

**General information**

Scheme name	M4 Junction 17 Improvements (MRN)
Promoter	Wiltshire Council

**Purpose**

The purpose of this toolkit is to provide promoters with transparent information on the areas of the modelling and economic appraisal that the DfT scrutinise as part of the any business case submission. It allows the promoter to clearly flag areas of the analysis that requires additional work and to inform the DfT of how the work will be undertaken. As well as promoting transparent and open engagement it aims to significantly reduce the amount of time required for the DfT to respond to submissions and to allow the DfT to help the promoter to deliver the most robust analysis and maximise the potential of approval. The DfT appreciate not all tabs will be required at the earlier stages of the business case submission however they are provided to give the promoter visibility of the analysis required at later stages

**Submission**

This toolkit is required to be submitted at all stages of the business case development in order for all stakeholders to clearly understand progress and outstanding issues and risk. Each of the fields in all of worksheets will need to be completed with references to where the information can be found. If the field is not relevant please leave blank and provided notes in the commentary section as to why. An appropriate RAG will need to be applied. Green aligning to TAG or robust analysis demonstrating why a revised method is appropriate, Amber - further work is needed and actions have been established, Red - not yet begun or acknowledging the provided information is not sufficient. It is not expected that all boxes are Green at all submission stages.

**References**

All report references must highlight specific pages within documents and where possible paragraphs. Naming a complete document will not be accepted

**Comments**

This is provided for the promoter to add comments as to why items maybe red/amber and how/when/if they are likely to be addressed.

# ASR Checklist

## Approach to Traffic Modelling and Forecasting

What is the identified problem and likely solutions?

Has a suitable study area been defined? Is evidence provided to support this?  
NB: see OAR review for further detail

Has availability of existing models been considered (to include assessment of models based on structure of overall model and its components; the age, quality and spatial coverage of the underlying data; and the models adherence to quality criteria for calibration and validation).

### Base Year Traffic Model and Traffic Data

Proposed approach to developing traffic models. To include description of the road traffic and public transport passenger assignment models, including proposed model network and zone plans, details of treatment of congestion on the road system and crowding on the public transport system.

Will proposed methods capture scheme impacts (to consider OAR results and scheme risk/rates)?  
Availability of existing traffic data.

Traffic Data requirements and approach to surveys (to include consideration of demand data, traffic/passenger flow data and journey time data).

Are proposed survey of sufficient coverage to support the proposed model build - both spatially and across modes?

Description of the data to be used in model building and validation with a clear Base Year and Time periods to be modelled. Is evidence provided to support the selection of modelled time periods?

Description of the overall spatial coverage of the model and the evidence to support this.  
Details of matrix development methodology (e.g. RSI, Mobile Network Data, gravity model) including approach to matrix calibration and validation.  
Description of the approach to validation.

Does the proposed validation provide sufficient coverage to demonstrate fitness for purpose for appraisal of the scheme

### Demand Modelling

Description of the approach to demand modelling.

Description of the proposed approach for developing the demand model and rationale for its setup.

Does the methodology proposed align with TAG in terms of: model form; choices includes appropriate mode coverage etc

### Forecasting

Proposed forecast years and the rationale for those chosen.  
Is it proposed to forecast "as far into the future as possible" as per TAG M4 1.2?

Description of the forecast scenarios to be modelled.

Description of the methods to be used in forecasting future traffic demand.

Description of the methods to be used in forecasting future supply.

Details of the Sensitivity Testing that will be carried out (to include high and low growth, as well as other significant sources of uncertainty).

Details of approach to dependent development (to include description of potential dependent development site(s), the approach to evidencing / quantifying dependency, scenarios that will be modelled).

## Approach to Appraisal

A clear explanation of the methodology to be used in the calculation of TEE benefits (including appropriate DMDS inputs) - TUBA/bespoke calculation (including up-to-date TUBA version; standard economics file; appropriate appraisal period; if bespoke calculations parameters are correct/up-to-date; etc.)

