A13 Widening

Economic Case

January 2017

Thurrock Council

Mott MacDonald

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Issue and revision record

Revision	Date	Originator	Checker	Approver	Description
A	December 2016	P Shears	I Johnston	C Walker	First Draft
B	January 2017	N Brody	I Johnston	C Walker	Second Draft

Information class: Standard

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1 Introduction

This Economic Case for the A13 Widening has been prepared in accordance with the Guidance published by the Department for Transport in January 2013 ("The Transport Business Cases"), in December 2013 ("Value for Money Assessment: Advice Note for Local Transport Decision Makers"), and in June 2015 ("Distributional Impacts: Advice for promoters of LGF-retained schemes"). The Economic Case is intended to provide evidence of the value for money of the project.

A Specification for the proposed traffic modelling work required to produce the Economic Case was produced in May 2015 and is shown at **Appendix D**. This was discussed with the Department for Transport and agreed as a reasonable basis for carrying out the traffic modelling. The proposed Lower Thames Crossing (LTC) could significantly affect A13 traffic, and the traffic modelling therefore relies on the LTC traffic model to estimate traffic growth and variable demand impacts which take account of changes in traffic congestion in the area, and the change in travel costs as a result of the A13 Widening and the proposed route for the Lower Thames Crossing.

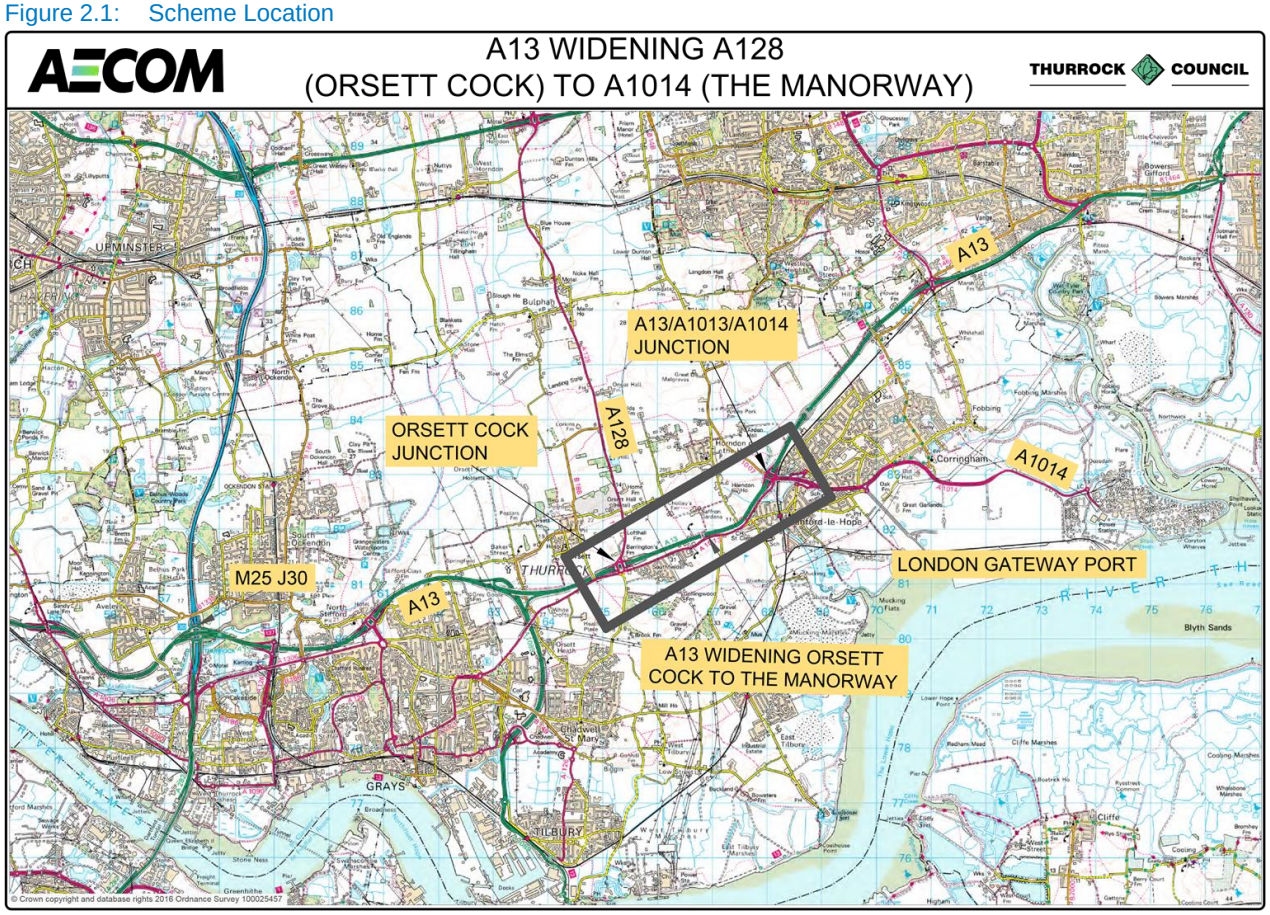
The value for money of the scheme has been based on TUBA for time savings and vehicle operating cost changes, and COBALT for accident benefits. The inputs to TUBA are from a local traffic model which takes account of WebTAG Guidance and updates to the LTC model during 2015 and 2016.

