months Time: Pessimistic - 6 months, need to pull people off other jobs, recruitment. Optimistic - reorganising existing resource. ML - 4 weeks to source and mobilise resource	0	0	20,000	5	20	120	0%	1	Risk will be mitigated	0	0	0	0	0	0	0	Alan Law	1. Programming 2. Early warnings to design services on resource requirements 3. Engagement with consultancies	Alan Law	30/11/2014	it would seem sensible to reduce the costs and time impact here to reflect the smaller scheme (25% of original - £3m now, £12m for full scheme). Note assumptions change by same factor.
12	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%	2	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%	1	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	no change?
13	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	25%	2	Probability: Based on safety audits and will reduce over time as audits are conducted. High as expe… are always foun… that t… Time… s 4 weeks for signi… redesign, 2 week… 3 days Opt Cost… 10% of the desig… Opt 2…	3,00…	7,500	…00	1	3	5…	…5%	1	Probability: Based on safety audits and will reduce over time as audits conducte… Time: Pess… ks for significant … gn, 2 week… ML, 3 days… Cost: Pe… % of the design … L 5% and Op… 2%	3,000	…00	15,000	3	…	…	1,275	Alan Law	1. C… e to engage wi… fety during scheme deve… nt to minimise risk	Alan Law	Ongoing through design process	it would seem sensible to reduce the costs and time impact here to reflect the smaller scheme (25% of original - £3m now, £12m for full scheme). Risk probability reduced due to lateer stage of design phase, no departures noted so far.
14	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%	1	Mai… utational risk Prob… Always the pote… r this to happ… /CC proc… s should pick up issue… work progresses Cost: Would be transferred to the contractor Time:WCC view is that scheme is finished	0	0				0	5%	1	M… eputational risk P… bility: Always the …tial for this to happen. …C procedures should pi… ssues as work progress… Cost: Would be transferred to the contractor Time:WCC view is that scheme is finished	0			0	0			…w	1. W… 2. R… quality checks, standard procedure	Alan Law	End of contract	no change?
15	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%	3	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	37,500	37,500	37,500	25	25	25	20%	2	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	37,500	37,500	37,500	25	25	25	7,500	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	it would seem sensible to reduce the costs and time impact here to reflect the smaller scheme (25% of original - £3m now, £12m for full scheme)
16	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%	1	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%	1	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			cost impact and likelihood initially low therefore retain original estimates

Quantitative Cost Risk Analysis

Warwickshire County Council

A444 Coton Arches Junction Improvements

5th November 2014

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
02	05.11.14	To reflect scope change	Mark Warner		

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DISCLAIMER

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CONTENTS

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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 A444 Coton Arches Junction Improvements project, 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 is presented in the table below:

Pre Mitigation			
Confidence Levels			
Mean	10%	50%	80%
£39.2K	£[illegible]k	£40[illegible]	£[illegible]0.6k
Post Mitigation			
Confidence Levels			
Mean	10%	50%	80%
£17.6K	0	£11.9k	£37.5k

Table 1: Pre and Post Mitigation Confidence Values

This shows a post mitigated cost risk exposure of less than 1% of the £3m project CAPEX. It is recommended that the risk register be reviewed further to provide WCC with confidence that this is an appropriate figure.

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 15: There is a risk of unacceptable level of noise during construction;
- Risk ID 9: There is a risk that uncharted utilities may be discovered when work starts;
- Risk ID 5: There is a risk of significant disruption during construction.

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 this by working with WCC to produce a risk register and QCRA for the A444 Coton Arches Junction Improvements project.

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Further details of the scheme can be found in the Outline Business Case produced by Warwickshire County Council.

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 A444 Coton Arches Junction Improvements scheme. Alan Law, Nick Dauncey and Nick Holland represented WCC, Steve Boden represented Atkins and Claire Mills from F+G facilitated the workshop.

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 impact of the risks on the project outcome. A risk owner was allocated and a mitigation strategy decided upon.

Following a change to the project scope the risks register was further reviewed by the Warwickshire County Council project team and the design team in October 2014 to reflect the amendments to the register resulting from the change. The register analysed is titled 'Risk Register Warwick CC A444 Coton Improvements updated issue'.

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.

4.0 RESULTS

The mean risk exposure for the project pre mitigation is £32.9k and post mitigation is £17.6k. This is represented as follows:

Pre Mitigation			
Confidence Levels			
Mean	10%	50%	80%
£39.2K	£6k	£40k	£60.6k

Post Mitigation			
Confidence Levels			
Mean	10%	50%	80%
£17.6K	0	£11.9k	£37.5k

Table 2: Pre and Post Mitigation Confidence Values

At the time of the analysis the project CAPEX was understood to be circa £3m. The analysis shows a pre mitigation cost risk exposure of 1.6% and a post mitigated cost risk exposure of less than 1% of the project CAPEX. These figures appear low compared to the expected cost of the project and it is recommended that this risk register be reviewed further to provide WCC with confidence that these are appropriate figures.

4.1 Pre Mitigation Results

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

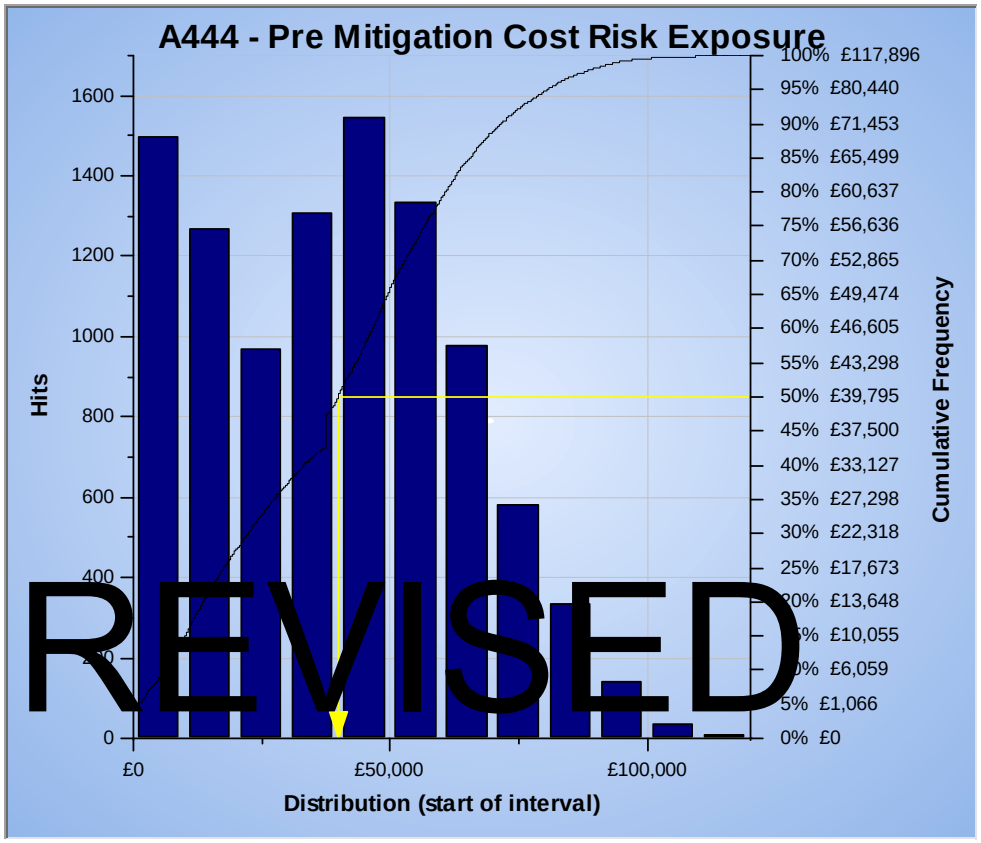

Figure 1: Pre Mitigation Cost Risk Exposure

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

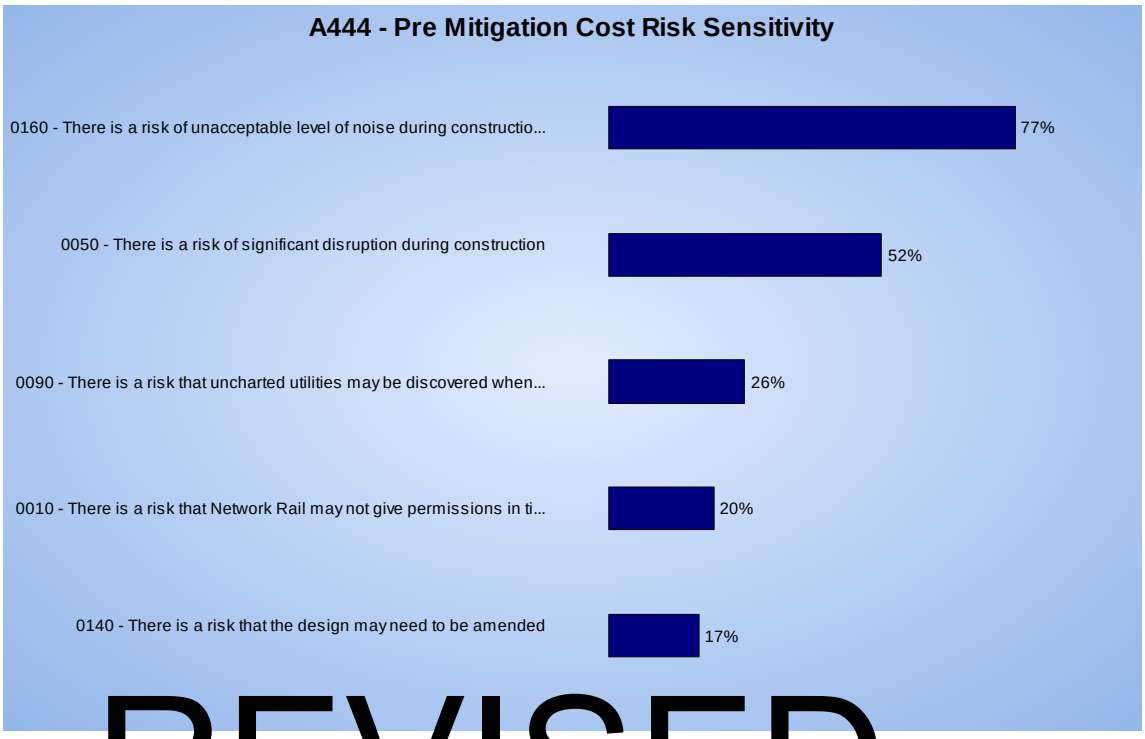

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Figure 2: Pre Mitigation Sensitivity

Management attention should be afforded to the mitigation of these risks

4.2 Post Mitigation Results

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

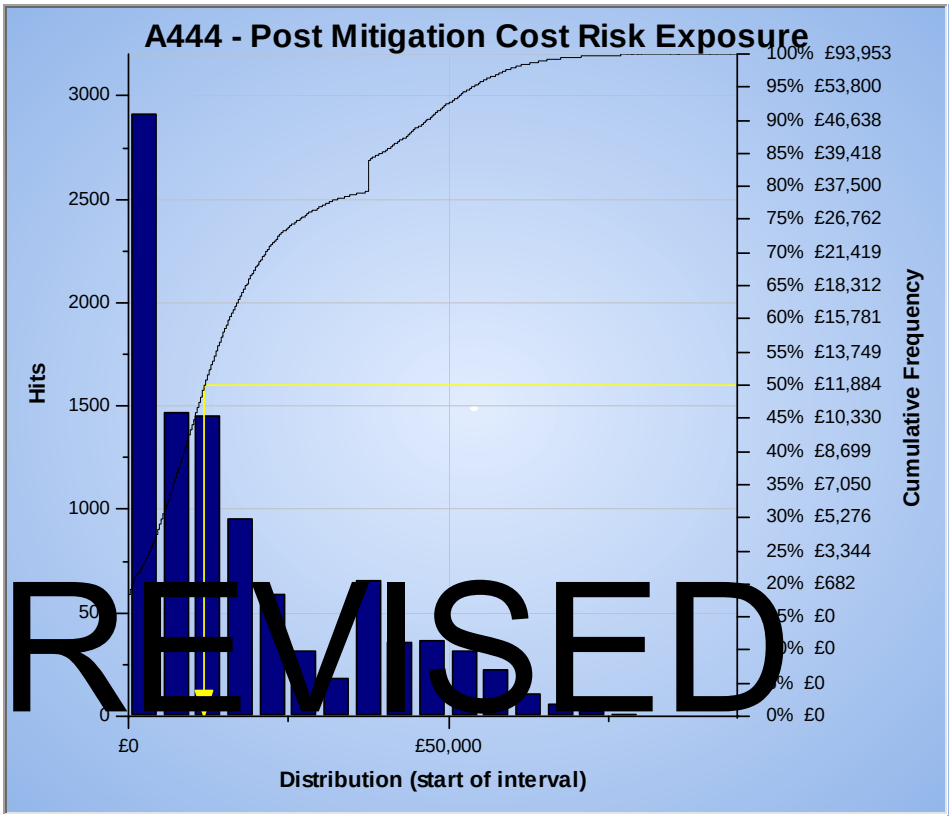

Figure 3: Post Mitigation Cost Risk Exposure

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

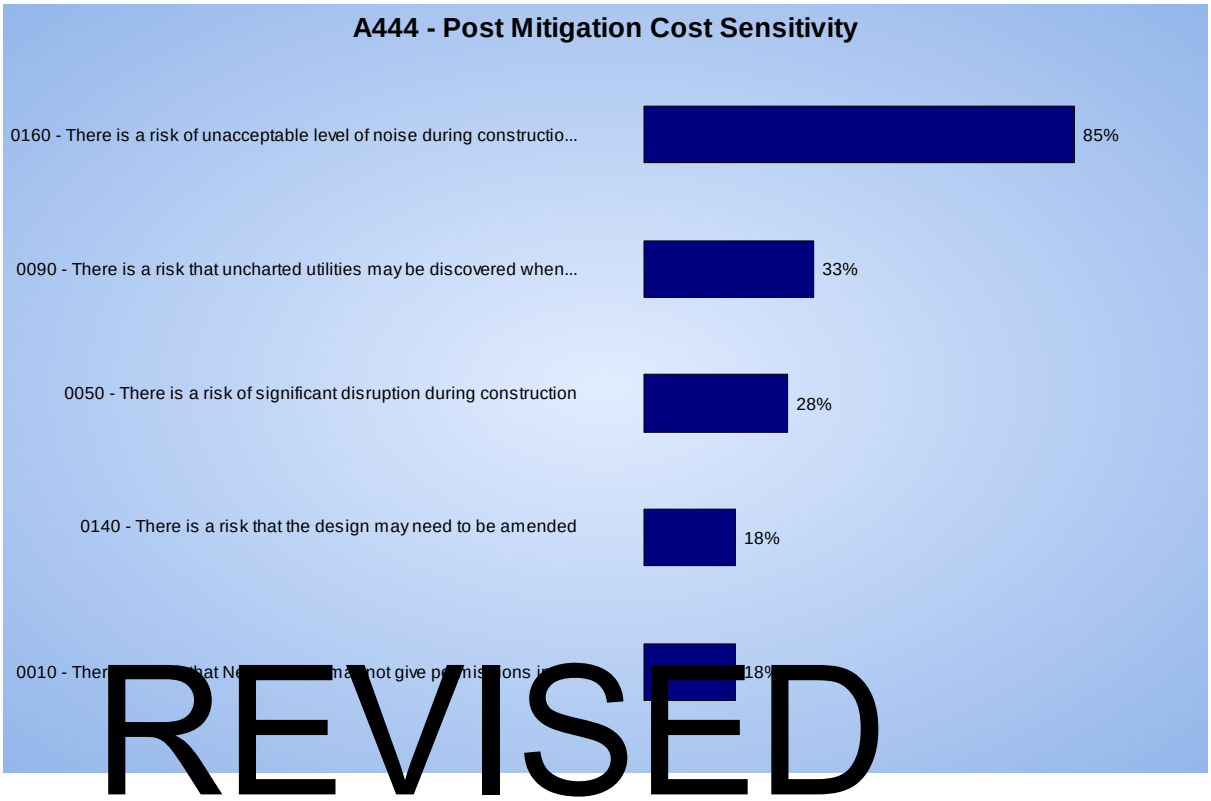

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Figure 4: Post Mitigation Sensitivity

