A582 South Ribble Western Distributor Upgrade

Lancashire County Council

Appraisal Specification Report

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April 29, 2019

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0	24/04/2019	Appraisal Specification Report for Submission of SOBC	Mohsen Zare	Sergey Makov	Sergey Makov

Contents

1. Introduction

1.1 The Purpose of the Appraisal Specification Report

This document represents the Appraisal Specification Report (ASR) for the A582 South Ribble Western Distributor Upgrade scheme for Lancashire County Council (LCC).

The overarching aim of the ASR is to:

- define the scope, methodology, assumptions and associated risks of the transport appraisal, and how it will be supported by traffic modelling;
- provide a platform for agreement of the appraisal approach with DfT who will be undertaking assurance on the modelling and economics underpinning VfM of the scheme, and to provide timely, agreed inputs to the appraisal process.

The ASR is supported by an Appraisal Specification Summary Table (ASST) in Appendix A, which proposes a methodology for appraisal, set out against each of sub-impacts in the Appraisal Summary Table (AST).

The ASR allows all stakeholders involved in scheme preparation (LCC, TfN, DfT) to understand the assessment and appraisal work required for the submission of the Strategic Outline Business Case (SOBC).

This document also contains details of pertinent risks which have been identified at the time of writing. The risks will feed into the risk management process, and since the ASR is a live document this will be continued throughout. By highlighting these risks, this will increase their visibility and allow a greater understanding of how the technical work detailed in the ASR may impact on project timescales, quality and cost.

1.2 SOBC Scope

In December 2017 the Government launched a consultation setting out proposals for creation of a Major Road Network (MRN). The response confirmed the eligibility criteria and the objectives of the MRN programme. At the budget the government accounted the National Roads Fund would be £28.8 billion between 2020-2025, £3.5 billion of which is expected to be spend on local roads.

As outlined in the “Investment Planning Guidance: For the Major Road Network and Large Local Major Programmes”[1] guidance, the Sub-national Transport Body is responsible for developing a Regional Evidence Base (REB) for the region. A REB must provide a strategic overview of the MRN in the region. While the REB will present the overall picture of the MRN in the region and its strategic needs, funding decisions will be made based on the evidence of individual schemes and **the scheme’s business case** at the various stages of development.

Lancashire County Council is seeking a funding contribution from the National Roads Fund to enhance economic growth, support housing provision and relieve congestion through the delivery of a significant road improvement scheme on the A582 in South Ribble. The A582 is part of the indicative Major Road Network published by the Department for Transport in December 2017 and the A582 Dualling is one of the schemes included in the TfN final Investment Programme.

As set out in the Investment Planning Guidance, for the MRN schemes that are scheduled to begin by April 2023, they should be developed to at least SOBC stage. The A582 SOBC will however benefit from the detailed

[1] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/765680/mrn-investment-planning-guidance.pdf

traffic modelling and economic assessment and therefore it is expected that some of the elements of the BC, particularly, Economic Case will largely meet requirements for the OBC.

1.3 Scheme Background

The A582 South Ribble Western Distributor is located in Central Lancashire, and is one of the radial routes connecting Preston with the M65 (Figure 1-A). It is a modern standard, part single, part dual two-lane road with access generally restricted to major junctions that are either roundabouts or controlled by traffic signals, and a partial grade-separated junction providing a link with the local road network in the Cop Lane area of Penwortham.

