

# M25 junction 10/A3 Wisley interchange Economic Assessment Report Updated Addendum

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# 1. Introduction

## 1.1 Context

- 1.1.1 In December 2014, the Department for Transport (DfT) published the Road Investment Strategy (RIS) for 2015-2020. The RIS set out the list of schemes that were to be delivered by Highways England over the period covered by the strategy (2015-2020).
- 1.1.2 The RIS identified improvements to M25 J10/A3 Wisley Interchange as one of the key investments in the Strategic Road Network (SRN) for the London and South-East region. The commitment to take forward the scheme for delivery in RIS 1 was confirmed within the Highways England Delivery Plan.
- 1.1.3 Planning and construction of the M25 J10 scheme includes works to convert the intra-junction mainline M25 at J10, from Dual Three Controlled Motorway (D3CM) to Dual 4 All Lane Running (D4ALR). This element was previously considered solely as an element of the M25 J10-J16 Smart Motorway Intervention. A detailed description of the Scheme proposals can be found in the 'Introduction to the Application' (Application document TR010030/APP/1.2) and summarised in the Stage 4 Economic Assessment Report (Document ref HE551522-ATK-GEN-XX-RP-TR-000003).
- 1.1.4 Without measures to improve Junction 10, congestion on the approaches to, and through the junction will continue. This will become exacerbated by future traffic growth and would serve to discourage economic growth in the immediate surrounding areas, and along the A3 corridor. It would hinder the aspirations of the Enterprise M3 Local Enterprise Partnership (LEP) as well as Surrey County Council and Guildford Borough Council. There are no real alternatives to meeting this volume of travel demand via means other than road-based improvements. The scheme objectives have been defined in line with addressing the problems and their consequences. Details of the scheme objectives and a summary of the option development and previous economic assessments are detailed in the Stage 4 Economic Assessment Report (Document ref HE551522-ATK-GEN-XX-RP-TR-000003).
- 1.1.5 In 2020, further PCF Stage 4 economic assessments were undertaken to include an additional forecast year 2051 within the transport modelling and to consider an updated scheme cost estimate. At this stage, the scope of assessment included the following elements:
- Road user journey time impacts due to changes in travel time and vehicle operating costs: travel user benefits and indirect tax benefits were calculated using the DfT's TUBA program, v1.9.10 based on the impact on travel times, demand and distances forecasted using the SATURN model. The TUBA analyses presented provide assessments of impacts over a 60-year appraisal period after scheme opening (i.e. years 2022 to 2081), using forecast model outputs from three time periods (AM peak, Interpeak (IP) and PM peak) and three years (2022, 2037 and 2051).



- Road user safety impacts due to changes in the future number and/or severity of accidents: The impacts on road accidents at the junction have been estimated using COBA-LT v2013.2 (parameters v2017.1) and changes in traffic levels by road link forecast by the SATURN model. The COBA-LT analyses presented provide assessments of impacts over a 60-year appraisal period after scheme opening (i.e. years 2022 to 2081), using forecast model outputs from the same three time periods and three years.
- Wider economic impact (WEI): A Level 2 WEI assessment was undertaken based on connectivity improvements only, without explicit land use change.
- Present Value of Costs was updated: although there had been no updated cost estimate, an updated BCR was generated based on economic costs which had been adjusted to account for reforecasts of construction price inflation.

1.1.6 Details of these updated PCF Stage 4 economic assessments are documented in the Stage 4 Economic Assessment Report – Addendum (Document ref HE551522-ATK-GEN-RP-TB-000001).

## 1.2 Scope of this PCF Stage 4 economic assessment update

1.2.1 In this Addendum, the economic assessment carried out for the Stage 4 Economic Assessment Report – Addendum is updated to reassess the road user journey time benefits and vehicle operating costs using updated TAG Databook values and TUBA economic parameters only. No new traffic forecasting, for example to reflect the updated parameters, has been undertaken at this stage. The transport model forecasts, assessment approach and processes all remain consistent with those undertaken at Stage 4 and reported in the Stage 4 Economic Assessment Reports.