QCRA Report
Warwickshire County Council
A444 Coton Arches Junction Improvements

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Appendix E

Table 1: Assumed phasing of jobs across years based on employment densities calculations for employment land, and construction jobs for housing

Sector	Year										
	1	2	3	4	5	6	7	8	9	10	11
20 Construction	0	1081	1400	1800	2100	2400	2600	2850	3183	0	0
24 Land transport	364	400	420	450	500	520	550	600	628	0	0
27 Warehousing & postal	278	300	320	340	360	380	400	450	480	0	0
35 Head offices & manag. cons.	100	105	110	115	120	125	130	135	146	0	0
37 Other professional services	500	550	560	600	620	680	700	720	750	0	0
38 Business support services	324	400	450	500	570	600	620	650	700	0	0
Total	1566	2836	3260	3805	4270	4705	5000	5405	5887	0	0

Table 2: GVA per worker figures for C&W (LEFM)

Sector	Year								
	1	2	3	4	5	6	7	8	9
20 Construction	38758.43563	38731.42223	39045.05578	39592.05383	40175.78572	40562.25736	40988.34465	41567.08239	42181.83097
24 Land transport	21203.29084	21581.51744	21889.46059	22422.8207	22710.42735	23138.61273	23436.92484	23768.07367	24088.54673
27 Warehousing & postal	36059.80667	35932.31402	35622.42563	35497.63198	35368.59497	35178.88451	35180.621	35352.55818	35138.84044
35 Head offices & manag. cons.	18079.40481	18178.74163	18273.22592	18298.21828	18383.94298	18408.35329	18500.29721	18613.34295	18777.32899
37 Other professional services	21694.22624	21850.81903	21973.34364	22095.20168	22304.40562	22499.71725	22669.40912	22856.53383	23039.47127
38 Business support services	23949.2755	23925.17164	23964.72855	24073.38339	24191.94215	24380.97282	24602.61059	24874.06872	25150.35262

Table 3: Gross GVA impact

Sector	Year								
	1	2	3	4	5	6	7	8	9
20 Construction	0	41868667.43	54663078.09	71265696.9	84369150.01	97349417.65	106569696.1	118466184.8	134264768
24 Land transport	7717997.866	8632606.978	9193573.448	10090269.32	11355213.68	12032078.62	12890308.66	14260844.2	15127607.35
27 Warehousing & postal	10024626.25	10779694.21	11399176.2	12069194.87	12732694.19	13367976.11	14072248.4	15908651.18	16866643.41
35 Head offices & manag. cons.	1807940.481	1908767.871	2010054.851	2104295.102	2206073.158	2301044.161	2405038.637	2512801.298	2741490.033
37 Other professional services	10847113.12	12017950.47	12305072.44	13257121.01	13828731.48	15299807.73	15868586.39	16456704.36	17279603.45
38 Business support services	7759565.263	9570068.657	10784127.85	12036691.7	13789407.02	14628583.69	15253618.56	16168144.67	17605246.83
Total	38157242.98	84777755.61	100355082.9	120823268.9	138281269.5	154978908	167059496.8	183773330.5	203885359.1

TOTAL CUMULATIVE:	1192091714

Table 4: Application of Displacement rates

Sector	Year								
	1	2	3	4	5	6	7	8	9
24 Land transport	7717997.866	8632606.978	9193573.448	10090269.32	11355213.68	12032078.62	12890308.66	14260844.2	15127607.35
27 Warehousing & postal	10024626.25	10779694.21	11399176.2	12069194.87	12732694.19	13367976.11	14072248.4	15908651.18	16866643.41
Displacement @ 60% fo B8	7097049.648	7764920.473	8237099.86	8863785.676	9635163.146	10160021.89	10785022.82	12067798.15	12797700.3
35 Head offices & manag. cons.	1807940.481	1908767.871	2010054.851	2104295.102	2206073.158	2301044.161	2405038.637	2512801.298	2741490.033
37 Other professional services	10847113.12	12017950.47	12305072.44	13257121.01	13828731.48	15299807.73	15868586.39	16456704.36	17279603.45
38 Business support services	7759565.263	9570068.657	10784127.85	12036691.7	13789407.02	14628583.69	15253618.56	16168144.67	17605246.83
Displacement @ 40% for B1	12248771.32	14098072.2	15059553.08	16438864.68	17894527	19337661.35	20116346.15	21082590.19	22575804.19
20 Construction	0	41868667.43	54663078.09	71265696.9	84369150.01	97349417.65	106569696.1	118466184.8	134264768
Displacement @ 0% for housing	0	41868667.43	54663078.09	71265696.9	84369150.01	97349417.65	106569696.1	118466184.8	134264768
Total after displacement	19345820.97	63731660.11	77959731.03	96568347.26	111898840.2	126847100.9	137471065.1	151616573.2	169638272.5

TOTAL CUMULATIVE:	955077411.1

Table 5: Application of discount rate & additionality

	Year								
	1	2	3	4	5	6	7	8	9
	100%	93.63%	87.67%	82.09%	76.86%	71.97%	67.39%	63.10%	59.08%
Discounted value	19345820.97	59673839.05	68348317.26	79272223.63	86008341.7	91290226.03	92636850.49	95663861.57	100219866.4
Additionality @ 50%	9672910.483	29836919.52	34174158.63	39636111.82	43004170.85	45645113.01	46318425.24	47831930.78	50109933.21

TOTAL CUMULATIVE:	346229673.6
7% of impact:	£24,236,077

Appendix F

Technical Note

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Project title	A444 Coton Arches Scheme Appraisal	Job number	232815-28
cc	Warwickshire County Council	File reference	232815-28.TN002
Prepared by	James Edwards	Date	4 November 2014
Subject	Coton Arches - Economic Analysis Overview		

Introduction

A series of outputs have been produced from the 'A444/B4113 Coton Arches Junction' PARAMICS models. In addition to the standard modelling outputs an economic analysis has also been undertaken using the Trip-all 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.

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PEARS does not at present consider accidents and therefore, if it is considered necessary 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.

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 **£3.05 million**. These prices were based on April 2014 values with an RPI index of **128.1** and are inclusive of a **44%** 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 **2017** delivery year.

Scenario Years

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The scenario years have been based on the available, forecast model years, which have been produced as part of the PARAMICS model development process.

As a result it was decided that the analysis would be based on the 2016 (opening year) and 2021 (5 years from opening).

- 2017 (Year of Opening) – Forecast from 2009 using TEMPRO factors
- 2022 (5 Years from Opening) – Forecast from 2009 using TEMPRO factors

The Nuneaton & Bedworth Authority level TEMPRO factors were adjusted by NTEM to reflect the increased housing projections for the area which are not currently included within the base TEMPRO factors:

Table 1 – NTEM Adjusted TEMPRO Growth Factors

Level	AM	IP	PM
2009 to 2017	1.034	1.065	1.038
2009 to 2022	1.089	1.133	1.095

A summary of the demands output as a result of this application of the aforementioned TEMPRO factors is presented within the following Table:

Year	AM	Growth	IP	Growth	PM	Growth
2009	9621		18867		10391	
2017	9944	3.36%	20099	6.53%	10790	3.84%
2022	10482	8.95%	21381	13.32%	11377	9.49%

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 the case of this assessment the model has been developed to encompass the 12 hour working day period between 07:00 to 19:00. Thus the assessment has focussed on this time period with an annualisation factor of 253 which provides a total of 3036 hours considered within the assessment.

This approach does mean that the potential benefits that may be accrued within any other period, such as the weekends, will not be accounted for within the analysis. Similarly any benefits or dis-benefits of implementation within the off-peak will also be omitted from the economic analysis as a result of this approach, dis-benefits may occur through the implementation of signals which incur delay at times when vehicles may otherwise be able travel through the network unimpeded.

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Assessment Parameters

The opening year of the assessment was assumed to be 2017.

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 2047 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 2017 to 2022 benefit accrual rate. In reality the benefits will begin to diminish towards the end of the life of the scheme and the delay levels would begin to converge again.

The calculation of the fuel costs within the PEARS assessment was based on outputs from the Trips-all file (Calculated method).

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 **8.19** based on the application of the aforementioned assessment parameters.

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DOCUMENT CHECKING (not mandatory for File Note)

	Prepared by	Checked by	Approved by
Name	James Edwards	Alan Law	James Edwards
Signature	JME		JME

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

Scheme Title A444 First Draft

IMPACT	Ref.	Cal'n / Source	Total	Cars	LGVs	OGVs	Private Buses & Coaches	Service Buses
NON-BUSINESS USER BENEFITS								
Travel Time								
Commuting Travel Time	1		£4.72	£4.68	£0.03			£0.00
Other Travel Time	2		£6.31	£6.20	£0.11		£0.00	£0.00
Non-business Travel Time	**3**	**1+2**	**£11.02**					
Vehicle Operating Costs								
Commuter Fuel VOC	4		£0.47	£0.46	£0.00			
Commuter Non-fuel VOC	5		£0.05	£0.05	£0.00			
Other Fuel VOC	6		£0.54	£0.52	£0.02			
Other Non-fuel VOC	7		£0.11	£0.10	£0.00			
Non-business Vehicle Operating Costs	**8**	**4+5+6+7**	**£1.16**					
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**	**£5.23**					
NET NON-BUSINESS BENEFITS: OTHER	**12**	**2+6+7+10**	**£6.95**					
NET NON-BUSINESS BENEFITS - SUB TOTAL	**13**	**11+12**	**£12.18**					
BUSINESS USER BENEFITS								
User Benefits								
Business Travel Time	**14**		**£8.11**	£6.03	£1.70	£0.38	£0.00	£0.00
Fuel VOC	15		£0.5	£0.17	£0.14	£0.14		
Non-fuel VOC	16		£0.2	£0.32	£0.08	£0.12		
Business Vehicle Operating Costs	**17**	**15+16**	**£0.6**					
During Construction (*)	*18*							
During Maintenance (*)	*19*							
During Construction and Maintenance (*)	*20*	**18+19**						
Subtotal	**21**	**14+17+20**	**£9.07**					
Private Sector Provider Impacts								
Revenue (*)	*22*							
Fuel VOC	23		£0.00				£0.00	£0.00
Non-fuel VOC	24		£0.00				£0.00	£0.00
Private Sector Vehicle Operating Costs	**25**	**23+24**	**£0.00**					
Investment Costs (*)	26							
Grant / Subsidy (*)	27							
Subtotal	**28**	**22+25+26+27**	**£0.00**					
Other Business Impacts								
Developer & Other Contributions (*)	*29*							
NET BUSINESS IMPACT	**30**	**21+28+29**	**£9.07**					
TOTAL PRESENT VALUES OF TEE IMPACTS	**31**	**13+30**	**£21.25**					

* 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 2010.
Evaluation period 30 years. Scheme opening year 2017.
Current year 2014.

Scheme Title A444 First Draft

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		£2.54
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)	***£2.54***
Central Government Funding : Non-Transport			
Indirect Tax Revenues	48		£0.73
TOTALS			
Broad Transport Budget	49	39+47	**£2.54**
Wider Public Finances	50	48	**£0.73**

* 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 2017.
Current year 2014.

Reference data: Date: January 2014 Version: 14.1

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

Scheme Title A444 First Draft

IMPACT	Reference	Cal'n / Source	Total
TEE Impacts			
Noise (^)*	51		
Local Air Quality (^)*	52		
Greenhouse Gases (Emissions) (low)			£0.13
Greenhouse Gases (Emissions) (central)	53		**£0.26**
Greenhouse Gases (Emissions) (high)			£0.39
Journey Ambience (^)*	54		
Accident Benefits (*)	55		
Non-Business User Benefits: Commuting	56	11	£5.23
Non-Business User Benefits: Other	57	12	£6.95
Business User & Provider Benefits	58	30	£9.07
Wider Public Finance (Indirect Tax Revenue)	59	-50	£-0.73
Option Values (^)*	60		
Present Value of Benefits (PVB)	61	Sum(51 to 60)	**£20.78**
Broad Transport Budget	62	49	£2.54
Present Value of Cost (PVC)	63	62	**£2.54**
OVERALL IMPACTS			
Net Present Value (NPV)	64	61-63	**£18.24**
Benefit to Cost Ratio (BCR)	65	61/63	**8.19**

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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 2010.
Evaluation period 30 years. Scheme opening year 2017.
Current year 2014.