2 Options Appraised

2.1 Scheme Description

The location of the A13 Widening is shown in **Figure 2.1**. The existing carriageway has 2 lanes in each direction. The widening will tie in with the existing 3-lane section of the A13 west of the interchange with the A128 and will complete a 3-lane carriageway from the M25 to the A1014 interchange. Both the A128 and A1014 interchanges are already grade-separated, but the junction with the A128 will need to be re-constructed in order to provide adequate width for the widened A13 carriageway beneath the interchange.

Figure 2.1: Scheme Location



Source: Thurrock Council

The London Gateway Port Harbour Empowerment Order was made in May 2008 following a Public Inquiry in 2003, and includes compulsory purchase powers to acquire land, and powers to construct the A13 Widening. These powers are time-limited such that notice to treat must be served by 16th May 2018. The scheme will be funded from the Local Growth Fund with contributions from London Gateway Port.

2.2 Options Considered

As the A13 links the Port to the M25, widening was the only option considered at the Public Inquiry. The powers do not permit the construction of any other option outside of the land for widening defined in the Order.

A Feasibility Study was carried out by Atkins for Thurrock Council in 2015. This confirmed that land which can be compulsorily purchased under the HEO is sufficient to construct a widened road to the geometric requirements laid down in DMRB TD9/93.

Preliminary design of the Widening has recently been completed by AECOM. At preliminary design stage it was not appropriate to investigate alternatives to the consented scheme. However as part of the design process, options within the scheme design and within the approved limits of the HEO were considered.

The scope of the Scheme is to provide an extra lane in each direction on the A13 through the Orsett Cock Junction to the Manorway A1014 Junction. The Project Design Team took the Atkins Feasibility design and refined it to produce a Preliminary design. Matters taken into account throughout the process were; buildability, traffic assessments, environmental considerations, cost, land restrictions, geotechnical considerations and Statutory Undertakers apparatus.

The AECOM design was refined from the Atkins design in a few key areas;

- Improving the alignment of the Orsett Cock Roundabout to produce a design more compliant to standards.
- Lowering the Orsett Cock Roundabout, reducing the difference between the existing proposed finished levels to improve buildability.
- Moving the Orsett Cock Eastern bridge further to the west to allow space between the new and existing eastern bridges.
- Widening of the highway verges to allow for the surface water drainage system.
- Raising the level of the carriageway to improve drainage paths and buildability.
- Updating the access to the northern service station to reflect the new construction undertaken by the service station owner.
- Offsetting the new bridges at Saffron Gardens and Horndon Road to allow for the existing bridges to remain open during construction.

3 Assumptions

The traffic forecasts and economic assessments for the project have been produced in accordance with WebTAG.

Details of the development, calibration and validation of the local traffic model are contained in the Local Model Validation Report shown in **Appendix A**.

Details of the forecast assumptions and traffic forecasts are contained in the Forecasting Report shown in **Appendix B**. Forecasts have been produced separately for a network which excludes and includes a Lower Thames Crossing.

Details of the economic assessment assumptions, and the results of the economic assessment, are shown in **Appendix C**. The results show that the project generates high value for money.

4 Sensitivity and Risk Profile

4.1 Scheme Costs

The scheme costs are set out in the separate Financial Case. The cost includes an allowance for risk following Monte Carlo analysis of a quantified risk register which has been developed during the preliminary design phase. An Optimism Bias of 3% has also been added to the costs input to the economic assessment, as recommended by TAG Unit A1.2.

4.2 Scheme Benefits

Low and high growth traffic forecast sensitivities have been produced using outputs from the Lower Thames Crossing model, as described in Appendix B. These low and high growth traffic forecast sensitivities have then been input to TUBA and COBA as described in Appendix C. Even with a low growth traffic forecast, the scheme provides high value for money.