1.2.2 The economic assessment has been carried out using standard procedures and economic parameters as defined by TAG Unit A1- Cost Benefit Analysis and in line with the July 2021 TAG Data Book. For proportionality, only the following elements of the Stage 4 Economic Assessment Report are updated:

- Road user journey time impacts due to changes in travel time and vehicle operating costs: travel user benefits and indirect tax benefits are calculated using the DfT's TUBA program, v1.9.15 based on the impact on travel times, demand and distances forecasted using the SATURN model. The TUBA analyses presented provide assessments of impacts over a 60-year appraisal period after scheme opening (i.e. years 2022 to 2081), using forecast model outputs from three time periods (AM, IP and PM) and three years (2022, 2037 and 2051).
- Wider economic impact (WEI): A Level 2 WEI assessment is undertaken based on connectivity improvements only, without explicit land use change.
- Present Value of Costs was updated to reflect the latest scheme cost information calculated by National Highways on the 5<sup>th</sup> November 2021

1.2.3 A further purpose of this Addendum is to document investigations into the effect of removing through junction running at J10 from the scheme. This is considered towards the end of the document, after the reporting of the revised Core scenario appraisal.

## 2. Economic assessment approach

- 2.1.1 The economic assessment has been carried out as set out in Section 3 of the Stage 4 Economic Assessment Report except for the updated elements outlined in Section 1.2 above.
- 2.1.2 All benefits and costs are assessed over the construction period and a 60-year post-opening appraisal period, and then discounted to a common base year of 2010. Discount rates of 3.5% are applied to benefits and costs for the initial 30 years from the current year and rates of 3.0% are applied to subsequent years. All present values are quoted in the market price unit of account unless otherwise stated.
- 2.1.3 The price base is 2010 and therefore all prices in the appraisal are adjusted for inflation to be presented in 2010 prices, after allowing for real growth above standard inflation.
- 2.1.4 The Value for Money (VfM) assessment is carried out as a staged process. An initial BCR is calculated based on the Level 1 transport user benefits as defined by TAG. The BCR is then adjusted to capture the journey time reliability benefits and wider economic impacts

### 2.2 Scheme costs

- 2.2.1 The assessment of scheme costs have been updated to reflect the latest economic information supplied by National Highways released on the 5<sup>th</sup> November 2021. These costs were provided 2010 prices, in factor cost unit of account and excluding VAT, both recoverable and non-recoverable.
- 2.2.2 For ease of reference Table 2-1 shows the estimated scheme costs, and the corresponding Present Value of Costs, adjusted to 2010 market prices, and discounted to 2010 values, for the economic calculations.

**Table 2-1: Stage 4 scheme costs, £million**

	2010 factor prices	Present Value of Costs, 2010 market prices, discounted to 2010
Scheme	196.226	148.765

- 2.2.3 Indirect taxation revenue impacts are assessed as affecting the level of benefits rather than the level of costs. This means that in the Benefit Cost Ratio (BCR) calculation indirect taxation revenue is added to the benefits rather than subtracted from the scheme costs.

### 2.3 Changes in travel time and vehicle operating costs

- 2.3.1 The impacts of the scheme on travel times and vehicle operating costs for trips using the junction are assessed using TUBA v1.9.15 based on relevant information as output from the SATURN traffic model.
- 2.3.2 The following benefits are estimated:
- user benefits by vehicle type and journey purpose, for each element of journey cost (i.e. travel time and vehicle operating costs - fuel and non-fuel)

- changes in the indirect tax income received by the government (for highway schemes this primarily reflects the levels of indirect taxation incurred on fuel cost)

2.3.3 TUBA provides a complete set of default economic parameters in its standard economics file, including values for variables such as values of time, vehicle operating cost data, tax rates and GDP deflators.

2.3.4 The scheme related parameters in the TUBA scheme file were largely determined by the parameters used in the forecasting model, namely:

- First year – 2022 (scheme opening year)
- last year – 2081 (60 years from opening year)
- modelled years – 2022, 2037, 2051

2.3.5 No further growth in traffic or benefits was assumed beyond 2051 (apart from an allowance from continued growth in the real value of time, in line with TAG).

2.3.6 Time slices and annualisation factors remain as presented in Sections 3.8 and 4.4 of the Stage 4 Economic Assessment Report (EAR).

## 2.4 Monetisation of wider economic impacts

2.4.1 Consistent with Stages 3 and 4, benefits associated with increased output in imperfectly competitive markets are quantified, in line with TAG Unit A2.2 (updated May 2020) and the DfT's Wider Economic Benefits and Transport Appraisals: A Guidance Framework. The welfare effects which arise due to the presence of imperfect competition (the market structure distorts the efficient operation of the market), is estimated by applying a 10% uplift factor to the business and freight user benefits.

2.4.2 The monetised benefits assessed from the above process are Level 2 benefits and are therefore included in the adjusted BCR when considering overall Value for Money.

