



Medway Consultancy 221430VV81_IN119

Lodge Hill - 'Large Roundabouts Scheme'

June 2013

Medway Council



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A	23/05/13	S Hasan	C Martin	R Bland	1 st Issue
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1 Introduction

1.1 Introduction

Medway Council have commissioned Mott MacDonald to undertake a modelling and costing exercise for the potential highways works known as the 'Large Roundabouts Scheme' associated with the Lodge Hill development. Furthermore Peter Brett Associates have undertaken a transport economic appraisal for the scheme.

1.2 Background

As part of the emerging Core Strategy, Medway Council has identified a series of traffic hotspots, in particular the A289 link between Four Elms roundabout and Medway Tunnel including Sans Pareil and Anthony's Way roundabouts and the exit from Medway City Estate.

As part of the Lodge Hill planning application Medway Council are seeking to agree a financial contribution to this transport intervention but before engaging with any negotiations the following is needed;

(a) traffic modelling, to verify that this scheme has sufficient capacity to deal with predicted traffic at 2026 including the proposed development at Lodge Hill, Chattenden; and

(b) high level estimated costs associated with the 'Large Roundabouts Scheme'.

An existing base and forecast Saturn model is used for modelling the proposed scheme.

A supplementary request was made to examine the roundabouts separately.

1.3 The 'Large Roundabouts Scheme'

The proposed 'Large Roundabouts Scheme' layout is contained in Appendix A which encompasses the following roundabouts:

- Four Elms;
- San Pareil; and
- Anthony's Way

It shows modifications to three roundabouts and the link carriageways between them.

1.4 Technical Note Structure

The format of this technical note is as follows:

- the modelling scenarios and outputs are presented in section 2 with Saturn model summary plots provided in Appendix B;
- the high level cost estimates are provided in section 3;
- the full breakdown of costs, assumptions and a list of excluded items are included in Appendix C; and
- the transport economics assessment undertaken by Peter Brett Associates is contained in Appendix D.

2 Modelling

2.1 Modelling Assumptions

The modelling outputs presented in this technical note should be read in conjunction with the main assumptions listed below:

- The model uses SATURN software.
- Base year of the model is 2008 and 2026 was identified as the forecast year, with the AM peak period modelled.
- The modelling outputs refer to the 2026 reference case and schemes.
- The AM peak hour (08:00-09:00) is considered as the most severe case in terms of traffic loading in comparison to other time periods.
- The future year matrices exclude specific development at Lodge Hill unless shown otherwise.
- The background growth in trips came from the changes in population and employment in the area and vehicle trip rates used in the DfT's National Transport Model and distributed as Tempro 5.4 forecasts.
- The network assumes existing signal timings other than at the new/identified junctions, with any potential changes and impacts of this work, not accounted for.
- Four Elms was modelled as a signalised junction, with Sans Pareil and Anthony's Way as priority roundabouts.
- SATURN is a strategic modelling tool, and should therefore be used as guidance to changes in traffic flows and movements after implementations of such schemes, and not as exact numerical flows throughout the scheme area. Although every effort has been made to model the schemes accurately, SATURN is not a junction based modelling package, and should therefore not be used to provide exact results on a junction by junction basis, for which additional studies are recommended if deemed necessary. As such, overall, the modelled traffic conditions may not be fully representative of the actual traffic conditions.
- Traffic flows are in Passenger Car Units (PCU) unless otherwise specified.

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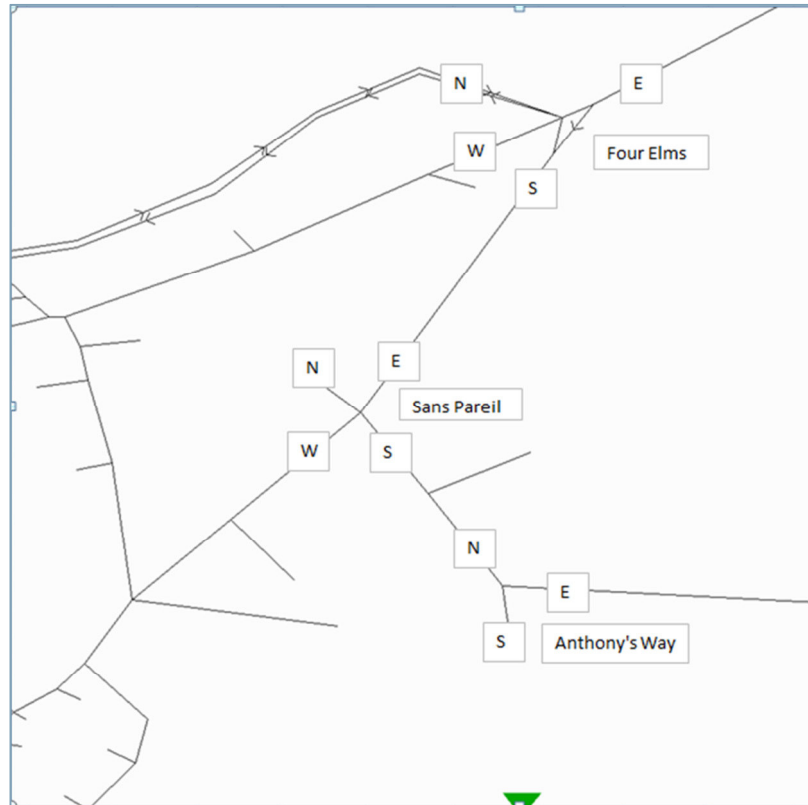
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2.2 The Saturn Model

An existing base and forecast Saturn Model was used to model the scheme to predict traffic growth to 2026.

The diagram below is the Saturn Model reference diagram used for the modelling work.

Figure 2.1: Saturn Model reference diagram



Source: Mott MacDonald

2.3 Modelling Scenarios

In total seven 2026 scenarios were modelled. Table 2.2 below lists the seven scenarios.

Table 2.2: Modelled Scenario Matrix

Medway Modelling Options						
Option	Matrix	Matrix Name	Total Trips	Junction Option		
				Four Elms	Sans Pareil	Anthony's Way
1	2026 Ref	Ma26BA68A.ufm	71081	Do Nothing	Do Nothing	Do Nothing
2	2026 Ref	Ma26BA68A.ufm	71081	Do Nothing	Do Nothing	Do Something
3	2026 Ref	Ma26BA68A.ufm	71081	Do Something	Do Something	Do Something
4a	2026 Ref + Lodge Hill	MA26BA68A_Tempro54.ufm	71711	Do Something	Do Something	Dummy
4b	2026 Ref + Lodge Hill	MA26BA68A_Tempro54.ufm	71711	Do Something	Do Something	Do Something
5	2026 Ref + Lodge Hill	MA26BA68A_Tempro54.ufm	71711	Do Nothing	Do Nothing	Do Something
6	2026 Ref	Ma26BA68A.ufm	71081	Do Nothing	Do Something	Do Something

Source: Mott MacDonald

2.4 Modelling Flows

Table 2.3 shows the predicted flows and percentage differences against reference for each of the modelled scenarios.

[DN=Do Nothing, DS=Do Something, Dum=Dummy]

Table 2.3: Flows

	Junction Option			Anthonys Way						Sans Pareil								Four Elms									
	Four Elms	Sans Pareil	Anthony's Way	North		East		South		East		South		West		North		North		East		South		West			
				In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out		
Option 1	DN	DN	DN	2666	2505	2574	2625	1166	1275	2801	1787	2753	3220	653	1276	315	239	2432	2398	2387	1779	1900	2609	379	310		
Option 2	DN	DN	DS	3265	2753	2731	2815	1180	1608	2801	1787	2753	3220	653	1276	315	239	2581	2370	2441	1775	1787	2801	360	221		
Option 3	DS	DS	DS	3392	2718	2662	2835	1180	1670	2791	1974	2718	3210	833	1159	-	-	1552	2444	2306	1776	1974	2791	635	354		
Option 4A	DS	DS	Dum	4435	2803	2737	3541	1073	1902	4771	2314	2803	4354	540	1516	295	226	2256	2599	5007	3158	2314	4771	793	726		
Option 4B	DS	DS	DS	4416	2863	2748	3490	1073	1884	4665	2375	2863	4332	698	1519	-	-	2252	2749	5007	3160	2375	4665	791	694		
Option 5	DN	DN	DS	3945	2961	2941	3157	1073	1842	4298	2472	2961	3870	853	1839	295	226	2366	2428	5007	3151	2472	4298	512	479		
Option 6	DN	DS	DS	3361	2646	2615	2818	1180	1693	2583	1778	2646	3183	994	1261	-	-	2562	2395	2108	1774	1778	2583	351	245		
Percentage Difference																											
	Junction Option			Anthonys Way						Sans Pareil								Four Elms									
	Four Elms	Sans Pareil	Anthony's Way	North		East		South		East		South		West		North		North		East		South		West			
				In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out		
Option 1	DN	DN	DN																								
Option 2	DN	DN	DS	122%	110%	106%	107%	101%	126%	100%	100%	100%	100%	100%	100%	100%	100%	106%	99%	102%	100%	94%	107%	95%	71%		
Option 3	DS	DS	DS	127%	109%	103%	108%	101%	131%	100%	110%	99%	100%	128%	91%			64%	102%	97%	100%	104%	107%	168%	114%		
Option 4A	DS	DS	Dum	166%	112%	106%	135%	92%	149%	170%	129%	102%	135%	83%	119%	94%	95%	93%	108%	210%	178%	122%	183%	209%	234%		
Option 4B	DS	DS	DS	166%	114%	107%	133%	92%	148%	167%	133%	104%	135%	107%	119%			93%	115%	210%	178%	125%	179%	209%	224%		
Option 5	DN	DN	DS	148%	118%	114%	120%	92%	144%	153%	138%	108%	120%	131%	144%	94%	95%	97%	101%	210%	177%	130%	165%	135%	155%		
Option 6	DN	DS	DS	126%	106%	102%	107%	101%	133%	92%	99%	96%	99%	152%	99%			105%	100%	88%	100%	94%	99%	93%	79%		

Source: Mott MacDonald

2.5 Modelling Outputs

Of the 2026 tests, four were run using the 2026 reference matrix (Option 1, 2, 3 and 6), and three with the 2026 matrix including the Lodge Hill development (Options 4a, 4b and 5). The Lodge Hill development adds an additional **2800 PCUs (Passenger Car Units)** to the network, with a large proportion of that traffic using Four Elms roundabout and going south towards Sans Pareil and onwards.