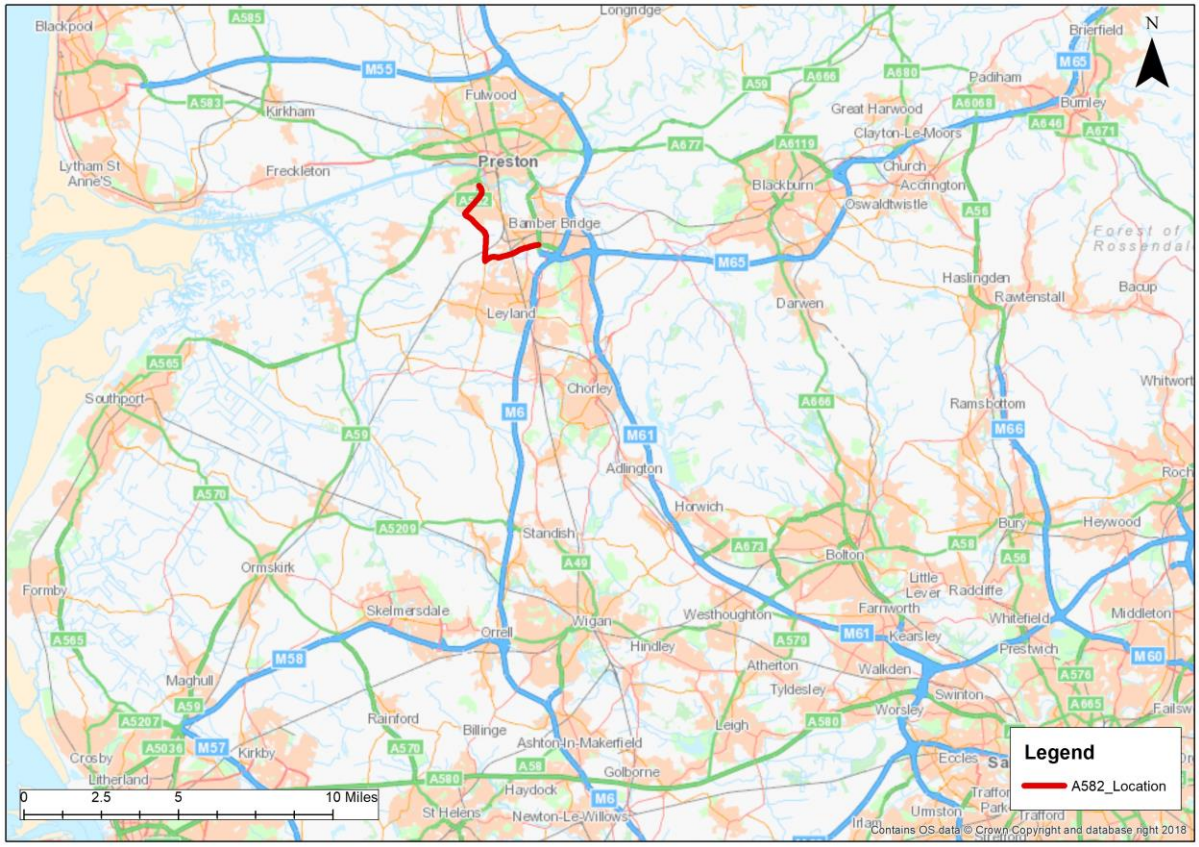


Figure 1-A: A582 location

The A582 upgrade scheme was identified a key component of the programme of measures set out in the adopted **Central Lancashire Highways and Transport Masterplan** that collectively will support the scale of development set out in the approved **Central Lancashire Core Strategy** and mitigate its impact on the transport network.

It is also one of the four major highway schemes that will be delivered as part of the Preston, South Ribble and Lancashire **City Deal** signed with the government in September 2013 The City Deal aims to transform Central Lancashire, creating 20,000 net new private sector jobs and delivering over 17,000 new homes, growing the local economy by over £1 billion.

1.4 Recent Improvements/Schemes

In preparation for dualling multiple improvements have already been made to the links and junctions that form the A582 in the past few years.

The Chain House Lane junction was improved in 2014. The improvement comprised of the widening of the approaches to the junction while also increasing the lanes available for traffic. Improvement were also made for cyclists, including toucan crossings to enable cyclists to cross alongside pedestrians.

Golden Way North and South have also been improved from Broad Oak roundabout to the north of the A582, with the roads being transformed from single carriageways into dual carriageways. Alongside the improvements to Golden Way South, a shared cycle/footway along Millbrook Way and Cop Lane was constructed.

Pope Lane junction improvement was completed in 2017 with the junction converted into a signalised 'crossroads' junction with additional lanes added to each of the four approaches. In addition, Tank roundabout was also upgraded through the provision of traffic lights, a capacity increase, and a spine road created connecting the junction to new housing developments.