## 3. Economic appraisal results

### 3.1 Introduction

3.1.1 This section presents the results of the updated economic assessment, using DfT's TUBA program v1.9.15, alongside the results presented in the Stage 4 EAR Addendum, which used TUBA v1.9.10. It should be noted that, consistent with the approach taken at Stage 4, scheme impacts have been analysed on a geographical basis. This means that some of the sector movements have been masked out of the economic analysis, in order to reduce the impact of model noise. The masking definition has been determined based on the relevance of each movement with regards to the scheme impact. All results presented from here in are 'masked' results.

### 3.2 Travel time and vehicle operating benefits

3.2.1 Table 3-1 presents the Present Value of Benefits (PVB) of travel time and vehicle operating cost benefits for the scheme after opening (i.e. without the construction impact). Travel time savings account for most of the scheme benefits.

**Table 3-1: TEE summary of 60-year travel time and vehicle operation costs**

	Stage 4 Core Scenario PV, £000s (2010 prices and values)	
	TUBA v1.9.10	TUBA v1.9.15
Travel Time	420,375	368,801
Vehicle Operating Cost	-31,556	-17,211
Total	388,818	351,590

3.2.2 The reduction in benefits between the two TUBA runs is largely explained by two factors, both of which have been reflected in the July 2021 updates to TAG, including the Databook and TUBA economics parameters:

- Changes to the value of time growth rates in appraisal accounting – new growth indices for appraisal apply a fixed growth rate of 1.5%p.a. whereas previous versions of TUBA applied value of time growth rates in line with GDP/capita; and
- GDP growth forecasts themselves have been substantially reduced – ONS and OBR updates in 2021 reflect actual and forecast GDP growth that is consistently lower than the GDP growth rates that were applied in the earlier TUBA v1.9.10.

### Benefits by time period

3.2.3 Table 3-2 presents the TEE benefits for the scheme over the 60-year appraisal period, disaggregated by time period.

3.2.4 These figures show that whilst benefits are seen in all time periods, the AM accounts for around 40% of the total benefits. This can be explained by the current and forecasted congestion experienced in the AM period being significantly higher than the other time periods, which gives a higher potential for improvement.

**Table 3-2: TEE user benefits by time period**

	Stage 4 Core Scenario			
	TUBA v1.9.10		TUBA v1.9.15	
	PV, £000s (2010 prices and values)	%age of user benefits	PV, £000s (2010 prices and values)	%age of user benefits
AM	154,899	40%	136,646	39%
IP	120,104	31%	109,832	31%
PM	54,128	14%	50,809	14%
Weekend	59,687	15%	54,303	15%
Total	388,818	100%	351,590	100%

### Benefits by travel purpose

3.2.5 Table 3-3 presents the TEE benefits for the scheme over the 60-year appraisal period, disaggregated by journey purpose.



- 3.2.6 The table shows that most benefits, 57%, are accrued by business users; and business benefits are significantly greater than those accrued by commuters and those on other trips combined. This reflects several influences, including the fact that LGV and HGV benefits are included in the business total, and the fact that business values of time per car trip are significantly higher than the values for car trips for commuting and other purposes.

**Table 3-3: TEE user benefits by purpose**

	Stage 4 Core Scenario			
	TUBA v1.9.10		TUBA v1.9.15	
	PV, £000s (2010 prices and values)	%age of user benefits	PV, £000s (2010 prices and values)	%age of user benefits
Business	221,515	57%	200,538	57%
Commuting	55,336	14%	49,776	14%
Other	111,968	29%	101,276	29%
Total	388,818	100%	351,590	100%

### Travel time benefits by size of time saving

- 3.2.7 For the two TUBA runs, Table 3-4 and Table 3-5 present the monetised travel time saving benefits for the scheme disaggregated by the length of the time savings accrued in minutes for the scheme in 2022, 2037, 2051 and over the full 60-year appraisal period.
- 3.2.8 In 2022, 2037, 2051 and over the 60-year total, the greatest contributions to the time saving benefits are derived from time savings of 0 to +2 minutes, but these are substantially offset by journey time disbenefits in the 0 to -2 minutes time band. In net terms, the greatest journey time benefits arise within the +/-2 to +/-5 minutes time bands.