Reference data: Date: January 2014 Version: 14.1

Appendix G

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Project title	A444 Coton Arches Scheme Appraisal	Job number	232815-28
cc	Warwickshire County Council	File reference	TN002
Prepared by	James Edwards	Date	4 November 2014
Subject	A444 Coton Arches Model Development & Forecasting Note		

Introduction

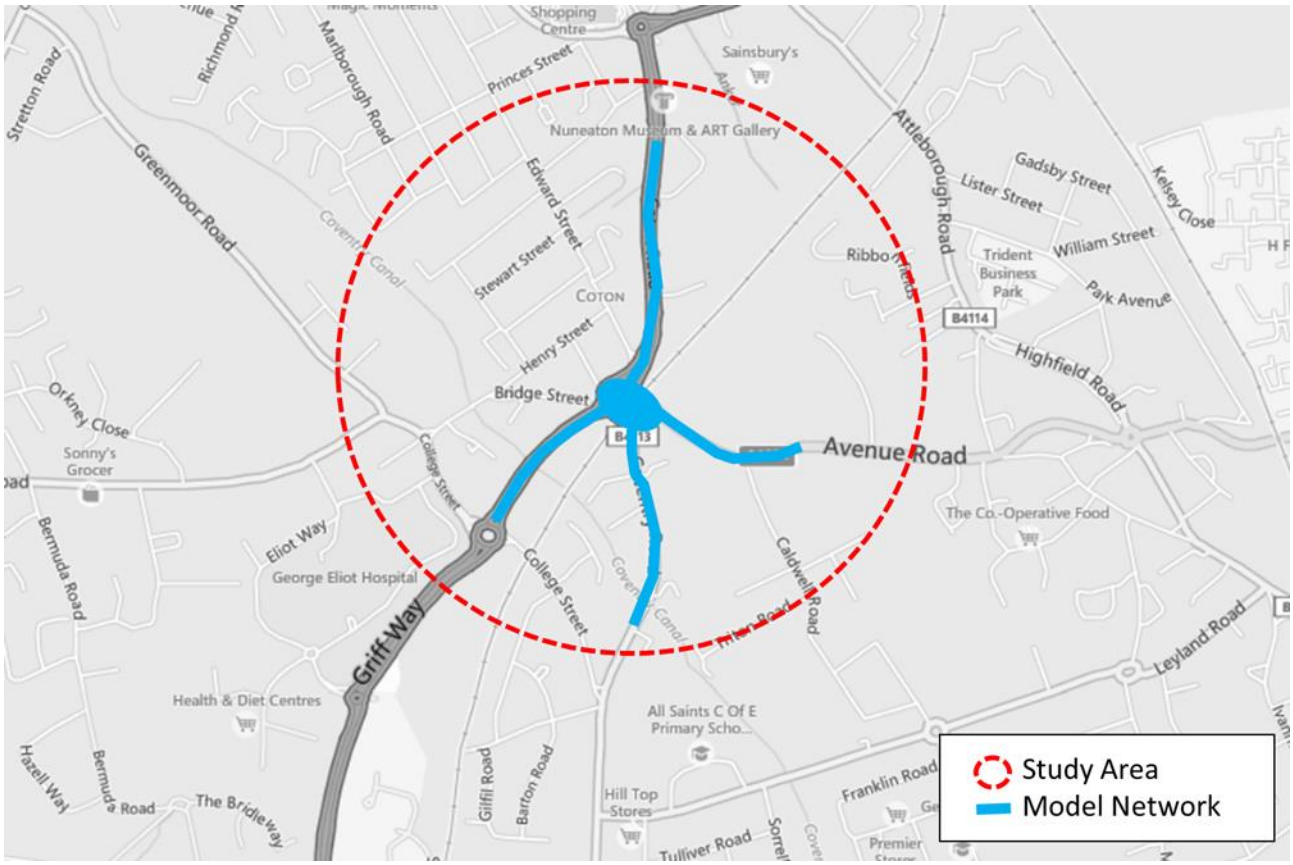
The following Note sets out the methodology for developing a PARAMICS model of the A444/B4113 Coton Arches roundabout in Nuneaton and presents the calibration and validation thereof. In addition a series of forecast demands have been produced for assignment within the same model in order that the scheme appraisal can take cognisance of the likely forecast network conditions since the increase in demands will also increase the congestion impacts within the model which will, in turn, allow early identification of any potential issues with base and scheme configurations.

The model was developed from a cordon of the Nuneaton and Bedworth wide area PARAMICS model. A cordon model was required in order that the model could be used for both scheme and economic appraisal. Conducting economic appraisal via testing in the wide area model would not be possible due to the likelihood that the inherent variation between scenario runs may impact upon the calculation of a BCR.

Scope

A single junction model has been developed for the A444/B4113 roundabout. The core model network was developed from a direct cordon of the study area extracted from the Nuneaton and Bedworth Wide Area Paramics model. The extent of the study area is illustrated within the following **Figure 1:**

Figure 1 - A444 Coton Arches Study Area



The model was developed direct from a 2009 manual classified turn count provided by Warwickshire County Council in TARA format. The count was undertaken for the 07:00 to 19:00 time period and this was directly incorporated within the PARAMICS model.

The traffic data was converted into Origin-Destination (OD) matrices for the following time periods:

- 07:00 to 10:00 (AM Period)
- 10:00 to 16:00 (Inter-peak)
- 16:00 to 19:00 (PM Period)

The OD matrices were split across two matrix levels. The purpose of this is to assign Light and Heavy vehicles separately since HGV movements are unlikely to mirror the movements of light vehicles since the numbers are much lower and the vehicles more likely to remain on major routes across the network.

The count data was subsequently interrogated to provide the vehicle fleet mix assigned to the model network. The proportions of each vehicle class varies between model periods. The proportions identified through the analysis of the count data, and subsequently assigned within the model network, are summarised within the following **Table 1:**

Table 1 - Coton Arches Vehicle Fleet Mix

Time Period	Matrix 1		Matrix 2	
	Cars	LGV	OGV1	OGV2
AM	87.41%	12.59%	67.39%	32.61%
IP	86.69%	13.31%	65.94%	34.06%
PM	91.98%	8.02%	57.63%	42.37%

PARAMICS relies on the assignment of release profiles to control the release rate of vehicles into the model within each 15 minute time segment that comprise each model period. The same count data was interrogated and for each O-D movement a specific release profile was produced to account for the release of vehicles within the periods outlined previously.

Model Calibration

The model calibration checks have been undertaken using hourly summaries of the count data for all hours included within the model period. A summary of the calibration levels, by hour, are provided within the following **Table 2**:

Table 2 - Coton Arches Model Calibration Levels

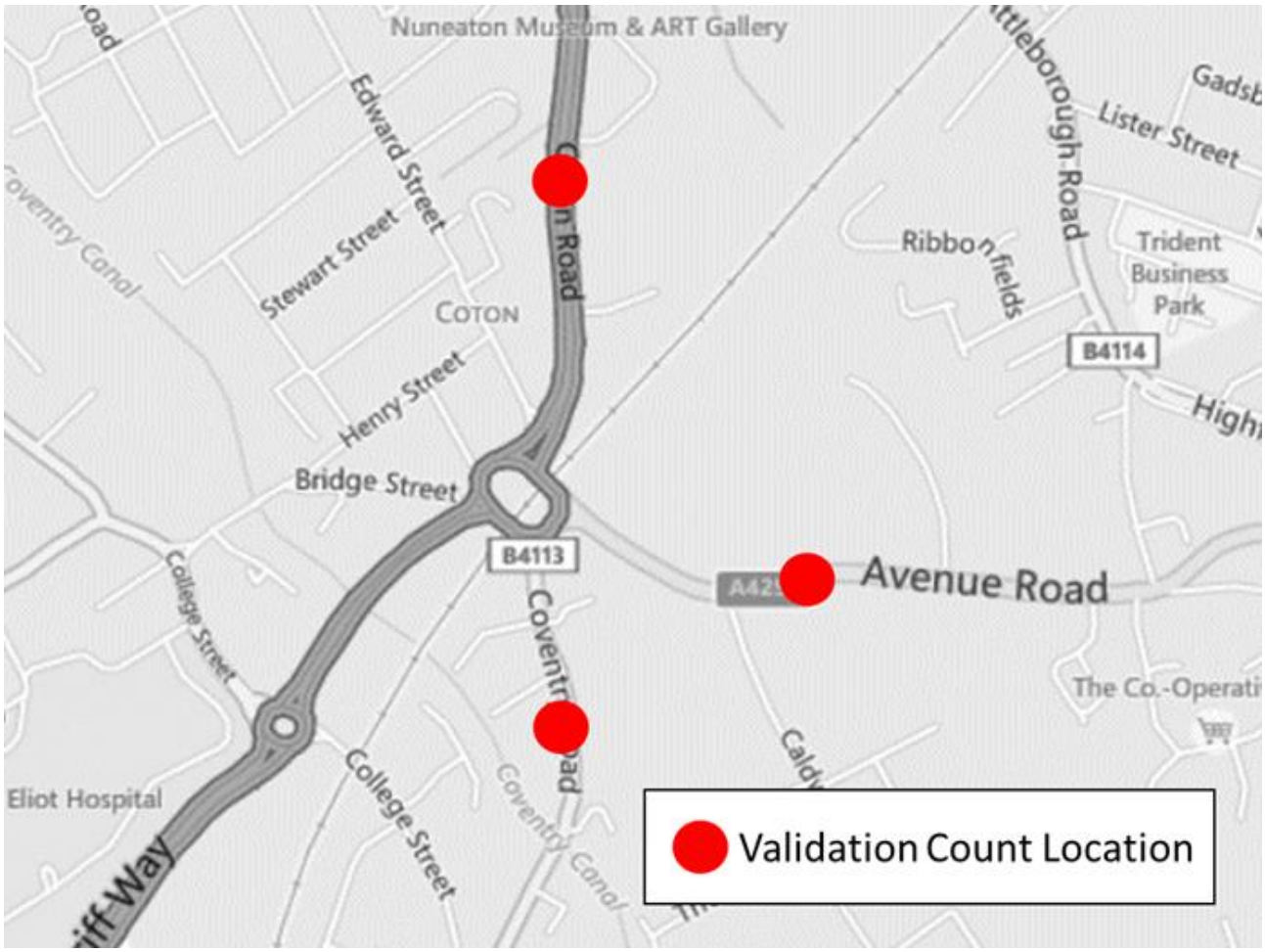
Hour	Calibration Levels
0700-0800	100%
0800-0900	100%
0900-1000	100%
1000-1100	100%
1100-1200	100%
1200-1300	100%
1300-1400	100%
1400-1500	100%
1500-1600	100%
1600-1700	100%
1700-1800	100%
1800-1900	100%

The analysis presented within the previous Table demonstrates that the model calibration exceeds the DMRB requirements.

Model Validation

Model validation checks have also been undertaken using ATC link count information collected during the same year as the MCC survey. These link counts were provided by WCC at the locations outlined within the following **Figure 2.**

Figure 2 - A444 Coton Arches Validation Data Locations



Since there are only 3 locations available for the validation checks this means that there are only 6 samples per hour. If one sample fails to conform to the validation standards then, should validation be undertaken on an hourly basis, this would render that hour invalid. This is not considered to be appropriate as it places too heavy reliance upon each individual link count. Furthermore, the fact that the validation counts were collected on three different months means some allowance for variation between calibration and validation data needs to be considered within the comparisons. As a result, validation checks were undertaken using the aggregate of all data samples to calculate the overall percentage validation levels achieved.

Overall 61 of the 72 link counts were found to conform to the necessary standards which means an overall validation level of 85% has been achieved.

Summary

Based on the information set out previously within this note it is reasonable to conclude that a high level of model validation has been achieved alongside an acceptable level of model validation. Both of which conform to at least, the requisite DMRB standards.

Model Forecasting

Upon successful completion of the model development, calibration and validation exercise a series of forecast demands were produced for assignment within the model. The purpose of these forecast demands is to enable to assess the relative performance of the junction proposals under increasing levels of junction stress.

Following discussions with WCC the following forecast years were identified:

- 2017
- 2022
- 2028
- 2028 LDF

The last of the above forecast years is related directly to the delivery of the local plan housing and employment figures identified by Nuneaton and Bedworth Borough Council.

The first three forecast years were defined from analysis of the TEMPRO database whilst demands for the latter were extracted from the NBBC Local Plan Strategic model.

TEMPRO Factor Adjustments

Because of the strategic nature of the junction it was decided that the Authority Level TEMPRO factor for Nuneaton and Bedworth area was the appropriate growth factor for application within the demand forecasting.

In line with wider analysis of the Local Plan growth and impacts there, a comparison between the housing projections within TEMPRO and those identified within the local plan was undertaken. This revealed a shortage in the housing numbers identified within the TEMPRO database when compared to the housing numbers identified through the latest round of the NBBC Local Plan.

TEMPRO housing projections for the 2009 to 2028 period were reviewed and this revealed around 3,700 dwellings were assumed to be delivered which is significantly lower than the 5520 identified within the Local Plan.

As a result the TEMPRO factors were adjusted by NTEM prior to application within the forecasting procedure.

The NTEM Adjusted TEMPRO factors utilised within the model forecasting process are summarised within the following **Table 3:**

Table 3 – NTEM Adjusted Nuneaton & Bedworth Authority TEMPRO factors

Level	AM	IP	PM
2009 to 2017	1.034	1.065	1.038
2009 to 2022	1.089	1.133	1.095
2009 to 2028	1.162	1.223	1.169

2028 Local Plan Demand Forecasting

In addition to the TEMPRO forecasting, an additional set of forecast demands were created to be reflective of the 2028 Local Plan horizon year. These demands were produced from direct extractions of the relevant demands from the NBBC Local Plan Strategic Transport Assessment model. These demands were extracted for the AM (07:00 to 10:00) and PM (16:00 to 19:00) periods

since these are the only periods contained within the NBBC Local Plan Model. The demands were extracted based on the following user classes:

- Background
- HGV
- Committed Developments
- Local Plan Growth

A summary of the AM and PM demands produced as a result of this cordon process is provided within the following **Table 4**:

Table 4 – NBBC STA Cordon Demands

	AM (07:00 to 10:00)	PM (16:00 to 19:00)
Background	7395	8983
HGV	536	249
Com Dev	1936	1747
LDF	2669	1947
Total	12536	12926

Forecast Demand Summary

Completion of the forecasting process resulted in the following demands and growth levels:

Table 5 – A444 Coton Arches Forecast Demands and Growth

Year	AM	Growth	IP	Growth	PM	Growth
2009	9621		18867		10391	
2017	9944	3.36%	20099	6.53%	10790	3.84%
2022	10482	8.95%	21381	13.32%	11377	9.49%
2028	11175	16.15%	23075	22.30%	12149	16.92%
2028 LDF	12536	30.30%	23075	22.30%	12926	24.40%

Overall it is clear to see that the growth levels within the local plan model demands are considerably higher than the 2028 TEMPRO informed growth levels.

Such a disparity in growth levels is indicative of the strategic nature of the corridor coupled with the effect of the improvements within the Local Plan model along key A444 junctions. This serves to increase the capacity of the A444 which is also a strategically important route and, as such, is likely to experience a disproportionate increase in growth levels as a result of the developments assigned within the NBBC area.

