6. ECONOMIC APPRAISAL

6.1 Introduction

6.1.1 The end outputs from this analysis are presented in standard WebTAG 2010 prices, discounted to 2010. The WebTAG databook (November 2018) has been referred to, applying the appropriate deflator and discounting values. These and other core assumption parameter values are presented in Section 6.19 in the annex to this value for money assessment.

6.1.2 This analysis has been conducted on a uni-modal basis, using the Aimsun strategic model outputs and Project Team derived scheme costs.

6.2 Scheme & appraisal outline

6.2.1 The 'Do-Less' scheme is described within this business case. It comprises a new Relief Road along with improvements to junctions and links on the A228 and A289. These measures increase network capacity and alleviate a bottleneck on the single access route into the Hoo Peninsula.

6.2.2 Aside from the highway network capacity improvements for car, light goods vehicles (LGV) and heavy goods vehicles (HGV) users, there are proposed ancillary works to support cycling, and an assumption of increased bus use due to market forces.

6.2.3 Scheme proposals currently only include a sufficient level of detail on the highway elements to be able to appraise the benefits in relation to the link road itself.

6.2.4 With respect to ancillary elements:

- Cycle route improvements have been included within the overall scheme costs (base cost estimate £1m), but no specific benefits derived;
- A transfer to bus from highway has been assumed, based on case study analysis combined with considerations of Council aspirations and critical mass potential to support additional services. This modal shift to bus has been incorporated within the Aimsun modelling, but no specific bus user benefits have been derived; and
- Mitigation works (including screening and acoustic fencing) have been costed for at a high level (£2m in total), but there is insufficient detail to account for the associated benefits.

6.3 Appraisal Methodology – Benefits Approach Overview

6.3.1 The appraisal methodology employed follows WebTAG guidelines in assessing the direct scheme impact and dependent development impact separately. Table 1 within TAG Unit A2.2 identifies the relevant scenarios.

Table 6.1 - Combination of Scenarios

	Without Dependent Development	With Dependent Development
Without Transport Scheme	P	Q
With Transport Scheme	S	R

6.3.2 There are three broad categories of benefits to be considered;

i. S vs. P (where S = DL or DS, P = DM). This captures the direct Transport Benefits from the scheme to existing users.

ii. R vs. S (where R = DL or DS, S = DM). This captures the Transport External Costs (Disbenefits) from the congestion impact of the additional housing.

iii. R vs. P (where R = DL or DS, P = DM). This captures the Environmental and Social Impacts including local air quality, CO2 and accidents.

6.3.3 The first two elements are captured in this appraisal through TUBA analysis alone. The direct scheme Transport Benefits are based on model runs with and without the scheme without the dependent development. The Transport External Costs compare the change in travel costs with the scheme but without or with the dependent development, considering how this change in cost impacts on the existing users (non-dependent demand).

6.3.4 The third element is captured through applying marginal external costs to the change in vehicle kilometres, plus TUBA based CO2 outputs. It compares the social and environmental cost (disbenefit) impact with the dependent development and with the scheme, against the without dependent development and without the scheme scenario.

6.4 Appraisal Methodology – Inputs

6.4.1 A strategic Aimsun model has been used to assess the impact of the scheme and changes in demand arising from the modal shift and proposed housing developments. Details of the model itself and the technical changes to the model inputs to account for scheme changes, as well as derivation of modal shift and dependent development, are described in detail elsewhere.

6.4.2 The key outputs from this for the economic appraisal are the origin to destination matrices ('skims') for the alternative time periods and scenarios. For input into TUBA, these are the demand, time and distance matrices in this case (no tolls).

6.4.3 To further understand the impacts, road section by section (links and turns) data have been processed to identify changes in flow and travel delay.

6.4.4 An added use of the link data is for the marginal external costs, discussed below.

6.5 TUBA

6.5.1 The current version of DfT's standard TUBA software (version 1.9.12) has been used to monetise the direct cost impacts on highway users, with respect to changes in time and distance. Standard TUBA values of times and vehicle operating costs parameters have been maintained.

6.5.2 The Aimsun model reflects a central peak hour for the AM, Inter-Peak and PM peak periods. Previous work with the model has identified model hour to peak period multipliers to approximate the daily benefits / disbenefits, these ratios are[4]:

- AM, 1.99;
- Inter-Peak, 7.00; and
- PM, 1.91

6.6 Marginal External Costs (MECs)

6.6.1 Given the time constraints for this study and stage of work, a proportionate approach to the environmental and social impacts (costs) has been conducted. The CO2 impact is estimated through TUBA, for noise, local air quality and accidents, a marginal external cost approach has been used.

6.6.2 The parameter values have been taken from the current WebTAG databook (November 2018) Table A5.4.2. In absence of specific LGV and HGV values, these values have been applied to all vehicles. The Aimsun model links have COBA classifications, which have been used to allocate them to the corresponding link types in Table A5.4.2.

6.6.3 As with TUBA, the final modelled year reported vehicle kilometres have been carried forwards for subsequent years.

6.7 Appraisal Methodology - Costs

6.7.1 Capital costs have been received from the Project Team. These have been provided in 2018 prices and, for this study, have been converted to 2010 prices.

Capital Costs (CAPEX)

Table 6.2 -Base estimate capital costs (including 20% risk, £,000 2018 prices – excl. inflation)

Summary	2017	2018	2019	2020	2021	2022	2023	Totals
Fees & Charges / Scheme Development	£0	£175	£2,613	£2,484	£1,341	£1,341	£671	£8,625

[3] For more information on these see; https://www.southeastlep.com/project/a289-four-elms-roundabout-to-medway-tunnel-journey-time-and-network-improvements/

Relief Road Construction	£0	£0	£0	£4,304	£6,136	£4,883	£417	£15,739
A228 Highway Works	£0	£0	£0	£1,559	£3,330	£4,121	£1,603	£10,613
A289 Highway Works	£0	£0	£0	£4,611	£4,611	£4,611	£0	£13,832
Local Road Improvements	£0	£0	£0	£1,492	£746	£373	£746	£3,357
Utility Works / Enabling Works	£0	£0	£0	£16,909	£6,909	£5,182	£0	£29,000
TOTAL Scheme Construction CAPEX Cost	£0	£0	£0	£11,966	£14,823	£13,987	£2,766	£43,542
TOTAL Scheme Enabling CAPEX Cost	£0	£175	£2,613	£19,393	£8,250	£6,523	£671	£37,625
TOTAL Scheme CAPEX Cost	**£0**	**£175**	**£2,613**	**£31,359**	**£23,073**	**£20,510**	**£3,437**	**£81,167**

6.7.2 Capital costs for the economic analysis have been adjusted from their base (including 20% risk) estimates as follows:

- ★ Replacement of risk value with 44% optimism bias, in line with WebTAG unit A1.2.
- ★ Real price increase for construction works of 2% per annum above the standard deflator adjustments. This has been identified as a reasonable estimate with consideration of new works construction price increases over the last two years, as identified in ONS data[5]
- ★ Tax correction addition 19%;
- ★ Adjustment to 2010 prices; and
- ★ Discounted to 2010.

OPEX

Table 6.3 - Identified base estimate maintenance costs (2018 prices)

Summary	Proposed additional infrastructure	Existing cost per Unit	Estimated additional costs
New traffic signal installations	4	£750	£3,000
Energy estimates - new signals	4	£180	£720
CCTV traffic monitoring	5	£140	£700
VMS signs (provide as part of main scheme)	6	£290	£1,740

4 https://www.ons.gov.uk/businessindustryandtrade/constructionindustry/datasets/interimconstructionoutputpriceindices

Environment Monitoring Unit	4	£490	£1,960
Energy & maintenance estimate - new street lights estimated	50	£150	£7,500
Energy estimates - UTC costs	-	Est Sum	£1,200
Total	**£16,820**		

6.7.3 Bespoke maintenance and renewal costs have been identified for several of the anticipated additional scheme related items, as shown in the table above, but this is a subset of the total maintenance costs, which are not all available at this stage of works. Therefore, for the economic appraisal, a more robust 1.5% per annum of the total construction costs (£650,000) and a mid-life (30th year) 10% for renewal costs (£4.3m) have been assumed.

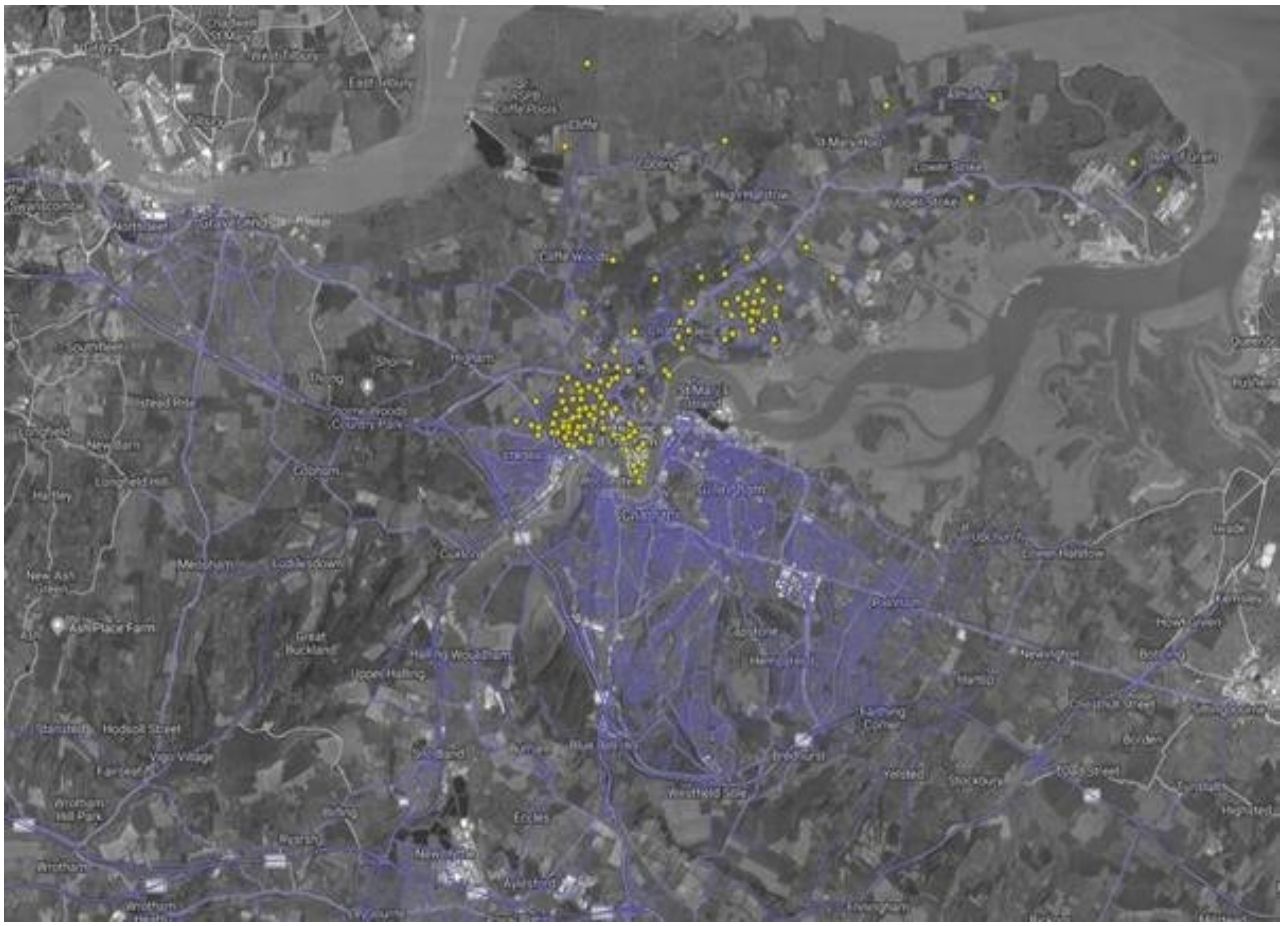
6.7.4 For the maintenance costs a 1% per annum real price increase has also been assumed; based on review of ONS maintenance cost price index data relative to the WebTAG deflator, this is considered to add to the robustness of the maintenance estimate.