Details of the approach to appraisal of maintenance delay (costs/savings).

Details of the approach to appraisal of construction delay.

Details of the planned approach to annualisation of TEE benefits in TUBA.

Reliability

Regeneration

Wider Impacts

Noise

Details of methodology to be used for appraisal of:

Air Quality

Greenhouse Gases

Accidents

Physical Activity (active mode impacts)

Details of the approach to appraisal if there is dependent development (to include Transport External Costs, Land Value Uplift and Land Amenity Value)

Details of base scheme investment costs - clearly aligned with those in the financial case (including risk/real inflation) - and cover whole life costs.

Public Accounts

Clear explanation of how costs will be converted to appropriate price base and how discounting etc. will be applied to provide appraisal costs

Details of the Sensitivity Testing that will be carried out.

A methodology for appraisal, set out against each of the challenges or sub-impacts in the ASR, is included in the ASST.

Comments RAG Rating Report Reference

Unless otherwise stated, paragraph numbers refer to ASR document.

A full account of issues and objectives to be addressed by the scheme is presented in Chapter 2.	G	2.1.1-2.3.1
Details of the model study area are provided in the ASR. The impact of the scheme will be well within the Area of Detailed Modelling (AoDM) of the Wiltshire Transport Model (WTM).	G	4.4.5-4.4.9
Consideration of the various transport models available and justification for the one chosen is presented in the ASR.	G	4.1.1-4.1.6

The proposed modelling approach is presented in ASR. The impact of the scheme will be well within the Area of Detailed Modelling (AoDM) of the Wiltshire Transport Model (WTM). Figure 4-1 of the ASR highlights the Area of Detailed Modelling (AoDM) currently within the WTM. To fully capture the network impacts of changes within Wiltshire, the AoDM encompasses the whole of Wiltshire, Swindon, Bath, parts of South Gloucestershire and parts of the Cotswolds. Initial testing has confirmed the model will capture the scheme impacts.	G	4.1.1-4.4.33
Available existing traffic counts are identified. However, the collection of new count data is not recommended due to the outbreak of Covid-19.	A	4.4.32 - 4.4.33
Key features of the Wiltshire Transport Model (WTM) have been retained, including the average peak hour setup. Average peak hours are fully compatible with the WTM VDM derived from the South West Regional Transport Model (SWRTM), and provide a suitable platform to undertake the economic assessment.	G	4.4.1
The ADM of the WTM has been defined in the ASR.	G	4.3.1-4.3.2
Prior matrix was derived from mobile phone data in the development of the SWRTM.	G	4.4.30
Validation is undertaken within TAG guidance over a comprehensive area in Wiltshire.	G	4.4.28-4.4.33

The Wiltshire Transport Model is a full Variable Demand Model (VDM). The modelling approach set out assumes use of the VDM, however tests will be undertaken to understand whether use of the VDM is appropriate.	G	4.2.3-4.2.5, 4.4.10-4.4.27
Details of VDM development included in ASR.	G	4.4.10-4.4.27

Forecast years of 2024 (opening year), 2036 (scheme design year) and 2051 (horizon year).	G	4.5.4
Appraisal to be conducted in the context of dependent development. The forecast model scenarios are outlined at the end of Section 5.	G	5.7.1
Details given in ASR.	G	4.5.1-4.5.18
Details given in ASR.	G	4.5.1-4.5.18
High and low growth scenarios developed in line with TAG Unit M4, with local assumptions varied where appropriate.	G	4.5.15-4.5.17
The Chippenham Urban Expansion will be demonstrated to be partially dependent on intervention at M4 J17. The quantum of the development which is dependent upon improvement at M4 J17 will be determined using a bespoke methodology outlined in Section 5.	G	5.1.1-5.7.1