Scheme Model Outputs

Measure: Average Speed

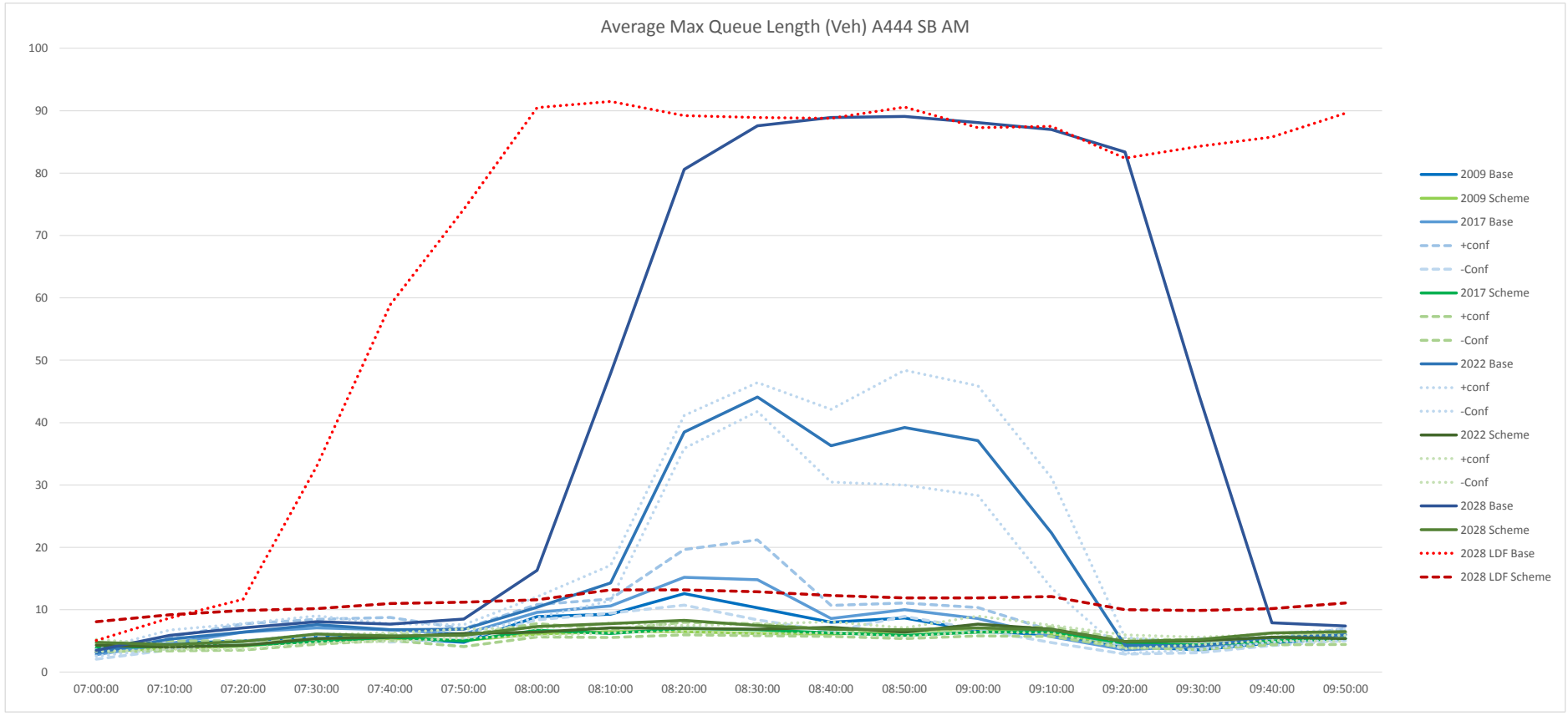
	2009		2017		2022		2028		2028 LDF	
	Ref	Scheme	Ref	Scheme	Ref	Scheme	Ref	Scheme	Ref	Scheme
AM Peak Hour	43	40	41	40	31	38	20	32	7	33
	-7.61%		-3.93%		22.17%		62.74%		358.55%	
AM Peak Period	45	41	44	40	36	39	23	33	7	35
	-10.59%		-8.49%		8.51%		46.55%		439.58%	
PM Peak Hour	39	32	33	29	24	25	9	17	4	28
	-16.69%		-10.27%		5.69%		89.27%		533.72%	
PM Peak Period	42	37	38	35	29	32	10	19	4	27
	-11.35%		-5.87%		11.41%		80.56%		506.17%	
Inter-Peak Period	47	41	46	40	43	40	36	26	9	28
	-13.18%		-11.95%		-8.60%		-25.56%		214.88%	

Measure: Completed Trips

	2009		2017		2022		2028		2028 LDF	
	Ref	Scheme	Ref	Scheme	Ref	Scheme	Ref	Scheme	Ref	Scheme
AM Peak Hour	3747	3753	3865	3870	4032	4076	4137	4297	4038	4871
	0.16%		0.14%		1.09%		3.86%		20.62%	
AM Peak Period	9549	9541	9870	9865	10403	10391	11084	11063	11417	12397
	-0.09%		-0.05%		-0.12%		-0.19%		8.59%	
PM Peak Hour	3729	3726	3853	3856	4015	4020	4187	4336	4111	4666
	-0.07%		0.09%		0.14%		3.58%		13.51%	
PM Peak Period	10471	10483	10882	10888	11487	11485	12436	12428	13351	13166
	0.12%		0.05%		-0.02%		-0.07%		-1.39%	
Inter-Peak Period	18858	18855	20080	20079	21348	21364	22877	22907	23729	22933
	-0.02%		0.00%		0.08%		0.13%		-3.35%	

Measure: Completed Trips

	2009		2017		2022		2028		2028 LDF	
	Ref	Scheme	Ref	Scheme	Ref	Scheme	Ref	Scheme	Ref	Scheme
AM Peak Hour	3747	3753	3865	3870	4032	4076	4137	4297	4038	4871
	0.16%		0.14%		1.09%		3.86%		20.62%	
AM Peak Period	9549	9541	9870	9865	10403	10391	11084	11063	11417	12397
	-0.09%		-0.05%		-0.12%		-0.19%		8.59%	
PM Peak Hour	3729	3726	3853	3856	4015	4020	4187	4336	4111	4666
	-0.07%		0.09%		0.14%		3.58%		13.51%	
PM Peak Period	10471	10483	10882	10888	11487	11485	12436	12428	13351	13166
	0.12%		0.05%		-0.02%		-0.07%		-1.39%	
Inter-Peak Period	18858	18855	20080	20079	21348	21364	22877	22907	23729	22933
	-0.02%		0.00%		0.08%		0.13%		-3.35%	