6.8 Direct Scheme and Transport External Costs TUBA Results

6.8.1 TUBA summary results are presented in Section 6.22 of the annex to this economic appraisal (for both the Do-Less and Do-Something scenarios), showing the total benefit (or disbenefits) on a 2-sector basis. This has been conducted to highlight the distribution of benefits with respect to being 'internal' (sector 1 – highlighted in yellow in the figure below) or 'external' (sector 2 – the remaining blue model area in the figure). The internal area corresponds to the Aimsun model validation area for this study and contains the immediate impact area of the scheme.

6.8.2 The summary results are also presented as inclusive or exclusive of the IP perio d, as this has been identified as one of the differentiators between the Do -Less and Do-Something scenario results.

Figure 6.1- TUBA results internal (yellow) and external (blue) sectors.



6.8.3 Key findings from the Do-Less TUBA analysis are;

- Under the core scenario (all time periods included), 81% of the direct scheme benefits (SvP) are at least partially internal, sector 1 related (either 1:1, 1:2 or 2:1). Only 19% are purely external (sector 2) related. This reduces slightly with the exclusion of the IP data though.
- The housing external costs (congestion impacts) though (RvS), are 53%-55% percent purely external related.
- The environmental disbenefits (RvP) are similarly slanted towards the external area only trips, comprising 53%-65% of an equivalent TUBA run – noting that this output includes user disbenefits, which are not applicable to this analysis and are only included here for comparison of the sector distribution.
- This suggest that the scheme is operating as intended in catering for movements related to the internal area, but the dependent development housing impact is further afield.
- The scale of the external transport disbenefit is approximately three times the scale of the direct scheme impact benefits.

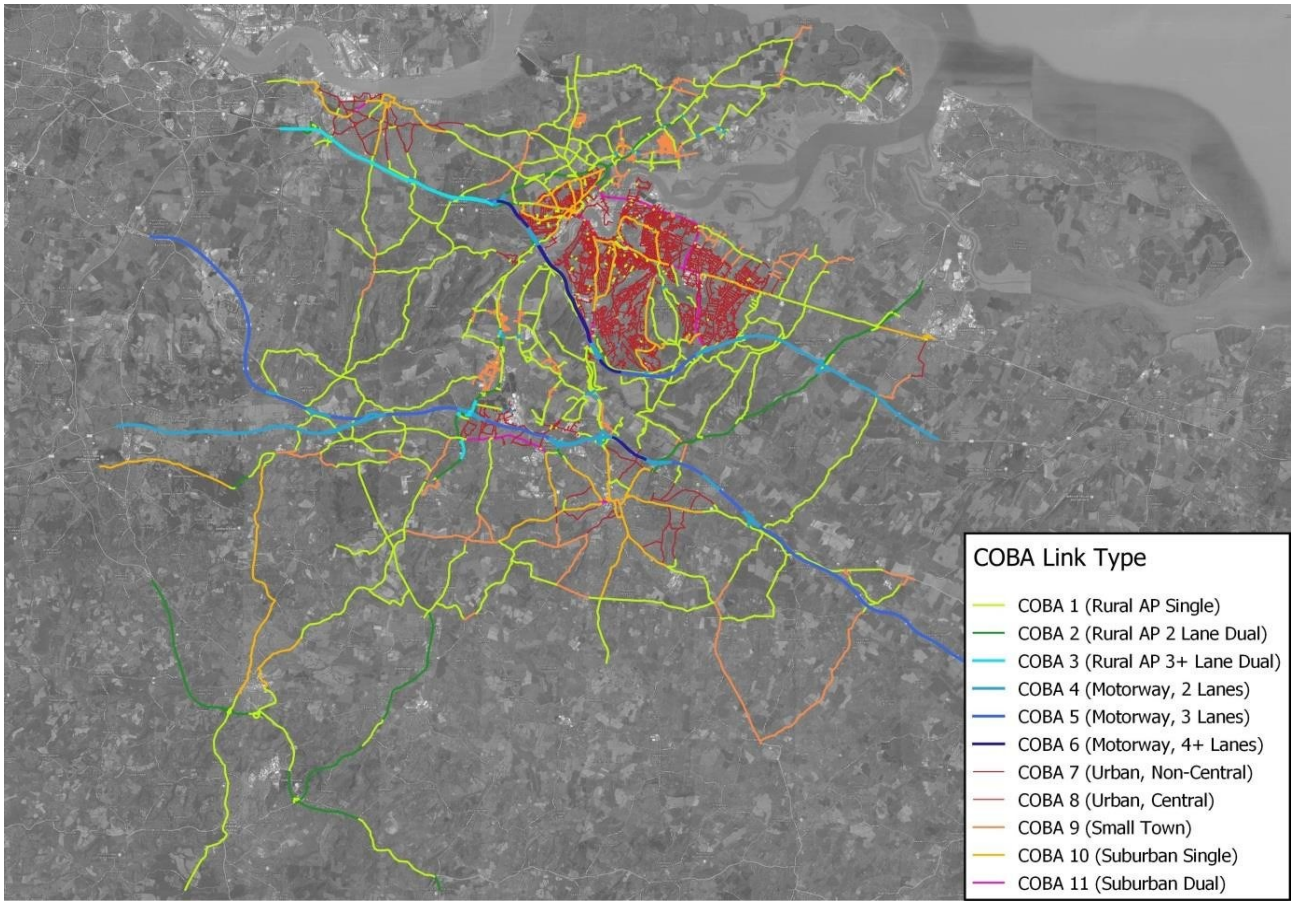
6.9 Environmental and Social External Costs

6.9.1 The environmental and social costs have been derived by applying a marginal external costs (MEC) approach. This involves applying the respective externality cost parameter to the change in vehicle kilometres between the alternate scenarios.

6.9.2 The Aimsun model links contain a COBA descriptor, which has been aligned to the closest WebTAG databook table A5.4.2 descriptor to obtain the appropriate parameters. This correspondence list and MEC parameter values are presented in Section 6.21 of the annex to the appraisal.

6.9.3 The distribution of model link types is shown in the image below;

Figure 6.2 - Traffic model link types by COBA descriptor.



6.9.4 Presented below are the net vehicle kilometres by model forecast year and time period for each link type, by scenario for the Do-Less option.

6.9.5 The analysis shows that most of the external disbenefits impact rural road types, rather than urban area road types.

Table 6.4 - Scenario 'P' vehicle kilometres by link type

Model links by COBA class	Vehicle kilometres					
	AM	AM	IP	IP	PM	PM
	2028	2035	2028	2035	2028	2035
COBA 1 (Rural AP Single)	322,652	356,778	198,975	219,856	369,138	408,631
COBA 2 (Rural AP 2 Lane Dual)	186,131	198,307	131,525	143,325	197,227	208,608
COBA 3 (Rural AP 3+ Lane Dual)	105,190	111,643	86,530	93,371	117,676	125,978
COBA 4 (Motorway, 2 Lanes)	188,253	203,334	133,766	146,220	201,981	215,393
COBA 5 (Motorway, 3 Lanes)	380,125	411,281	288,231	316,170	411,437	442,014
COBA 6 (Motorway, 4+ Lanes)	84,502	91,521	67,820	73,835	96,922	104,145
COBA 7 (Urban, Non-Central)	161,062	172,031	107,965	114,877	168,121	180,997
COBA 8 (Urban, Central)	85	98	64	65	53	54
COBA 9 (Small Town)	78,684	89,267	45,573	50,095	83,844	97,384
COBA 10 (Suburban Single)	149,318	159,791	108,679	115,223	153,616	163,428
COBA 11 (Suburban Dual)	66,456	68,901	49,240	51,732	65,063	68,493
TOTAL	**1,722,458**	**1,862,951**	**1,218,368**	**1,324,770**	**1,865,078**	**2,015,126**

Table 6.5- Scenario 'S' (Do-Less) vehicle kilometres by link type

Model links by COBA class	Vehicle kilometres					
	AM	AM	IP	IP	PM	PM
	2028	2035	2028	2035	2028	2035
COBA 1 (Rural AP Single)	322,729	356,540	198,695	219,755	367,499	408,311
COBA 2 (Rural AP 2 Lane Dual)	189,535	203,132	131,925	144,923	199,787	212,816
COBA 3 (Rural AP 3+ Lane Dual)	105,197	111,853	86,511	93,354	117,633	126,035
COBA 4 (Motorway, 2 Lanes)	188,676	203,711	133,863	146,431	201,899	215,511
COBA 5 (Motorway, 3 Lanes)	379,840	411,003	288,473	316,351	411,563	442,026
COBA 6 (Motorway, 4+ Lanes)	84,490	91,919	67,962	74,384	97,047	104,099
COBA 7 (Urban, Non-Central)	160,634	171,245	107,781	114,326	167,348	179,364
COBA 8 (Urban, Central)	81	96	67	65	53	53
COBA 9 (Small Town)	78,141	88,433	45,319	49,728	83,102	96,263
COBA 10 (Suburban Single)	149,150	159,358	108,802	114,936	153,257	162,844
COBA 11 (Suburban Dual)	66,069	68,573	49,485	51,742	64,805	68,486
TOTAL	**1,724,541**	**1,865,863**	**1,218,883**	**1,325,995**	**1,863,992**	**2,015,809**

Table 6.6 - Scenario 'R' (Do-Less) vehicle kilometres by link type

Model links by COBA class	Vehicle kilometres					
	AM	AM	IP	IP	PM	PM
	2028	2035	2028	2035	2028	2035
COBA 1 (Rural AP Single)	333,007	365,554	202,143	223,332	378,965	415,702
COBA 2 (Rural AP 2 Lane Dual)	196,039	209,682	135,166	147,538	207,029	219,015
COBA 3 (Rural AP 3+ Lane Dual)	106,376	112,240	86,874	93,697	117,791	126,353
COBA 4 (Motorway, 2 Lanes)	188,921	203,693	134,110	146,529	202,901	216,825
COBA 5 (Motorway, 3 Lanes)	380,384	411,247	288,399	316,209	412,680	443,777