In terms of performance of the junctions, the schemes work well, handling the large flow increases produced around each of the junctions, particularly helped by the south bound slip roads at these junctions bypassing the roundabouts. An analysis of traffic flow differences comparing to the 2026 do nothing reference case has been provided for more in depth analysis on the junctions. Option 4b (with all three junction options modelled) shows the most consistent flow increases across the network, however, all other options do show moderate flow increases and capacity for increases in traffic on the local network. Further effects include diverting traffic from the M2 to the A289.

Delay and queue difference summary output plots for each of the individual options compared to the reference (Option 1) are shown in Appendix B.

Option 2, with just the Anthony's Way scheme in place shows queuing and delays increasing slightly on all arms around Four Elms Roundabout, but a reduction in delays at Anthony's Way and Sans Pareil northbound. This stems mainly from the new slip at Anthony's Way alleviating southbound queuing at the junction and helping traffic travel more smoothly in this area.

Option 3 plots do not show a major difference due to the network changes at all 3 junctions making these figures incomparable. However, analysis does show an increase in flow from the north of Four Elms, southbound through the Sans Pareil slip and eastbound via the slip at Anthony's Way, showing Option 3 to be a more attractive route for traffic towards Gillingham via the Medway Tunnel.

Option 4a has been modelled to show Anthony's Way as an unlimited dummy junction with options implemented for the other two sites, in addition to the Lodge Hill development. This shows the affect that the

Sans Pareil and Four Elms schemes would have without any delays at Anthony's Way, identifying potential queues and delays on the west arm of Sans Pareil, and the north arm of Four Elms, which can potentially be reduced with local modelling at signal optimisation at the junction. Option 4b follows on from this, which includes all three sites modelled. This again adds traffic southbound towards the Medway Tunnel.

Option 5, without the schemes at Four Elms and Sans Pareil, performs badly with queues and delays at Four Elms due to the nearby Lodge Hill development adding significant volumes of traffic here. This would indicate the proposed scheme would be needed at Four Elms if the Lodge Hill development occurred.

Option 6, modelling Sans Pareil and Anthony's Way, but without Four Elms or the Lodge Hill development, shows that whilst these schemes show a slight increase in traffic down towards the Medway tunnel, there are also some minor increases in queues and delays around Four Elms.

2.6 Modelling Summary

The SATURN summary output diagrams are contained in Appendix B which demonstrates relative changes in delay and queuing. These have not been qualified as these can vary with signal optimisation with local modelling (TRANSYT).

The Four Elms Roundabout has been modelled with signalisation as this is deemed essential because of the direction of flows and land constraints at this location. However, whilst preferable to signalise for pedestrians and bus priority movements the Sans Pareil and Anthony's Way junctions could be signalised in phases as the Lodge Hill scheme (or other developments in the area) is built.

The scheme can be delivered in any combination depending on priority and again it depends very much on the order which the developments are built.

3 Cost Estimate

3.1 Initial C2 Enquiries

High level utilities costs were estimated by reviewing each C2 enquiry returned from the utilities companies.

Initial C2 utility information was obtained from the following companies:

- BT
- Southern Gas
- National Grid
- Southern Water
- Virgin Media

EDF information awaited.

3.2 Cost Estimate

The high level cost estimates for the scheme are shown in Table 3.1 below. The full breakdown of costs, assumptions and a list of excluded items are included in Appendix C. The costs are for 2013 Q1.

Three versions of the scheme were costed:

- Improvements to Anthony's Way only
- Improvements to Sans Pareil and Anthony's Way roundabouts
- Improvements to Four Elms, Sans Pareil and Anthony's Way roundabout

These costs apply only to the construction costs. The full breakdown of costs and a list of excluded items are shown below.

Table 3.1 High level cost estimates

Item	Anthony's Way	Sans Pareil and Anthony's Way	Four Elms, Sans Pareil and Anthony's Way
Preliminaries and traffic management	406,775	863,900	1791300
Site clearance	14,000	34,000	90000
Fencing and barriers	68,500	155,500	305000
Drainage	75,000	170,000	600000
Earthworks	500,000	1,200,000	2000000
Pavements	425,000	1,025,000	3150000
Kerbs and footways	130,000	290,000	825000
Signs and signals	89,600	181,100	309000
Lighting	25,000	50,000	227500
Electrical work	40,000	80,000	250000
Structures (footbridge)	250,000	250,000	1100000
Landscaping	10,000	20,000	100000
Contingencies at 10%	162,710	345,560	895,650
Estimated Construction costs	2,200,000	4,670,000	12,100,000
Utilities	380,000	830,000	2,470,000
Risk allowance at 20%	516,000	1,100,000	2,914,000
Total	3,100,000	6,600,000	17,484,000

In addition to a 10% contingency, a 20% risk allowance is added to the scheme costs to allow for risks, such as utilities costs awaited from EDF.

This gives a total capital cost, including risk, of:

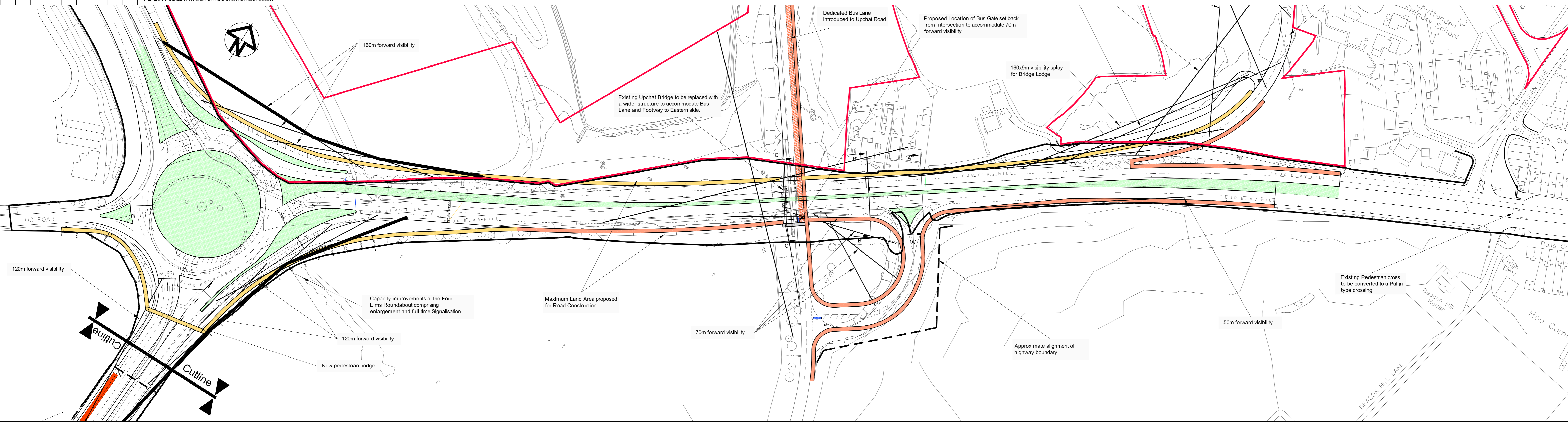
- **£3.1m** for option 1, Anthony's Way roundabout alone.
- **£6.6m** for option 2, Sans Pareil and Anthony's Way
- **£17.5m** for option 3, Four Elms, Sans Pareil and Anthony's Way

These figures do not include optimum bias. As the scheme is a road scheme at the programme entry level of development, optimism bias of 44% is added for the economic transport appraisal presented in Appendix D.

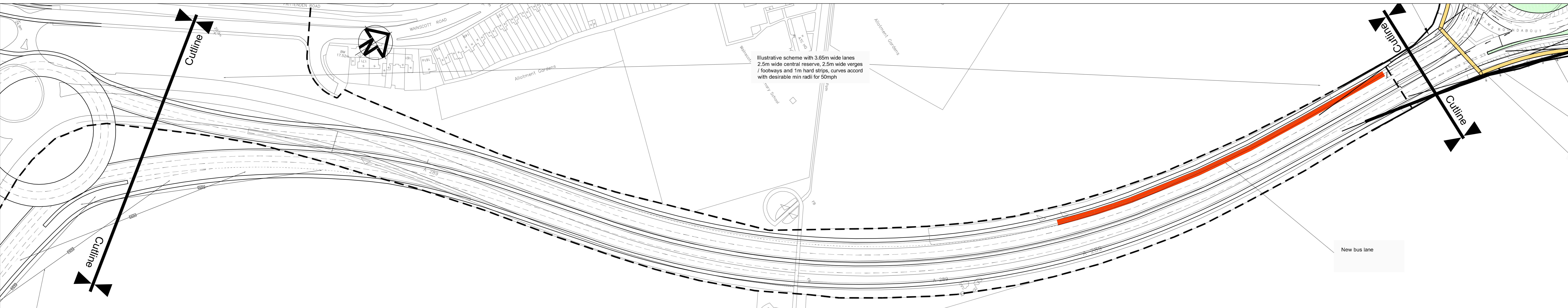
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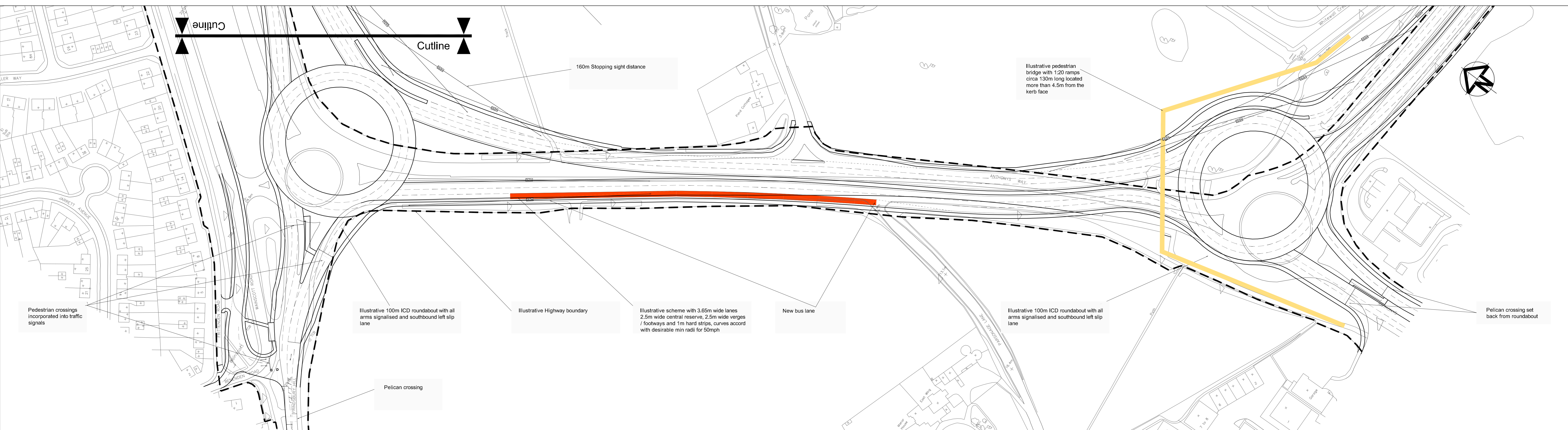
Appendix A. Large Roundabouts Scheme Layout