4.3 Risk Profile

A full Risk Register is included in the Management Case.

The main risk to delayed service implementation for this scheme is the withdrawal of funding from the DfT and subsequently DPWorld.

If such a risk should occur then the scheme cannot be progressed as funding cannot be provided by Thurrock Council alone. There is also a risk that withdrawal of funding could delay the scheme to such an extent that the powers contained within Harbour Empowerment Order under which the scheme is being developed and is to be constructed would expire.

Should the above risks occur the contingency actions would be:

1) Close-out all contracts currently in progress;
2) Consider options for progressing the scheme;
3) Identify and agree on the preferred option;
4) Plan out the works required to deliver the scheme;
5) Re-bid for funding from the Department for Transport as a traditional scheme;
6) Go to tender for a design consultant to finalise the design;
7) Gain planning approval;
8) Go to tender for Contractor;
9) Construct the works.

5 Appraisal Summary Table

The Appraisal Summary Table (AST) is included as **Table 5.1**. The inputs to the AST are taken from the economic assessment (**Appendix C**), the Non-Statutory Environmental Report (**Appendix E**) the Noise Summary (**Appendix F**) and the Air Quality Survey (**Appendix G**).

Note that the noise and air quality assessments will be updated with the results of the latest traffic forecasts described in **Appendix B**. We do not expect significant changes in the conclusions of the noise and air quality reports appended.

Table 5.1: A13 Appraisal Summary Table

Name of scheme:		A13 widening			**Name**	
Description of scheme:		Widening of the A13 mainline carriageway between Orsett Cook and the A1014 to three lanes in each direction and improvements to the roundabout at Orsett Cock.			**Organisation**	
					Role	Promoter/Official
Impacts		**Summary of key impacts**	**Assessment**			
			Quantitative		**Qualitative**	**Monetary £(NPV)**	**Distributional 7-pt scale/ vulnerable grp**
Economy	Business users & transport providers	The proposed scheme results in shorter journey times and a reduction of congestion in the study corridor.	**Value of journey time changes(£m)** £112.22 **Net journey time changes (£m)** 0 to 2min: £102.64; 2 to 5min: £9.58; > 5min: £0			PVB = £119.12m	not applicable to business users
	Reliability impact on Business users	The proposed scheme results in less congestion and improved journey time reliability at peak periods in the study corridor.			Moderate Beneficial		
	Regeneration	The scheme will result in shorter journey times and improved reliability and therefore improve access to services within the corridor including jobs and housing.	The South East Strategic Economic Plan identified that the A13 Widening and other planned transport investments will directly enable the creation of 4,045 jobs and 3,340 new homes, and facilitate 43,610 jobs and 11,000 jobs in the corridor				
	Wider Impacts	The scheme is likely to result in significant wider impacts as the scheme runs through a Functional Urban Region (FUR).	As regeneration impacts				
Environmental	Noise	A13 Noise Summary of 26th August 2016 produced by AECOM suggests reduction in traffic noise as a result of the use of a low noise surface on the proposed scheme.			Slight Beneficial		
	Air Quality	No significant effect on air quality expected according to JMP report as stated in the A13 widening Non-Statutory Environmental Report. A13 Air Quality summary of 3rd August 2016 produced by AECOM suggests that the air quality impacts from the A13 widening in the 2019 opening year would be negligible.			Neutral		Not applicable
	Greenhouse gases	Net increase in emissions over the 60 years.	Change in non-traded carbon over 60y (CO2e): 78,328 Change in traded carbon over 60y (CO2e): 273			-£3.64m	