COBA 6 (Motorway, 4+ Lanes)	85,715	92,662	68,245	74,555	99,593	106,433
COBA 7 (Urban, Non-Central)	160,865	171,510	108,371	114,731	168,611	180,790
COBA 8 (Urban, Central)	81	92	64	65	52	53
COBA 9 (Small Town)	80,963	91,476	46,036	50,491	85,076	98,190
COBA 10 (Suburban Single)	150,741	161,373	109,482	115,894	154,957	164,257
COBA 11 (Suburban Dual)	65,923	68,662	49,791	52,083	65,683	69,579
TOTAL	**1,749,016**	**1,888,192**	**1,228,682**	**1,335,125**	**1,893,338**	**2,040,973**

Table 6.7 - Scenario 'R' (Do-Less) minus 'P' vehicle kilometres by link type

Model links by COBA class	Veh / kms					
	AM	AM	IP	IP	PM	PM
	2028	2035	2028	2035	2028	2035
COBA 1 (Rural AP Single)	7,766	6,582	2,376	2,607	7,370	5,304
COBA 2 (Rural AP 2 Lane Dual)	7,431	8,531	2,731	3,160	7,351	7,805
COBA 3 (Rural AP 3+ Lane Dual)	889	448	258	244	86	281
COBA 4 (Motorway, 2 Lanes)	501	269	259	232	690	1,075
COBA 5 (Motorway, 3 Lanes)	194	-25	126	29	932	1,322
COBA 6 (Motorway, 4+ Lanes)	910	856	319	540	2,003	1,716
COBA 7 (Urban, Non-Central)	-148	-391	304	-110	368	-156
COBA 8 (Urban, Central)	-3	-4	0	0	-1	-1
COBA 9 (Small Town)	1,709	1,657	348	297	924	604
COBA 10 (Suburban Single)	1,067	1,186	602	503	1,006	622
COBA 11 (Suburban Dual)	-399	-179	414	263	465	814
TOTAL	**19,918**	**18,930**	**7,735**	**7,766**	**21,195**	**19,386**

Table 6.8 - Scenario 'R' (Do-Less) minus 'P' vehicle kilometres percentage of total by link type

Model links by COBA class	Vehicle kms					
	AM	AM	IP	IP	PM	PM
	2028	2035	2028	2035	2028	2035
COBA 1 (Rural AP Single)	39%	35%	31%	34%	35%	27%
COBA 2 (Rural AP 2 Lane Dual)	37%	45%	35%	41%	35%	40%
COBA 3 (Rural AP 3+ Lane Dual)	4%	2%	3%	3%	0%	1%
COBA 4 (Motorway, 2 Lanes)	3%	1%	3%	3%	3%	6%
COBA 5 (Motorway, 3 Lanes)	1%	0%	2%	0%	4%	7%
COBA 6 (Motorway, 4+ Lanes)	5%	5%	4%	7%	9%	9%
COBA 7 (Urban, Non-Central)	-1%	-2%	4%	-1%	2%	-1%
COBA 8 (Urban, Central)	0%	0%	0%	0%	0%	0%
COBA 9 (Small Town)	9%	9%	4%	4%	4%	3%
COBA 10 (Suburban Single)	5%	6%	8%	6%	5%	3%
COBA 11 (Suburban Dual)	-2%	-1%	5%	3%	2%	4%
TOTAL	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

6.10 Present Value of Benefits Summary

6.10.1 Presented below is a summary table of the contributing elements of the net PVB, adjacent the total for the Do-Less scenario.

6.10.2 It can be seen that in its own right, the direct impact of the scheme implementation is £99m (less without the Greenhouse Gas component, which is not carried forward from this SvP scenario for the overall Do-Less appraisal total). However, this is more than offset by the impacts of the dependent development on the transport external costs of -£238m and environmental / social impact -£20m.

6.10.3 The environmental and social disbenefits are primarily Greenhouse Gas (-£12.3m) and Accident (-£7.4) related.

6.10.4 The user benefits and disbenefits show a similar proportional distributional pattern in terms of trip purpose. It should be noted though that, proportionally, Commuters are affected more by the external (dependent development) development, wit h Business users proportionally less so.

Table 6.9 - Scenario 'R' (Do-Less) minus 'P' vehicle km percentage of total by link type, £m

	Total	S1vP (direct scheme impacts)	R1vS1 (dependent development transport impacts)	R1vP (net environmental impacts)
Noise	**-0.5**	0.0	0.0	-0.5
Local Air Quality	**-0.1**	0.0	0.0	-0.1
Greenhouse Gases	**-12.3**	-0.8*	-2.7*	-12.3
Journey Quality		0.0	0.0	
Physical Activity		0.0	0.0	
Accidents	**-7.4**	0.0	0.0	-7.4
Economic Efficiency: Consumer Users (Commuting)	**-61.8**	26.5	-88.4	
Economic Efficiency: Consumer Users (Other)	**-31.4**	20.7	-52.2	
Economic Efficiency: Business Users and Providers	**-49.1**	51.1	-100.3	
Wider Public Finances (Indirect Taxation Revenues)	**-7.1**	-1.5	-5.5	
Present Value of Benefits (see notes) (PVB)	**-155.6**	99.1	-237.9	-20.2

('' values don't contribute to the overall Total)*

6.11 Do Something Analysis

6.11.1 The 'Do-Something' scheme from a highway perspective is the same as the 'Do-Less' scenario. However, in addition to this highway scheme, there is an addition of a new

rail station, which induces a modal shift. The derivation of this modal shift is discussed within this report.

6.11.2 While the highway network capacity remains the same, this modal shift of existing and development related travellers, means that additional houses amongst the planned dependent development can be accommodated. The impact of the local transfer to rail will not be the same as the specific dependent development locations. So while the net level of traffic which can be accommodated by the highway network will remain the same, there will be a partial shift in the demand distribution, which will alter the junction by junction traffic assignment somewhat.

6.12 Appraisal Methodology

6.12.1 Rather than considering the rail and road impacts purely in isolation, the highway traffic model has been re-run with the impacts of the modal shift and additional dependent development in place.

6.12.2 The outturn highway economic results have been processed in the same way as for the 'Do-Less' scenario and are presented in the following section.

6.13 Direct Scheme and Transport External Costs TUBA Results

6.13.1 Key findings from the Do-Something TUBA analysis are;

- Under the core scenario (all time periods included), 46% of the direct scheme benefits (SvP) are at least partially internal. This changes little with the exclusion of the IP data.
- The housing external costs (congestion impacts) though (RvS), are 53% percent purely external related.
- Similarly, the environmental disbenefits (RvP) equivalent figure is 67% -65%.
- This suggests that the impact of the scheme under the Do-Something scenario compared to the Do-Less scenario is to benefit a wider area. This is to be expected given that the modal shift to rail impacts a wider area than the immediate highway scheme 'bottleneck removal' impact.
- The scale of the external transport disbenefits in the Do-Something case is less than two times the scale of the direct scheme impact benefits. The reduction in this gap relative to the Do-Less scenario is considered to be due to two main factors;
- The impact of the modal shift to bus use impacting a wider area, smoothing out the change in flow impact, enabling the wider network to cater for the development traffic better.
- An increased performance of the IP as reported by the model in the 2028 forecast year for the with-scheme scenario relative to the without-scheme scenario. This aligns it with the other time periods and relative IP performance in the 2035 forecast year. It is assumed that in the Do-Less scenario, there is some model noise specific to the 2028 IP which results in scheme impact disbenefits arising,

against the trend with other time periods and years. This could suggest that the current Do-Less net scheme impact benefits are partially underestimated.

6.14 Environmental and Social External Costs

6.14.1 Presented below are the net vehicle kilometres by model forecast year and time period for each link type, by scenario for the Do-Something option. The analysis shows a similar trend as with the Do-Less option, in that most of the external disbenefits impact rural road types, rather than urban area road types.

Table 6.10 - Scenario 'P' vehicle kilometres by link type

Model links by COBA class	Vehicle kilometres					
	AM	AM	IP	IP	PM	PM
	2028	2035	2028	2035	2028	2035
COBA 1 (Rural AP Single)	322,652	356,778	198,975	219,856	369,138	408,631
COBA 2 (Rural AP 2 Lane Dual)	186,131	198,307	131,525	143,325	197,227	208,608
COBA 3 (Rural AP 3+ Lane Dual)	105,190	111,643	86,530	93,371	117,676	125,978
COBA 4 (Motorway, 2 Lanes)	188,253	203,334	133,766	146,220	201,981	215,393
COBA 5 (Motorway, 3 Lanes)	380,125	411,281	288,231	316,170	411,437	442,014
COBA 6 (Motorway, 4+ Lanes)	84,502	91,521	67,820	73,835	96,922	104,145
COBA 7 (Urban, Non-Central)	161,062	172,031	107,965	114,877	168,121	180,997
COBA 8 (Urban, Central)	85	98	64	65	53	54
COBA 9 (Small Town)	78,684	89,267	45,573	50,095	83,844	97,384
COBA 10 (Suburban Single)	149,318	159,791	108,679	115,223	153,616	163,428
COBA 11 (Suburban Dual)	66,456	68,901	49,240	51,732	65,063	68,493
TOTAL	**1,722,458**	**1,862,951**	**1,218,368**	**1,324,770**	**1,865,078**	**2,015,126**

Table 6.11 - Scenario 'S' (Do-Less) vehicle kilometres by link type

Model links by COBA class	Vehicle kilometres					
	AM	AM	IP	IP	PM	PM
	2028	2035	2028	2035	2028	2035
COBA 1 (Rural AP Single)	320,423	353,672	197,663	218,586	365,415	405,835
COBA 2 (Rural AP 2 Lane Dual)	187,754	201,329	130,495	143,370	198,203	210,525
COBA 3 (Rural AP 3+ Lane Dual)	105,007	111,670	86,228	93,089	117,354	125,651
COBA 4 (Motorway, 2 Lanes)	188,327	203,432	133,669	146,210	201,612	215,363
COBA 5 (Motorway, 3 Lanes)	379,492	410,700	288,343	316,202	410,964	441,369
COBA 6 (Motorway, 4+ Lanes)	84,207	91,388	67,776	74,168	96,376	103,471
COBA 7 (Urban, Non-Central)	160,063	170,474	107,577	114,266	166,637	179,279
COBA 8 (Urban, Central)	78	95	67	65	52	53
COBA 9 (Small Town)	77,716	87,958	45,067	49,475	82,702	95,789
COBA 10 (Suburban Single)	148,334	158,297	108,523	114,555	152,473	162,136
COBA 11 (Suburban Dual)	65,643	67,910	48,961	51,188	64,381	67,881
TOTAL	**1,717,045**	**1,856,926**	**1,214,370**	**1,321,174**	**1,856,169**	**2,007,351**