TUBA software v1.9.14 in conjunction with economics file "Economics_TAG_db1_14_0.txt" will be used to undertake the TEE appraisal over a 60 year appraisal period with the P and S scenarios forming the DM and DS respectively. Sensitivity test using "Economics_TAG_db1_10_0.txt" has been prepared.	G	6.5.2-6.5.4, 6.6.3-6.6.7
Maintenance delay will not be captured as maintenance delay would be present in both the DM and DS scenarios.	G	6.6.13
Construction delay is captured through implementing the proposed traffic management measures into the transport model. Impacts are then monetised through TUBA.	G	6.6.10-6.6.13
Appraisal is undertaken on a peak period model hence standard annualisation factors can be assumed.	G	6.5.3-6.5.4
Bespoke python script using urban roads method in TAG Unit A1-3.	G	6.6.15
Regeneration is not captured as part of the appraisal.	G	
Increased economic output in imperfectly competitive markets will be calculated by taking 10% of impacts to Business Users calculated in TUBA.	G	6.6.16-6.6.21
Static agglomeration impacts will be calculated using WITA software.	G	
Impacts not monetised, however there will be full consideration for each of the TAG environmental sub objectives in accordance with TAG Unit A3.	G	6.8.1, 6.8.9
Impacts not monetised, however there will be full consideration for each of the TAG environmental sub objectives in accordance with TAG Unit A3.	G	6.8.1, 6.8.10
Due to the size and cost of the scheme it is considered proportionate to monetise greenhouse gas impacts through TUBA as part of the TEE assessment, however no further analysis will be undertaken.	A	
Monetised using COBA-LT software.	G	6.6.8-6.6.9
The scheme will have a negligible effect on physical activity, and hence impacts will not be monetised.	G	
The Chippenham Urban Expansion will be demonstrated to be partially dependent on intervention at M4 J17. The quantum of the development which is dependent upon improvement at M4 J17 will be determined using a bespoke methodology outlined in Section 5.	G	5.1.1-5.7.1, 6.6.22-6.6.29
The methodologies used for monetising impacts of the dependent development are covered in the Level 3 Impacts subsection of section 6.	G	
The various elements that feed into base scheme investment costs and how they link to the economic and financial cases is set out in the ASR.	G	6.7.1-6.7.7
Conversion to 2010 price base will be undertaken assuming discount rates of 3.5% for the initial 30 years and 3.0% for the subsequent years.	G	6.5.5-6.5.7, 6.7.8
Low and High growth sensitivity tests will be undertaken. Other sensitivity test may be confirmed and undertaken at a later stage.	G	6.11.1-6.11.2
ASST provided in Appendix A	G	Appendix A

## Overall Assessment

Overall Comments Overall RAG

A robust and proportionate approach to modelling and appraisal of the scheme in line with TAG has been developed and documented within the ASR. This has regard to the expected scheme impacts. The modelling tool (Wiltshire Transport Model) has been shown to be suitable for the purposes of the appraisal, and the WTM and modelling approach have been addressed through recent discussions with DfT regarding other schemes promoted by Wiltshire Council. The proposed appraisal is considered to be comprehensive for the scale and nature of expected scheme impacts, with the inclusion of dependent development (induced investment). There are not considered to be any significant limitations with the proposed modelling and appraisal approach for the purposes of informing the Outline Business Case.	G	
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ASR - Traffic Modelling and Economics