	Landscape	The proposed scheme results in significant landscape and visual effects during construction and a significant visual impact to receptors in year 1 at one of the viewpoints. Measures, i.e. screening through planning can mitigate those effects. New structures may be required to mitigate noise for instance and may reduce the quality of views further.		Slight adverse in the short term, neutral with mitigation measures in place		
	Townscape	Not applicable		Neutral		
	Historic Environment	A13 widening Non-Statutory Environmental Report of 3rd August 2016 produced by AECOM states that there is no physical impact on any designated heritage assets.		Neutral		
	Biodiversity	A13 widening Non-Statutory Environmental Report of 3rd August 2016 produced by AECOM states no let loss in habitat is expected in line with HE's Biodiversity Action plan.		Neutral		
	Water Environment	No impact expected during operation.		Neutral		
Social	Commuting and Other users	The proposed scheme results in shorter journey times and a reduction of congestion in the study corridor.	**Value of journey time changes(£m)** £66.37 **Net journey time changes (£m)** 0 to 2min: £55.72 | 2 to 5min: £10.64 | > 5min: £0		PVB = £66.37m	IMD Quintile1 - Slight Beneficial IMD Quintile2 - Slight Beneficial IMD Quintile3 - Large Beneficial IMD Quintile4 - Large Beneficial IMD Quintile5 - Moderate Beneficial
	Reliability impact on Commuting and Other users	The proposed scheme results in less congestion and improved journey time reliability at peak periods in the study corridor.		Moderate Beneficial		
	Physical activity	There are no changes to facilities for public transport or non-motorised users.		Neutral		
	Journey quality	The proposed scheme is likely to result in an improved journey quality to car users reducing traveller stress		Slight Beneficial		
	Accidents	The A13 widening slightly increases the predicted amount of accidents on the network due to higher traffic levels as some road users travel longer distances to take advantage of time savings.	Would cause 81 additional accidents over the 60 year appraisal period. This includes 2 fatal, 9 Serious and 104 Slight casualties.		PVB = -£4.43m	On the section of A13 to be widened: Children&Young People - Large Beneficial Older People - Slight Beneficial Motorcyclists - Moderate Beneficial
	Security	There are no changes to facilities for public transport or non-motorised users.		Neutral		Not applicable
	Access to services	The scheme will not change public transport accessibility, but will result in shorter journey times and improved reliability for road users and therefore improve access to jobs along the A13 corridor.		Slight Beneficial		Not applicable

	Affordability	TUBA results shows an increase in vehicle operating costs (non-fuel) for car commuters and other car users as a result of the A13 widening, as users may wish to increase journey lengths to take advantage of time savings. This would represent a user choice as existing journey routes would still be available, and hence the affordability of the journey is not affected. Public transport fares, parking charges and road user charges are not affected by the widening.	£2.14m of VOC fuel-£8.61m of VOC non-fuel	Neutral	-£6.47m	
	Severance	The proposed scheme does not result in changes to the infrastructure for pedestrians once the scheme is operational.		Neutral		Not applicable
	Option and non-use values	No impact on public transport	Not applicable			
Public Accounts	Cost to Broad Transport Budget				£58.75m	
	Indirect Tax Revenues				-£7.56m	

6 Distributional Impact Appraisal

A Distributional Impact Assessment has been carried in accordance with TAG Unit A4.2.

6.1 Step 1 Assessments

The Step 1 Distributional Impact Appraisal is shown in **Table 6.1**. It should be noted that the noise and air quality assessments are being updated with the traffic forecasts described in **Appendix B**.

Table 6.1: Initial Distributional Impact Appraisal

Indicator	(a) Appraisal output criteria	(b) Potential impact (yes / no, positive/negative if known)	(c) Qualitative Comments	(d) Proceed to Step 2
User benefits	The TUBA user benefit analysis software will be used in the appraisal; and the value of user benefits Transport Economic Efficiency (TEE) table is non-zero.	TUBA has been used, scheme has a, positive impact on user benefits in total, with slight negative impact on vehicle operating costs (see also comments under Affordability)	Positive impact overall to all social groups.	Yes
Noise	Any change in alignment of transport corridor or any links with significant changes (>25% or <-20%) in vehicle flow, speed or %HDV content. Also note comment in TAG Unit A3.	A13 Noise Summary of 26th August 2016 produced by AECOM suggests reduction in traffic noise as a result of the use of a low noise surface on the proposed scheme which results in a positive impact on receptors (all social groups).	Minor beneficial impact for all social groups.	To be reviewed when updated noise assessments are completed. The updates are not expected to change the conclusions of the initial assessment.
Air quality	Any change in alignment of transport corridor or any links with significant changes in vehicle flow, speed or %HDV content: • Change in 24 hour AADT of 1000 vehicles or more • Change in 24 hour AADT of HDV of 200 HDV vehicles or more • Change in daily average speed of 10kph or more • Change in peak hour speed of 20kph or more • Change in road alignment of 5m or more	No signifcant effect on air quality expected according to JMP report as stated in the A13 widening Non-Statutory Environmental Report. A13 Air Quality summary of 3rd August 2016 produced by AECOM suggests that the air quality impacts from the A13 widening in the 2019 opening year would be negligible.	Neutral impact for all social groups.	To be reviewed when updated air quality assessments are completed. The updates are not expected to change the conclusions of the initial assessment