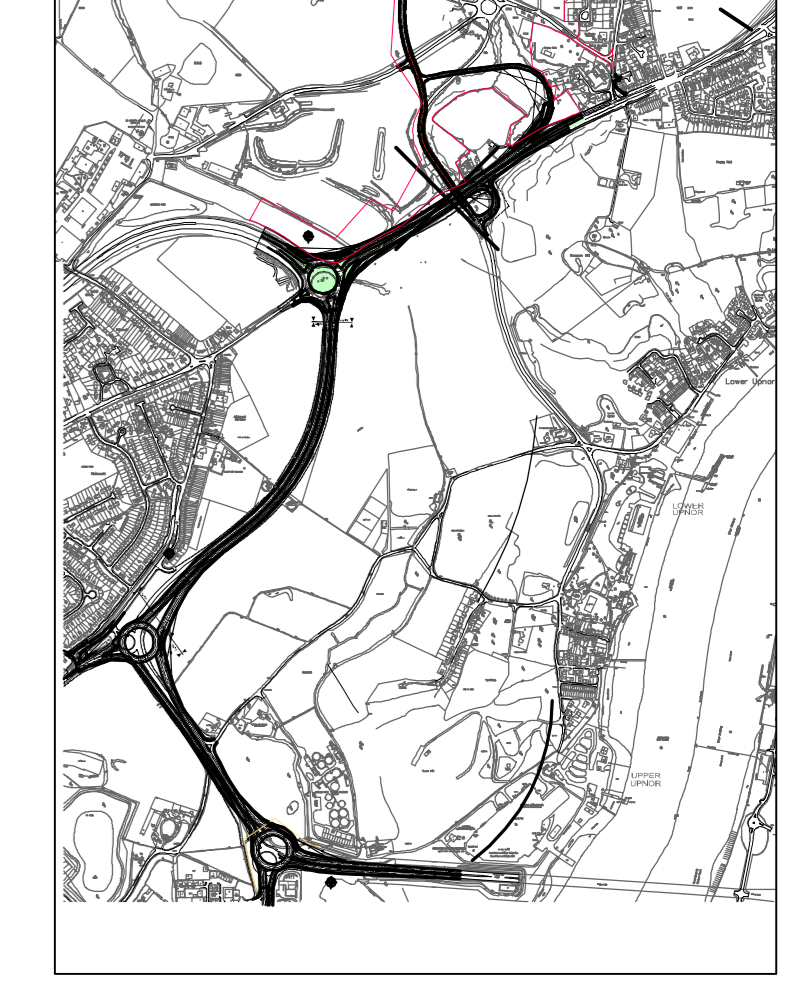
View 1 - Chattenden Lane to the Four Elms Roundabout



View 2 - the Four Elms Roundabout to the Sans Pareil junction with Anthony's Way



View 3 - Sans Pareil Junction to the Anthony's Way Junction



Key to drawing views

Key

- New Bus Lane
- New Pedestrian / Cycle path
- New Island
- Illustrative Highway Boundary TBC with Medway Council

- Notes**
1. Roundabouts are illustrative and as such may be subject to alteration to achieve suitable parameters such as deflection at detailed design stage.
 2. Traffic capacity analysis has not been carried out on the illustrative arrangement shown.

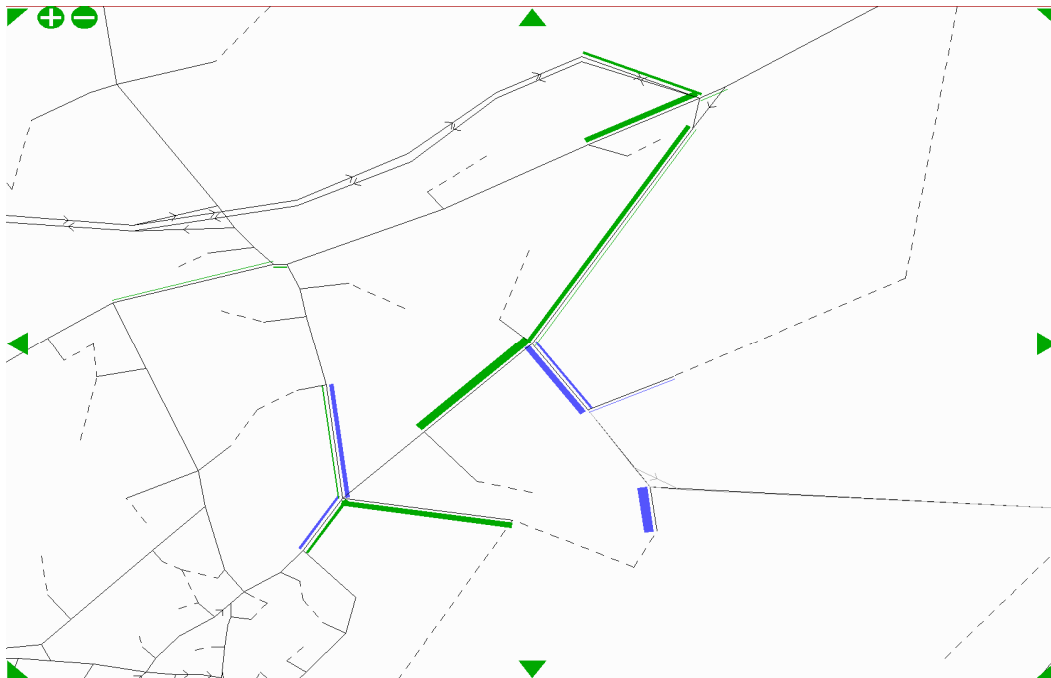
Appendix B. SATURN Model Plots

Option 2 (Delay per link)



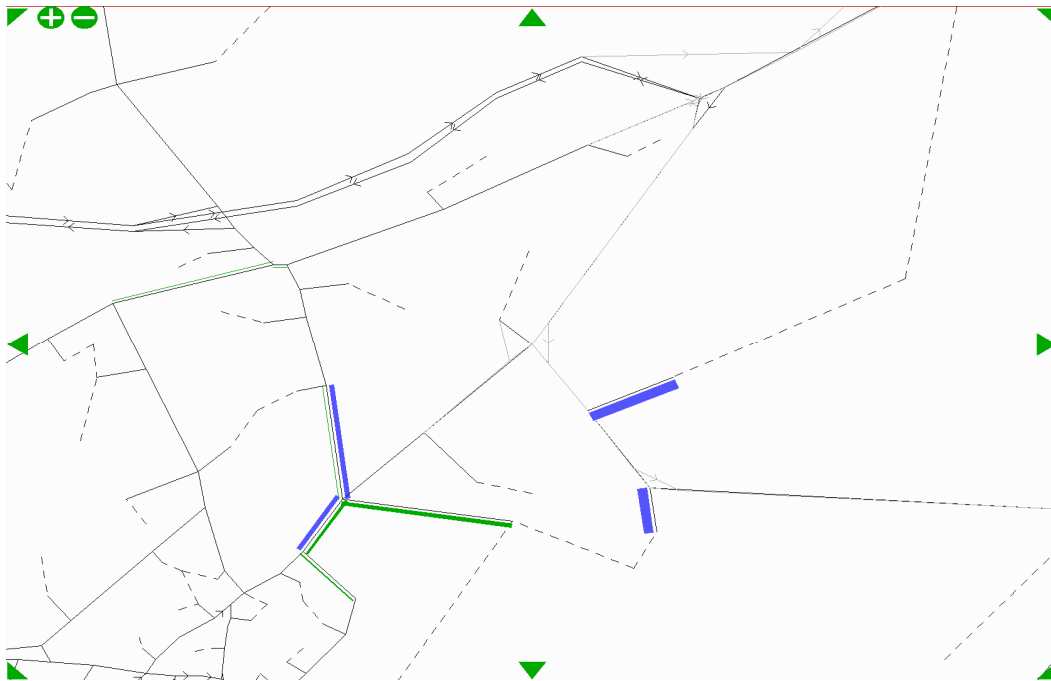
Option 2 – Option 1 (Delay)

(Comparison plot)



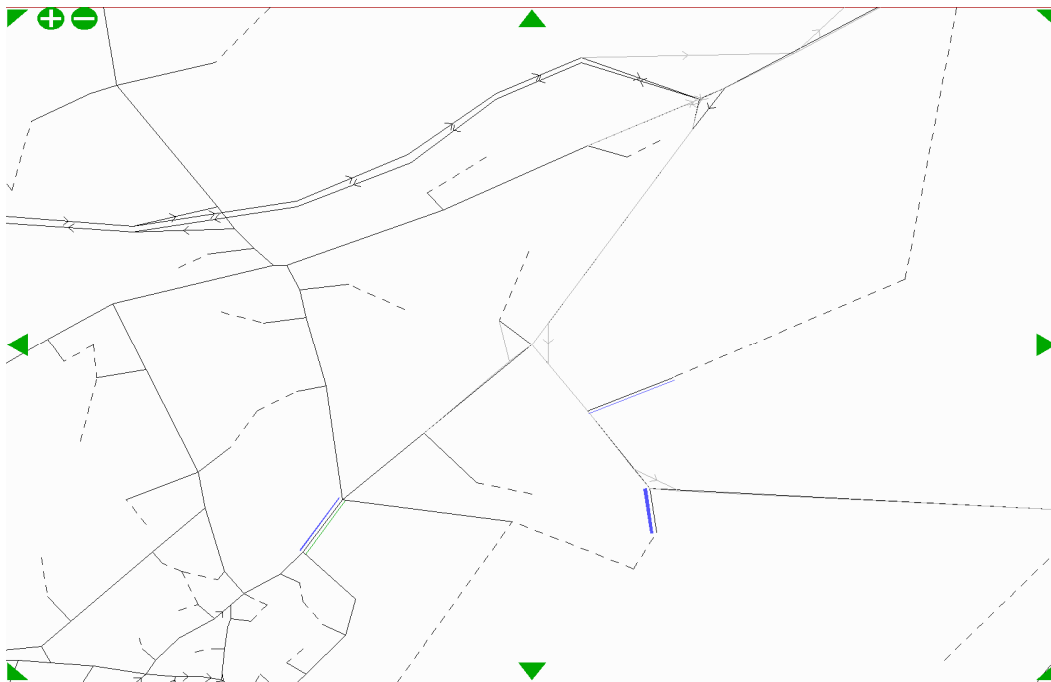
Option 3 – Option 1 (Delay)