Average Max Queue Length (Veh) A444 SB AM
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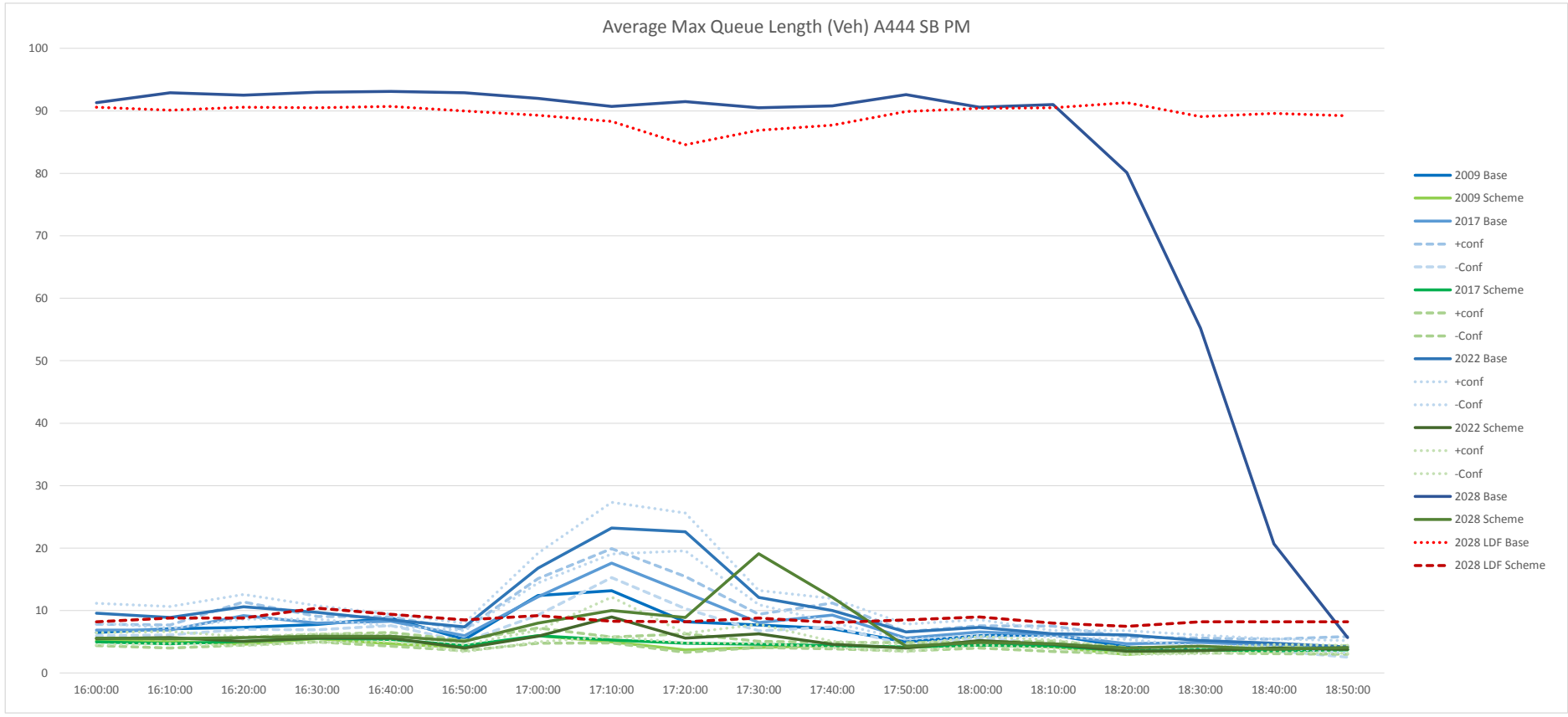
Average Max Queue Length (Veh) A444 SB PM
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2009 Base
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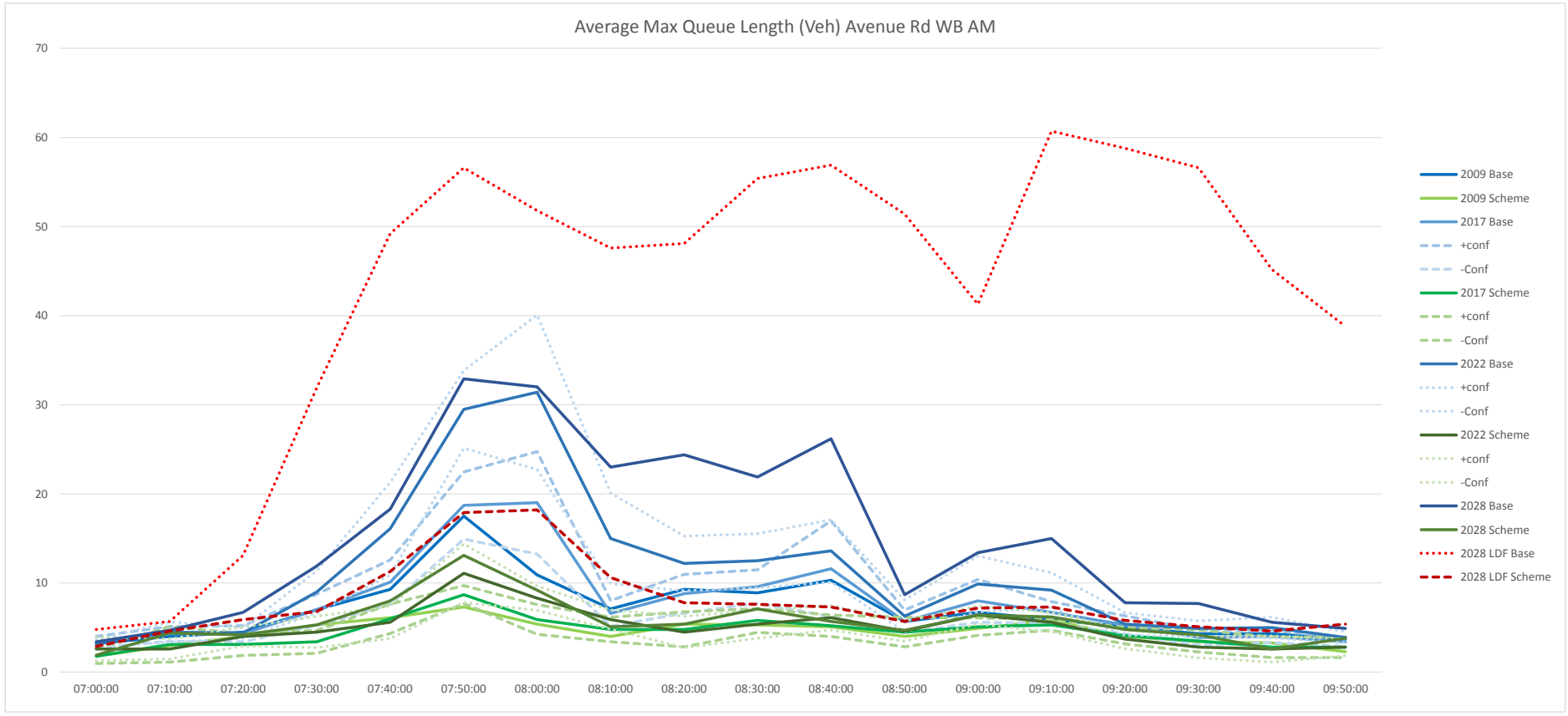
Average Max Queue Length (Veh) Avenue Rd WB AM
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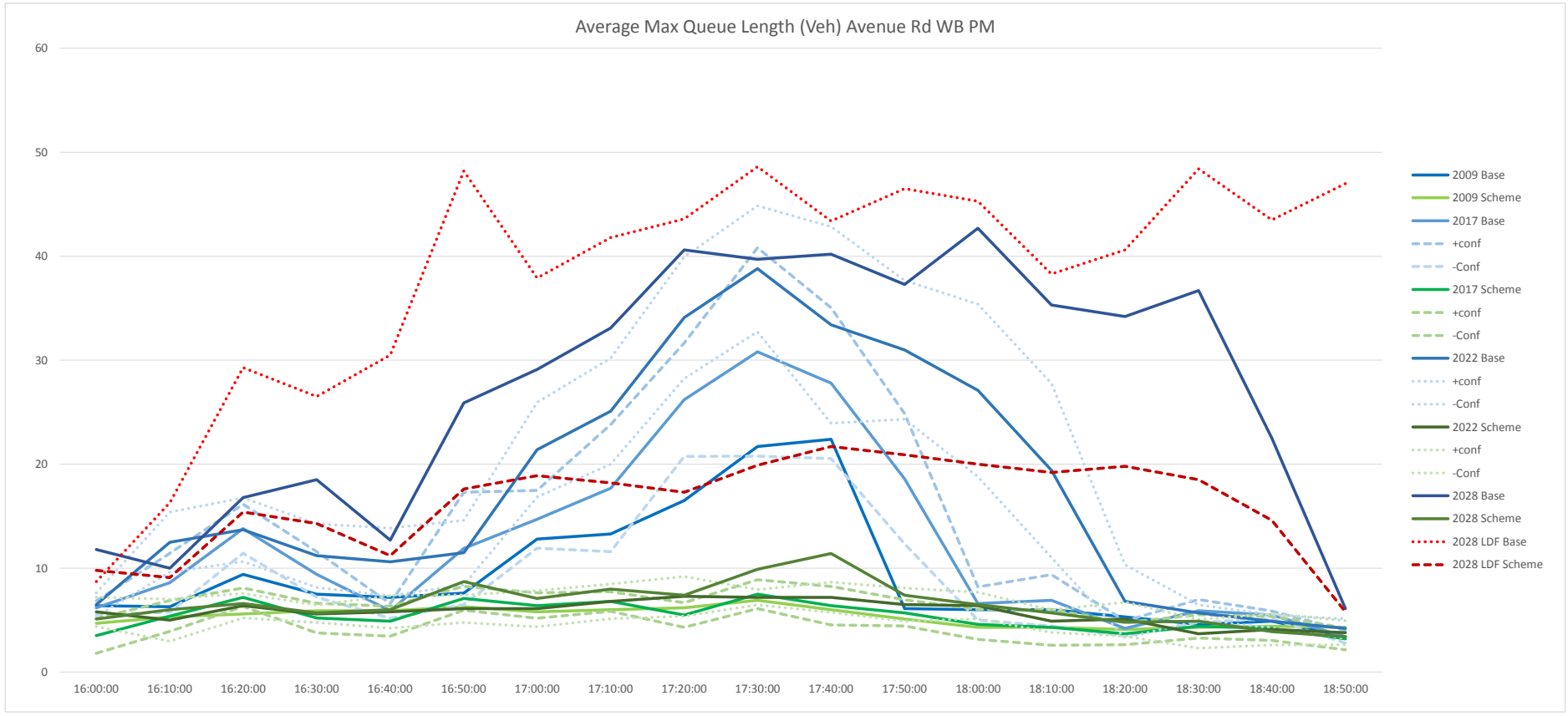
Average Max Queue Length (Veh) Avenue Rd WB PM
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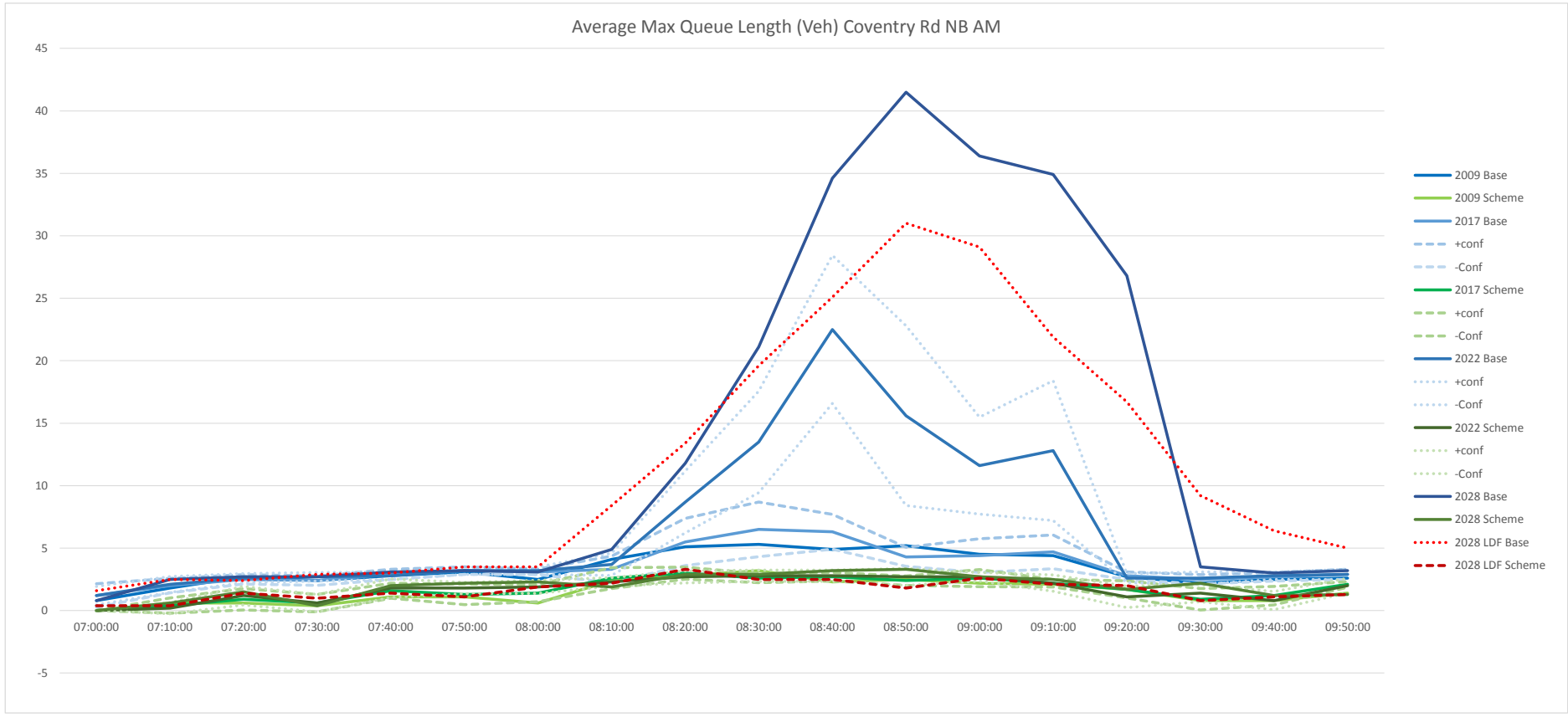
Average Max Queue Length (Veh) Coventry Rd NB AM
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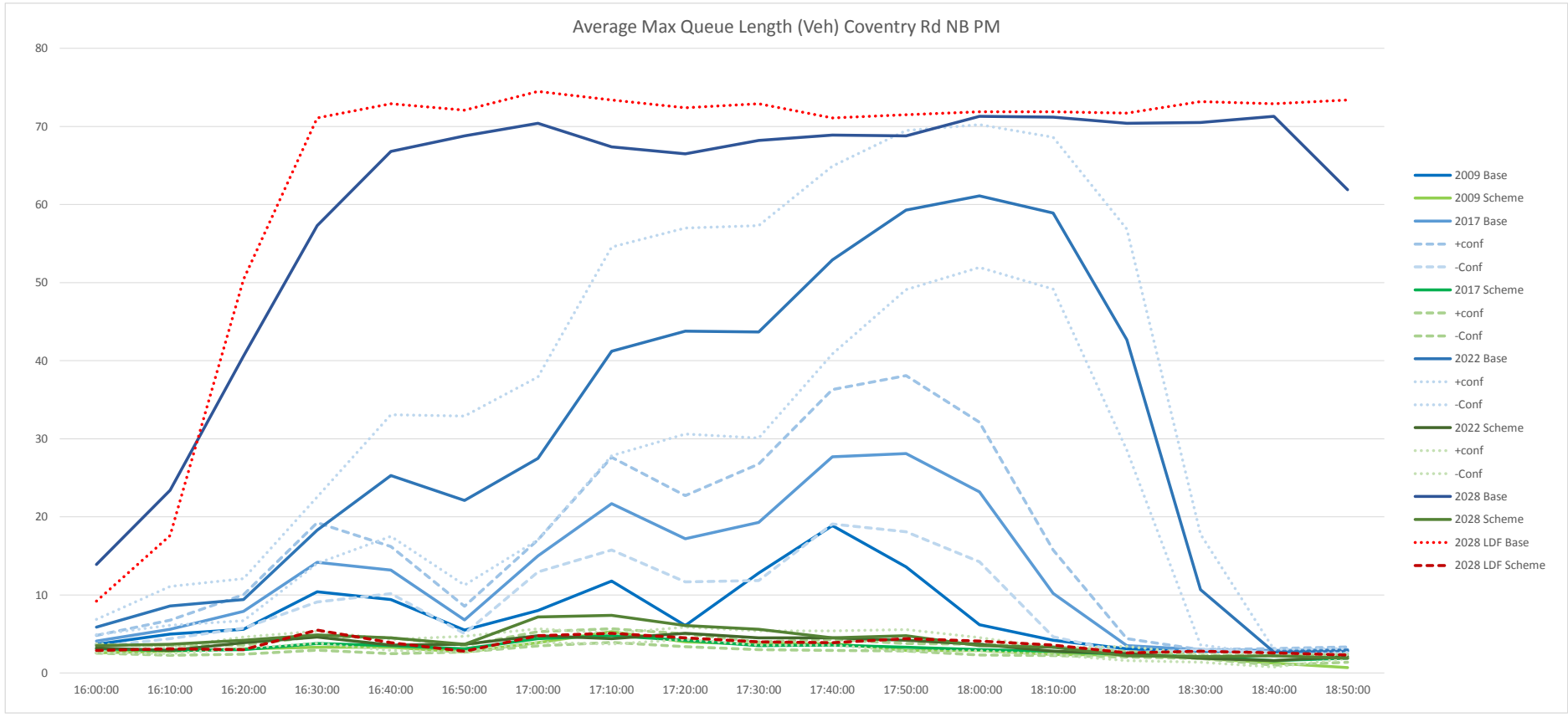
Average Max Queue Length (Veh) Coventry Rd NB PM
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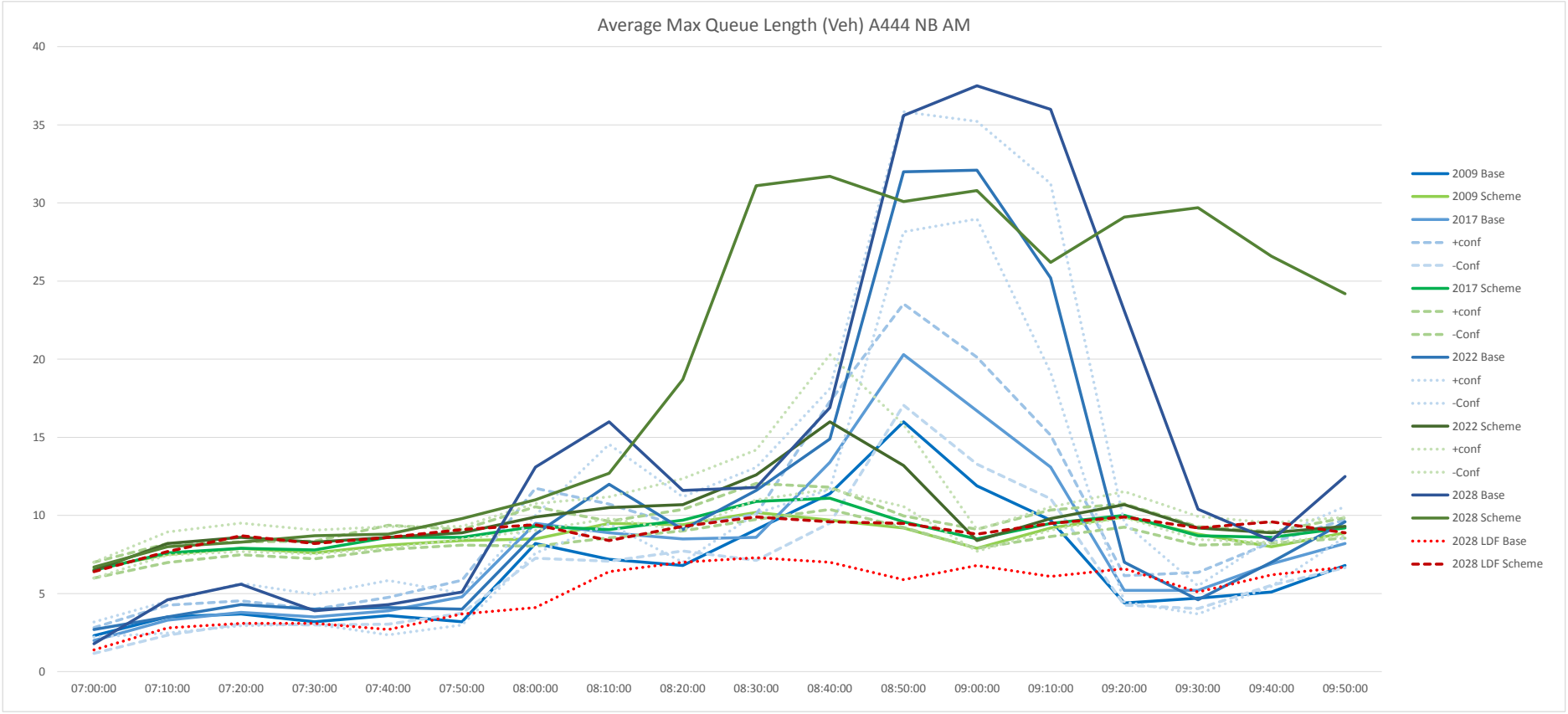
Average Max Queue Length (Veh) A444 NB AM
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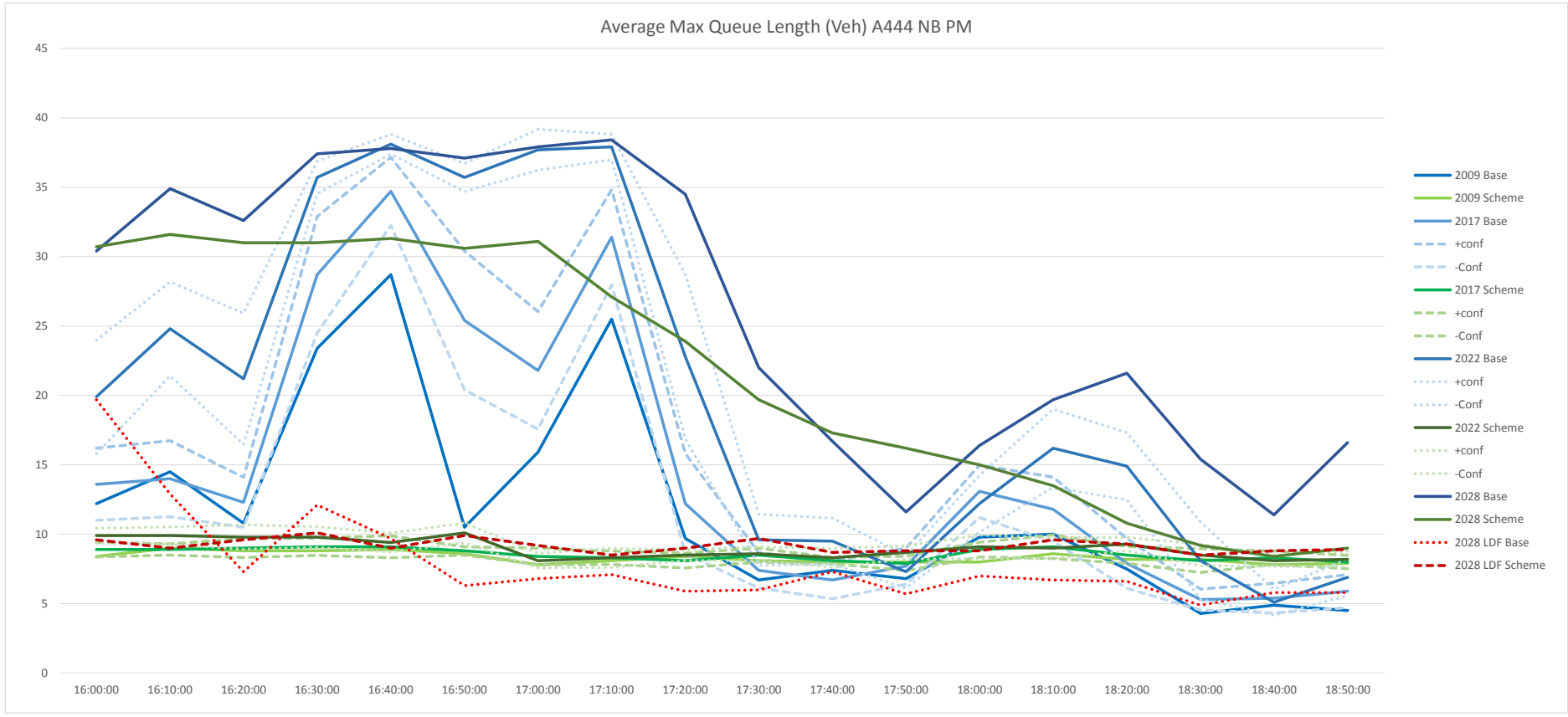
Average Max Queue Length (Veh) A444 NB PM
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Scheme Impact Pro Forma