Stanifield Roundabout has received similar improvements with the widening of the roundabout, construction of traffic lights, and safety improvements including on and off-carriageway cycle lanes, 'shared used' cycle/footways and controlled crossings. However, there are minor changes to the updated layout planned with the eastern exit onto Lostock lane gaining an extra lane before the road is narrowed to two lanes.

Penwortham Bypass is a committed scheme that is under construction. It runs along the south western side of Penwortham between the A59 Liverpool Road and A582, connecting to the existing Broad Oak roundabout. The road has been designed as a dual carriageway, with a 50mph speed limit along its whole length.

Penwortham Triangle will also go through improvements as part of the Penwortham Bypass scheme. As part of these improvements the slip road from A59 Liverpool Road on to A59 River Ribble crossing will be severed so that the traffic use Penwortham Bypass onto A582 and Preston.

Figure 1-B shows the location of these improvements/schemes.

1.5 Scheme Description

The proposed scheme comprises the upgrade of A582 to a dual carriageway between its junction with the A5083 Stanifield Lane in Lostock Hall and the existing dual carriageway section from Broad Oak Roundabout (Penwortham) into Preston City Centre. It will thereby create a dual carriageway along the full length of the A582 between the M6, M65 and M61 motorways at Cuerden and the city centre. The upgraded A582 will also connect to the A59 Preston to Liverpool road (also part of the indicative MRN) via a completed Penwortham Bypass, currently under construction and due to open to traffic in early 2020. The scheme will include the following improvements:

- Penwortham Triangle: these improvements will include upgrading the eastern roundabout layout of Penwortham Triangle to a signalised junction. The layout of the movement from Liverpool Road East and A59 South signalised roundabout will change to provide two lanes in each direction for the movements between east to south. Only one lane will be provided for east to west movements.
- Croston Road: The Croston Road improvements will include the removal of the dumbbell roundabout arrangement and to be upgraded to a signalised junction. The improvements will also include severance of Croston Road south with access to Fidler Lane retained with left in/left out arrangement.
- Sherdley Road: The Sherdley Road junction will have a new layout which includes a signalised junction.
- Stanifield Lane (Cuerden Associated Works): Minor improvements will be made to the Stanifield Lane roundabout where additional exit lanes will be provided for the northern and eastern arms.

- A582 Link between Stanifield Lane and A6: The westbound carriageway will be widened to three lanes. This widening is undertaken by narrow widening of the existing carriageway.
- A6 Roundabout: The roundabout will include an additional circulation lane.
- M65 Terminus Roundabout: The junction will be upgraded to provide additional lanes on the eastern arm where M65 terminates.

The proposed dualling is approximately 5.2 kilometres long and comprises provision of a segregated 3-metre-wide combined cycle track/footway with a 0.5 metre buffer strip providing separation from the carriageway along the full length of the road on one side, with connections to existing cycle routes. This will be built along the east side of the A582 Penwortham Way, and the south side of the A582 Flensburg Way and Farington Road.

The scheme includes construction of a new bridge adjacent to the existing structure over the West Coast Main Line (A582 Farington Link) and replacement of the Woodfield Railway Bridge on the Preston to Ormskirk line to accommodate the new dual carriageway. The scheme will also require widening and adaptation of existing structures providing underpasses and crossing waterways.

The extent of the scheme is shown in Figure 1-B.