(Comparison plot)

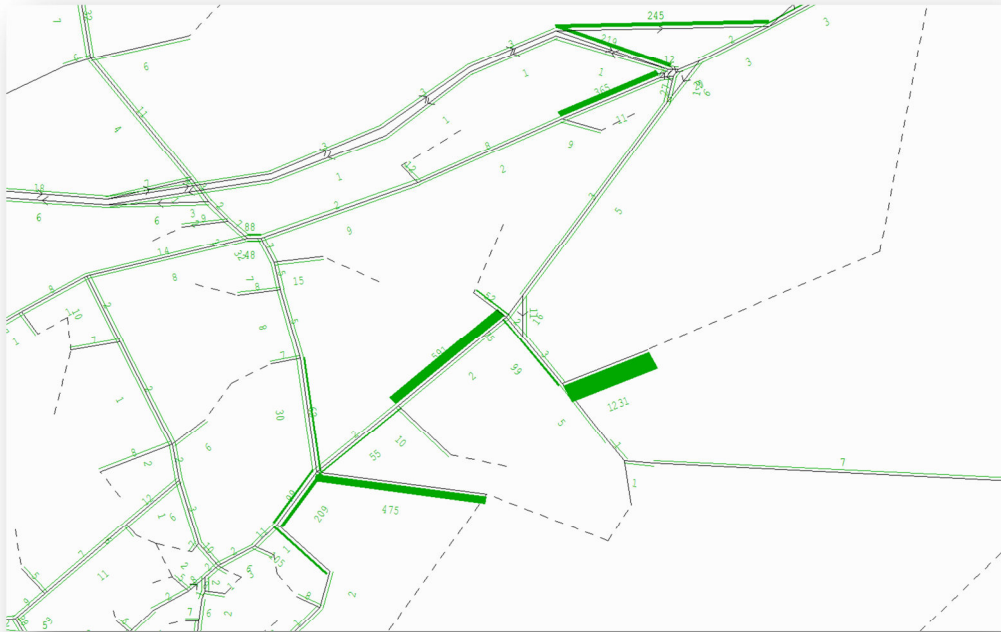


Option 3 – Option 1 (Queues)

(Comparison plot)

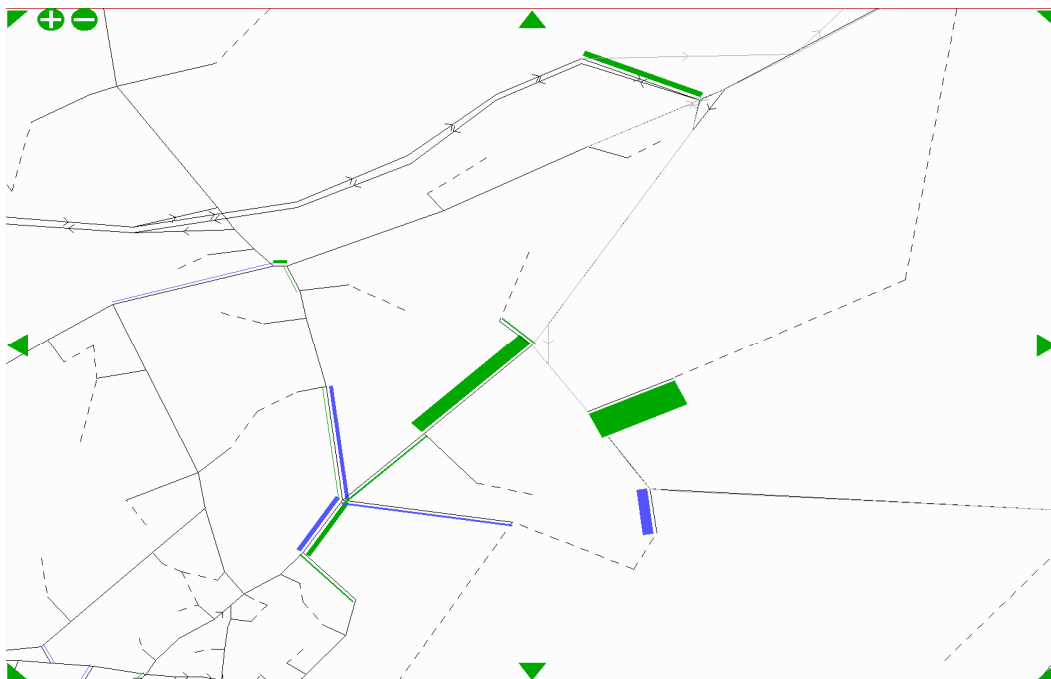


Option 4a (Delay per link)



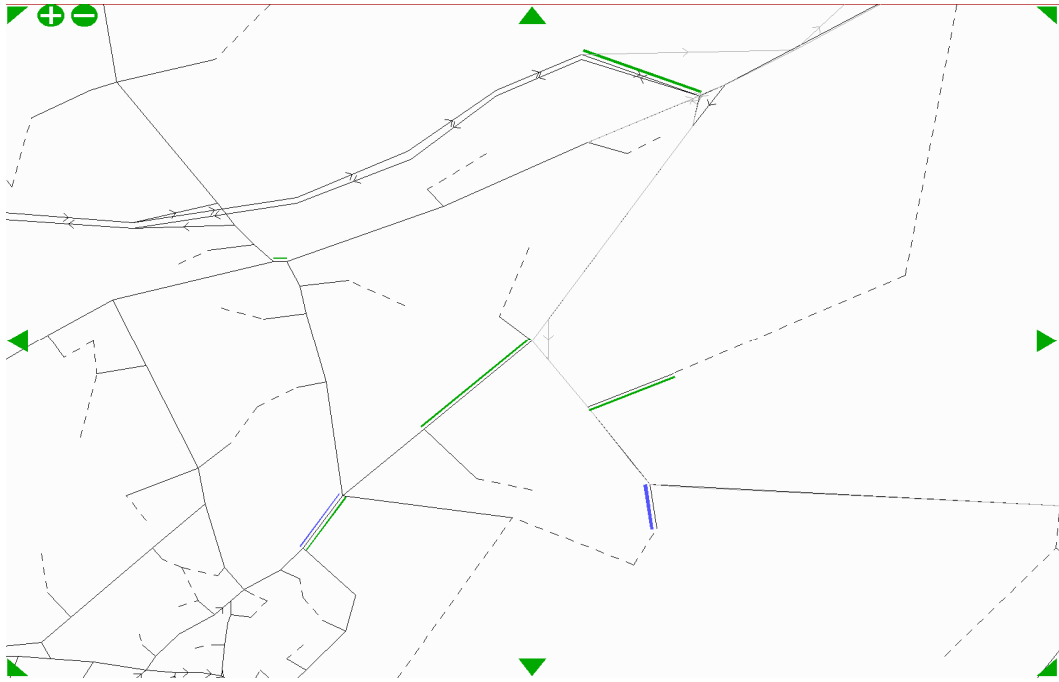
Option 4a – Option 1 (Delay)

(Comparison plot)

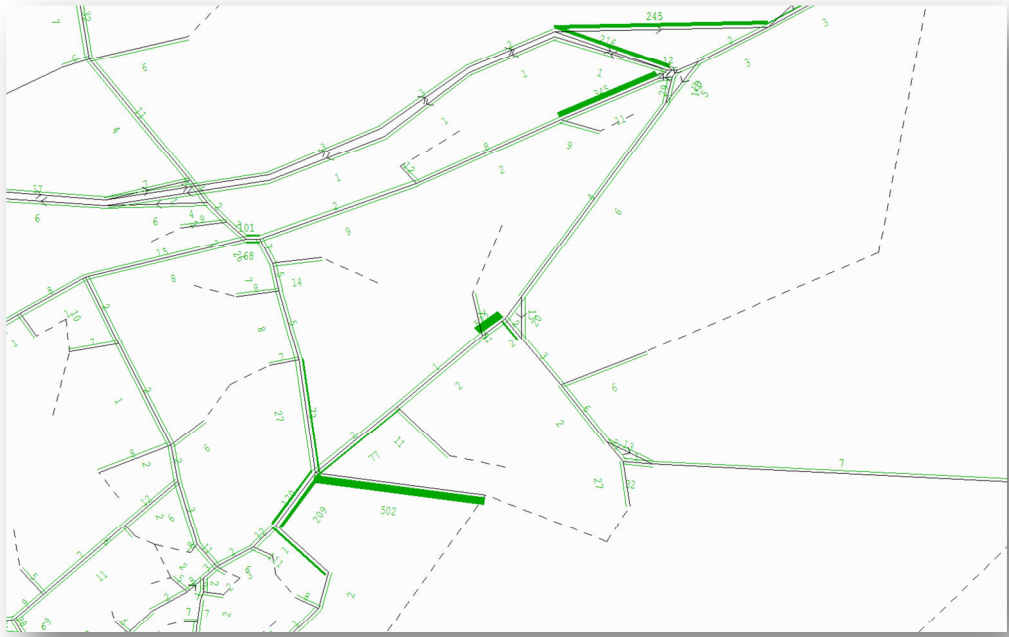


Option 4a – Option 1 (Queues)

(Comparison plot)