**Table 3-4: Time saving benefits, PV - by size of time saving (TUBA v1.9.10)**

Year	PVB						Total PVB £000s
	< -5 mins	- 5 to -2 mins	-2 to 0 mins	0 to 2 mins	2 to 5 mins	> 5mins	
2022	-140	-883	-5,687	7,692	3,470	947	5,399
2037	-276	-739	-8,504	11,765	5,008	547	7,801
2051	-295	-1,508	-8,983	10,924	7,021	692	7,851
Total	-15,150	-68,446	-471,136	599,664	336,991	38,450	420,373

**Table 3-5: Time saving benefits, PV - by size of time saving (TUBA v1.9.15)**

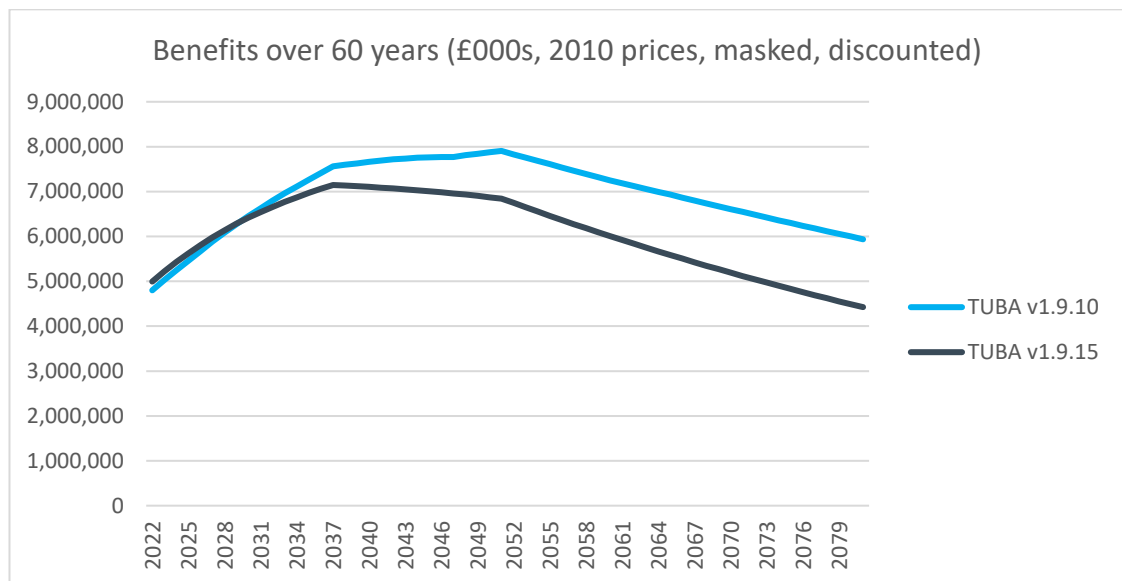
Year	PVB						Total PVB £000s
	< -5 mins	- 5 to -2 mins	-2 to 0 mins	0 to 2 mins	2 to 5 mins	> 5mins	
2022	-140	-875	-5,625	7,605	3,430	938	5,333
2037	-263	-702	-8,064	11,156	4,750	520	7,397
2051	-259	-1,314	-7,818	9,514	6,124	604	6,851
Total	-13,243	-59,137	-411,943	526,617	292,532	33,973	368,799

- 3.2.9 When considering the reductions in benefits between the two TUBA runs by year, the combined cumulative effect of the reduced GDP growth forecasts and fixed Value of Time growth rate are reflected in the larger differences in benefits in the 2037 and 2051 modelled years.

### Yearly profile of benefits

- 3.2.10 Figure 3-1 shows the benefits over the 60-year period for both TUBA runs. These profiles represent the same traffic model skims and the differences in profiles reflect the differences in GDP growth and value of time growth.
- 3.2.11 Comparing the TUBA v1.9.10 run, as reported in the EAR Addendum, against the currently updated TUBA v1.9.15 run:
- Between 2022 and 2037, there are estimated to be large year-on-year increases in benefits as congestion in the do minimum scenario worsens. Within this short-to-medium term time horizon the congestion benefits continue to grow even under the updated value of time growth profiles;
  - Between 2037 and 2051, although there continue to be benefits of the scheme as congestion continues to worsen in the do minimum scenario, the effective benefit values begin to be offset by the effects of reduced value of time growth indices; and
  - After 2051, the benefits are held level, and the diagram shows a tail as they are discounted through time. The lower profile reflects the combined cumulative effects of reduced value of time growth and discounting.

**Figure 3-1: Benefits over 60 years**



### 3.3 Accident benefits

3.3.1 The assessment of accident impacts on the highways network remains as presented in Section 3.3 of the Stage 4 EAR – Addendum.