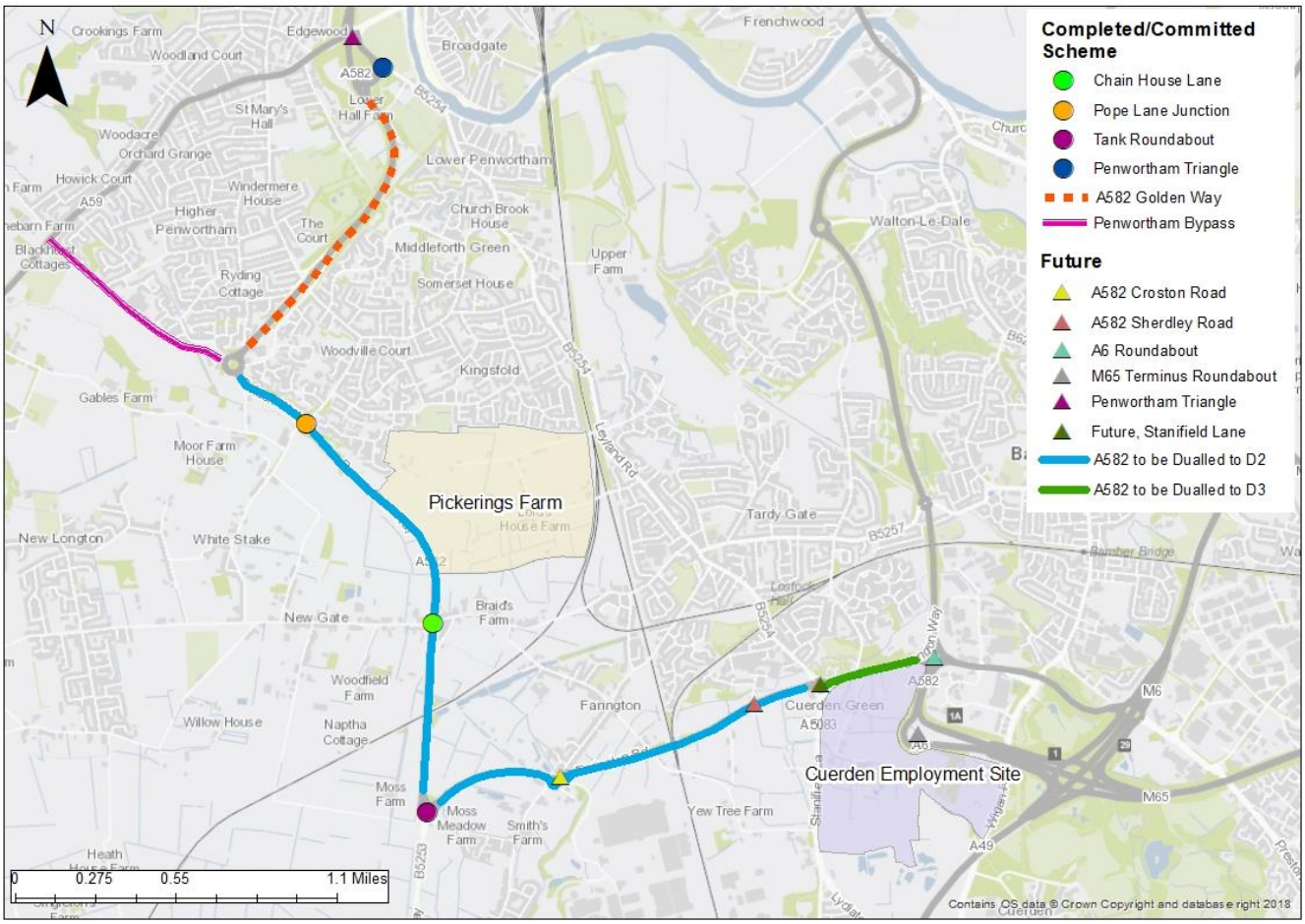


Figure 1-B: Extent of the A582 South Ribble Western Distributor Upgrade Scheme (including upgraded junctions)

2. Strategic Case

2.1 Strategic Case Development

The Strategic Case helps determine whether an investment is needed, and its key benefits, either now or in the future. It demonstrates the case for change - that is, a clear rationale for making the investment; and strategic fit - how an investment will further the aims and objectives of local and central government.

More specifically, the Strategic Case will:

- Specify the business need for a project
- Set the context and identify a series of investment aims
- Assess the investment aims against the MRN objectives
- Consider alternative options in achieving the identified objectives

Determining the case for change and strategic fit is an iterative process as the business case develops, and should always be supported by robust evidence, such as identifying key risks and constraints. It will require a close contact with main stakeholders of the project.