Table 6.12 - Scenario 'R' (Do-Less) vehicle kilometres by link type

Model links by COBA class	Vehicle kilometres					
	AM	AM	IP	IP	PM	PM
	2028	2035	2028	2035	2028	2035
COBA 1 (Rural AP Single)	333,018	365,885	202,049	222,990	377,830	415,374
COBA 2 (Rural AP 2 Lane Dual)	196,272	209,697	134,764	146,999	206,921	218,676
COBA 3 (Rural AP 3+ Lane Dual)	106,000	112,221	86,613	93,426	117,536	126,026
COBA 4 (Motorway, 2 Lanes)	188,616	203,404	133,953	146,351	202,641	216,714
COBA 5 (Motorway, 3 Lanes)	380,213	411,285	288,184	315,983	412,531	443,282
COBA 6 (Motorway, 4+ Lanes)	85,990	92,875	68,089	74,349	99,758	106,356
COBA 7 (Urban, Non-Central)	160,667	171,293	108,310	114,683	168,339	180,437
COBA 8 (Urban, Central)	80	95	64	64	51	53
COBA 9 (Small Town)	81,438	92,099	45,968	50,409	85,095	98,078
COBA 10 (Suburban Single)	149,675	160,260	109,161	115,501	154,015	163,338
COBA 11 (Suburban Dual)	65,549	68,386	49,400	51,728	65,543	69,316
TOTAL	**1,747,518**	**1,887,500**	**1,226,556**	**1,332,484**	**1,890,260**	**2,037,650**

Table 6.13 - Scenario 'R' (Do-Less) minus 'P' vehicle kilometres by link type

Model links by COBA class	Veh / kms					
	AM	AM	IP	IP	PM	PM
	2028	2035	2028	2035	2028	2035
COBA 1 (Rural AP Single)	7,774	6,831	2,306	2,350	6,519	5,058
COBA 2 (Rural AP 2 Lane Dual)	7,606	8,542	2,429	2,755	7,271	7,551
COBA 3 (Rural AP 3+ Lane Dual)	608	434	63	42	-106	36
COBA 4 (Motorway, 2 Lanes)	272	53	140	98	495	991
COBA 5 (Motorway, 3 Lanes)	66	3	-36	-140	821	951
COBA 6 (Motorway, 4+ Lanes)	1,116	1,016	202	385	2,127	1,658
COBA 7 (Urban, Non-Central)	-297	-554	259	-146	163	-420
COBA 8 (Urban, Central)	-4	-2	0	-1	-2	-1
COBA 9 (Small Town)	2,066	2,124	297	235	938	521
COBA 10 (Suburban Single)	268	351	361	209	299	-68
COBA 11 (Suburban Dual)	-681	-386	121	-3	360	617
TOTAL	**18,795**	**18,412**	**6,141**	**5,785**	**18,887**	**16,894**

Table 6.14 - Scenario 'R' (Do-Less) minus 'P' vehicle kilometres percentage of total by link type

Model links by COBA class	Veh / kms					
	AM	AM	IP	IP	PM	PM
	2028	2035	2028	2035	2028	2035
COBA 1 (Rural AP Single)	41%	37%	38%	41%	35%	30%
COBA 2 (Rural AP 2 Lane Dual)	40%	46%	40%	48%	38%	45%
COBA 3 (Rural AP 3+ Lane Dual)	3%	2%	1%	1%	-1%	0%
COBA 4 (Motorway, 2 Lanes)	1%	0%	2%	2%	3%	6%
COBA 5 (Motorway, 3 Lanes)	0%	0%	-1%	-2%	4%	6%

COBA 6 (Motorway, 4+ Lanes)	6%	6%	3%	7%	11%	10%
COBA 7 (Urban, Non-Central)	-2%	-3%	4%	-3%	1%	-2%
COBA 8 (Urban, Central)	0%	0%	0%	0%	0%	0%
COBA 9 (Small Town)	11%	12%	5%	4%	5%	3%
COBA 10 (Suburban Single)	1%	2%	6%	4%	2%	0%
COBA 11 (Suburban Dual)	-4%	-2%	2%	0%	2%	4%
	100%	**100%**	**100%**	**100%**	**100%**	**100%**

6.15 PVB Summary Values

6.15.1 Presented below is a summary table of the contributing elements of the net PVB, adjacent the total for the Do-Something scenario.

6.15.2 It can be seen that in its own right, the direct impact of the scheme implementation is £248m (less without the Greenhouse Gas component, which is not carried forward from this SvP scenario for the overall Do-Something appraisal total). However, this is more than offset by the impacts of the dependent development on the transport external costs of -£319m and environmental / social impact -£17m.

6.15.3 This is much closer than the equivalent Do-Less figures, suggesting this option balances itself out better in terms of benefits and disbenefits.

6.15.4 The environmental and social disbenefits are primarily Greenhouse Gas (-£11.0m) and Accident (-£5.6) related.

6.15.5 The user benefits and disbenefits show a similar proportional distributional pattern in terms of trip purpose. It should be noted though that, proportionally, Commuters are affected more by the external (dependent development) development, with Business user proportionally less so.

Table 6.15 - Scenario 'R' (Do-Something) minus 'P' vehicle km % of total by link type, £m

	Total	S1vP (direct scheme impacts)	R1vS1 (dependent development transport impacts)	R1vP (net environmental impacts)
Noise	**-0.4**	0.0	0.0	-0.4
Local Air Quality	**-0.1**	0.0	0.0	-0.1
Greenhouse Gases	**-11.0**	7.8	-5.0	-11.0
Journey Quality		0.0	0.0	
Physical Activity		0.0	0.0	
Accidents	**-5.6**	0.0	0.0	-5.6
Economic Efficiency: Consumer Users (Commuting)	**-36.5**	89.1	-125.6	
Economic Efficiency: Consumer Users (Other)	**-12.2**	57.1	-69.3	
Economic Efficiency: Business Users and Providers	**-20.1**	109.1	-129.2	

Wider Public Finances (Indirect Taxation Revenues)	**5.5**	15.4	-9.9	
Present Value of Benefits (see notes) (PVB)	**-91.3**	247.6	-319.2	-17.0

('' values don't contribute to the overall Total)*

6.16 Benefits Costs Comparison (BCR)

6.16.1 The 'core' highway scheme BCRs are presented in the table below for the Do-Less and Do-Something options:

Monetised Costs and Benefits (£m)		
	Do-Less	Do-Something
PVB	-155.6	-91.3
PVC	78.3	78.3
NPV	-233.8	-169.6
BCR	-2.0	-1.2

6.16.2 On this basis alone, both options show negative PVBs and hence negative BCRs. Of the two options, the Do-Something option performs the better of the two, with an end BCR or -1.2 compared to -2.0 for the Do-Less scenario. These should however be considered in relation to the wider project context, which is discussed further below.

6.17 Sensitivity Tests

6.17.1 The appraisal above includes several assumptions. To assess the sensitivity of the overall BCR with respect to these assumptions, a series of sensitivity tests have been conducted;

- An inclusion of a 10% reduction in direct scheme benefits (SvP) to represent construction delay impacts, which have been excluded so far due to a lack of data for those conditions.
- An increase in capital costs of 10%
- An increase in maintenance costs to 2% per annum

6.17.2 The results show that in each test there is either a further reduction in the PVB (test 1) or increase in the PVC (tests 2 and 3). Given the core results generate negative BCRs, to see the pertinent change it is best to focus on the NPV, as the changes to BCRs are in this relative sense misleading. The results show an increase in NPV is greatest under both options in the case of test 1, with an approximate 4% increase in negative NPV for the Do-Less option and 14% negative increase for the Do-Something option. However, a 10% reduction in scheme benefits is an upper end scenario as the total construction duration is 4 years compared to the 60-year

lifespan, and much of the construction will be away from the active highway, or mitigated against through stage implementation.

Monetised Costs and Benefits (£m)						
	Do-Less			Do-Something		
	Test 1	Test 2	Test 3	Test 1	Test 2	Test 3
PVB	-165.6	-155.6	-155.6	-115.3	-91.3	-91.3
PVC	78.3	84.9	82.2	78.3	84.9	82.2
NPV	-243.8	-240.5	-237.7	-193.6	-176.2	-173.5
BCR	-2.1	-1.8	-1.9	-1.5	-1.1	-1.1

6.18 Wider Value for Money Context and Conclusions

6.18.1 The analysis has shown that for both options, Do-Less and Do-Something, the highway scheme is forecast to generate net benefits greater than its cost. On this basis, the Do-Less scenario would have a BCR or 1.3 and the 3.2 for the Do-Something.

6.18.2 However, when including the external impacts arising from the Dependent Development, the overall BCRs equate to -2.0 and -1.2 respectively.

6.18.3 It should be emphasised though, that these external impacts do only arise from the dependent development impacting on the immediate and downstream highway network. With this, two things should be borne in mind;

6.18.4 To develop housing of such a scale, it is inevitable that there will be impacts on the wider network, therefore it is important to consider the overall transport benefits. In WebTAG Unit A2.2 Table 2 shows the external costs grouped together with the land value uplift, under an overall welfare effect heading – one cannot be achieved without the other.

6.18.5 An analysis of the change in vehicle hours between scenario R and scenario P, for locations where the change in delay is greater than 60 seconds is shown in the annex to this section.

6.18.6 The figures show that most of the large vehicle hour delays are away from the internal sector area. They primarily relate to the A2 / M2 motorway. However, it is noted that there are proposed highway upgrades along this road which are not included with the traffic model currently. The inclusion of these capacity upgrades would be expected to reduce these delays and thus, the external disbenefits.

6.18.7 The land value uplift (LVU) associated with the road scheme alone is in the order of £380m (2010 price year), which comfortably outweighs the negative PVB identified above and would result in a net benefit to cost ratio comfortably above 2 in both cases. Further, not all the ancillary benefits have been captured at this stage of analysis.

6.18.8 It can therefore be concluded that bearing in mind the anticipated LVU impact, as well as the fact that the scheme would generate a BCR over one without any development, the scheme represents high value for money. This would be the case, irrespective of the whether the sensitivity test results were instead used as the core analysis.