Accidents	Any change in alignment of transport corridor (or road layout) that may have positive or negative safety impacts, or any links with significant changes in vehicle flow, speed, %HGV content or any significant change (>10%) in the number of pedestrians, cyclists or motorcyclists using road network.	Neither negative nor positive impact expected for non-motorised users as no change to the alignment of the existing corridor as a result of the A13 widening. Accident effects on all road users have been assessed using COBALT.	Forecast increased vehicle kilometres as a result of the scheme result in a network-wide increase in accident numbers of 0.3%. Accidents on the widened section are forecast to reduce.	Yes
Security	Any change in public transport waiting/interchange facilities including pedestrian access expected to affect user perceptions of personal security.	Neither negative nor positive impact expected as a result of the widening as no change to the facilities for public transport or Non-motorised users as a result of the A13 widening.	Neutral impact for all social groups.	Not required
Severance	Introduction or removal of barriers to pedestrian movement, either through changes to road crossing provision, or through introduction of new public transport or road corridors. Any areas with significant changes (>10%) in vehicle flow, speed, %HGV content.	NMU Context Report of July 2016 produced by AECOM suggests possible slight negative impacts on NMUs during the construction phase of the proposed scheme around the existing Orsett Cock roundabout and at overbridges as a result of footpath diversions. Neither negative nor positive impact expected during the operational phase as no change to the existing transport corridor for NMU, or changes to access across the A13. Potential for postive impact of the scheme for NMUs (all social groups) if existing facilities are enhanced during detailed design.	Possible slight adverse impact to all social groups during the construction phase. Potential for minor beneficial impact for NMUs from all social groups during operational phase. Agreement has been reached with the Thurrock Rights of Way Officer to divert one footpath which is parallel to the A13 and results in no severance impact, and the contractor will be required to maintain access to all other footways and cycleways throughout the duration of the works.	Not required

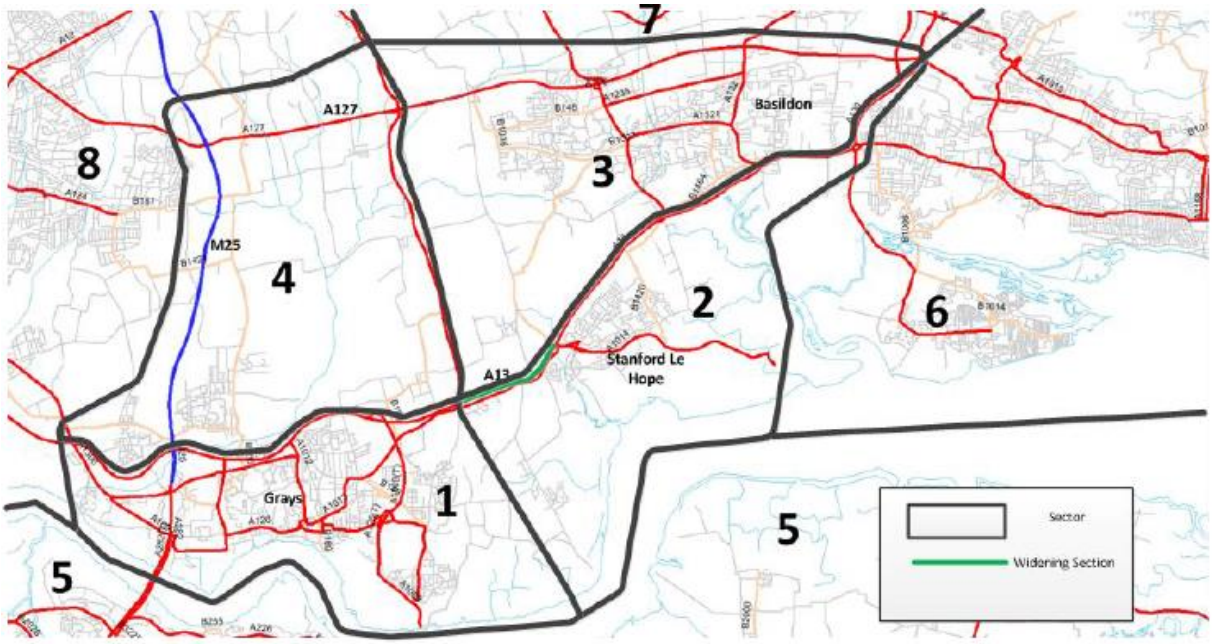
<table>
<tr>
<td>Accessibility</td>