### 3.4 Monetised environmental impacts

3.4.1 This assessment remains as presented in Sections 3.8 and 4.4 of the Stage 4 EAR.

### 3.5 User Impact of construction and maintenance

3.5.1 This assessment remains as presented in Sections 3.7 and 4.5 of the Stage 4 EAR.

### 3.6 Transport Economic Efficiency (TEE) table

3.6.1 The TEE table for the scheme is presented in Appendix A and summarised in Table 3-6.

3.6.2 The updated TEE benefits amount to £341m, with the majority being attributed to business users, with benefits of £195m.

**Table 3-6: TEE table summary**

Category		Stage 4 Core Scenario PV, £000s (2010 prices and values)	
		TUBA v1.9.10	TUBA v1.9.15
Business	Travel time	212,638	186,318
	Operating cost	8,876	14,221
	During construction	-5,126	-5,126 *
	Total	216,389	195,412
Commuting	Travel time	63,383	56,118
	Operating cost	-8,047	-6,342
	During construction	-1,626	-1,626 *
	Total	53,710	48,150
Other	Travel time	144,353	126,366
	Operating cost	-32,385	-25,090
	During construction	-4,017	-4,017 *
	Total	107,951	97,259
Present Value TEE Benefit		<b>378,049</b>	<b>340,821</b>

\* Note: Impacts of construction and maintenance are based on TUBA v1.9.10 as presented in the EAR.

## 3.7 Public accounts

3.7.1 Public Accounts (PA) details are presented in Appendix A and summarised in Table 3-7 below.

**Table 3-7: PA table summary**

Central Government Funding	Stage 4 Core Scenario PV, £000s (2010 prices and values)	
	TUBA v1.9.10	TUBA v1.9.15
Present Value Costs (PVC)	148,765	148,765
Wider Public Finances	-25,778	-11,646

## 3.8 Level 1 Analysis of Monetised Costs and Benefits (AMCB) table

3.8.1 Table 3-8 summarises the Level 1 economic assessment results for the core scenario for both TUBA runs. The AMCB table for the scheme is presented in Appendix A.

3.8.2 Considering the updated Level 1 benefits analysis and the Stage 4 scheme cost estimates, the initial expected BCR for the M25 J10 scheme is estimated at 2.80 based on TUBA v1.9.15 – a decrease on the Stage 4 BCR based on TUBA v1.9.10 which can be attributed to the reductions in GDP and value of time growth rates.

**Table 3-8: Level 1 AMCB summary table, £000s (PV, 2010 prices)**

Category	Stage 4 Core Scenario PV £000s	
	TUBA v1.9.10	TUBA v1.9.15
Greenhouse gases	-9,319	-9,319
Air quality	-344	-344
Noise	711	711
Accidents	73,159	73,159
TEE: Commuting	53,710	48,150
TEE: Other	107,951	97,259
TEE: Business	216,389	195,412
Wider public finances	25,778	11,646
PVB	468,035	416,674
PVC	148,765	148,765
NPV	319,270	267,909
Initial BCR	3.15	2.80

### 3.9 Level 2 journey reliability benefits

3.9.1 This assessment remains as presented in Sections 3.6 and 4.9 of the Stage 4 EAR.

### 3.10 Level 2 wider economic impacts

3.10.1 An estimate of the impact of increased output in imperfectly competitive markets (reflecting the additional margin that firms can make on each additional unit of output they can produce as a result of travel cost savings) has been derived directly from the business user benefits presented in the TEE (in line with TAG Unit A2.2, updated May 2020). The monetised benefit of increased output in imperfectly competitive markets is estimated to be £19.5 million (NPV, 2010 prices and values).

3.10.2 Whilst no assessment has been undertaken, and no monetised benefit produced, it is anticipated that the scheme would lead to a change in agglomeration and the increase in productivity associated with it as connectivity between economic activities is improved.

### 3.11 Level 2 Analysis of Monetised Costs and Benefits (AMCB) table

3.11.1 Table 3-9 summarises the Level 2 economic assessment results for the core scenario based on both TUBA runs and the Stage 4 scheme costs as reported in the EAR Addendum.

3.11.2 When Level 2 monetised benefits are added to the Level 1 assessment of scheme performance the adjusted BCR of the M25 J10 scheme is estimated at 3.17 – a decrease on the Stage 4 Level 2 BCR based on TUBA v1.9.10 which can be attributed to the reductions in GDP and value of time growth rates; and the reduced wider economic impacts associated with reduced business user benefits.