ANNEX TO ECONOMIC APPRAISAL

6.19 Assumptions

Assumption	Sub	Value	Source	Comment
Highway Model				
Model tool		Aimsun	Project Team	Model assumed to be produce a suitable reflection of scheme impact
Model base year		2017	Project Team	Assumed to be suitably calibrated / validated
Model Forecast Year 1		2028	Project Team	Assumed to perform suitably for appraisal purposes
Model Forecast Year 2		2035	Project Team	Assumed to perform suitably for appraisal purposes
Development Assumptions				
Housing Development Displacement Factor		0.750	Project Team	Proportion of houses considered as redistributed instead of new development.
Appraisal Timeframes				
Current year		2018	WebTAG	
First year of construction		2018	Project Team	
Final year of construction		2023	Project Team	
First year of benefits		2024	Project Team	Value used for spreadsheet based calculations, but noted that first model year is 2028, therefore that year used in TUBA as an approximation for the opening year.
Benefits profile by year 2024 and beyond	% of total	100%	Project Team	
Appraisal period (years)		60	Project Team	The maximum is 60 years under WebTAG
Price base year		2010	WebTAG (Unit A1.1, Para 2.6.3)	Values converted from model base year to price base year using GDP deflator
Base year for discounting		2010	WebTAG (Unit A1.1, Para 2.7.6)	
Discount rate (Social Time Preference Rate)	1st 30 year	0.035	WebTAG (Nov 2018 databook, Table A1.1.1)	

			& HM Treasury Green Book	
	next 45 years	0.030	WebTAG (Nov 2018 databook, Table A1.1.1) & HM Treasury Green Book	
	beyond	0.025	WebTAG (Nov 2018 databook, Table A1.1.1) & HM Treasury Green Book	
Day to Year annualisation		253	TUBA guidance	Standard assumption based on typical working days a year minus public holidays
AM hr to period factor		1.99	Project Team	
IP hr to period factor		7.00	Project Team	
PM hr to period factor		1.91	Project Team	
Tax				
Unit of account	Mkt Prices	0.190	WebTAG (Unit A1.1, Para 2.5.2)	19% added to convert factor prices to market prices
Capital and operating cost assumptions				
Changes in capital costs in real terms during appraisal period		GDP deflator	WebTAG "Annual Parameters"	No additional construction inflation added beyond GDP deflator values
Changes in operating costs costs in real terms during appraisal period		GDP deflator	WebTAG "Annual Parameters"	
Risk contingency		0.200	Project Team	
Optimism Bias		0.440	WebTAG	
CAPEX Real Inflation		0.020	Assumption	Informed by analysis of ONS construction price indices
OPEX Real Inflation		0.005	Assumption	Informed by analysis of ONS construction price indices
Highway Model				
Model tool		Aimsun	Project Team	Model assumed to be produce a suitable reflection of scheme impact

Model base year		2017	Project Team	Assumed to be suitably calibrated / validated
Model Forecast Year 1		2028	Project Team	Assumed to perform suitably for appraisal purposes
Model Forecast Year 2		2035	Project Team	Assumed to perform suitably for appraisal purposes
Development Assumptions				
Housing Development Displacement Factor		0.750	Project Team	Proportion of houses considered as redistributed instead of new development.

6.20 TUBA Benefits / Dis-benefits by Sector

S1vP

Total Benefits

		Destination Sector		
		1	2	Total
Origin Sector	1	18,295,252	5,166,801	23,462,053
	2	57,255,454	19,206,741	76,462,195
	Total	75,550,706	24,373,542	99,924,248

Benefit Distribution

		Destination Sector	
		1	2
Sector	1	18%	5%
	2	57%	19%

Proportion Within Internal Sector: 81%

S1vP - Without IP Period

Total Benefits

		Destination Sector		
		1	2	Total
Origin Sector	1	16,182,953	9,602,431	25,785,384
	2	44,878,280	25,088,815	69,967,095
	Total	61,061,233	34,691,246	95,752,479

Benefit Distribution

		Destination Sector	
		1	2
Sector	1	17%	10%
	2	47%	26%

Proportion Within Internal Sector: 74%

Do-Less 'S1' relative to 'P' TUBA benefit results (negative indicates a disbenefit), with an d without Inter-Peak data included

R1vS1

Total Benefits

		Destination Sector		
		1	2	Total
Origin Sector	1	-30,033,032	-89,610,694	-119,643,726
	2	-27,669,236	-166,342,989	-194,012,225
	Total	-57,702,268	-255,953,683	-313,655,951

Benefit Distribution

		Destination Sector	
		1	2
Sector	1	10%	29%
	2	9%	53%

Proportion Within Internal Sector: 47%

R1vS1 - Without IP Period

Total Benefits

		Destination Sector		
		1	2	Total
Origin Sector	1	-26,416,449	-87,645,909	-114,062,358
	2	-16,968,961	-162,424,249	-179,393,210
	Total	-43,385,410	-250,070,158	-293,455,568

Benefit Distribution

		Destination Sector	
		1	2
Sector	1	9%	30%
	2	6%	55%

Proportion Within Internal Sector: 45%

Do-Less 'R1' relative to 'S1' TUBA benefit results (negative indicates a disbenefit), with and without Inter-Peak data included

R1vP

Total Benefits

		Destination Sector		
		1	2	Total
Origin Sector	1	-30,033,032	-89,610,694	-119,643,726
	2	-27,669,236	-166,342,989	-194,012,225
	Total	-57,702,268	-255,953,683	-313,655,951

Benefit Distribution

		Destination Sector	
		1	2
Sector	1	10%	29%
	2	9%	53%

Proportion Within Internal Sector: **47%**

R1vP - Without IP Period

Total Benefits

		Destination Sector		
		1	2	Total
Origin Sector	1	-11,535,083	-92,921,062	-104,456,145
	2	30,664,827	-144,010,894	-113,346,067
	Total	19,129,744	-236,931,956	-217,802,212

Benefit Distribution

		Destination Sector	
		1	2
Sector	1	5%	43%
	2	-14%	66%

Proportion Within Internal Sector: **34%**

Do-Less 'R1' relative to 'P' TUBA benefit results (negative indicates a disbenefit), with and without Inter-Peak data included

S2vP

Total Benefits

		Destination Sector		
		1	2	Total
Origin Sector	1	21,906,737	14,530,255	36,436,992
	2	74,838,384	128,550,726	203,389,110
	Total	96,745,121	143,080,981	239,826,102

Benefit Distribution

		Destination Sector	
		1	2
Sector	1	9%	6%
	2	31%	54%

Proportion Within Internal Sector: **46%**

S2vP - Without IP Period

Total Benefits

		Destination Sector		
		1	2	Total
Origin Sector	1	17,405,188	16,351,873	33,757,061
	2	54,596,327	106,045,173	160,641,500
	Total	72,001,515	122,397,046	194,398,561

Benefit Distribution

		Destination Sector	
		1	2
Sector	1	9%	8%
	2	28%	55%

Proportion Within Internal Sector: **45%**

Do-Something 'S2' relative to 'P' TUBA benefit results (negative indicates a disbenefit), with and without Inter-Peak data included

R2vS2
Total Benefits

		Destination Sector		
		1	2	Total
Origin Sector	1	-48,187,729	-140,597,693	-188,785,422
	2	-31,266,974	-198,805,360	-230,072,334
	Total	-79,454,703	-339,403,053	-418,857,756

Benefit Distribution

		Destination Sector	
		1	2
Sector	1	12%	34%
	2	7%	47%

Proportion Within Internal Sector: **53%**

R2vS2 - Without IP Period
Total Benefits

		Destination Sector		
		1	2	Total
Origin Sector	1	-43,403,723	-136,679,518	-180,083,241
	2	-15,986,074	-176,286,435	-192,272,509
	Total	-59,389,797	-312,965,953	-372,355,750

Benefit Distribution

		Destination Sector	
		1	2
Sector	1	12%	37%
	2	4%	47%

Proportion Within Internal Sector: **53%**

Do-Something 'R2' relative to 'S2' TUBA benefit results (negative indicates a disb enefit), with and without Inter-Peak data included

R2vP
Total Benefits

		Destination Sector		
		1	2	Total
Origin Sector	1	-29,847,596	-170,873,246	-200,720,842
	2	44,941,351	-78,316,408	-33,375,057
	Total	15,093,755	-249,189,654	-234,095,899

Benefit Distribution

		Destination Sector	
		1	2
Sector	1	13%	73%
	2	-19%	33%

Proportion Within Internal Sector: **67%**

R2vP - Without IP Period
Total Benefits

		Destination Sector		
		1	2	Total
Origin Sector	1	-32,130,211	-161,190,086	-193,320,297
	2	41,779,498	-80,748,954	-38,969,456
	Total	9,649,287	-241,939,040	-232,289,753

Benefit Distribution

		Destination Sector	
		1	2
Sector	1	14%	69%
	2	-18%	35%

Proportion Within Internal Sector: **65%**

Do-Something 'R2' relative to 'P' TUBA benefit results (negative indicates a disbenefit), with and without Inter-Peak data included

6.21 Link Type Externality Parameters

Aimsun Model Link Types	WebTAG A5.4.2		ID
COBA 1 (Rural AP Single)	Rural	Other Roads	11
COBA 2 (Rural AP 2 Lane Dual)	Rural	A Roads	10
COBA 3 (Rural AP 3+ Lane Dual)	Rural	Motorways	9
COBA 4 (Motorway, 2 Lanes)	Rural	Motorways	9
COBA 5 (Motorway, 3 Lanes)	Rural	Motorways	9
COBA 6 (Motorway, 4+ Lanes)	Rural	Motorways	9
COBA 7 (Urban, Non-Central)	Other Urban	Other Roads	8

COBA 8 (Urban, Central)	Other Urban	Other Roads	8
COBA 9 (Small Town)	Other Urban	Other Roads	8
COBA 10 (Suburban Single)	Other Urban	Other Roads	8
COBA 11 (Suburban Dual)	Other Urban	A Roads	7

Link Type to WebTAG Table A5.4.2 correspondence list

	Link Type (WebTAG and COBA/Model)		2010	2015	2020	2025	2030	2035
COBA 1 (Rural AP Single)	11	Accident	0.007	0.008	0.008	0.009	0.010	0.011
	11	Local Air Quality	0.000	0.000	0.000	0.000	0.000	0.000
	11	Noise	0.001	0.001	0.001	0.001	0.001	0.002
COBA 2 (Rural AP 2 Lane Dual)	10	Accident	0.007	0.008	0.008	0.009	0.010	0.011
	10	Local Air Quality	0.000	0.000	0.000	0.000	0.000	0.000
	10	Noise	0.000	0.000	0.000	0.000	0.000	0.000
COBA 3 (Rural AP 3+ Lane Dual)	9	Accident	0.000	0.000	0.000	0.000	0.000	0.000
COBA 4 (Motorway, 2 Lanes)	9	Local Air Quality	0.001	0.000	0.000	0.000	0.000	0.000
COBA 5 (Motorway, 3 Lanes)	9	Noise	0.000	0.000	0.000	0.000	0.000	0.000
COBA 6 (Motorway, 4+ Lanes)	9							
COBA 7 (Urban, Non-Central)	8	Accident	0.030	0.032	0.035	0.039	0.043	0.048
COBA 8 (Urban, Central)	8	Local Air Quality	0.001	0.001	0.000	0.000	0.000	0.000
COBA 9 (Small Town)	8	Noise	0.002	0.002	0.002	0.003	0.003	0.003
COBA 10 (Suburban Single)	8							
COBA 11 (Suburban Dual)	7	Accident	0.030	0.032	0.035	0.039	0.043	0.048
	7	Local Air Quality	0.001	0.001	0.000	0.000	0.000	0.000
	7	Noise	0.002	0.002	0.002	0.003	0.003	0.003

Link Type MEC Parameters

6.22 AMCB and TEE Tables

Do-Less AMCB Table

Analysis of Monetised Costs and Benefits	£ millions		Comparison of relative impacts of the highway scheme (SvP) and dependent development (RvS)	
			SvP	RvS
Noise	-0.5	(12)	0.0	0.0
Local Air Quality	-0.1	(13)	0.0	0.0
Greenhouse Gases	-12.3	(14)	-0.8	-2.7
Journey Quality		(15)	0.0	0.0
Physical Activity		(16)	0.0	0.0
Accidents	-7.4	(17)	0.0	0.0
Economic Efficiency: Consumer Users (Commuting)	-61.8	(1a)	26.5	-88.4
Economic Efficiency: Consumer Users (Other)	-31.4	(1b)	20.7	-52.2
Economic Efficiency: Business Users and Providers	-49.1	(5)	51.1	-100.3
Wider Public Finances (Indirect Taxation Revenues)	-7.1	- (11) - sign changed from PA table, as PA table represents costs, not benefits	-1.5	-5.5
Present Value of Benefits (see notes) (PVB)	-155.6	(PVB) = (12) + (13) + (14) + (15) + (16) + (17) + (1a) + (1b) + (5) - (11)	99.1	-237.9
Broad Transport Budget		(10)		
Present Value of Costs (see notes) (PVC)	78.3	(PVC) = (10)	78.3	78.3
OVERALL IMPACTS			20.9	-316.2
Net Present Value (NPV)	-233.8	NPV=PVB-PVC	1.3	-3.0
Benefit to Cost Ratio (BCR)	-2.0	BCR=PVB/PVC		

Note : This table includes costs and benefits w hich are regularly or occasionally presented in monetised form in transport appraisals, together w ith some w here monetisation is in prospect. There may also be other significant costs and benefits, some of w hich cannot be presented in monetised form. Where this is the case, the analysis presented above does NOT provide a good measure of value for money and should not be used as the sole basis for decisions.