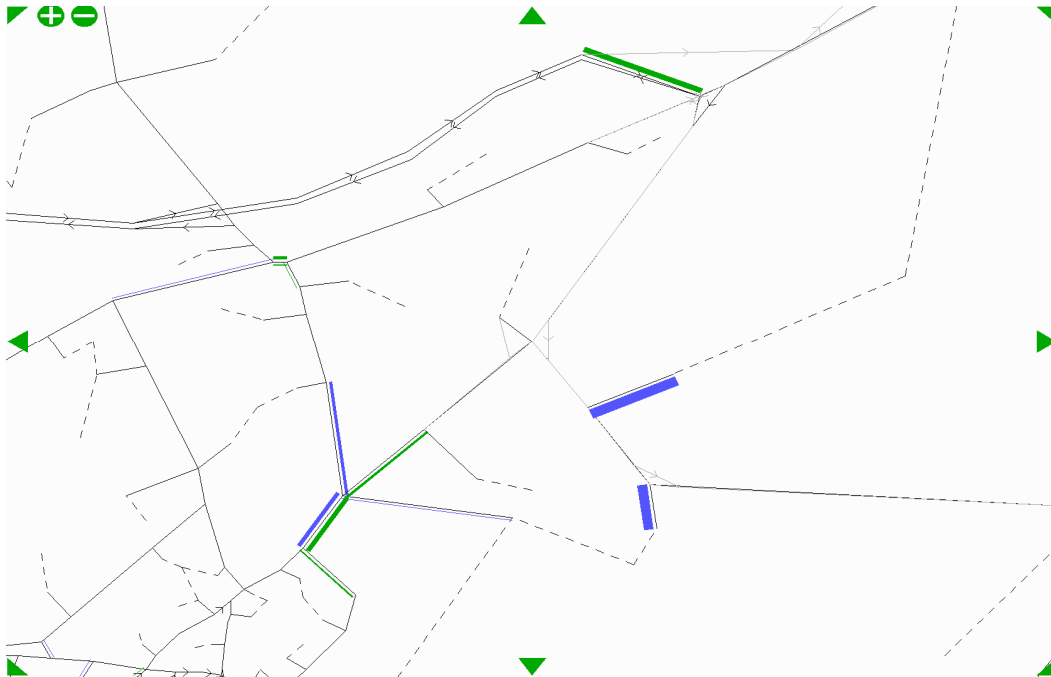


Option 4b (Delay per link)



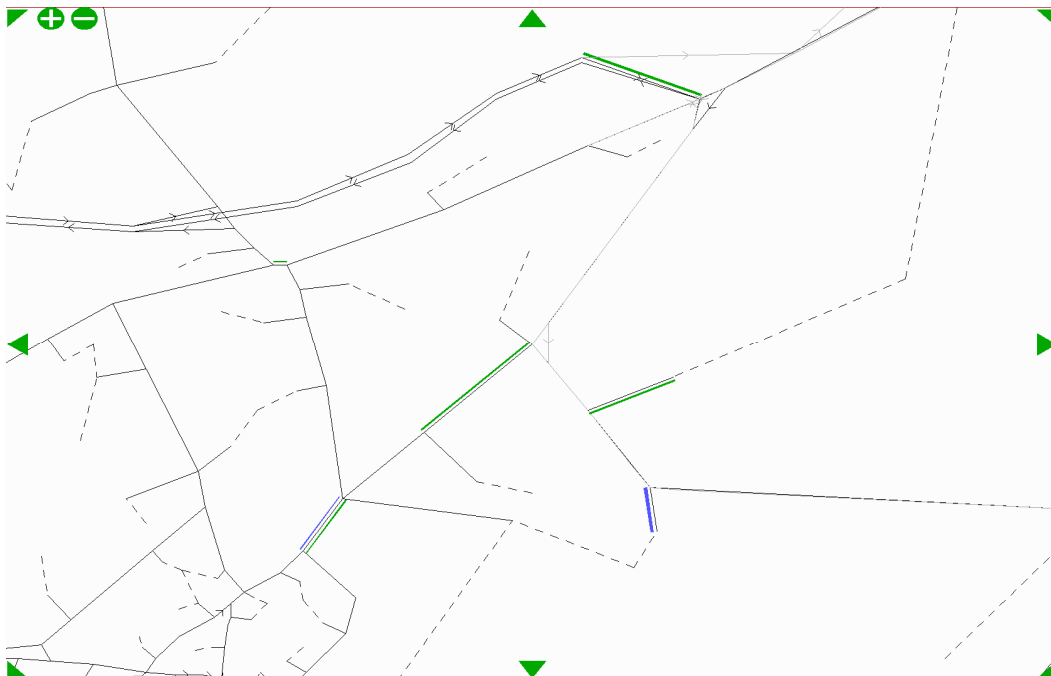
Option 4b – Option 1 (Delay)

(Comparison plot)

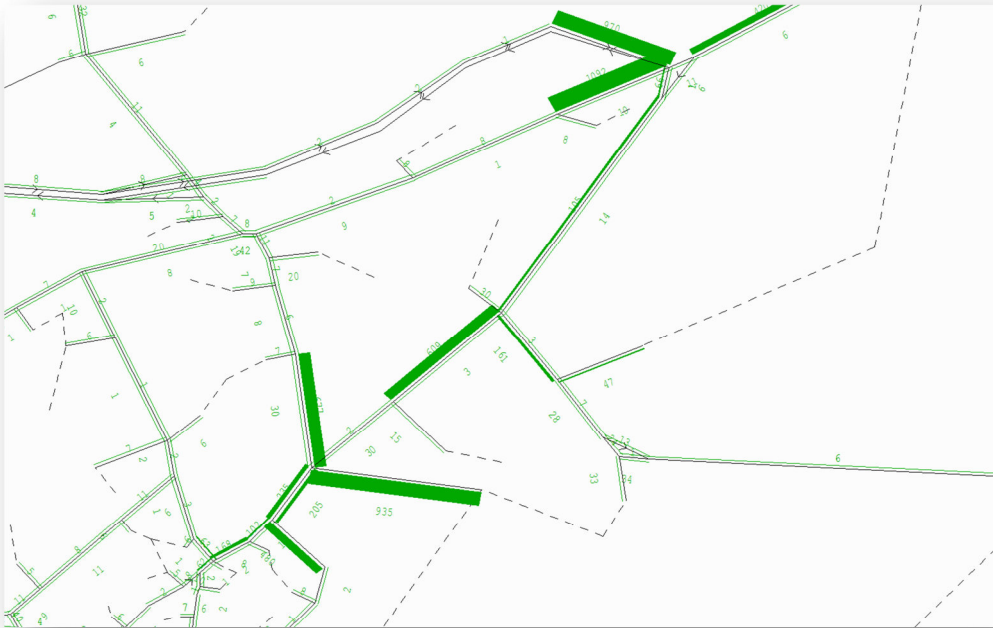


Option 4b – Option 1 (Queues)

(Comparison plot)

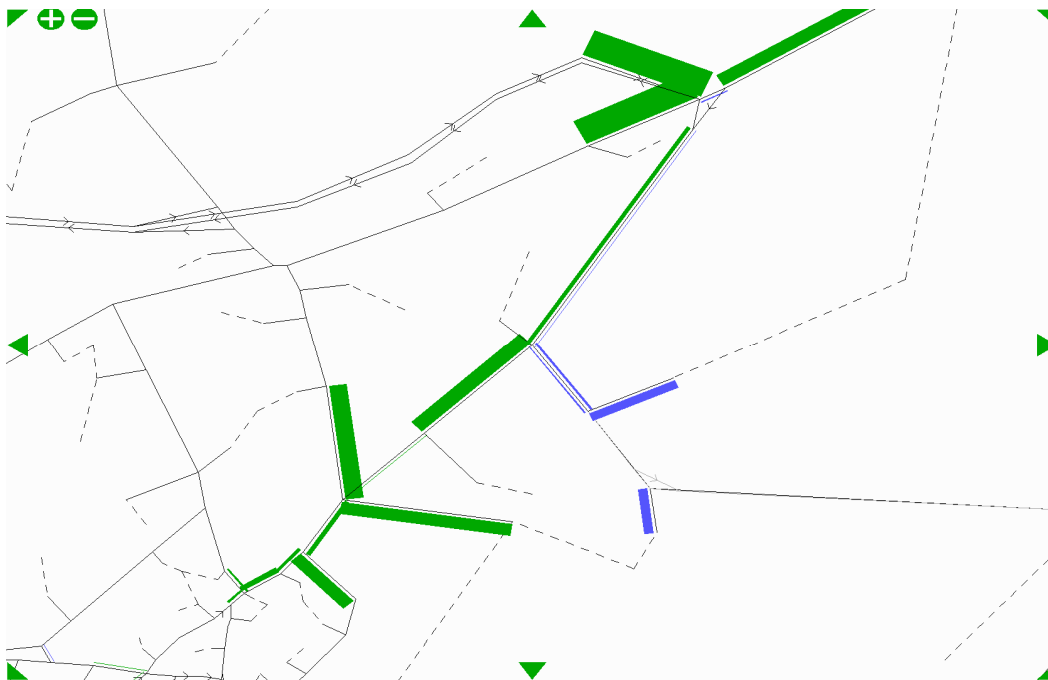


Option 5 (Delay per link)



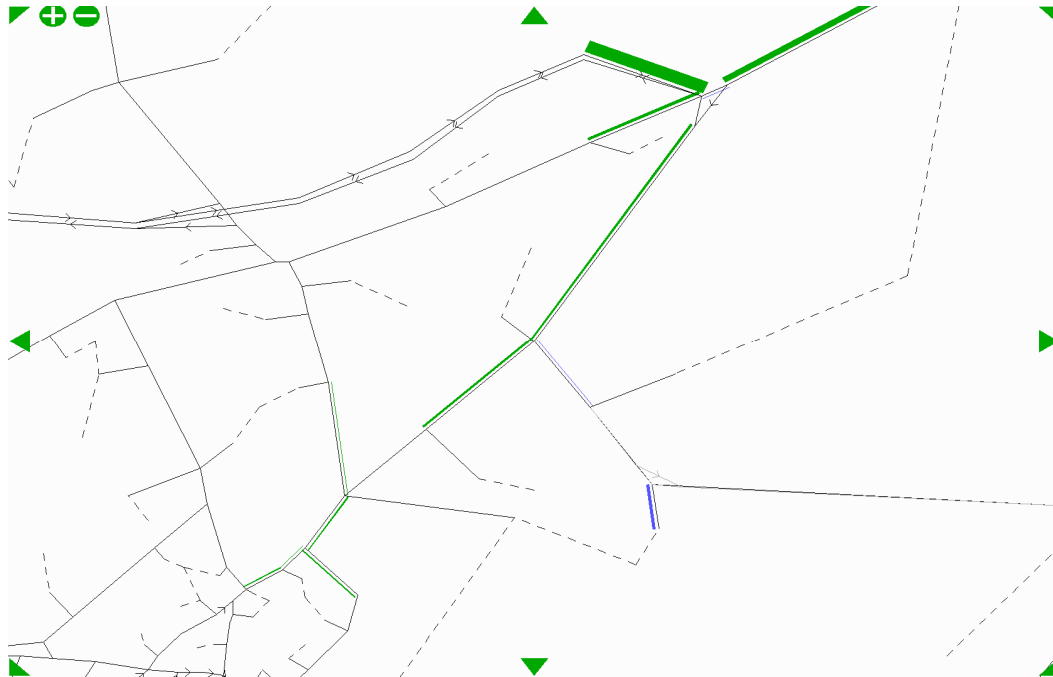
Option 5 – Option 1 (Delay)

(Comparison plot)