Scenario: 2017

Scenario	Input Data / Key Performance Indicators	Unit	AM Peak Period	PM Peak Period	Inter-Peak Hr	Nights	Sat	Sun
			Weekday	Weekday	Weekday	19:00-07:00	07:00-19:00	07:00-19:00
Do Nothing	Number of highway trips affected	vehicles	9,870	10,816	3,347	6,244	8,547	8,445
	Total vehicle travelled time	vehicle-hours	252	326	82	153	209	206
	Total vehicle travelled distance	vehicle-km	11,062	12,249	3,748	6,992	9,571	9,456
	Total network delays	vehicle-hours	44	111	12	21	29	29
	Highway peak period conversion factor	-	-	-	-	-	-	-
	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						
Do Something	Number of highway trips affected	vehicles	9,857	10,810	3,348	6,247	27,500	19,849
	Total vehicle travelled time	vehicle-hours	270	304	91	170	747	539
	Total vehicle travelled distance	vehicle-km	10,768	11,998	3,659	6,826	30,049	21,689
	Total network delays	vehicle-hours	62	89	21	38	169	122
	Highway peak period conversion factor	-	-	-	-	-	-	-
	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						

Scenario: 2017

For Do-Minimum Scenario	2	3	4
	AM Peak Period	PM Peak Period	Inter-Peak Hr
Vehicle Category	**Weekday**	**Weekday**	**Weekday**
Car Work			
Car Non-work Commuting			
Car Non-work Other			
Average Car	84%	83%	90%
LGV	12%	13%	8%
OGV1	3%	3%	1%
OGV2	1%	1%	1%
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%

For Do-Something Scenario	2	3	4
	AM Peak Period	PM Peak Period	Inter-Peak Hr
Vehicle Category	**Weekday**	**Weekday**	**Weekday**
Car Work			
Car Non-work Commuting			
Car Non-work Other			
Average Car	84%	83%	90%
LGV	12%	13%	8%
OGV1	3%	3%	1%
OGV2	1%	1%	1%
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	45.5	40.8	46.8
LGV.	44.8	40.4	45.9
HGV & PSV	43.0	37.3	44.6

	AM Peak Hr	PM Peak Hr	Inter-Peak Hr
Average Network Speed (kph)	**Weekday**	**Weekday**	**Weekday**
Car	41.4	40.8	41.7
LGV.	40.8	40.2	41.0
HGV & PSV	38.6	37.4	38.9

Scenario: 2022

Scenario	Input Data / Key Performance Indicators	Unit	AM Peak Period	PM Peak Period	Inter-Peak Hr	Nights	Sat	Sun
			Weekday	Weekday	Weekday	19:00-07:00	07:00-19:00	07:00-19:00
Do Nothing	Number of highway trips affected	vehicles	10,403	11,414	3,558	6,638	29,224	21,093
	Total vehicle travelled time	vehicle-hours	324	454	92	172	757	546
	Total vehicle travelled distance	vehicle-km	11,660	12,927	3,984	7,433	32,724	23,619
	Total network delays	vehicle-hours	105	277	17	32	143	103
	Highway peak period conversion factor	-	-	-	-	-	-	-
	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						
Do Something	Number of highway trips affected	vehicles	10,397	11,404	3,560	6,642	29,240	21,105
	Total vehicle travelled time	vehicle-hours	292	328	98	183	807	583
	Total vehicle travelled distance	vehicle-km	11,357	12,659	3,890	7,258	31,951	23,061
	Total network delays	vehicle-hours	73	151	24	44	193	139
	Highway peak period conversion factor	-	-	-	-	-	-	-
	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						

Scenario: 2022

For Do-Minimum Scenario	2	3	4
	AM Peak Period	PM Peak Period	Inter-Peak Hr
Vehicle Category	**Weekday**	**Weekday**	**Weekday**
Car Work			
Car Non-work Commuting			
Car Non-work Other			
Average Car	84%	83%	90%
LGV	12%	13%	8%
OGV1	3%	3%	1%
OGV2	1%	1%	1%
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%

For Do-Something Scenario	2	3	4
	AM Peak Period	PM Peak Period	Inter-Peak Hr
Vehicle Category	**Weekday**	**Weekday**	**Weekday**
Car Work			
Car Non-work Commuting			
Car Non-work Other			
Average Car	84%	83%	90%
LGV	12%	13%	8%
OGV1	3%	3%	1%
OGV2	1%	1%	1%
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	41.1	34.4	44.9
LGV.	40.4	34.5	44.1
HGV & PSV	39.3	30.4	43.1

	AM Peak Hr	PM Peak Hr	Inter-Peak Hr
Average Network Speed (kph)	**Weekday**	**Weekday**	**Weekday**
Car	40.6	39.5	41.1
LGV.	40.2	39.4	40.5
HGV & PSV	37.6	36.6	38.5

Scenario: 2028 LDF

Scenario	Input Data / Key Performance Indicators	Unit	AM Peak Period	PM Peak Period	Inter-Peak Hr	Nights	Sat	Sun
			Weekday	Weekday	Weekday	19:00-07:00	07:00-19:00	07:00-19:00
Do Nothing	Number of highway trips affected	vehicles	11,417	12,260	3,955	7,379	32,483	23,445
	Total vehicle travelled time	vehicle-hours	1,923	2,755	497	927	4,082	2,946
	Total vehicle travelled distance	vehicle-km	12,498	13,467	4,429	8,263	36,374	26,254
	Total network delays	vehicle-hours	1,689	2,655	414	772	3,400	2,454
	Highway peak period conversion factor	-	-	-	-	-	-	-
	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						
Do Something	Number of highway trips affected	vehicles	12,399	12,951	3,842	7,168	31,556	22,776
	Total vehicle travelled time	vehicle-hours	339	449	107	200	881	636
	Total vehicle travelled distance	vehicle-km	13,078	13,814	4,198	7,831	34,476	24,884
	Total network delays	vehicle-hours	83	355	26	49	218	157
	Highway peak period conversion factor	-	-	-	-	-	-	-
	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						

Scenario: 2028 LDF

For Do-Minimum Scenario	2	3	4
	AM Peak Period	PM Peak Period	Inter-Peak Hr
Vehicle Category	**Weekday**	**Weekday**	**Weekday**
Car Work			
Car Non-work Commuting			
Car Non-work Other			
Average Car	88%	83%	93%
LGV	7%	13%	6%
OGV1	3%	3%	1%
OGV2	1%	1%	1%
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%

For Do-Something Scenario	2	3	4
	AM Peak Period	PM Peak Period	Inter-Peak Hr
Vehicle Category	**Weekday**	**Weekday**	**Weekday**
Car Work			
Car Non-work Commuting			
Car Non-work Other			
Average Car	88%	83%	93%
LGV	7%	13%	6%
OGV1	3%	3%	1%
OGV2	1%	1%	1%
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	24.8	24.4	28.4
LGV.	25.2	21.7	28.6
HGV & PSV	30.9	28.3	31.0

	AM Peak Hr	PM Peak Hr	Inter-Peak Hr
Average Network Speed (kph)	**Weekday**	**Weekday**	**Weekday**
Car	40.5	39.2	40.8
LGV.	39.6	38.1	40.3
HGV & PSV	37.0	36.6	38.2

Scenario: 2028

Scenario	Input Data / Key Performance Indicators	Unit	AM Peak Period	PM Peak Period	Inter-Peak Hr	Nights	Sat	Sun
			Weekday	Weekday	Weekday	19:00-07:00	07:00-19:00	07:00-19:00
Do Nothing	Number of highway trips affected	vehicles	11,084	12,308	3,813	7,114	31,317	22,604
	Total vehicle travelled time	vehicle-hours	547	1,345	120	224	986	712
	Total vehicle travelled distance	vehicle-km	12,423	13,937	4,269	7,964	35,060	25,305
	Total network delays	vehicle-hours	314	1,216	40	75	328	237
	Highway peak period conversion factor	-	-	-	-	-	-	-
	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						
Do Something	Number of highway trips affected	vehicles	11,052	12,331	3,821	7,129	31,382	22,651
	Total vehicle travelled time	vehicle-hours	384	597	158	294	1,295	935
	Total vehicle travelled distance	vehicle-km	12,076	13,671	4,177	7,793	34,307	24,762
	Total network delays	vehicle-hours	151	468	77	144	636	459
	Highway peak period conversion factor	-	-	-	-	-	-	-
	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						

Scenario: 2028

For Do-Minimum Scenario	2	3	4
	AM Peak Period	PM Peak Period	Inter-Peak Hr
Vehicle Category	**Weekday**	**Weekday**	**Weekday**
Car Work			
Car Non-work Commuting			
Car Non-work Other			
Average Car	84%	83%	90%
LGV	12%	13%	8%
OGV1	3%	3%	1%
OGV2	1%	1%	1%
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%

For Do-Something Scenario	2	3	4
	AM Peak Period	PM Peak Period	Inter-Peak Hr
Vehicle Category	**Weekday**	**Weekday**	**Weekday**
Car Work			
Car Non-work Commuting			
Car Non-work Other			
Average Car	84%	83%	90%
LGV	12%	13%	8%
OGV1	3%	3%	1%
OGV2	1%	1%	1%
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	34.5	19.4	40.9
LGV.	34.0	18.8	40.3
HGV & PSV	34.2	20.4	40.0

	AM Peak Hr	PM Peak Hr	Inter-Peak Hr
Average Network Speed (kph)	**Weekday**	**Weekday**	**Weekday**
Car	37.0	30.3	36.3
LGV.	36.5	29.6	35.9
HGV & PSV	33.1	24.1	33.6

Appendix H

Appraisal Summary Table

Date produced:	05/11/2014

Contact:	
Name	
Organisation	Atkins
Role	

Name of scheme:	A444 Corridor Improvements - Coton Arches Roundabout Signalisation
Description of scheme:	The scheme comprises capacity improvements at A444 Coton Arches Roundabout

Impacts		Summary of key impacts	Assessment			
			Quantitative	Qualitative	Monetary £(NPV)	Distributional 7-pt scale/ vulnerable grp
Economy	Business users & transport providers	The scheme will increase capapcity, therefore, reducing congestion. Currently the congestion and bottlenecks are a safety concern as there is regular queuing on the main route between Nuneaton, the M6 and Coventry. This is of particular concern during the AM and PM peak hours. Additionally, the traffic issue is becoming a barrier to growth in the local area.	Value of journey time changes(£): 9.2m Net journey time changes (£): 0 to 2min / 2 to 5min / > 5min	Large Beneficial	10.3m	
	Reliability impact on Business users	The reduction of congestion will improve journey times and safety for car users and commuters, making journey times more reliable. The scheme will improve capacity to urban employment centres.	As documented in business case	Large Beneficial		
	Regeneration	The scheme will improve access to a development site that has the potential to create housing. The scheme will improve access to a development site that has the potential to create jobs. The net change in GVA due to employment which will be generated following the completion of the highway scheme and up until the completion of the employment site between 2017 and 2025 is £26.9m.	As documented in business case	Large Beneficial	24.2m	
	Wider Impacts	Not Assessed	As documented in business case	-		
Environmental	Noise	Although, the level of traffic changes 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		
	Air Quality	Although, the level of traffic changes as a result of the scheme, it does not increase by more than 10%, therefore, the air quality will not change by a level to be a concern.	n/a	Neutral		
	Greenhouse gases	The improvement in road network conditions will lead to a reduction in Carbon emissions	Change in non-traded carbon over 60y (CO2e) Change in traded carbon over 60y (CO2e)	Slight Beneficial	0.3m	
	Landscape	Heavily urbanised area	n/a	Neutral		
	Townscape	Heavily urbanised area	n/a	Neutral		
	Historic Environment	Heavily urbanised area	n/a	Neutral		
	Biodiversity	None present	n/a	Neutral		
	Water Environment	None present	n/a	Neutral		
Social	Commuting and Other users	The scheme will help reduce congestion and safety concerns for commuters. Therefore, a reduction in journey time is forecast.	Value of journey time changes(£): 11.7m Net journey time changes (£): 0 to 2min / 2 to 5min / > 5min	Large Beneficial	12.9m	
	Reliability impact on Commuting and Other users	The reduction in congestion will enable to commuters and other users to keep time more often to and from destination.	n/a	Large Beneficial		
	Physical activity	A change in physical activity is not expected.	n/a	Neutral		
	Journey quality	A reduction in congestion will reduce frustration and stress for commuters and other road users.	n/a	Slight Beneficial		
	Accidents	The scheme is proposed in order to improve safety, therefore, a reduction in accidents is likely.	n/a	Slight Beneficial		
	Security	There are no specific changes or concerns with security as a result of the project.	n/a	Neutral		
	Access to services	There will be improved accesibilty to local amenities and services. Including but not limited to hospitals, schools and shopping centres.	n/a	Slight Beneficial		
	Affordability	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.	n/a	Slight Beneficial		
	Severance	There are no immediate concerns or benefits related to this specific highway scheme	n/a	Neutral		
	Option and non-use values	This scheme does not take away from existing or add to the existing level of travel options availaible to current users.	n/a	Neutral		
Public Accounts	Cost to Broad Transport Budget	Central Government Funding: Transport Investment Costs	Total cost including contingency and inflation to the start of construction as estimated in October 2014 is £3.05 million	-	2.54m	
	Indirect Tax Revenues	Changes in vehicle speeds with the scheme, and therefore reduction in fuel used, would result in changes in indirect tax revenues to central government		-	-0.78m	