Do-Less TEE Table

Non-business: Commuting	ALL MODES		ROAD	BUS and COACH	RAIL	OTHER
User benefits	TOTAL		Private Cars and LGVs	Passengers	Passengers	
Travel time	-55.7		-55.7			
Vehicle operating costs	-6.2		-6.2			
User charges	0.0		0.0			
During Construction & Maintenance	0.0		0.0			
NET NON-BUSINESS BENEFITS: COMMUTING	-61.8	(1a)	-61.8			

Non-business: Other	ALL MODES		ROAD	BUS and COACH	RAIL	OTHER
User benefits	TOTAL		Private Cars and LGVs	Passengers	Passengers	
Travel time	-26.7		-26.7			
Vehicle operating costs	-4.7		-4.7			
User charges	0.0		0.0			
During Construction & Maintenance	0.0		0.0			
NET NON-BUSINESS BENEFITS: OTHER	-31.4	(1b)	-31.4			

Business							
User benefits			Goods Vehicles	Business Cars & LGVs Passengers		Freight	Passengers
Travel time	-39.5		-12.8	-26.8			
Vehicle operating costs	-9.6		-5.2	-4.4			
User charges	0.0		0.0	0.0			
During Construction & Maintenance	0.0		0.0	0.0			
Subtotal	-49.1	(2)	-18.0	-31.1			
Private sector provider impacts						Freight	Passengers
Revenue							
Operating costs							
Investment costs							
Grant/subsidy							
Subtotal	0.0	(3)					
Other business impacts							
Developer contributions		(4)					
NET BUSINESS IMPACT	-49.1	(5) = (2) + (3) + (4)					
TOTAL							
Present Value of Transport Economic Efficiency Benefits (TEE)	-142.4	(6) = (1a) + (1b) + (5)					

Notes: Benefits appear as positive numbers, w hile costs appear as negative numbers.
All entries are discounted present values, in 2010 prices and values

Do-Something AMCB Table

Analysis of Monetised Costs and Benefits	£ millions		Comparison of relative impacts of the highway scheme (SvP) and dependent development (RvS)	
			SvP	RvS
Noise	-0.4	(12)	0.0	0.0
Local Air Quality	-0.1	(13)	0.0	0.0
Greenhouse Gases	-11.0	(14)	7.8	-5.0
Journey Quality		(15)	0.0	0.0
Physical Activity		(16)	0.0	0.0
Accidents	-5.6	(17)	0.0	0.0
Economic Efficiency: Consumer Users (Commuting)	-36.5	(1a)	89.1	-125.6
Economic Efficiency: Consumer Users (Other)	-12.2	(1b)	57.1	-69.3
Economic Efficiency: Business Users and Providers	-20.1	(5)	109.1	-129.2
Wider Public Finances (Indirect Taxation Revenues)	5.5	- (11) - sign changed from PA table, as PA table represents costs, not benefits	15.4	-9.9
Present Value of Benefits (see notes) (PVB)	-91.3	(PVB) = (12) + (13) + (14) + (15) + (16) + (17) + (1a) + (1b) + (5) - (11)	247.6	-319.2
Broad Transport Budget		(10)		
Present Value of Costs (see notes) (PVC)	78.3	(PVC) = (10)	78.3	78.3
OVERALL IMPACTS				
Net Present Value (NPV)	-169.6	NPV=PVB-PVC	169.4	-397.4
Benefit to Cost Ratio (BCR)	-1.2	BCR=PVB/PVC	3.2	-4.1

Note : This table includes costs and benefits w hich are regularly or occasionally presented in monetised form in transport appraisals, together w ith some w here monetisation is in prospect. There may also be other significant costs and benefits, some of w hich cannot be presented in monetised form. Where this is the case, the analysis presented above does NOT provide a good measure of value for money and should not be used as the sole basis for decisions.

Do-Something TEE Table

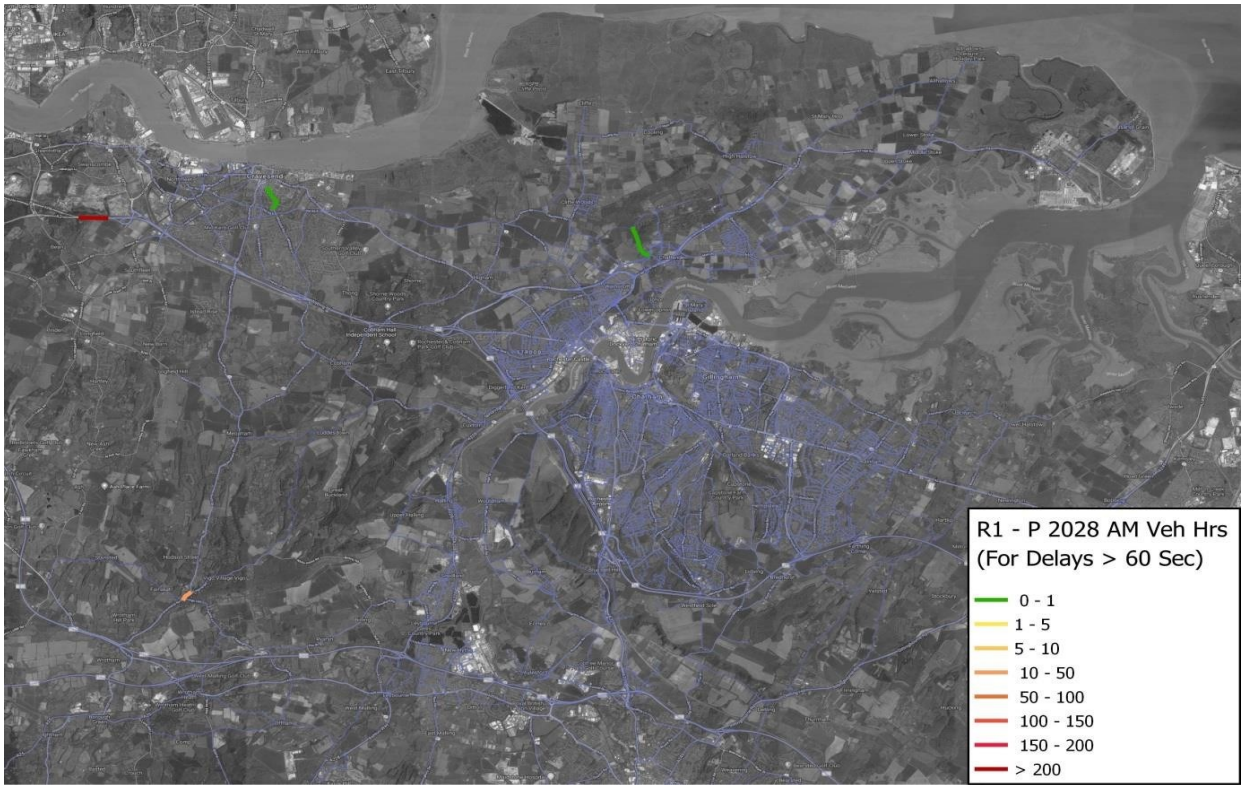
Non-business: Commuting	ALL MODES		ROAD	BUS and COACH	RAIL	OTHER
User benefits	TOTAL		Private Cars and LGVs	Passengers	Passengers	
Travel time	-37.7		-37.7			
Vehicle operating costs	1.1		1.1			
User charges	0.0		0.0			
During Construction & Maintenance	0.0		0.0			
NET NON-BUSINESS BENEFITS: COMMUTING	-36.5	(1a)	-36.5			

Non-business: Other	ALL MODES		ROAD	BUS and COACH	RAIL	OTHER
User benefits	TOTAL		Private Cars and LGVs	Passengers	Passengers	
Travel time	-17.3		-17.3			
Vehicle operating costs	5.1		5.1			
User charges	0.0		0.0			
During Construction & Maintenance	0.0		0.0			
NET NON-BUSINESS BENEFITS: OTHER	-12.2	(1b)	-12.2			

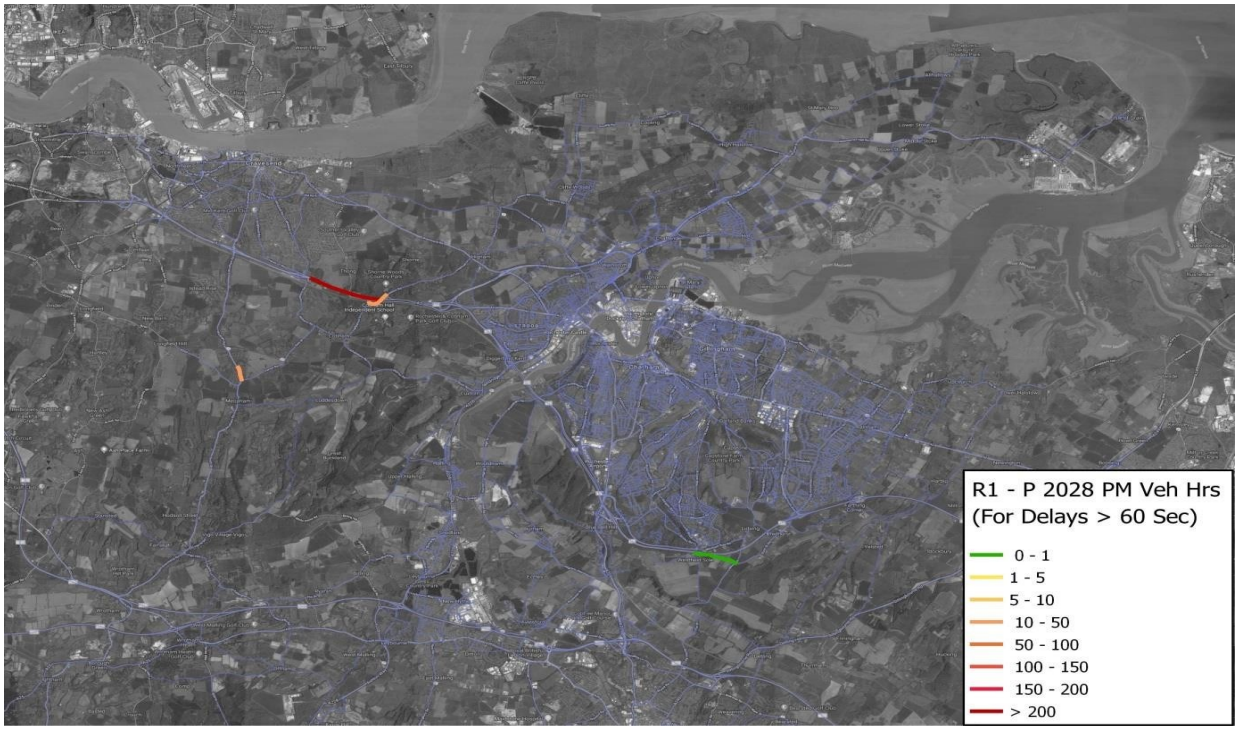
Business							
User benefits			Goods Vehicles	Business Cars & LGVs	Passengers	Freight	Passengers
Travel time	-14.1		-1.1	-13.0			
Vehicle operating costs	-6.0		-2.7	-3.3			
User charges	0.0		0.0	0.0			
During Construction & Maintenance	0.0		0.0	0.0			
Subtotal	-20.1	(2)	-3.8	-16.3			
Private sector provider impacts						Freight	Passengers
Revenue							
Operating costs							
Investment costs							
Grant/subsidy							
Subtotal	0.0	(3)					
Other business impacts							
Developer contributions		(4)					
NET BUSINESS IMPACT	-20.1	(5) = (2) + (3) + (4)					
TOTAL							
Present Value of Transport Economic Efficiency Benefits (TEE)	-68.8	(6) = (1a) + (1b) + (5)					