# Modelling Checklist

## Data

		Comments	RAG Rating	Report Reference
Details of the sources, locations (illustrated on a map), methods of collection, dates, days of week, durations, sample factors, estimation of accuracy, etc.	Highway	A summary of the data used for model development is included in chapter 3 of the LMVR.	G	LMVR: 3
	Bus	Bus data is not incorporated in the WTM. Consistent with the RTM on which this model was developed, there is no assigned public transport component.	G	NA
	Rail	Rail data is not incorporated in the WTM. Consistent with the RTM on which this model was developed, there is no assigned public transport component. There is an estimated rail demand and associated cost of travel for the demand model.	G	NA
	Active Mode	Active modes data is not incorporated in the WTM.	G	NA
Details of mobile phone data (e.g. data processing, validation or expansion method). Details of any specialist surveys (e.g. stated preference).		Prior matrices are inherited from the SW RTM. Full details of the MPD are provided in the relevant documentation.	G	LMVR: 5.1.1
		NA	G	NA
	Highway	WTM is an average peak hour model, so is developed in consideration of the 12 hour day.	A	NA
	Bus	Bus data is not incorporated in the WTM. Consistent with the RTM on which this model was developed, there is no assigned public transport component.	G	NA
Traffic and passenger flows; including daily, hourly and seasonal profiles, including details by vehicle class where appropriate.	Rail	Rail data is not incorporated in the WTM. Consistent with the RTM on which this model was developed, there is no assigned public transport component. There is an estimated rail demand and associated cost of travel for the demand model.	G	NA
	Active Mode	Active modes data is not incorporated in the WTM.	G	NA
		Summary of Trafficmaster journey time data is presented in the LMVR.	G	LMVR: 3.5
		No queue data was collected, or would typically be used to inform a strategic model. However, an operational assessment of the junction is being undertaken in VISSIM.	G	NA
Journey times by mode, including variability if appropriate. Details of the pattern and scale of traffic delays and queues. Details of crowding and interchange for public transport. Desire line diagrams for important parts of the network.		NA	G	NA
		NA	G	NA
	Highway	Existing traffic flows are presented at a screenline level.	G	LMVR: 3.4
	Bus	Bus data is not incorporated in the WTM. Consistent with the RTM on which this model was developed, there is no assigned public transport component.	G	NA
Diagrams of existing traffic flows, both in the immediate corridor and other relevant corridors.	Rail	Rail data is not incorporated in the WTM. Consistent with the RTM on which this model was developed, there is no assigned public transport component. There is an estimated rail demand and associated cost of travel for the demand model.	G	NA
	Active Mode	Active modes data is not incorporated in the WTM.	G	NA
Other comments				

## Overall Assessment

	Overall Comments	Overall RAG
Data	<p>There is not a standalone data collection report that accompanies the Wiltshire Transport Model, therefore all data used in the development of the model is summarised in the LMVR. An extensive data collection exercise has been undertaken to ensure the availability of sufficient data in terms of quantity and quality.</p> <p>There are not considered to be any significant limitations with the available data for the purpose of informing the Outline Business Case.</p>	G

# Modelling Checklist

## Assignment Model

Description of the overall spatial coverage of the model and the evidence to support this.

Base year of model and software used

Description of the road traffic assignment model development, including model network and zone plans, generalised cost function (VOT, VoC, toll, Databook version), details of treatment of congestion on the road system.

Description of the public transport passenger assignment model development, including model network and zone plans, generalised cost function, details of crowding on the public transport system.

Description of the data used in model building and validation with a clear distinction made for any independent validation data.

Evidence of the validity of the networks employed, including range checks, link length checks, and route choice evidence.

Details of the modelling of junctions, including data for modelling level crossings and junctions, in particular traffic signals and whether these have been updated or optimised.

Details of the segmentation used, including the rationale for that chosen.

Details of matrix development methodology (e.g. RSI, Mobile Network Data, gravity model).

Details of specific sites and validation of trips (e.g. airport, port, rail station, park and ride, industrial site, business park, retail park)

Validation of the trip matrices, including estimation of measurement and sample errors.

Details of any 'matrix estimation' techniques used and evidence of the effect of the estimation process on the scale and pattern of the base travel matrices.

Validation of the trip assignment: comparisons of flows across screenlines/cordons.

Validation of the trip assignment: comparisons of flows on links and, for road traffic models, turning movements at key junctions.

Journey time validation, including, for road traffic models, checks on queue pattern and magnitudes of delays/queues.

Detail of the assignment convergence.

Present year validation if the model is more than 5 years old.

A diagram of modelled traffic flows, both in the immediate corridor and other relevant corridors.