<td>Changes in routings or timings of current public transport services, any changes to public transport provision, including routing, frequencies, waiting facilities (bus stops / rail stations) and rolling stock, or any indirect impacts on accessibility to services (e.g. demolition & re-location of a school).</td>
<td>Neither negative nor positive impact expected as a result of the widening as there are no changes to the accessibility to existing public transport services.</td>
<td>Neutral impact for all social groups. No local bus services use the section of A13 to be widened, and no changes in bus route are required as a result of the widening. The reductions in car journey times shown in Table 5.4 of Appendix B will improve access to jobs along the A13 corridor.</td>
<td>Not required</td>
</tr>
<tr>
<td>Affordability</td>
<td>In cases where the following charges would occur; Parking charges (including where changes in the allocation of free or reduced fee spaces may occur); Car fuel and non-fuel operating costs (where, for example, rerouting or changes in journey speeds and congestion occur resulting in changes in costs); Road user charges (including discounts and exemptions for different groups of travellers); Public transport fare changes (where, for example premium fares are set on new or existing modes or where multi-modal discounted travel tickets become available due to new ticketing technologies); or Public transport concession availability (where, for example concession arrangements vary as a result of a move in service provision from bus to light rail or heavy rail, where such concession entitlement is not maintained by the local authority[1]).</td>
<td>TUBA results (Table 4.2 in Appendix C) show a small reduction in vehicle operating costs which comprise only about 0.2% of total benefits. However, for non-work purposes the split of benefits below (£m 2010 prices discounted to 2010) shows voc dis-benefits as users may wish to increase journey lengths to take advantage of time savings.
<table>
<tr><td>commute+other</td><td>Time</td><td>VOC</td></tr>
<tr><td>AM</td><td>16860</td><td>-1241</td></tr>
<tr><td>PM</td><td>20365</td><td>-1364</td></tr>
<tr><td>IP</td><td>20488</td><td>-2805</td></tr>
<tr><td>Weekend</td><td>8652</td><td>-1061</td></tr>
<tr><td>Total</td><td>66365</td><td>-6471</td></tr>
</table>
Any increase in voc would represent a user choice as existing journey routes would still be available without increased monetary cost, and hence the affordability of the journey is not affected. Public transport fares, parking charges and road user charges are not affected by the widening.</td>
<td>Neutral impact for all social groups.</td>
<td>Not required</td>
</tr>
</table>