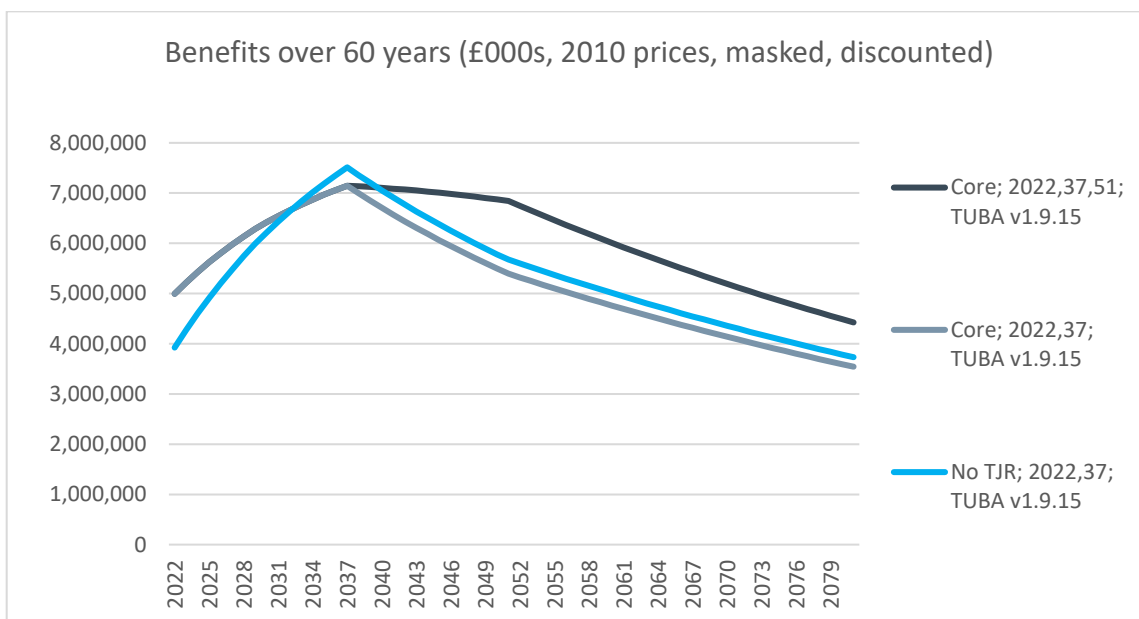
**Table 3-9: Level 2 AMCB summary table, £000s (PV, 2010 prices)**

Category	Stage 4 Core Scenario PV £000s	
	TUBA v1.9.10	TUBA v1.9.15
Greenhouse gases	-9,319	-9,319
Air quality	-344	-344
Noise	711	711
Accidents	73,159	73,159
TEE: Commuting	53,710	48,150
TEE: Other	107,951	97,259
TEE: Business	216,389	195,412
Wider public finances	25,778	11,646
Reliability benefits	35,400	35,400
Imperfect markets	21,639	19,541
PVB	525,073	471,615
PVC	148,765	148,765
NPV	376,308	322,850
Adjusted BCR	3.53	3.17

## M25 J10 Through Junction Running

- 3.11.3 The scheme currently includes the proposed conversion of the through-junction section of the M25 from 3 lanes plus hard shoulder to 4 lanes, known as J10 Through Junction Running (TJR). This element was originally part of the M25 J10-16 RIS scheme but is now included within the M25 J10 scheme description due to the opportunity to reduce construction impact on the network by delivering both elements at the same time. This sensitivity tests seeks to understand how the scheme impact might change if the J10 TJR element is removed.
- 3.11.4 Updated TUBA runs have been undertaken using the existing transport model skims representing the scheme without the J10 TJR element. As discussed in Section 1.2, no new traffic forecasting, either for the additional forecast year 2051 or to reflect the updated parameters, has been undertaken at this stage. The implication of this has been that a 'like-for-like' comparison to gauge the effects of the J10 TJR element would need to be undertaken on TUBA assessments which include just two forecast years, 2022 & 2037, as presented in the initial EAR. Figure 3-2 shows the benefits over the 60-year period for TUBA runs representing the core scenario with and without the J10 TJR element, using *two* forecast years – termed the 'core comparator'. For reference, the benefits profile for the main core scenario with J10 TJR, using *three* forecast years is also shown.

**Figure 3-2: Benefits profiles over 60 years**



3.11.5 For the purposes of this assessment, the estimated costs for the full scheme with J10 TJR have been applied throughout. The headline economics for these tests are included in Table 3-10. The cost-benefit assessment using two forecast years suggests that the estimated impact of through junction running on the BCR is relatively small (~1%). While the direction of change is counter-intuitive, it should be noted that the scale of the difference is well within the accuracy of the forecasting model.