Other comments

Comments	RAG Rating	Report Reference
Details of the ADM are provided in the LMVR.	G	LMVR: 4.1
Details of the model software and base year are provided in the model specification of the LMVR.	G	LMVR: 2.3.1 - 2.3.3
Details are provided in base model specification (chapter 2) and highway network development (chapter 4) sections of the LMVR.	G	LMVR: 2, 4
Consistent with the RTM on which this model was developed, there is no assigned public transport component. There is an estimated rail demand and associated cost of travel for the demand model.	G	NA
Data collection is summarised in chapter 3 of the LMVR, including the specification of data used in validation.	G	LMVR: 3
Overview of network refinements is provided in chapter 4 of the LMVR. Evidence of route choice is provided in Appendix H.	G	LMVR: 4, App. H
Overview of network refinements is provided in chapter 4 of the LMVR.	G	LMVR: 4
Segmentation for the HAM is consistent with the SW RTM donor model.	G	LMVR: 2.3.5
Prior matrix is consistent with the SW RTM donor model, but refinements are detailed in chapter 5 of the LMVR	G	LMVR: 5
Details of specific sites are not discussed in isolation.	G	NA
Prior matrices are compared against observed ANPR data in the LMVR.	G	LMVR: 5.3
Details of ME are presented in chapter 6 of the LMVR.	G	LMVR: 6
Flow calibration / validation across the WTM is presented in section 7.2 of the LMVR, whilst localised details are provided in section 7.4.	G	LMVR: 7.2, 7.4
Consistent with the RTM on which this model was developed, there is no assigned public transport component.	G	NA
Flow calibration / validation across the WTM is presented in section 7.2 of the LMVR, whilst localised details are provided in section 7.4.	G	LMVR: 7.2, 7.4
Consistent with the RTM on which this model was developed, there is no assigned public transport component.	G	NA
JT validation across the WTM is presented in section 7.3 of the LMVR, whilst localised details are provided in section 7.4.	G	LMVR: 7.3, 7.4
Assignment convergence is provided in the LMVR.	G	LMVR: 7.6
Not older than five years.	G	NA
Model flows are presented on screenlines in the LMVR and accompanying dashboard	G	LMVR: 7.2
Consistent with the RTM on which this model was developed, there is no assigned public transport component.	G	NA

## Overall Assessment

Supply Model / Base Model Fit

Overall Comments	Overall RAG
The results demonstrate that the traffic model is suitable, within the requirements of TAG, to be used to support the Outline Business Case.	G

## Demand Model

Where no Variable Demand Model has been developed evidence should be provided to support this decision (e.g. follow guidance in WebTAG Unit 3.10.1 Variable Demand Modelling - Preliminary Assessment Procedures).

Base year of model and software used

Description of the demand model and rationale for its setup.

Description of the data used in the model building and validation.

Details of the segmentation used, including the rationale for that chosen. This should include justification for any segments remaining fixed.

Details of any geographically fixed elements and rationale for this.

Details of any imported model components and rationale for their use.

Evidence of model calibration and validation and details of any sensitivity tests.

Validation of the supply model sensitivity in cases where the detailed assignment models do not iterate directly with the demand model.

Details of cost damping function and rationale for its setup.

Details of the realism testing, including outturn elasticities of demand with respect to fuel cost and public transport fares.

Details of the demand/supply convergence for the realism testing.