6.2 Step 2 Assessments

6.2.1 User Benefits

A high level distributional impact appraisal in terms of the user benefits (for commuters and others) has been carried out using the TUBA results. In the first instance, the impact area has been defined to be the modelled area. To simplify the process user benefits have been extracted at sector level covering sector 1-4 as shown in **Figure 6.1** for the AM and PM peaks assuming that the user benefits are most felt for the origins of journeys in the AM and destinations in the PM peak. The assessment does not cover trips with an origin or destination in other sectors, because these are represented by cordon points in the local model, not external zones.

Figure 6.1: Impact area and modelled sectors



Source: Contains OS data © Crown copyright and database right (2016)

Income deprivation data at LSOA level has then been assigned to the sectors as shown above. In order to assign the sectored benefits to the LSOAs, population proportions of each LSOA in each sector have been calculated. The results are shown in the Appraisal Summary Table in **Table 5.1**. The worksheet for calculating the benefits for each income domain is shown in **Table 6.2**.

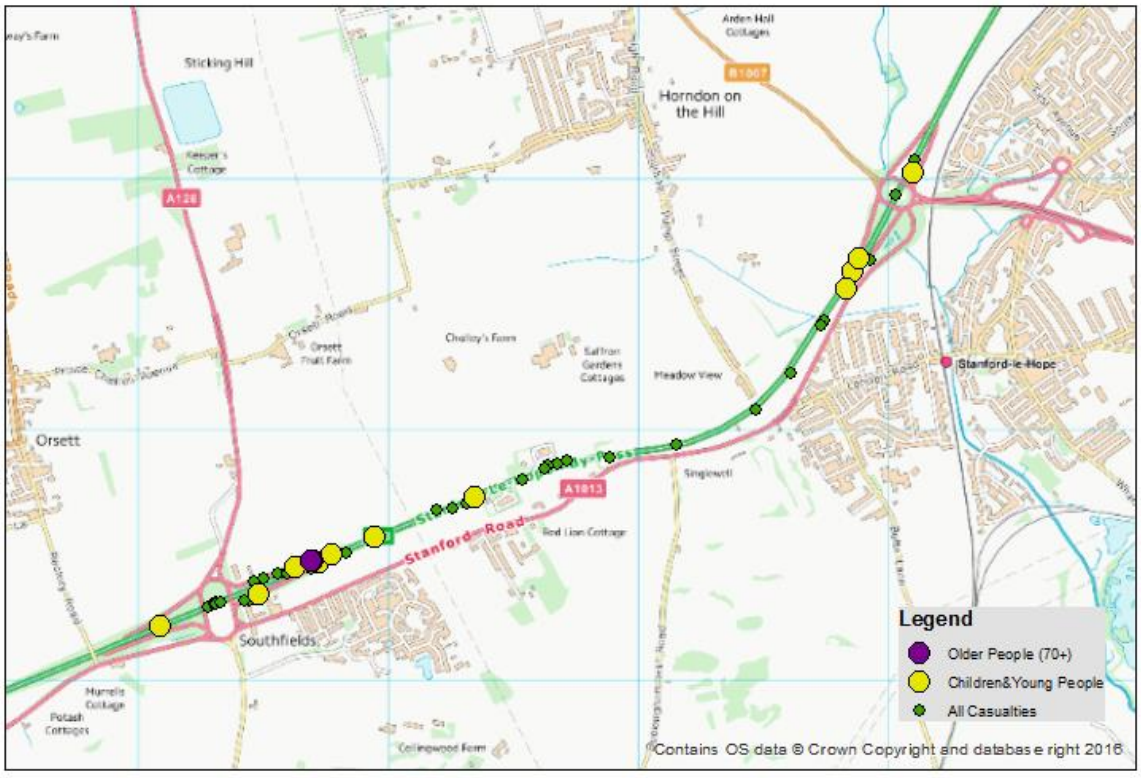
Table 6.2: Worksheet Distributional Impacts: User Benefits

	IMD Income Domains £m					
	Most deprived areas		Least deprived areas			
	0%<20%	20%<40%	40%<60%	60%<80%	80%<100%	Total
Total benefits (∑LSOAs)	1.0	3.7	3.5	2.8	1.8	12.8
Total disbenefits (∑LSOAs)	-	-	-	-	-	-
Share of user benefits	8%	29%	27%	22%	14%	100%
Share of user disbenefits	-	-	-	-	-	-
Share of population in the impact area	24%	37%	16%	14%	9%	100%
Assessment	✓	✓	✓✓✓	✓✓✓	✓✓	

6.2.2 Accidents

Using STATS19 data from 2011-2015 the casualties along the corridor of the A13 widening have been analysed. This highlighted that there were less than 50 casualties in total over a 5 year period. Therefore, a qualitative distributional impact appraisal has been carried out. **Figure 6.2** shows all casualties along the A13 corridor also highlighting the different vulnerable social groups involved.

Figure 6.2: A13 accidents by vulnerable social groups



Source: See stated, STATS19

The proportion of casualties involving children and young people (<25 years old) is about 22% of all casualties within the corridor. In comparison the national average for 2015 suggests a proportion of 12%