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	P1 and P2	A1, A2 and A4
	R1-R15, R18 or R22	P1, P2 and P3	A1 and A3
	R17 or R20	P1 and P3	A1 and A2
	R21	P1 and P4	A1 and A2
The *Contractor*	R1-R10, R16 or R19	P1 and P4	A1 and A2
	R17 or R20	P1 and P4	A1 and A2

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

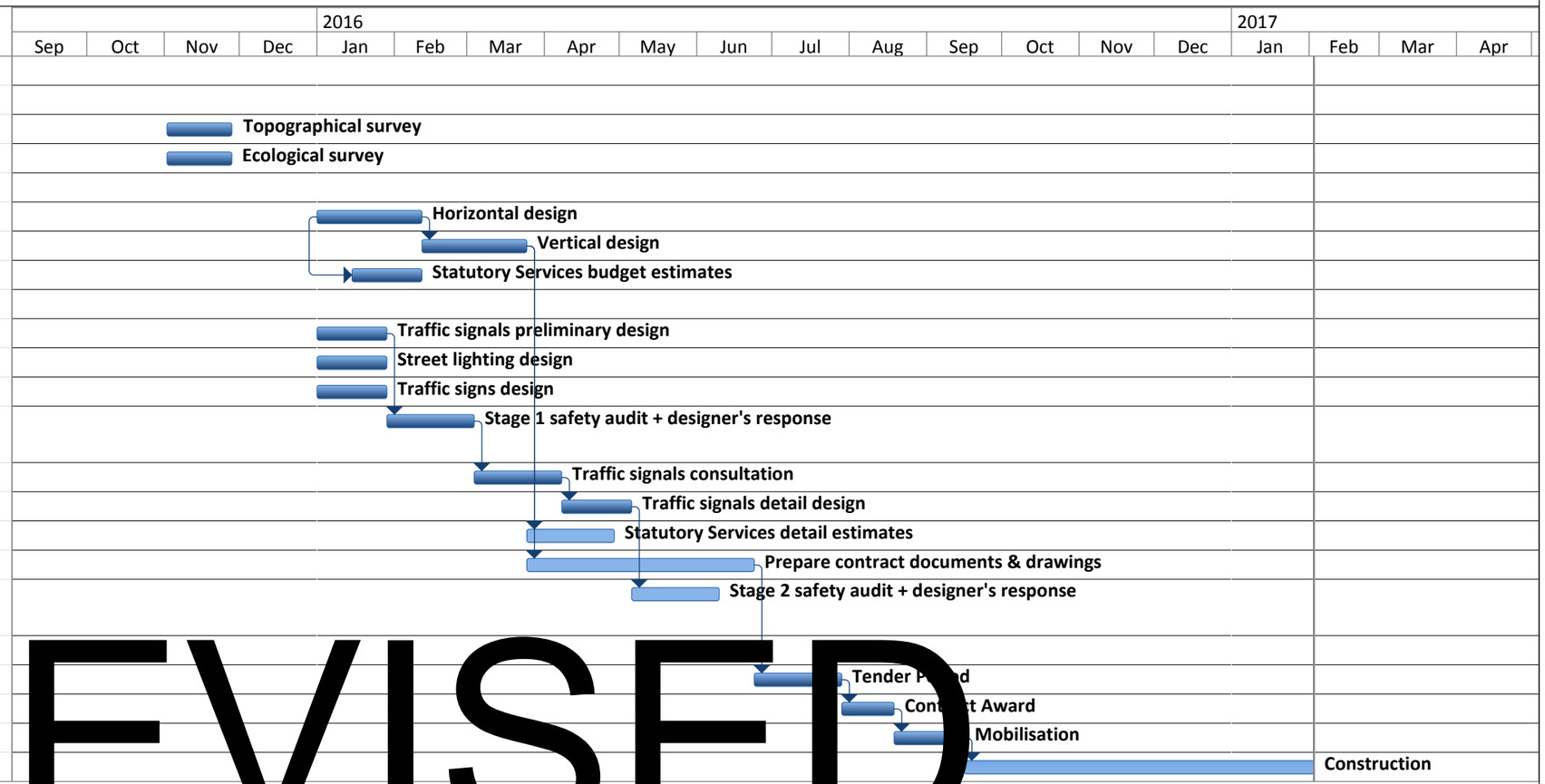
91.8 The *Employer* may terminate without notice if he becomes aware:
- of the *Contractor*'s involvement in corrupt practices or
- of the *Contractor*'s involvement in collusive activity or
- that the Contractor has submitted false or inaccurate information in his tender submission (R22).

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

M40 Jnc 12 - Scheme Delivery Programme

ID	Task Name	Duration	Start
1			
2			
3	Topographical survey	4 wks	Mon 02/11/15
4	Ecological survey	4 wks	Mon 02/11/15
5			
6	Horizontal design	6 wks	Fri 01/01/16
7	Vertical design	6 wks	Fri 12/02/16
8	Statutory Services budget estimates	4 wks	Fri 15/01/16
9			
10	Traffic signals preliminary design	4 wks	Fri 01/01/16
11	Street lighting design	4 wks	Fri 01/01/16
12	Traffic signs design	4 wks	Fri 01/01/16
13	Stage 1 safety audit + designer's response	5 wks	Fri 29/01/16
14	Traffic signals consultation	5 wks	Fri 04/03/16
15	Traffic signals detail design	4 wks	Fri 08/04/16
16	Statutory Services detail estimates	5 wks	Fri 25/03/16
17	Prepare contract documents & drawing	13 wks	Fri 25/03/16
18	Stage 2 safety audit + designer's response	5 wks	Fri 06/05/16
19			
20	Tender Period	5 wks	ri 24/06/16
21	Contract Award	3 wks	ri 29/07/16
22	Mobilisation	4 wks	16
23	Construction	20 wks	ri 16/09/



Project: Programme WCC-HA-JLR
Date: Mon 03/11/14

Task	Project Summary	Inactive Milestone	Manual Summary Rollup	Deadline
Split	External Tasks	Inactive Summary	Manual Summary	Progress
Milestone	External Milestone	Manual Task	Start-only	
Summary	Inactive Task	Duration-only	Finish-only	

Appendix K

Coton Arches Scheme

Value for Money Statement

The scheme comprises capacity improvements at A444 Coton Arches Roundabout, the schemes forms a significant element of wider A444 improvement proposals in the area which are required to deliver future growth. The wider scheme proposals included A444/B4112 College St Roundabout, B4112 College St/Bull Ring junction, B4112 Heath End Rd/Greenmoor Rd and A444/George Elliot Hospital (GEH) Roundabout (these junction improvements are not included in this assessment). A444 Coton Arches improvements are required in order to address a serious congestion issue on the Warwickshire County Council (WCC) highway network which results in significant and regular queuing on the main route from Nuneaton to the M6 and Coventry.

Summary Table

	Assessment	Detail
Initial BCR	Very High (8.19)	• Estimated using PARAMICS Transport Model and Program for Economic Assessment of Road Schemes (PEARS).
Qualitative Assessment	Largely beneficial	• Gross Value Added (GVA) benefits generated by the jobs created by the scheme; • Impacts of accident reduction; • Carbon emission reductions; and • Business efficiency and Labour Market Efficiencies.
Key Risk, Sensitivities	Minimal	• Land requirements and acquisition; • Costs and lead-in time for diverting utilities; and • Costs of structures (bridges) and environmental works.
VfM Category	High	• Reduction of congestion; • Journey time improvements; and • Increased reliability.

The benefits and costs of the scheme have been considered and have returned an initial BCR of 8.19. This was calculated by using the Paramics transport model and the PEARS (Program for Economic Assessment of Road Schemes) module. Although the BCR is very high for this scheme, there are a number of factors that have not been included in the calculations of the BCR due to these benefits being combined with the wider schemes. As a result, it is expected the BCR is an underestimation.

Gross Value Added (GVA)

The total direct GVA increase to Nuneaton and Bedworth Borough as a direct result of this scheme is £0.6m over the 6 month construction period through the creation of 21 FTE jobs.

The scheme will also contribute to the wider schemes in the area which is expected to yield a GVA value of £24.2m through the creation of 412 FTE jobs. The total combined growth in GVA resulting

from implementation of the scheme and the wider schemes is therefore £24.8m directly attributable to scheme construction and through enabling sufficient capacity on the network to bring forward Local Plan employment sites.

Impacts of accident reduction
One of the objectives of the scheme is to improve safety. A reduction in accidents is expected for all road users and this will deliver monetary benefits that would further increase the BCR.

Carbon emission reductions
The improvement in road network conditions will lead to a reduction in carbon emissions that has been calculated as £0.3m of scheme benefits (as shown in the Analysis of Monetised Costs and Benefits).

Social

There will be improved accessibility to local amenities and services, including but not limited to hospitals, schools and shopping centres. 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. This scheme does not take away from existing or add to the existing level of travel options available to current users.

Key Risks, Sensitivities and Uncertainties

The main risks associated with the delivery of the scheme are those typical of any major road scheme and will be associated with land requirements and acquisition, costs and lead-in time for diverting utilities, costs of structures (bridges), and environmental works. Other risks are associated with the final housing and employment allocations for NBBC Local Plans.

Risk
There is a risk of unacceptable level of noise during construction
There is a risk of significant disruption during construction
There is a risk that uncharted utilities may be discovered
There is a risk that Network Rail may not give permissions in time
There is a risk that the design may need to be amended

VfM

The VFM category of the scheme is ***very high*** based on the overall results of the AST and Business Case work. The significant benefits of the scheme, including the reduction of congestion, journey time improvements and increased reliability, ensure high value for money.

Part 2 – Updated Transport and Economics Outputs

Coton Arches – Economic Analysis Overview

Project title	Coton Arches Business Case Review	Job number	VM165050
cc	Warwickshire County Council	File reference	VM165050.TN001
Prepared by	James Edwards	Date	28 January 2016

Introduction

1. Warwickshire County Council (WCC) and Warwick District Council (WDC) have requested that, in light of revisions to the proposed layout, and the availability of 2015 survey data, Vectos Microsim (VM) update the economic appraisal of the Coton Arches Junction proposal.

2. A series of outputs have been produced from the A444/B4113 'Coton Arches Junction' PARAMICS models. In addition to the standard modelling outputs an economic analysis has also been undertaken using the Trips-all outputs.

3. 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

4. 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).

5. 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.

6. 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.

7. PEARS does not at present consider accidents and therefore, if it is considered necessary 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.

Overview

8. 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

9. Based on information provided by WCC, the scheme costs for both the roundabout and signalised options were included at **£3.7 million**. These prices were based on April 2014 values with an RPI index of **128.1** and are inclusive of a **44%** allowance for optimism bias.

Scenario Years

10. The cost profile associated with the delivery of the scheme assumed **100%** of the scheme costs would be borne in the **2017** delivery year. A second year of **2022** was included within the assessment to reflect a +5 years from opening horizon.

11. Demands were forecast from 2015 using the NTEM adjusted TEMPRO factors for the forecast period.

Table 1: NTEM Adjusted TEMPRO Growth Factors

Level	AM	IP	PM
2015 to 2017	1.023	1.028	1.024
2015 to 2022	1.078	1.093	1.079

12. A summary of the demands output as a result of this application of the aforementioned TEMPRO factors is presented within the following Table:

Table 2: NTEM Adjusted Model Demands

Year	AM	Growth	IP	Growth	PM	Growth
2015	9687		18540		10343	
2017	9911	2.31%	19052	2.76%	10586	2.35%
2022	10446	7.84%	20263	9.29%	11161	7.91%

Time Periods

13. PEARS guidance states that it is acceptable that an urban junction may be presumed only to accrue significant benefits during peak periods. In the case of this assessment the model has been developed to encompass the 12 hour working day period between 07:00 to 19:00. Thus

the assessment has focussed on this time period with an annualisation factor of 253 which provides a total of 3036 hours considered within the assessment.

14. This approach does mean that the potential benefits that may be accrued within any other period, such as the weekends, will not be accounted for within the analysis. Similarly any benefits or dis-benefits of implementation within the off-peak will also be omitted from the economic analysis as a result of this approach, dis-benefits may occur through the implementation of signals which incur delay at times when vehicles may otherwise be able travel through the network unimpeded.

Assessment Parameters

15. The opening year of the assessment was assumed to be 2017.

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

17. 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 2047 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 2017 to 2022 benefit accrual rate. In reality the benefits will begin to diminish towards the end of the life of the scheme and the delay levels would begin to converge again.

18. The calculation of the fuel costs within the PEARS assessment was based on outputs from the Trips-all file (Calculated method).

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

Outputs

20. 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.

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

22. Analysis of the TEE tables reveals an initial BCR of **5.85** based on the application of the aforementioned assessment parameters.

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

Scheme Title A444 Updated Version (2 years)

IMPACT	Ref.	Cal'n / Source	Total	Cars	LGVs	OGVs	Private Buses & Coaches	Service Buses
NON-BUSINESS USER BENEFITS								
Travel Time								
Commuting Travel Time	1		£4.52	£4.48	£0.04			£0.00
Other Travel Time	2		£4.31	£4.19	£0.11		£0.00	£0.00
Non-business Travel Time	**3**	**1+2**	**£8.83**					
Vehicle Operating Costs								
Commuter Fuel VOC	4		£0.43	£0.43	£0.01			
Commuter Non-fuel VOC	5		£0.04	£0.04	£0.00			
Other Fuel VOC	6		£0.39	£0.37	£0.02			
Other Non-fuel VOC	7		£0.09	£0.08	£0.01			
Non-business Vehicle Operating Costs	**8**	**4+5+6+7**	**£0.95**					
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**	**£4.99**					
NET NON-BUSINESS BENEFITS: OTHER	**12**	**2+6+7+10**	**£4.79**					
NET NON-BUSINESS BENEFITS - SUB TOTAL	**13**	**11+12**	**£9.78**					
BUSINESS USER BENEFITS								
User Benefits								
Business Travel Time	**14**		**£7.69**	£5.38	£1.78	£0.53	£0.00	£0.00
Fuel VOC	15		£0.49	£0.15	£0.18	£0.17		
Non-fuel VOC	16		£0.55	£0.28	£0.11	£0.16		
Business Vehicle Operating Costs	**17**	**15+16**	**£1.04**					
During Construction (*)	*18*							
During Maintenance (*)	*19*							
During Construction and Maintenance (*)	*20*	**18+19**						
Subtotal	**21**	**14+17+20**	**£8.73**					
Private Sector Provider Impacts								
Revenue (*)	*22*							
Fuel VOC	23		£0.00				£0.00	£0.00
Non-fuel VOC	24		£0.00				£0.00	£0.00
Private Sector Vehicle Operating Costs	**25**	**23+24**	**£0.00**					
Investment Costs (*)	26							
Grant / Subsidy (*)	27							
Subtotal	**28**	**22+25+26+27**	**£0.00**					
Other Business Impacts								
Developer & Other Contributions (*)	*29*							
NET BUSINESS IMPACT	**30**	**21+28+29**	**£8.73**					
TOTAL PRESENT VALUES OF TEE IMPACTS	**31**	**13+30**	**£18.51**					

* 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 2010.
Evaluation period 30 years. Scheme opening year 2017.
Current year 2014.