Other comments (e.g. land use model)

Comments	RAG Rating	Report Reference
VDM has been used.	G	NA
Details of the model software and base year are provided in the model specification of the LMVR.	G	LMVR: 2.3.1 - 2.3.3
Details of the VDM are provided in chapter 8 of the LMVR.	G	LMVR: 2.4.6, 2.5, 8
Data collection is summarised in chapter 3 of the LMVR, including the specification of data used in validation.	G	LMVR: 3
Segmentation for the VDM is consistent with the SW RTM donor model.	G	LMVR: 8.1
No geographical areas have been fixed.	G	NA
The VDM has been inherited from the SW RTM donor model.	G	NA
Details of model calibration are presented in chapter 6 of the LMVR.	G	LMVR: 6
The HAM and VDM are fully compatible.	G	NA
Consistent with the SWRTM, a distance-based deterrence function was used. As described in chapter 8 of the LMVR.	G	LMVR: 8.2.1
Details of the VDM realism test are provided in chapter 8 of the LMVR.	G	LMVR: 2.4.6, 8.2
Details of the VDM realism test are provided in chapter 8 of the LMVR.	G	LMVR: 8.2.4

## Overall Assessment

Overall Comments

Overall RAG

Demand Model

<p>The results demonstrate that the traffic model is suitable, within the requirements of TAG, to be used to support the Outline Business Case.</p>	
<p>The VDM realism tests have produced elasticities which are in-line with general expectations and experience. Therefore, the VDM model is considered suitable for preparing forecasts to use in the appraisal of schemes.</p>	G

# Forecasts

Description of the methods used in forecasting future traffic demand

Forecast Years Modelled (and rationale for those chosen). Is it proposed to forecast "as far into the future as possible" as per TAG M4 1.2?

Description of the future year demand assumptions (e.g. land use and economic growth - for the do minimum, core and variant scenarios).

An uncertainty log providing a clear description of the planning status of local developments. Check the uncertainty logs with the number of trips associated with each of the developments and the details of planning status information that has led to the uncertainty status. Ensure a plot of these development (at least for the largest developments) is provided.

Description of the future year transport supply assumptions (i.e. networks examined for the do minimum, core scenario and variant scenarios). Check details on forecast assumptions related to traffic signals.

Description of the travel cost assumptions (e.g. VoT, VoC, Databook version, fuel costs, PT fares, parking). Compare the VoT and VoC with the base year model.

Details of the demand/supply convergence .

Comments	RAG Rating	Report Reference
The forecasting approach is consistent with the guidance from TAG unit M2 (Variable demand modelling) & M4 (Forecasting & Uncertainty). Vissim micro-simulation modelling has been used to supplement the SATURN strategic modelling, with forecast demands informed by SATURN.	G	TFR - Section 3
2024 is the initial assumed scheme opening year. 2036 is the proposed scheme design year. It ensures compatibility with other OBC schemes and the emerging Local Plan.	G	TFR - Section 3.3
Demand assumptions were developed in line with TAG Unit M4, with local assumptions varied where appropriate .	G	TFR - Section 3.5, 4
Uncertainty Log is included in the TFR.	G	TFR - Section 3.4
Forecast year transport supply details are included in the TFR	G	TFR - Section 5
Travel cost assumptions are included in the TFR.	G	TFR - Section 5.2, 6.2
Details on model convergence are included in the TFR.	G	TFR - Section 5.3, 6.3

<p>Check details on the forecast demand assumptions and matrices – committed development housing and job totals; NTEM housing and job planning data comparison; adjusted TEMPRO factors. And also the base year, background growth, development trips and the forecast year matrix total, by time period and user class.</p>	<p>Details on the forecast demand assumptions and matrices are included in the TFR.</p>	G	TFR - Section 4
<p>Comparison of the local forecast results to national forecasts, at an overall and sectoral level.</p>	<p>Local and national forecasts are included in the TFR, in addition to the Reference Case trip totals.</p>	A	TFR - Section 4
<p>Presentation of the forecast travel demand and conditions (including journey time analysis on key routes) for the do minimum and core scenario and variant scenarios. Include a diagram of forecast flows for the do-minimum and the scheme options for affected corridors. Analysis of users of the DS infrastructure (e.g. by select link analysis).</p>	<p>Due to the more localised nature of this study, differences in delay were deemed to be a more suitable analysis, however journey time analysis for the do minimum and core do something is included in the appendices.</p>	G	TFR - Section 7.4, 8.4 and App. I
<p>If the model includes very slow speeds or high junction delays evidence of their plausibility.</p>	<p>Speed and delay differences are included in the Atkins Data Visualisation (ADV) tool (Appendix B). There is minimal change in speed and delay on the local network, therefore Volume over Capacity (V/C) was deemed a better metric for inclusion in the TFR.</p>	G	TFR - App. B
<p>An explanation of any forecasts of flows above capacity, especially for the do-minimum, and an explanation of how these are accounted for in the modelling/appraisal.</p>	<p>V/C analysis is included in the TFR.</p>	G	TFR - Section 7.2 and 8.2
<p>Presentation of the sensitivity tests carried out (to include high and low demand tests).</p>	<p>The high growth alternative scenario model outputs are included in the TFR. Low growth forecasting is set out in the EAR. The Common Analytical Scenarios (Uncertainty Toolkit) were released in August '22. Due to the timing, these scenarios have not been modelled explicitly, and the economic appraisal provides a qualitative assesment in relation to these.</p>	A	TFR - Section 8 and EAR section 5