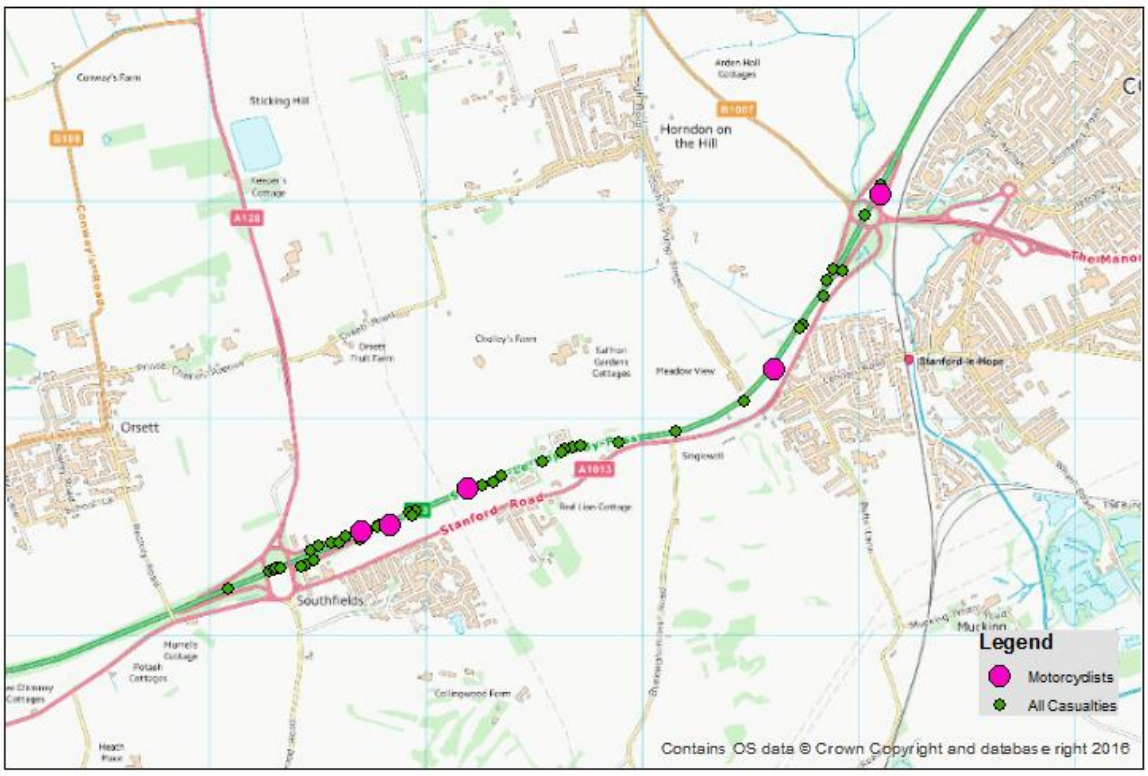
of total casualties for Young People. It should be noted however that the breakdown of national casualties by age only provides the age group 0-17 years which is different to the definition in the Distributional Impact Appraisal.

The results of the COBALT runs have been analysed to assess future accident rates along the A13 corridor. These suggest that the accident rates are estimated to reduce over time on the affected links. This suggests that the scheme would be largely beneficial for children and younger people.

The same process as for children and younger people has been applied to Older People (70+ years). For this social group the proportion is around 2% of total casualties along the corridor. The national average suggests a proportion of 13% for casualties among 60+ year olds. Even though the age group definition differs it can be concluded that the scheme would be slight beneficial to older people.

STATS19 data has further been analysed in terms of the user groups involved in accidents. This has shown that along the section of the A13 widening there has been no involvement of either pedestrians nor cyclists. Casualties involving motorcyclists are highlighted in **Figure 6.3**.

Figure 6.3: A13 accidents by user groups.



Source: As stated, STATS19

The proportion casualties involving motorcyclists is around 10%. This is broadly in line with the national average of 11%. The scheme would therefore be moderately beneficial for motorcyclists.

7 Value For Money Statement

The economic assessment of the project, taking account of changes in travel times, vehicle operating costs and accidents, has been carried out using TUBA and COBALT and is described in **Appendix C**. A summary of the benefits and costs is shown in **Table 7.1** (without the Lower Thames Crossing) and **Table 7.2** (with Lower Thames Crossing). The assessment concludes that the project demonstrates high value for money without Lower Thames Crossing and very high value for money with Lower Thames Crossing.

The results of assessments assuming low and high growth assumptions will be completed following receipt of outputs from the Lower Thames Crossing traffic model.

Table 7.1: Core scenario: Combined Economic Results (£000s 2010 prices discounted to 2010)

Benefit/Disbenefit	£000s
Greenhouse Gases	-3,664
Accidents	-4,433
Economic Efficiency: Consumer Users (Commuting)	12,896
Economic Efficiency: Consumer Users (Other)	46,999
Economic Efficiency: Business Users and Providers	112,455
Wider Public Finances (Indirect Taxation Revenues)	7,560
Present Value of Benefits (see notes) (PVB)	**171,813**
Broad Transport Budget	58,749
Present Value of Costs (see notes) (PVC)	**58,749**
Net Present Value (NPV)	**113,064**
Benefit to Cost Ratio (BCR)	**2.9**

Table 7.2: Core scenario + LTC: Combined Economic Results (£000s 2010 prices discounted to 2010)

Benefit/Disbenefit	£000s
Greenhouse Gases	-4,768
Accidents	-6,146
Economic Efficiency: Consumer Users (Commuting)	20,650
Economic Efficiency: Consumer Users (Other)	67,820
Economic Efficiency: Business Users and Providers	169,427
Wider Public Finances (Indirect Taxation Revenues)	10,149
Present Value of Benefits (PVB)	**257,133**
Broad Transport Budget	58,749
Present Value of Costs (PVC)	**58,749**
Net Present Value (NPV)	**198,384**
Benefit to Cost Ratio (BCR)	**4.4**

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