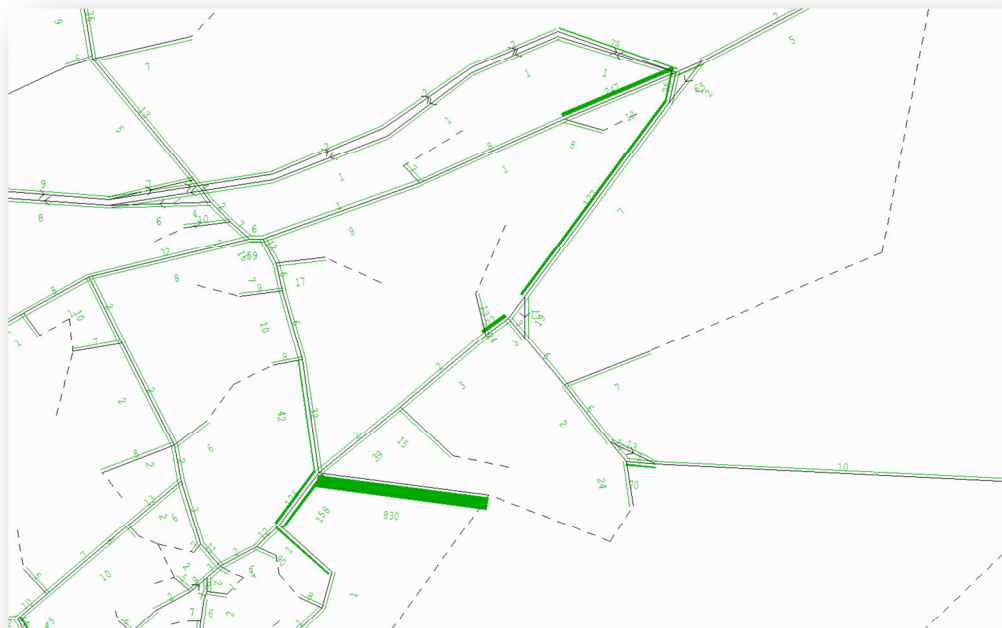


Option 5 – Option 1 (Queues)

(Comparison plot)

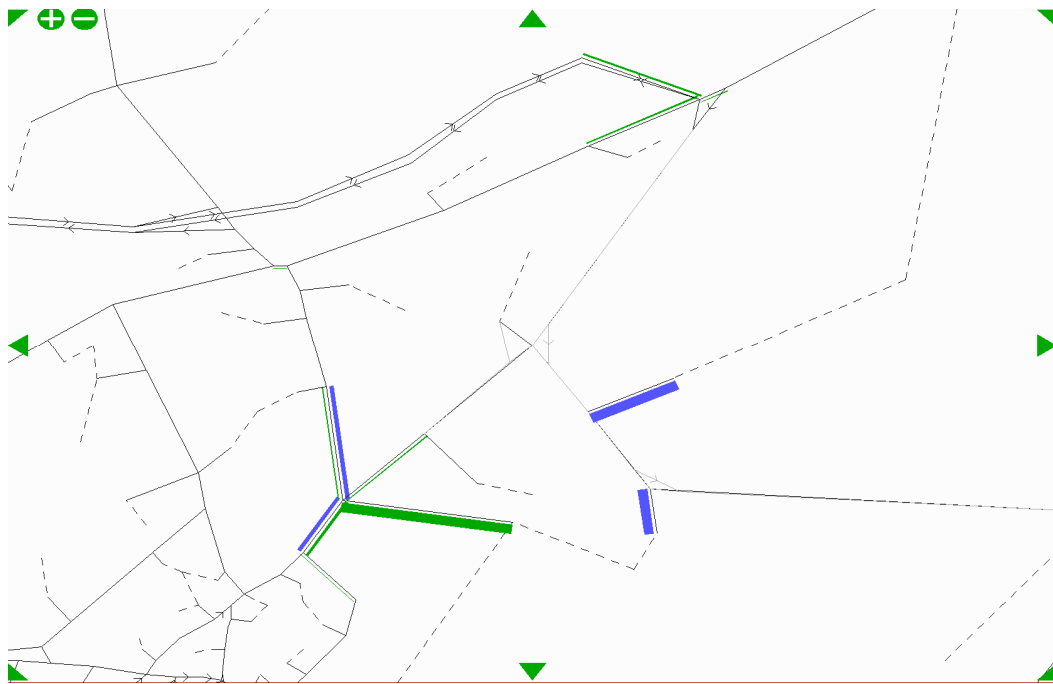


Option 6 (Delay per link)



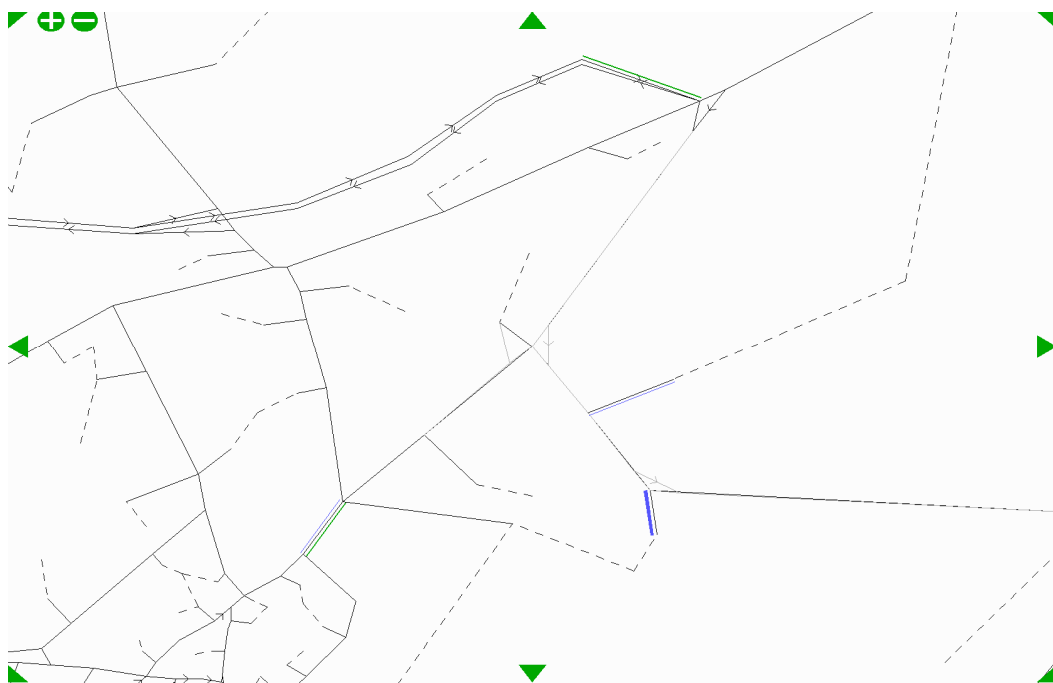
Option 6 – Option 1 (Delay)

(Comparison plot)



Option 6 – Option 1 (Queue)

(Comparison plot)



Appendix C. Full Breakdown of Costs including Assumptions

POTENTIAL NEW HIGHWAY WORKS, LODGE HILL, MEDWAY

OPTION 1 - ANTHONY'S WAY JUNCTION

HIGH LEVEL ESTIMATE FOR CONSTRUCTION WORKS OF **ANTHONY'S WAY JUNCTION** BASED ON
DRAWING REF: ILLUSTRATIVE MITIGATION REV 1 230212 AND UTILITY ENQUIRY C2 PLAN

Provisional Draft

DESCRIPTION	£
PRELIMINARIES	
Preliminaries Based on 15% of the construction works estimated costs	244,065
Traffic Management Based on 10% of the construction works estimated costs	162,710
sub total	406,775
SITE CLEARANCE	
General site clearance including any street furniture such as existing lighting and columns, existing kerbs, signs, vegetation, etc based on 3.5 hectare area assumed.	14,000
sub total	14,000
FENCING AND BARRIER	
Possible temporary fencing to protect existing trees	500
New safety barrier - allow 400m (generally to raised central reserve areas-as discussed)	50,000
New pedestrian guardrail - 300m allowed for around roundabout areas, pedestrian crossing and some adjacent c/way.	18,000
sub total	68,500
DRAINAGE	
This allows for modifying and connecting to existing drainage system as well as new chambers, gullies, pipework, connections, service ducts, raise/lower existing covers, CCTV surveys and hard breakout, etc	75,000
sub total	75,000
EARTHWORKS	
This figure is based on a similar scheme where the new alignment coincides with the existing. Therefore allowance has been made for earthworks connected with the formation of new roundabouts and slip roads to the tie in of existing carriageway, existing carriageway layer removal where required for shaping and all earthworks to provide designed formation levels generally including excavation, fill and hard breakout	500,000
sub total	500,000
PAVEMENTS	

<p>An allowance has been made for a mixture of full depth construction for junction and new slip road construction where required together with planing off and resurfacing with 50mm thick surface course over existing construction to new profiles. (as discussed)</p> <p>It has been assumed that there will be approximately 10,000 square metres of new surface area required.</p> <p>The construction is based on 3.6m wide lanes in junction and 3.6m wide lanes, 2.5m wide central reserve and 1m hard strip to c/way tie ins.</p>	<p>425,000</p>
sub total	425,000
<u>KERBS AND FOOTWAYS</u>	
<p>Assume 1,500m of new precast concrete kerbs (to both sides of c/way slips tie ins and roundabouts).</p>	<p>45,000</p>
<p>Assumed central reserve construction to c/way tie ins, therefore allow 1,000 square metres.</p>	<p>25,000</p>
<p>Assumed 2,000 square metres of footway construction to each side of carriageway slips to tie in. Footway based on granular sub base with asphalt surfacing and concrete edgings.</p>	<p>60,000</p>
sub total	130,000
<u>TRAFFIC SIGNS AND ROAD MARKINGS</u>	
<p>Advance Directional signs - assumed 2 no.</p>	<p>5,000</p>
<p>R/Bout chevron signs, Bus Lane signs, etc allow 6 no.</p>	<p>2,000</p>
<p>Continuous line - assume 1,500m</p>	<p>3,000</p>
<p>intermittant line - assume 800m</p>	<p>1,600</p>
<p>miscellaneous lines, hatching, symbols, letters, studs at crossings,etc</p>	<p>3,000</p>
<p>Traffic Signals Anthony's Way junction - all arms and slip lne</p>	<p>75,000</p>
sub total	89,600
<u>STREET LIGHTING</u>	
<p>Allow 6 no new 12m high columns</p>	<p>15,000</p>
<p>Allow 10 no re-install previously set aside</p>	<p>10,000</p>
sub total	25,000
<u>ELECTRICAL WORK</u>	
<p>Allowance for electrical work to lighting, signs and traffic signals</p>	<p>40,000</p>
sub total	40,000
<u>STRUCTURES</u>	
<p>Anthony's Way - Steel Footbridge</p>	<p>250,000</p>
sub total	250,000