**Table 3-10: Cost benefit analysis for no J10 TJR test, £000s (PV)**

Category	Core comparator (Forecast years 2022, 2037)	No J10 TJR (Forecast years 2022, 2037)
<b>Present Value of Benefits (PVB)</b>	420,943	425,715
<b>Present Value of Costs</b>	148,765	148,765
<b>Expected Benefit Cost Ratio (BCR)</b>	2.83	2.86

## 3.12 Non-monetised benefits

3.12.1 This assessment remains as presented in Sections 3.10 and 4.12 of the Stage 4 EAR.

## 4. Summary

4.1.1 This Updated Addendum to the Economic Assessment Report summarises the approach for updating the TUBA assessments of the existing traffic forecasts to consider the latest TAG Databook and TUBA parameters.

4.1.2 Given the changes in appraisal accounting in respect of value of time growth, and the revised GDP forecasts, the Addendum also seeks to provide the evidence needed to establish the extent to which the scheme provides value for

money in relation to impacts on public accounts under the currently forecast economic outlook.

- 4.1.3 The economic assessment compares the monetised costs and benefits of the proposed scheme (the Do-Something) against the alternative without scheme scenario (the Do-Minimum).
- 4.1.4 The costs of the scheme used in the assessment comprise the scheme construction costs taken directly from the latest tables provided by the Highways England Commercial team (15/02/22).
- 4.1.5 For proportionality at this stage, the benefits of the scheme have only been recalculated for road user benefits and consequent wider economic impacts.
- 4.1.6 All other elements of the core benefits have been carried over from the existing Stage 4 economic assessments, including the monetised greenhouse gas, air quality and noise impacts, accident benefits, journey time reliability, delays during construction and maintenance, and social and distributional impacts.
- 4.1.7 The results from the different elements of the economic assessment are presented in three summary tables:
- The Transport Economy Efficiency (TEE) table
  - The Public Accounts (PA) table
  - The Analysis of Monetised Costs and Benefits (AMCB) table
- 4.1.8 An initial Benefit Cost Ratio (BCR) has been calculated over the 60-year appraisal period that excludes the outputs of the journey time reliability assessment and wider economic impacts, with an adjusted BCR also reported that includes these impacts.
- 4.1.9 The economic appraisal has been undertaken for the core scenario of the identified single option.
- 4.1.10 All benefits and costs were calculated in monetary terms and expressed as present values (PV) in 2010 market prices, discounted to 2010. This enables direct economic comparison with other schemes which may have very different timescales.
- 4.1.11 Based on the modelling underpinning the EAR Addendum, including the additional forecast year, the scheme is now forecast to produce Level 1 benefits of £416.7m (PV) over the 60-year appraisal period.
- 4.1.12 The scheme construction costs are £148.765m (PV). The construction cost figure was the best available at the time of compiling this addendum.
- 4.1.13 With consideration of the effects of delays during construction, accident benefits, indirect taxation benefits, monetised environmental impacts and maintenance costs, the initial expected BCR is therefore 2.80 relative to the scheme costs.
- 4.1.14 An estimate of the impact of increased output in imperfectly competitive markets (reflecting the additional margin that firms can make on each additional unit of output they can produce as a result of travel cost savings) has been derived directly from the estimated business user benefits (in line with TAG Unit A2.2, updated in May 2020) and is estimated to be £19.5m (NPV, 2010 prices and values).

- 4.1.15 Monetised benefits resulting from improved journey time reliability as a result of the scheme have been estimated to be £35.4m (PV).
- 4.1.16 Inclusion of journey time reliability benefits and wider economic impacts gives an adjusted expected BCR of 3.17, relative to the scheme costs.
- 4.1.17 A sensitivity test in which the J10 through junction running is removed from the core scheme, suggests a ~1% increase in benefits, though this is not statistically significant.