Scheme Title A444 Updated Version (2 years)

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		£3.09
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)	***£3.09***
Central Government Funding : Non-Transport			
Indirect Tax Revenues	48		£0.66
TOTALS			
Broad Transport Budget	49	39+47	**£3.09**
Wider Public Finances	50	48	**£0.66**

* 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 2017.
Current year 2014.

Reference data: Date: January 2014 Version: 14.1

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

Scheme Title A444 Updated Version (2 years)

IMPACT	Reference	Cal'n / Source	Total
TEE Impacts			
Noise (^)*	51		
Local Air Quality (^)*	52		
Greenhouse Gases (Emissions) (low)			£0.12
Greenhouse Gases (Emissions) (central)	53		**£0.24**
Greenhouse Gases (Emissions) (high)			£0.36
Journey Ambience (^)*	54		
Accident Benefits (*)	55		
Non-Business User Benefits: Commuting	56	11	£4.99
Non-Business User Benefits: Other	57	12	£4.79
Business User & Provider Benefits	58	30	£8.73
Wider Public Finance (Indirect Tax Revenue)	59	-50	£-0.66
Option Values (^)*	60		
Present Value of Benefits (PVB)	61	Sum(51 to 60)	**£18.09**
Broad Transport Budget	62	49	£3.09
Present Value of Costs (PVC)	63	62	**£3.09**
OVERALL IMPACTS			
Net Present Value (NPV)	64	61-63	**£14.99**
Benefit to Cost Ratio (BCR)	65	61/63	**5.85**

* 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 2017.
Current year 2014.

Reference data: Date: January 2014 Version: 14.1

Coton Arches – Model Refresh Overview

Project title	Coton Arches Business Case Review	Job number	VM165050
cc	Warwickshire County Council	File reference	VM165050.TN002
Prepared by	James Edwards	Date	28 January 2016

Introduction

1. Warwickshire County Council (WCC) have requested that, in light of revisions to the proposed layout, and the availability of 2015 survey data, Vectos Microsim (VM) update the traffic modelling for the Coton Arches Junction to account for these changes.

2. This note has been produced to provide a high level summary of the changes applied and the results therefrom.

Methodology

3. The Coton Arches modelling was completed in November 2014. Since that time, more recent count data has become available and the scheme design has changed.

4. These changes were accounted for within the modelling via the following steps:

    - The new 2015 survey data was converted into a new set of 12 hour baseline demands which were assigned within the model network.
    - Traffic volumes for 2017, 2022 and 2028 were reforecast using updated TEMPRO factors based on a 2015 start year (previously 2009 data).
    - The scheme amendments were included in the network (reduced stacking capacity on Avenue Road).
    - Signal timings were assigned based on LinSig outputs provided by WCC and then subject to further manual optimisation for each model period.
    - The models were run and the 2017/2022 Economic appraisal work was redone (reported within a separate accompanying technical note).
    - Key model outputs, such as network delay, were extracted and reviewed to appraise the scheme performance.

5. Key changes from the original modelling include:

    - Avenue Road widening has been reduced meaning an overall reduction in capacity on Avenue Road. Coventry Road is affected by association, longer queues on Avenue Road results in a more constant stream of traffic emerging when the gaps are in place, the knock on effect is less gaps for traffic emerging from Coventry Road travelling towards Nuneaton Town Centre.

- The 2009 to 2015 flows indicate little overall increase in traffic levels but that there has been a predominant shift in flow off the minor arms (avenue Road & Coventry Road) and onto the A444. The A444 is predicted to be more adversely effected by traffic growth than the two minor arms. This has the effect of predicting slightly worse conditions arising in the baseline network than previously observed.

Scenario Review

6. The models have been reforecast, based on the new 2015 survey data, to reflect the 2017 (year opening), 2022 (5 years from opening) and 2028 (formally the Local Plan horizon year) and the average journey time across the entire study area has been collected and processed for the following time periods:

- AM (07:00 to 10:00)
- Inter-peak (10:00 to 16:00)
- PM (16:00 to 19:00)

7. The results that have been extracted and assessed comprise:

- Average Journey Time – the average time it takes (in seconds) for a journey to be completed within any given model period:
- Queueing on the A444 approaches – the average maximum queue length, in vehicles, recorded on the A444 approaches to the roundabout.

Average Journey Time

8. The average journey time has been extracted for all scenarios and the outputs are presented within the following Table:

Table 1: Average Journey Time (Reference versus Scheme)

	2015		2017		2022		2028	
	Ref	**Scheme**	**Ref**	**Scheme**	**Ref**	**Scheme**	**Ref**	**Scheme**
AM Peak Hour	102	101	120	102	183	106	298	126
	-0.69%		-14.81%		-41.85%		-57.59%	
AM Peak Period	93	100	101	101	133	104	236	115
	7.39%		0.00%		-21.80%		-51.30%	
PM Peak Hour	117	111	127	114	167	142	269	219
	-5.07%		-9.70%		-14.70%		-18.71%	
PM Peak Period	100	103	106	105	138	115	239	153
	3.30%		-0.99%		-16.42%		-36.08%	
Inter-Peak Period	85	97	86	97	88	99	97	101
	14.13%		13.53%		11.86%		4.03%	

9. Analysis of the data presented within the previous Table reveals the following:

- That the scheme delivers modest benefits within the peak hours from the moment of implementation.

- The peak hour journey times reduce within the 2017 model and the inclusion of signals has little impact on the broader AM and PM peak period journey times. Since the peak hours contain considerably greater traffic volumes than the overall periods this is acceptable.
- By 2022 there are substantial benefits across the AM peak hour and peak period, similarly for the PM period the smallest reduction in journey times is around 15%.
- By 2028 the benefits are amplified as the journey times recorded within the Reference Case network are very high and likely to be indicative of significant deficiencies with regards the current network layout. These issues are fully mitigated by the scheme proposals.

10. Thus the impacts on journey times across the scenarios reveals that, at opening year, the scheme will start to deliver benefits which will increase significantly as the traffic levels across the study area increase.

11. There will always be a residual impact resulting from the inclusion of the scheme in the inter-peak period as the signals are introduced to a relatively uncongested network and, thus, some additional delay occurs in the scenarios which would otherwise be able to accommodate the demands within the existing arrangement. Within the inter-peak the delays are relatively modest and are rarely observed to exceed 10 seconds.

Queueing Analysis

12. In addition to the review of the impact on journey times within the study area, a review of the impact on modelled queueing levels has also been undertaken for the A444 approaches. The graphs extracted from the model scenarios have been presented within **Appendix A** of this note.

13. The following observations are based on a review of the information presented within Appendix A:

- Without the scheme in place queueing levels will be very severe by 2028, rising as high as 90 vehicles on the A444 southbound.
- By 2022 queueing on the A444 is forecast to be as high as 45 vehicles without the scheme in place.
- Including the signal proposals results in a consistent level of queue lengths across all scenario years.

14. Thus it is reasonable to conclude that without the scheme in place queueing levels could increase significantly along the A444. Introduction of the signal proposals provides a better management strategy which results in consistent queueing levels across all scenarios in which the scheme is in place. This indicates that the scheme will also have an extended lifespan beyond the 2028 forecast year as is indicated by the consistent queueing levels predicted.

Conclusions

15. Based on the analysis set out previously, the following conclusions have been identified:

- That the scheme will deliver peak hour benefits (in the form of reduced journey times) in 2017 and peak period benefits in 2022.
- Significant journey time savings and queue mitigation is predicted to be realised by 2028.
- Queueing analysis reveals a consistent level of queueing, with the scheme in place, across all scenario years indicating that the scheme will likely have a lifespan beyond 2028.
- Without the scheme in place queueing levels on the A444 will become very severe and will impact on the operation of the network significantly as a result of general growth in traffic. Thus delivery of a scheme within this area is essential to mitigate these queueing impacts.

Appendix A

A444 Queueing Analysis

Figure A.1 – Average Maximum Queue Length (Veh.) A444 SB AM (07:00 to 10:00)

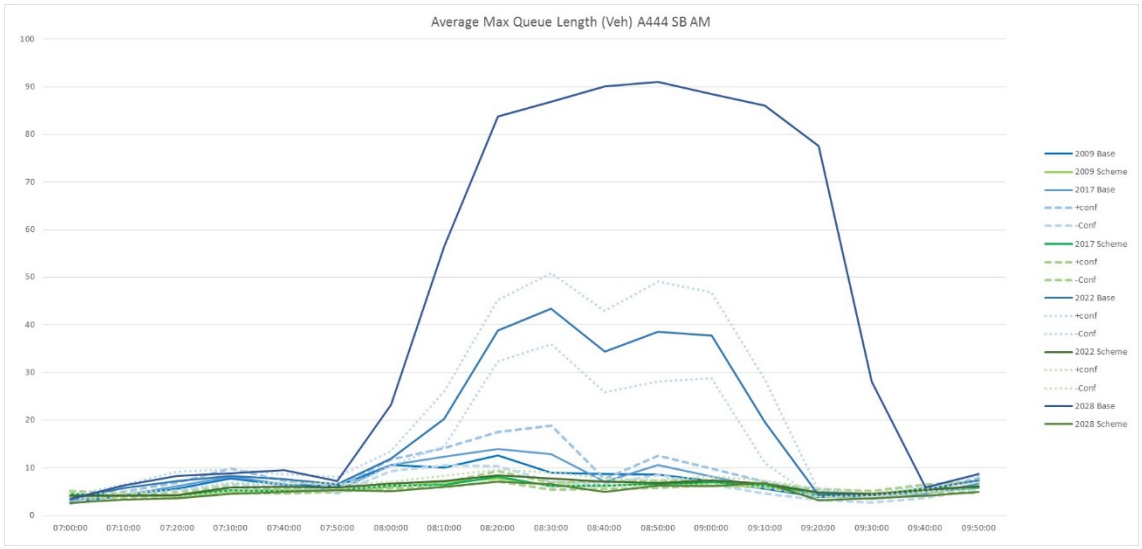


Figure A.2 – Average Maximum Queue Length (Veh.) A444 NB AM (07:00 to 10:00)

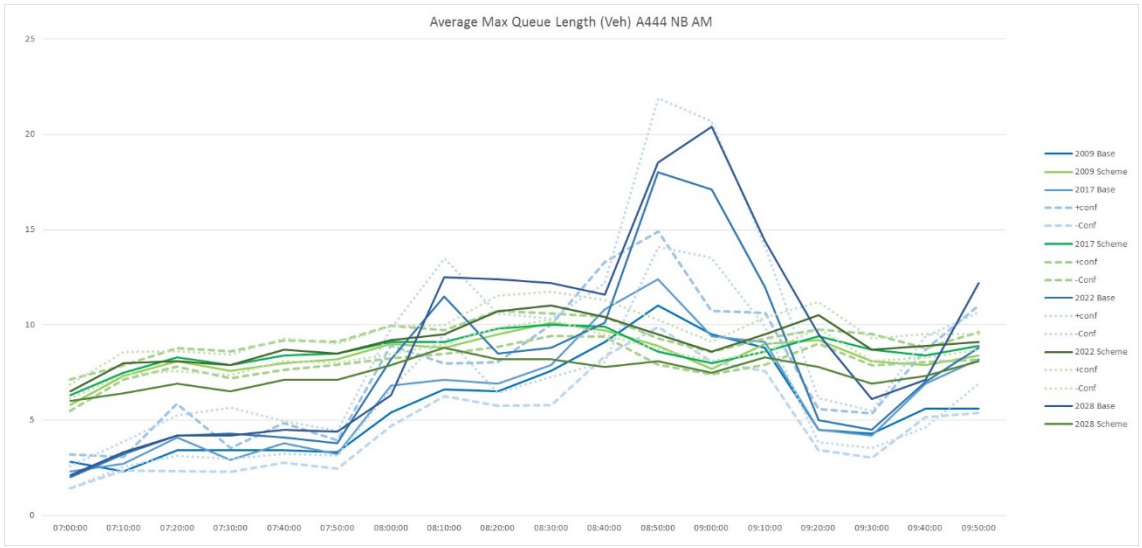


Figure A.3 – Average Maximum Queue Length (Veh.) A444 SB PM (16:00 to 19:00)

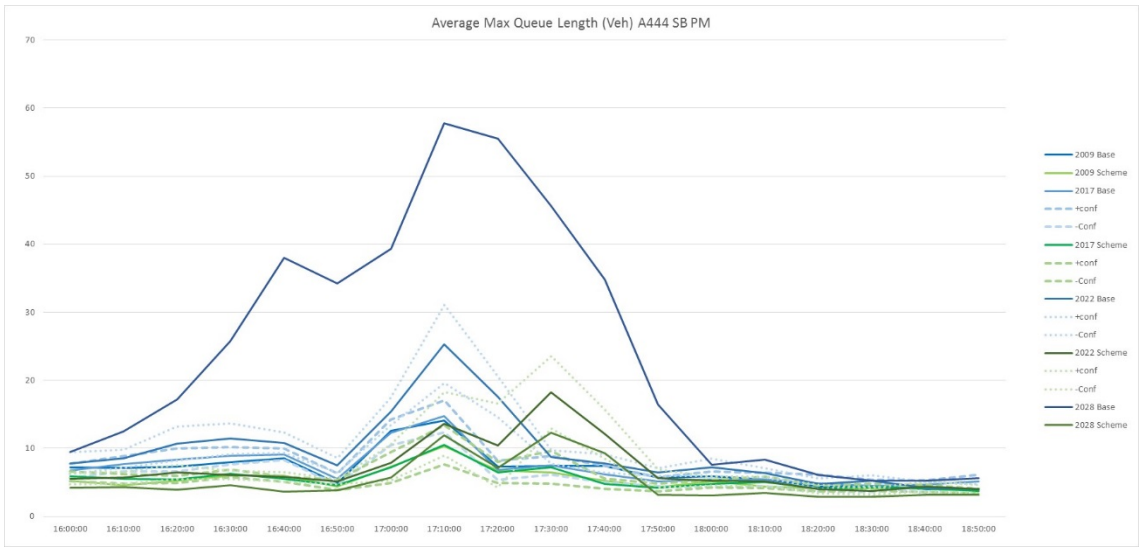


Figure A.4 – Average Maximum Queue Length (Veh.) A444 NB PM (16:00 to 19:00)