<u>LANDSCAPING</u>		
	Allow sum for landscaping	10,000
	sub total	10,000
	Estimated construction costs	1,627,100
	TOTAL	2,033,875
	Add 10% contingency on estimated construction costs	162,710
	GRAND TOTAL	2,196,585
	say	£ 2,200,000
<u>UTILITIES</u>		
	Statutory Undertakers: The following figures are very high level only, based on plans provided by the relevant Utility Company (C2 enquiry level) showing existing services where known. The actual diversions required as yet are unknown therefore an assumption has been made to divert services where they are in or adjacent the works, with a ball park figure used at this stage to allow for the works that may be involved.	
	Utility:	
	BT Openreach	80,000
	Virgin Media	80,000
	Southern Water	80,000
	National Grid	140,000
	Southern Gas	-
	EDF	(awaited)
	Utility total	380,000
<u>EXCLUSIONS</u>	The following items have been excluded from the cost estimate:	
	VAT	
	All allowance for risk	
	Price escalation beyond base date	
	Finance costs	
	Optimism bias uplift	
	Planning approval costs	
	Archeology	
	Costs associated with unforeseen ground conditions or obstructions	
	Costs associated with protestors	
	Land acquisition and compensation costs (Section 106 and 278)	
	Acquisition of land outside site boundary	
	Remediation	
	Property surveys and monitoring	
	Statutory Utilities (unless shown separately above)	
	Geotechnical investigations	
	Disposal/treatment of contaminated spoil (Japanese knotweed, etc)	
	Asbestos	
	Real time information	
	Temporary Traffic Regulation Orders	
	Traffic Regulation Orders	

Stopping up orders
Land purchase
Topographical Surveys
Consultants fee
Site supervision
Lane Rental Agreements
Nighttime working

POTENTIAL NEW HIGHWAY WORKS, LODGE HILL, MEDWAY

OPTION 2 - SAN PAREIL AND ANTHONY'S WAY JUNCTIONS

HIGH LEVEL ESTIMATE FOR CONSTRUCTION WORKS OF **SAN PAREIL AND ANTHONY'S WAY JUNCTIONS**
 BASED ON DRAWING REF: ILLUSTRATIVE MITIGATION REV 1 230212 AND UTILITY ENQUIRY C2 PLAN

Provisional Draft

DESCRIPTION	£
<u>PRELIMINARIES</u>	
Preliminaries Based on 15% of the construction works estimated costs	518,340
Traffic Management Based on 10% of the construction works estimated costs	345,560
sub total	863,900
<u>SITE CLEARANCE</u>	
General site clearance including any street furniture such as existing lighting and columns, existing kerbs, signs, vegetation, etc based on 3.5 hectare area assumed. (AW)	14,000
General site clearance including any street furniture such as existing lighting and columns, existing kerbs, signs, vegetation, etc based on 5 hectare area assumed. (SP)	20,000
sub total	34,000
<u>FENCING AND BARRIER</u>	
Possible temporary fencing to protect existing trees (SP and AW)	1,000
New safety barrier - allow 400m (WA) and 500m (SP) (generally to raised central reserve areas-as discussed)	112,500
New pedestrian guardrail - 300m (AW) and 400m (SP) allowed for around roundabout areas, pedestrian crossing and some adjacent c/way.	42,000
sub total	155,500
<u>DRAINAGE</u>	
This allows for modifying and connecting to existing drainage system as well as new chambers, gullies, pipework, connections, service ducts, raise/lower existing covers, CCTV surveys and hard breakout, etc (AW £75K, SP £95k)	170,000
sub total	170,000
<u>EARTHWORKS</u>	
This figure is based on a similar scheme where the new alignment coincides with the existing. Therefore allowance has been made for earthworks connected with the formation of new roundabouts and slip roads (and side road for SP) to the tie in of existing carriageway, existing carriageway layer removal where required for shaping and all earthworks to provide designed formation levels generally including excavation, fill and hard breakout. (AW £500K, SP £700K)	1,200,000

	sub total	1,200,000
<u>PAVEMENTS</u>	<p>An allowance has been made for a mixture of full depth construction for junction and new slip road construction where required together with planing off and resurfacing with 50mm thick surface course over existing construction to new profiles. (as discussed) (AW £425K, SP £600K)</p> <p>It has been assumed that there will be approximately 10,000 square metres of new surface area required (AW)and 15,000 sq. m for SP The construction is based on 3.6m wide lanes in junction and 3.6m wide lanes, 2.5m wide central reserve and 1m hard strip to c/way tie ins. Side road additional to SP.</p>	1,025,000
	sub total	1,025,000
<u>KERBS AND FOOTWAYS</u>	<p>Assume 1,500m (AW) and 2,000m (SP) of new precast concrete kerbs (to both sides of c/way slips tie ins and roundabouts).</p> <p>Assumed central reserve construction to c/way tie ins, therefore allow 1,000 square metres (AW) and 1,000sq.m (SP)</p> <p>Assumed 2,000 square metres (AW) and 2,500 sq.m (SP) of footway construction to each side of carriageway slips to tie in. Footway based on granular sub base with asphalt surfacing and concrete edgings.</p>	105,000
		50,000
		135,000
	sub total	290,000
<u>TRAFFIC SIGNS AND ROAD MARKINGS</u>	<p>Advance Directional signs - assumed 2 no AW, 2 no SP</p> <p>R/Bout chevron signs, Bus Lane signs, etc allow 6 no AW, 6 no SP</p> <p>Continuous line - assume 1,500m (AW) and 2000m (SP) intermittant line - assume 800m (AW) and 1000m (SP) miscellaneous lines, hatching, symbols, letters, studs at crossings,etc (AW £3K, SP £3.5K)</p> <p>Traffic Signals Anthony's Way junction - all arms and slip lne San Pareil junction - all arms and slip lne</p>	10,000
		4,000
		7,000
		3,600
		6,500
		75,000
		75,000
	sub total	181,100
<u>STREET LIGHTING</u>	<p>Allow 12 no new 12m high columns (6 AW, 6 SP)</p> <p>Allow 20 no re-install 65 no columns previously set aside (10 AW, 10 SP)</p>	30,000
		20,000

	sub total	50,000																					
<u>ELECTRICAL WORK</u>	Allowance for electrical work to lighting, signs and traffic signals. (AW £40K, SP £40K)	80,000																					
	sub total	80,000																					
<u>STRUCTURES</u>	Anthony's Way - Steel Footbridge	250,000																					
	sub total	250,000																					
<u>LANDSCAPING</u>	Allow sum for landscaping (AW £10K, SP £10K)	20,000																					
	sub total	20,000																					
	Estimated construction costs	3,455,600																					
	TOTAL	4,319,500																					
	Add 10% contingency on estimated construction costs	345,560																					
	GRAND TOTAL	4,665,060																					
	say	£ 4,670,000																					
<u>UTILITIES</u>	<p>Statutory Undertakers: The following figures are very high level only, based on plans provided by the relevant Utility Company (C2 enquiry level) showing existing services where known. The actual diversions required as yet are unknown therefore an assumption has been made to divert services where they are in or adjacent the works, with a ball park figure used at this stage to allow for the works that may be involved.</p> <p>Utility:</p> <table> <tr> <td>BT Openreach</td> <td>(AW £80K, SP £80K)</td> <td style="text-align: right;">160,000</td> </tr> <tr> <td>Virgin Media</td> <td>(AW £80K, SP £20K)</td> <td style="text-align: right;">100,000</td> </tr> <tr> <td>Southern Water</td> <td>(AW £80K, SP £100)</td> <td style="text-align: right;">180,000</td> </tr> <tr> <td>National Grid</td> <td>(AW £140K, SP £150K)</td> <td style="text-align: right;">290,000</td> </tr> <tr> <td>Southern Gas</td> <td>(SP only affected)</td> <td style="text-align: right;">100,000</td> </tr> <tr> <td>EDF</td> <td></td> <td style="text-align: right;">(awaited)</td> </tr> <tr> <td colspan="2" style="text-align: right;">Utility total</td> <td style="text-align: right;">830,000</td> </tr> </table>		BT Openreach	(AW £80K, SP £80K)	160,000	Virgin Media	(AW £80K, SP £20K)	100,000	Southern Water	(AW £80K, SP £100)	180,000	National Grid	(AW £140K, SP £150K)	290,000	Southern Gas	(SP only affected)	100,000	EDF		(awaited)	Utility total		830,000
BT Openreach	(AW £80K, SP £80K)	160,000																					
Virgin Media	(AW £80K, SP £20K)	100,000																					
Southern Water	(AW £80K, SP £100)	180,000																					
National Grid	(AW £140K, SP £150K)	290,000																					
Southern Gas	(SP only affected)	100,000																					
EDF		(awaited)																					
Utility total		830,000																					
<u>EXCLUSIONS</u>	<p>The following items have been excluded from the cost estimate:</p> <p>VAT All allowance for risk Price escalation beyond base date Finance costs Optimism bias uplift Planning approval costs Archeology Costs associated with unforeseen ground conditions or obstructions Costs associated with protestors Land acquisition and compensation costs (Section 106 and 278) Acquisition of land outside site boundary</p>																						

Remediation
Property surveys and monitoring
Statutory Utilities (unless shown separately above)
Geotechnical investigations
Disposal/treatment of contaminated spoil (Japanese knotweed, etc)
Asbestos
Real time information
Temporary Traffic Regulation Orders
Traffic Regulation Orders
Stopping up orders
Land purchase
Topographical Surveys
Consultants fee
Site supervision
Lane Rental Agreements
Nighttime working