The traffic implications of the scheme on the SRN should be reported; including details of increases/decreases in flows and journey times on the SRN in the area of influence of the scheme. If there are potential implications for the number of accidents on the SRN evidence should be provided to show these have been investigated and/or reported.

Other comments

Flow and journey time comparisons are provided in the TFR and accompanying ADV tool (Appendix B).	G	TFR - Section7, App. B and App. I
NA		

## Overall Assessment

Forecasting

Overall Comments	Overall RAG
The forecasts are considered suitable for informing the economic and environmental assessments undertaken as part of the M4 Junction 17 OBC.	G

# Monetised Benefits

	Comments	RAG Rating	Report Reference
TEE Benefits	<p>A clear explanation of the underlying assumptions used in the calculation of TEE benefits (including appropriate DM/DS inputs) - TUBA/bespoke calculation (including up-to-date TUBA version; standard economics file; appropriate appraisal period; if bespoke calculations parameters are correct/up-to-date; etc.).</p>	A	EAR sections 5.3, 5.5, App A and App B
	<p>Details of assumptions about operating costs and commercial viability (e.g. public transport, park and ride, etc.); including estimate of private sector revenue/investment.</p>	G	EAR section 5.4
	<p>Details of developer contributions (including adjustment to appropriate price base).</p>	G	
	<p>Details of the maintenance delay costs/savings.</p>	G	EAR section 5.7
	<p>Details of the delays during construction.</p>	A	EAR section 5.7
	<p>Full appraisal inputs/outputs (TUBA output files / bespoke spreadsheets) should be supplied and reviewed.</p>	G	EAR App E
	<p>Evidence that TUBA warning messages have been checked and found to be acceptable</p>	G	EAR App D
	<p>Spatial (sectoral) analysis of TEE benefits</p>	G	EAR section 5.5
	<p>Details of annualisation factors in TUBA (to include full details of any calculations).</p>	G	EAR section 5.3