Notes: Benefits appear as positive numbers, w hile costs appear as negative numbers.
All entries are discounted present values, in 2010 prices and values

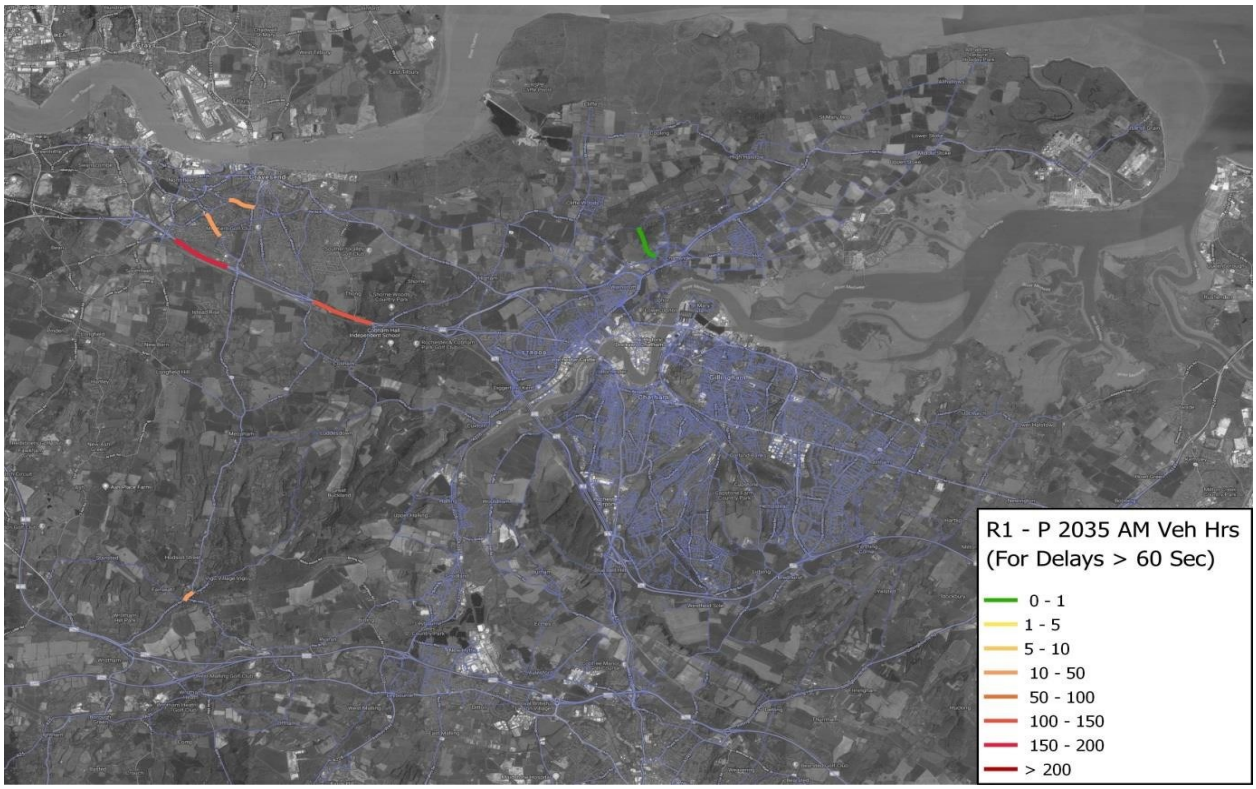
6.23 Vehicle Hour Delay Plots



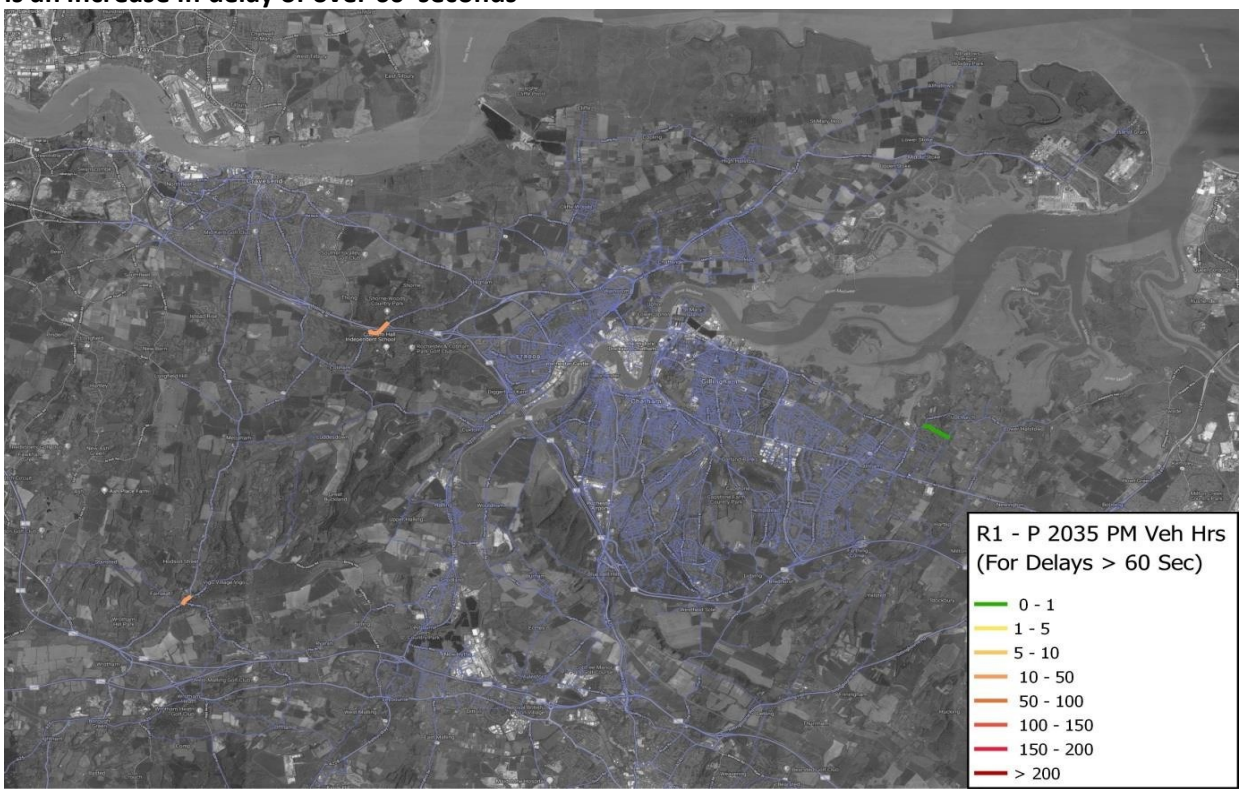
Scenario R1 (DL) relative to Scenario P, 2028 AM: Change in vehicle hours for locations where there is an increase in delay of over 60 seconds



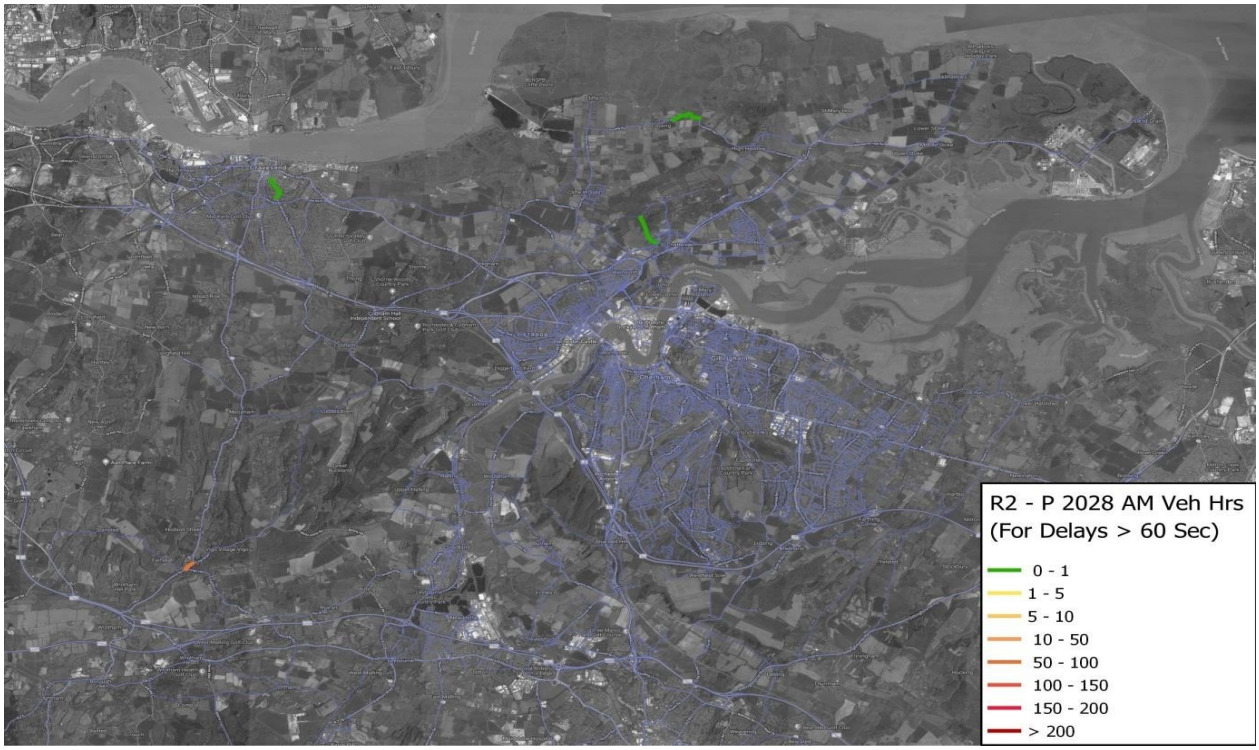
Scenario R1 (DL) relative to Scenario P, 2028 PM: Change in vehicle hours for locations where there is an increase in delay of over 60 seconds