POTENTIAL NEW HIGHWAY WORKS, LODGE HILL, MEDWAY

OPTION 3 - Four Elms, San Pareil and Anthony's Way

HIGH LEVEL ESTIMATE FOR CONSTRUCTION WORKS BASED ON DRAWING REF: ILLUSTRATIVE MITIGATION

REV 1 230212 AND UTILITY ENQUIRY C2 PLAN

Provisional Draft

DESCRIPTION	£
PRELIMINARIES	
Preliminaries Based on 15% of the construction works estimated costs	1,343,475
Traffic Management Based on 10% of the construction works estimated costs	895,650
sub total	2,239,125
SITE CLEARANCE	
General site clearance including any street furniture such as existing lighting and columns, existing kerbs, signs, vegetation, etc based on 20 hectare area assumed.	80,000
Demolition of existing Bridge construction in Upchant Lane	10,000
sub total	90,000
FENCING AND BARRIER	
Possible temporary fencing to protect existing trees	5,000
New safety barrier - allow 2000m (generally to raised central reserve areas-as discussed)	240,000
New pedestrian guardrail - 1000m allowed for around roundabout areas, pedestrian crossing and some adjacent c/way.	60,000
sub total	305,000
DRAINAGE	
This allows for modifying and connecting to existing drainage system as well as new chambers, gullies, pipework, connections, service ducts, raise/lower existing covers, CCTV surveys and hard breakout, etc	600,000
sub total	600,000
EARTHWORKS	
This figure is based on a similar scheme where the new alignment coincides with the existing. Therefore allowance has been made for earthworks connected with the formation of new roundabouts, slips and side road to the tie in of existing carriageway, existing carriageway layer removal where required, re shaping at Upchant Lane on and off slips, all earthworks to provide designed formation levels generally including excavation, fill and hard breakout	2,000,000
sub total	2,000,000

<u>PAVEMENTS</u>	An allowance has been made for a mixture of full depth construction for main carriageway and new slip/side road construction where required together with planing off and resurfacing with 50mm thick surface course over existing construction to new profiles. (as discussed) It has been assumed that there will be approximately 80,000 square metres of new surface area required. The construction is based on 3.6m wide lanes, 2.5m wide central reserve and 1m hard strip	3,150,000
	sub total	3,150,000
<u>KERBS AND FOOTWAYS</u>	Assume 10,000m of new precast concrete kerbs (to both sides of c/way, slips, side roads and roundabouts)	300,000
	Assumed central reserve construction all through, therefore allow 6,000 square metres.	150,000
	Assumed 12,500 square metres of footway construction to each side of carriageway. Footway based on granular sub base with asphalt surfacing and concrete edgings.	375,000
	sub total	825,000
<u>TRAFFIC SIGNS AND ROAD MARKINGS</u>	Advance Directional signs - assumed 10 no. R/Bout chevron signs, Bus Lane signs, etc allow 20 no.	25,000 6,000
	Continuous line - assume 10,000m intermittant line - assume 4000m	20,000 8,000
	miscellaneous lines, hatching, symbols, letters, studs at crossings,etc	10,000
Traffic Signals	Four Elms junction - all arms and slip lane Sans Pareil junction - all arms and slip lane Anthony's Way junction - all arms and slip lne	90,000 75,000 75,000
	sub total	309,000
<u>STREET LIGHTING</u>	Assume 130 units required to light scheme. Allow 65 no new 12m high columns Allow 65 no re-install 65 no columns previously set aside	162,500 65,000
	sub total	227,500
<u>ELECTRICAL WORK</u>		

	Allowance for electrical work to lighting, signs and traffic signals	250,000
	sub total	250,000
<u>STRUCTURES</u>		
	New roadbridge required to replace existing in Upchant Lane. Assumed 30m long with 10m wide deck, in reinforced concrete deck on precast concrete deck beams and reinforced concrete abutments.	600,000
	2 no. new structural steel footbridges with concrete foundations (Four Elms and Anthony's Way) max span 20m.	
	Four Elms	250,000
	Anthony's Way	250,000
	sub total	1,100,000
<u>LANDSCAPING</u>		
	Allow sum for landscaping	100,000
	sub total	100,000
	Estimated construction costs	8,956,500
	TOTAL	11,195,625
	Add 10% contingency on estimated construction costs	895,650
	GRAND TOTAL	12,091,275
	say	12,100,000
<u>UTILITIES</u>		
	Statutory Undertakers: The following figures are very high level only, based on plans provided by the relevant Utility Company (C2 enquiry level) showing existing services where known. The actual diversions required as yet are unknown therefore an assumption has been made to divert services where they are in or adjacent the works, with a ball park figure used at this stage to allow for the works that may be involved.	
	Utility:	
	BT Openreach	700,000
	Virgin Media	220,000
	Southern Water	500,000
	National Grid	750,000
	Southern Gas	300,000
	EDF	(awaited)
	Utility total	2,470,000
	The above estimate is based on a construction length of approximately 2.5km	

EXCLUSIONS

The following items have been excluded from the cost estimate:

VAT

All allowance for risk

Price escalation beyond base date

Finance costs

Optimism bias uplift

Planning approval costs

Archeology

Costs associated with unforeseen ground conditions or obstructions

Costs associated with protestors

Land acquisition and compensation costs (Section 106 and 278)

Acquisition of land outside site boundary

Remediation

Property surveys and monitoring

Statutory Utilities (unless shown separately above)

Geotechnical investigations

Disposal/treatment of contaminated spoil (Japanese knotweed, etc)

Asbestos

Real time information

Temporary Traffic Regulation Orders

Traffic Regulation Orders

Stopping up orders

Land purchase

Topographical Surveys

Consultants fee

Site supervision

Lane Rental Agreements

Nighttime working

Appendix D. Economic Transport Appraisal

Value for money assessment of Medway schemes for LTB prioritisation

Prepared by: Peter Brett Associates LLP

Prepared for: Medway Council

Date: 9 May 2013

Project no: 28729

Contents

Four Elms, Sans Pareil and St Anthony's Way Roundabouts

Darnley Arch

Chatham Railway Station

River Taxi to Medway City Estate

1. Four Elms, Sans Pareil and St Anthony's Way Roundabouts

Introduction

The objective of the scheme is to increase highway capacity on the western approach to the Medway Tunnel and into the Medway City Estate. The tunnel the northern crossing of the river Medway, Traffic wishing to use the tunnel but unable to get through the roundabouts on the western side has to make a lengthy alternative route to use the alternative crossings; the A2 over Rochester Bridge or the M2 over the Medway Bridge. Hence the time saving achieved per vehicle by increasing the capacity at these roundabouts and hence the number of vehicles that can use the Medway tunnel is considerable. The scheme also improves access times into and out of the large employment area on the Medway City Estate.

Three versions of the scheme were tested:

- Improvements to St Anthony's Way only.
- Improvements to Sans Pareil and St Anthony's Way roundabout
- Improvements to Four Elms, Sans Pareil and St Anthony's Way roundabout

These schemes involved modifications to the three roundabouts and the links between them as shown in figure 1 overleaf.

The three schemes were tested using Medway Council's highway model. The model's base year, 2008 and its forecast year 2026. The future year matrices did not include any development at Lodge Hill. The background growth in trips came from the changes in population and employment in the area and vehicle trip rates used in the DfT's National Transport Model and distributed as Temprow 5.4 forecasts. The model uses Saturn software and is available for the am peak hour, 8am – 9am.

Scheme costs

The high level cost estimates for the scheme are shown in table 1 below. These costs apply only to the construction costs. The full breakdown of costs and a list of excluded items is included in Appendix 1. The costs are for 2013 Q1.

In WebTAG Unit 3.5.9: The Estimation and Treatment of Scheme Costs, the DfT outline the need to make explicit allowance for risk in cost estimates and then to add an additional amount for optimism bias. For the purposes of the appraisal a 25% uplift has been applied to allow for risk. It is recommended that a quantified risk assessment is carried out and that the cost of some excluded items, such as utilities cost awaited from EDF, is added into the costings. As the scheme is a road scheme at the programme entry level of development, optimism bias is added at the rate of 44%.

This gives a total capital cost, including risk, of:

- £3.80 for option 1, St Anthony's Way roundabout alone.
- £7.36m for option 2, Sans Pareil and St Anthony's Way
- £17.81m for option 3, Four Elms, Sans Pareil and St Anthony's Way

With optimism bias this rises to;

- £5.47 for option 1, St Anthony's Way roundabout alone.
- £10.60m for option 2, Sans Pareil and St Anthony's Way
- £25.65m for option 3, Four Elms, Sans Pareil and St Anthony's Way

An annual maintenance and operations cost of £25,000 for option 1, £50,000 for option 2 and is £125,000 for option 3 assumed in the appraisal.

Item	St Anthony's Way	Sans Pareil and St Anthony's Way	Four Elms, Sans Pareil and St Anthony's Way
Preliminaries and traffic management	406,775	863,900	1791300
Site clearance	14,000	34,000	90000
Fencing and barriers	68,500	155,500	305000
Drainage	75,000	170,000	600000
Earthworks	500,000	1,200,000	2000000
Pavements	425,000	1,025,000	3150000
Kerbs and footways	130,000	290,000	825000
Signs and signals	89,600	181,100	309000
Lighting	25,000	50,000	227500
Electrical work	40,000	80,000	250000
Structures (footbridge)	250,000	250,000	1100000
Landscaping	10,000	20,000	100000
Link	500,000	500,000	500,000
Contingencies at 10%	203,388	481,950	1,124,780
Utilities	380,000	830,000	2,470,000
Risk allowance at 20%	3,800,715	7,357,740	17,811,096
Total, incl. 44% optimism bias	5,473,030	10,595,146	25,647,978

Table 1: Scheme costs, Sans Pareil and St Anthony's Way

The benefit cost ratio of each of the options was calculated using the DfT's TUBA software version 1.9.0. all figures are quoted in £'000s, in 2010 values and prices. The appraisal is carried out for 60 years, using a discount rate of 3.5% for the first 30 years and 30% for the next thirty years. All the costs were attributed to the public sector. If a third party contribution was available the benefit cost ratio to the public sector would rise.

The Medway transport model provide trip matrices and journey time and distance skims for cars, light goods vehicles and heavy goods vehicles for the morning peak hour of 8am – 9 am. Given the high volume of traffic throughout the day it was assumed that this would apply for three hours in the am peak and three hours in the pm peak. An annualisation factor of 300 was used.

The model years were 2008 and 2026. The opening year used for the scheme was 2017.

At this stage no allowance has been made for delays to existing traffic during the course of the construction works.

The results of the economic appraisal as produced by TUBA are shown as follows:

Benefit cost ratios

Option 1: St Anthony's Way	12.89
Option 2: Sans Pareil and St Anthony's Way	15.09
Option 3: Four Elms, Sans Pareil and St Anthony's Way	4.11

Present Value Benefits

Option 1: St Anthony's Way	85.11
Option 2: Sans Pareil and St Anthony's Way	193.53
Option 3: Four Elms, Sans Pareil and St Anthony's Way	128.01

Present Value Costs

Option 1: St Anthony's Way	6.60
Option 2: Sans Pareil and St Anthony's Way	12.83
Option 3: Four Elms, Sans Pareil and St Anthony's Way	31.16