	Are trip matrix totals reported in TUBA in line with expectation.	Matrix totals in the full SATURN model have been reviewed and align with expectations for the scale of the model in each forecast year and time period. Changes in trips between DM and DS are marginal. In the Vissim and cordoned SATURN model trips have also been reviewed and are as expected.	G	EAR App E
	Appropriate splits of benefits by type (i.e. time savings, vocs, etc.); mode; vehicle type; forecast year (profile); time period; trip distance.	Detailed summaries of benefits by type, time period, year and trip purpose are set out in the EAR and align with expectations	G	EAR section 5.5
	Do sensitivity outputs in TUBA suggest any problems with benefit calculation accuracy?	Sensitivity tests suggest a reasonable level of consistency, though the high growth test suggests that sections of the modelled network at some distance from the scheme do not have sufficient capacity to support the forecast level of traffic.	G	EAR section 5.11
	Do TUBA 'tbn' files suggest a problem with the rule of half calculation?	tbn files for the full SATURN network indicate changes in cost of typically -20% to +10% with small changes outside this range, and very low changes in trip numbers, which is consistent with the affected movements. Tbn files for TUBA runs reflecting the cordoned area around the junction indicate a much larger percentage change in both trip numbers and journey times, which is consistent with expectations as these models reflect only segments of full journeys and incorporate demand impacts of traffic rerouting to use the junction.	G	
Reliability	Details of the method used to calculate reliability benefits and evidence of appropriate input/outputs.	Details of the approach used and justification for it are set out in section 5.8 of the EAR	G	EAR section 5.8
Regeneration	Details of regeneration benefits and evidence of alignment to guidance in any monetised calculation.	Regeneration has not been monetised. Qualitative assessment of impacts is set out in the Economic Dimension	G	Economic Dimension sections 4.5 and 4.8
Wider Impacts	Details of wider impacts calculations and evidence of appropriate methods employed (e.g. inputs/outputs to WITA / bespoke calculations).	Regeneration has not been monetised. Qualitative assessment of impacts is set out in the Economic Dimension	G	Economic Dimension sections 4.5 and 4.8
Noise	Details of noise benefit calculations.	Details are set out in section 5.9 of the EAR	G	EAR section 5.9
Air Quality	Details of air quality benefit calculations.	Details are set out in section 5.9 of the EAR	G	EAR section 5.9
Greenhouse Gases	Details of greenhouse gas benefit calculations (e.g. use of TUBA / alternative methods).	Details are set out in section 5.9 of the EAR	G	EAR section 5.9
Accidents	Evidence of appropriate spatial coverage of accident analysis and a diagram of the network (if COBALT used).	Assessment using COBALT has been prepared and covers the full Area of Detailed Modelling which is set out in section 5.6 of the EAR	G	EAR section 5.6
	Details of accident rates used and appropriate forecast methods.	Details are set out in section 5.6 of the EAR. Link and junction combined assessment has been applied using default accident rates.	G	EAR section 5.6
Public Accounts	Details of base scheme investment costs - clearly aligned with those in the financial case (including risk/real inflation) - and cover whole life costs.	Costs for the Economic and Financial Dimensions have been developed in parallel with differences in assumptions used in each clearly set out in the Economic Dimension	G	EAR section 5.4

Evidence that an appropriate level of optimism bias has been applied to scheme investment costs - rationale for any departure from guidance. If TUBA is used to calculate PV of scheme investment costs - evidence that scheme investment costs been appropriately entered. If PV of scheme investment costs is based on a bespoke calculation - clear evidence that appropriate discounting, price base and market cost adjustments have been made. Evidence that indirect taxes been appropriately calculated and included. Evidence that operating costs, revenue and developer contributions been appropriately calculated and included.

Sensitivity Tests

Details of sensitivity test results  
Other comments

Optimsim bias applied is in line with the recommended rate for a scheme of this type at OBC stage.	G	EAR section 5.4
TUBA has not been used for assessment of scheme costs	G	EAR section 5.4
Workbook setting out these calculations has been provided. Cost proforma illustrates high level values at each stage of calculation	G	EAR section 5.4
Indirect taxes have been captured through TUBA. No other sources of indirect tax apply	G	EAR section 5.3
Maintenance and renewal costs over the appraisal period have been captured and included in the PVC. There is no cost to the private sector.	G	EAR section 5.4
Details of sensitivity tests are set out in the Economic Dimension and further detail on the modelling approaches for each are set out in section 5.11 of the EAR	G	EAR section 5.11

## Overall Assessment

Appraisal Assumptions

Overall Comments	Overall RAG
All relevant information has been supplied and no anomalies are apparent. A bespoke approach has been applied in the TUBA assessment to enable an accurate representation of user benefits. Details of this approach have been provided and agreed with DfT in advance and results of the process indicate performance which is in line with expectations for the scheme based on detailed analysis of both SATURN and Vissim modelling.	G