# Appendix A. Appraisal tables

Core results for three forecast years, retaining scheme costs from Stage 4

## Economic Efficiency of the Transport System (TEE)

<b>Non-business: Commuting</b>		
<b><u>User benefits</u></b>	<b>ALL MODES</b>	<b>ROAD</b>
	<b>TOTAL</b>	<b>Private Cars and LGVs</b>
Travel time	£56,118	£56,118
Vehicle operating costs	-£6,342	-£6,342
User charges	£-	
During Construction & Maintenance	-£1,626	-£1,626
<b>NET NON-BUSINESS BENEFITS: COMMUTING</b>	£48,150 (1a)	£48,150
<b>Non-business: Other</b>		
<b><u>User benefits</u></b>	<b>ALL MODES</b>	<b>ROAD</b>
	<b>TOTAL</b>	<b>Private Cars and LGVs</b>
Travel time	£126,366	£126,366
Vehicle operating costs	-£25,090	-£25,090
User charges	£-	
During Construction & Maintenance	-£4,017	-£4,017
<b>NET NON-BUSINESS BENEFITS: OTHER</b>	£97,259 (1b)	£97,259
<b>Business</b>		
		<b>Goods Vehicles, Business Cars &amp; LGVs</b>
<b><u>User benefits</u></b>		
Travel time	£186,318	£186,318
Vehicle operating costs	£14,221	£14,221
User charges	£-	
During Construction & Maintenance	-£5,126	-£5,126
<b>Subtotal</b>	£195,412 (2)	£195,412
<b><u>Private sector provider impacts</u></b>		
Revenue	£-	
Operating costs	£-	
Investment costs	£-	
Grant/subsidy	£-	
<b>Subtotal</b>	£- (3)	
<b><u>Other business impacts</u></b>		
Developer contributions	£- (4)	
<b>NET BUSINESS IMPACT</b>	£195,412 (5) = (2) + (3) + (4)	
<b>TOTAL</b>		
Present Value of Transport Economic Efficiency Benefits (TEE)	£340,821 (6) = (1a) + (1b) + (5)	
Notes: Benefits appear as positive numbers, while costs appear as negative numbers. All values in £000s. All entries are discounted present values, in 2010 market prices and values		



## Public Accounts (PA) Table

	ALL MODES		ROAD
	TOTAL		INFRASTRUCTURE
<b><u>Local Government Funding</u></b>			
Revenue	£-		
Operating Costs	£-		
Investment Costs	£-		
Developer and Other Contributions	£-		
Grant/Subsidy Payments	£-		
<b>NET IMPACT</b>	£- (7)		£-
<b><u>Central Government Funding: Transport</u></b>			
Revenue	£-		
Operating costs	£-		
Investment Costs	£148,765		£148,765
Developer and Other Contributions			
Grant/Subsidy Payments			
<b>NET IMPACT</b>	£148,765 (8)		£148,765
<b><u>Central Government Funding: Non-Transport</u></b>			
Indirect Tax Revenues	-£11,646 (9)		-£11,646
<b><u>TOTALS</u></b>			
<b><u>Broad Transport Budget</u></b>	£148,765 (10) = (7) + (8)		
<b><u>Wider Public Finances</u></b>	-£11,646 (11) = (9)		
<p>Notes: Costs appear as positive numbers, while revenues and 'Developer and Other Contributions' appear as negative numbers. All entries are discounted present values in 2010 market prices and values. All values in £000s.</p>			

## Analysis of Monetised Costs and Benefits

Noise	£711	(12)
Local Air Quality	-£344	(13)
Greenhouse Gases	-£9,319	(14)
Journey Quality		(15)
Physical Activity		(16)
Accidents	£73,159	(17)
Economic Efficiency: Consumer Users (Commuting)	£48,150	(1a)
Economic Efficiency: Consumer Users (Other)	£97,259	(1b)
Economic Efficiency: Business Users and Providers	£195,412	(5)
Wider Public Finances (Indirect Taxation Revenues)	£11,646	- (11) - sign changed from PA table, as PA table represents costs, not benefits
Present Value of Benefits (see notes) (PVB)	£416,674	$(PVB) = (12) + (13) + (14) + (15) + (16) + (17) + (1a) + (1b) + (5) - (11)$
Broad Transport Budget	£148,765	(10)
Present Value of Costs (see notes) (PVC)	£148,765	$(PVC) = (10)$
OVERALL IMPACTS		
<b>Net Present Value (NPV)</b>	£267,909	$NPV = PVB - PVC$
<b>Benefit to Cost Ratio (BCR)</b>	2.80	$BCR = PVB / PVC$
<p>Note: This table includes costs and benefits which are regularly or occasionally presented in monetised form in transport appraisals, together with some where monetisation is in prospect. There may also be other significant costs and benefits, some of which cannot be presented in monetised form. Where this is the case, the analysis presented above does NOT provide a good measure of value for money and should not be used as the sole basis for decisions.</p> <p>All entries are discounted present values in 2010 market prices and values.</p> <p>All values in £000s.</p>		

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