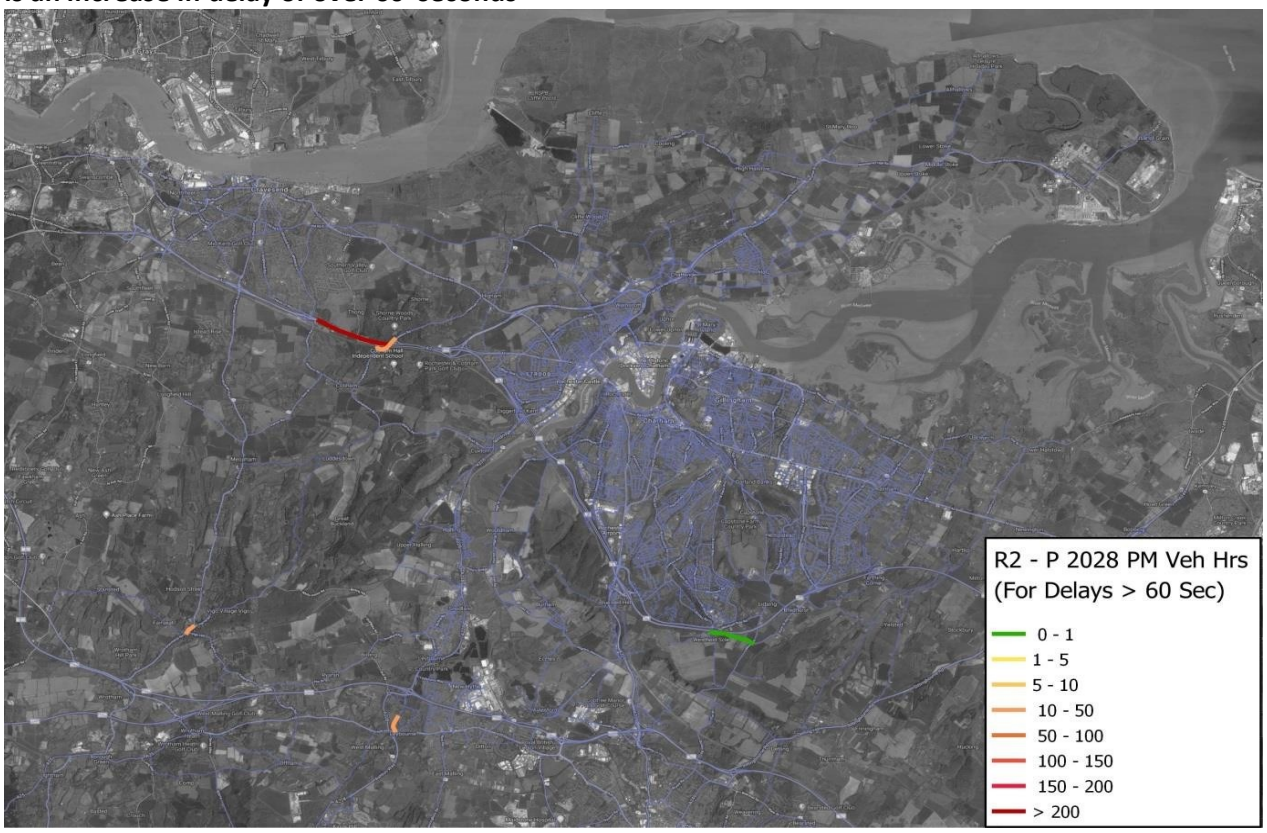
Scenario R1 (DL) relative to Scenario P, 2035 AM: Change in vehicle hours for locations where there is an increase in delay of over 60 seconds



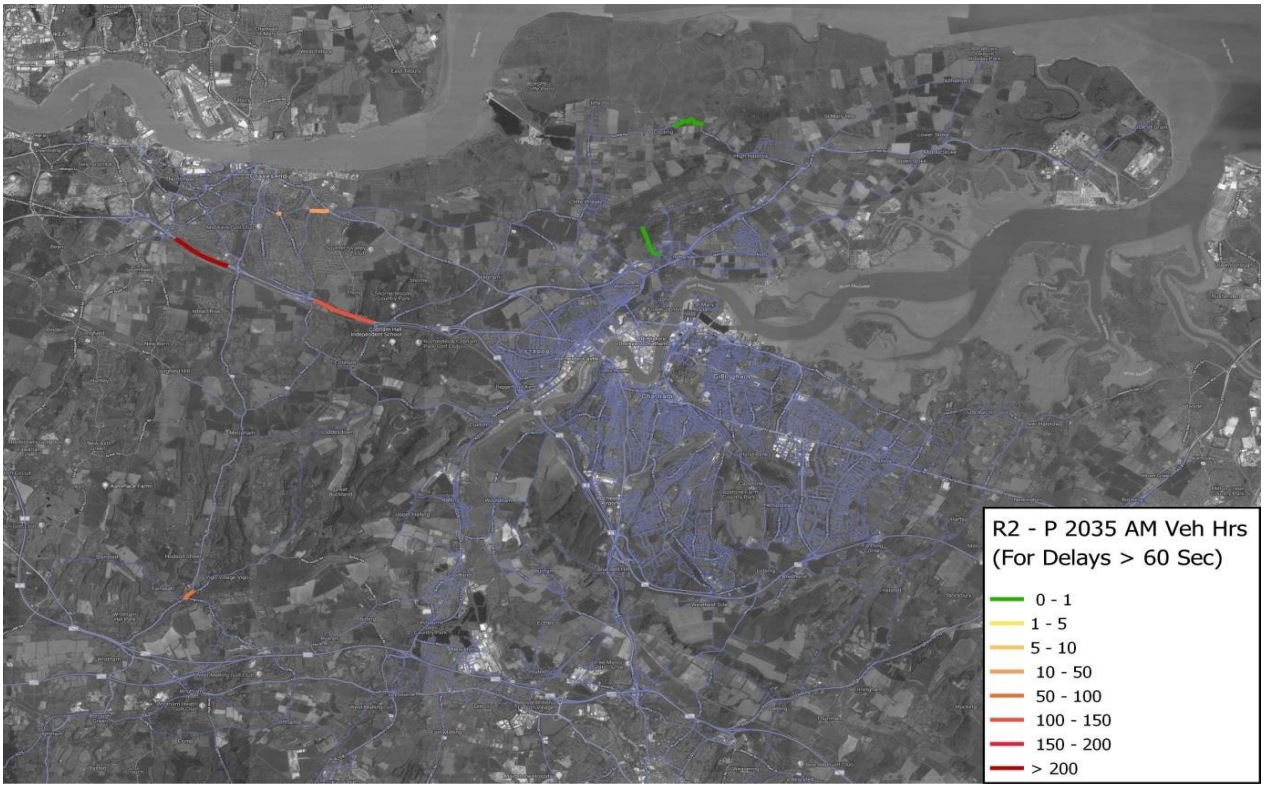
Scenario R1 (DL) relative to Scenario P, 2035 PM: Change in vehicle hours for locations where there is an increase in delay of over 60 seconds



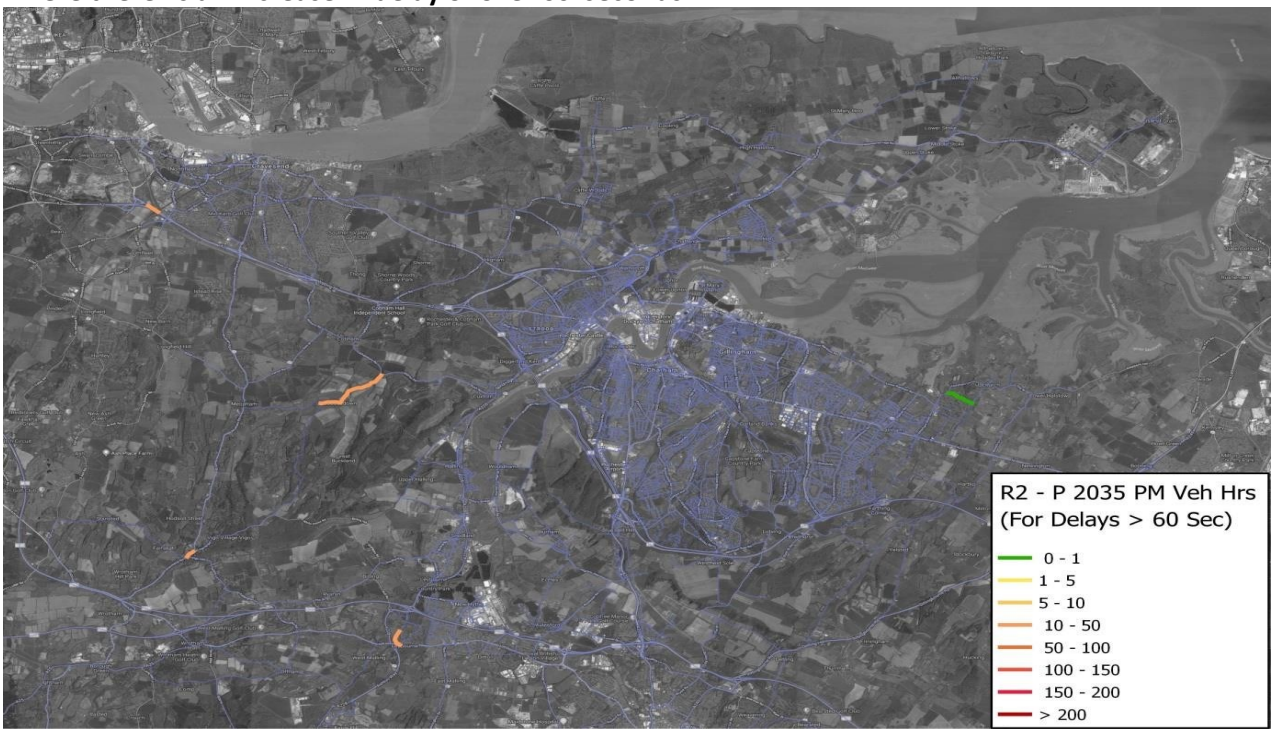
Scenario R2 (DS) relative to Scenario P, 2028 AM: Change in vehicle hours for locations where there is an increase in delay of over 60 seconds



Scenario R2 (DS) relative to Scenario P, 2028 PM: Change in vehicle hours for locations where there is an increase in delay of over 60 seconds



Scenario R2 (DS) relative to Scenario P, 2035 AM: Change in vehicle hours for locations where there is an increase in delay of over 60 seconds



Scenario R2 (DS) relative to Scenario P, 2035 PM: Change in vehicle hours for locations where there is an increase in delay of over 60 seconds