The following list of actions summarises the proposed approach to preparation of the Strategic Case for the scheme.

- Describe how the scheme aligns with the aims and objectives of MRN Investment Planning Guidance, Strategic Transport Plan by Transport for the North (TfN) and subsequently the Regional Evidence Base (REB)
- Identify and map the growth locations supported by the scheme- and analyse how, the scheme directly supports the proposed growth; which is the key objective of the scheme
- Identify the current transport situation in Lancashire and around Preston by analysis of the following data:
    - Journey time data available from Trafficmaster
    - Review the Central Lancashire Transport Model (CLTM) SATURN model to obtain AADTs, AM, PM and IP flows at key locations on the network
    - Details of the locations and causes of road traffic accidents
    - Details of the location, frequency and quality of public transport facilities
    - Details of the Demographics of the area through the Census 2011
    - Index of Multiple Deprivation scores for each Lower Super Output Area (LSOA) in the study area
    - Locations and details of any Air Quality Management Areas (AQMA)
    - Locations of strategic development sites within LCC and around Preston
- Describe current transport problems, and how these impact on the provision of further growth around Penwortham, Leyland and Lostock Hall
- Describe what would be the impact of not changing (Do Nothing Scenario); in both transport and economic terms
- Outline internal and external drivers for change; and potential synergies
- Identify key stakeholders and the level of support for the scheme

- Outline the options considered previously and consideration of the new options including sustainable and multi-modal options as specified in the OAR.

The Strategic case will aim to provide a compelling narrative based on both transport and economic growth objectives of the need for the scheme, its alignment with both local, sub-regional and national policies including MRN, its substantive impacts in terms of unlocking future housing and employment, whilst at the same time reducing levels of traffic and congestion and improve journey time reliability.

3. Traffic Modelling

3.1 Introduction

Transport Scheme Appraisal is more than just model development, but the transport model plays a fundamental part in the development of a WebTAG compliant business case.

This is because the model is used to help develop the strategic case and the value for money case, along with a range of supporting analyses, including environmental, social and distributional impacts.

3.2 Choice of Transport Model - Central Lancashire Highways & Transport Model

In late 2013 LCC commissioned Jacobs to develop a new Central Lancashire transport model to support major schemes business cases for a set of core interventions associated with the delivery of the CLTM and City Deal Vision. The Central Lancashire Highways and Transport Model (CLHTM) was initially developed in 2016 and updated in 2018 to support the FBC of the Preston Western Distributor (PWD) scheme and includes forecast scenarios for PWD opening year 2022 and design year 2037. The model passed DfT assurance in April 2019.

The A582 is located within the detailed simulation area of the model. It is therefore proposed that the CLTM model is an obvious choice for the purpose of the A582 scheme appraisal. However, given that the latest version of CLTM model was calibrated with the PWD in mind the model needs minor improvements to calibration around the A582 impact area to be considered suitable to support A582 business case.

3.3 CLHTM Model Components

3.3.1 Model Software Package

The CLHTM has been built using SATURN which operates as a static equilibrium highway assignment model and incorporates both simulation and assignment loops. SATURN software version 11.3.12W has been used for this model.

3.3.2 Model Area

Given that the scheme is one of the four schemes identified within the CLTM the model has been built to ensure the accurate reflection of the current trip movements within and around Preston.

The modelled area for CLHTM network is broken into three distinct areas. These are the area of detailed modelling where the granularity within the network and demand matrices is at its greatest, the rest of the fully modelled area where the level of detail is not as great, but capacity restraint is still modelled, and the external area (rest of Britain) where the level of detail is at its lowest.

The two tiers of the fully modelled area are demonstrated in Figure 3-A.

Figure 3-A: CLTM Modelled Area

3.3.3 Zoning System

The model simulation area that covered the Preston City Council boundary are zoned in more detail. Areas further away from the study area, where less spatial detail is required are based on National Trip End Model (NTEM) zone boundaries. Beyond that point, in the external area of the model, several NTEM zones are aggregated to comprise the modelled zone.

The zone system covering the study area of the model is shown in Figure 3-B.

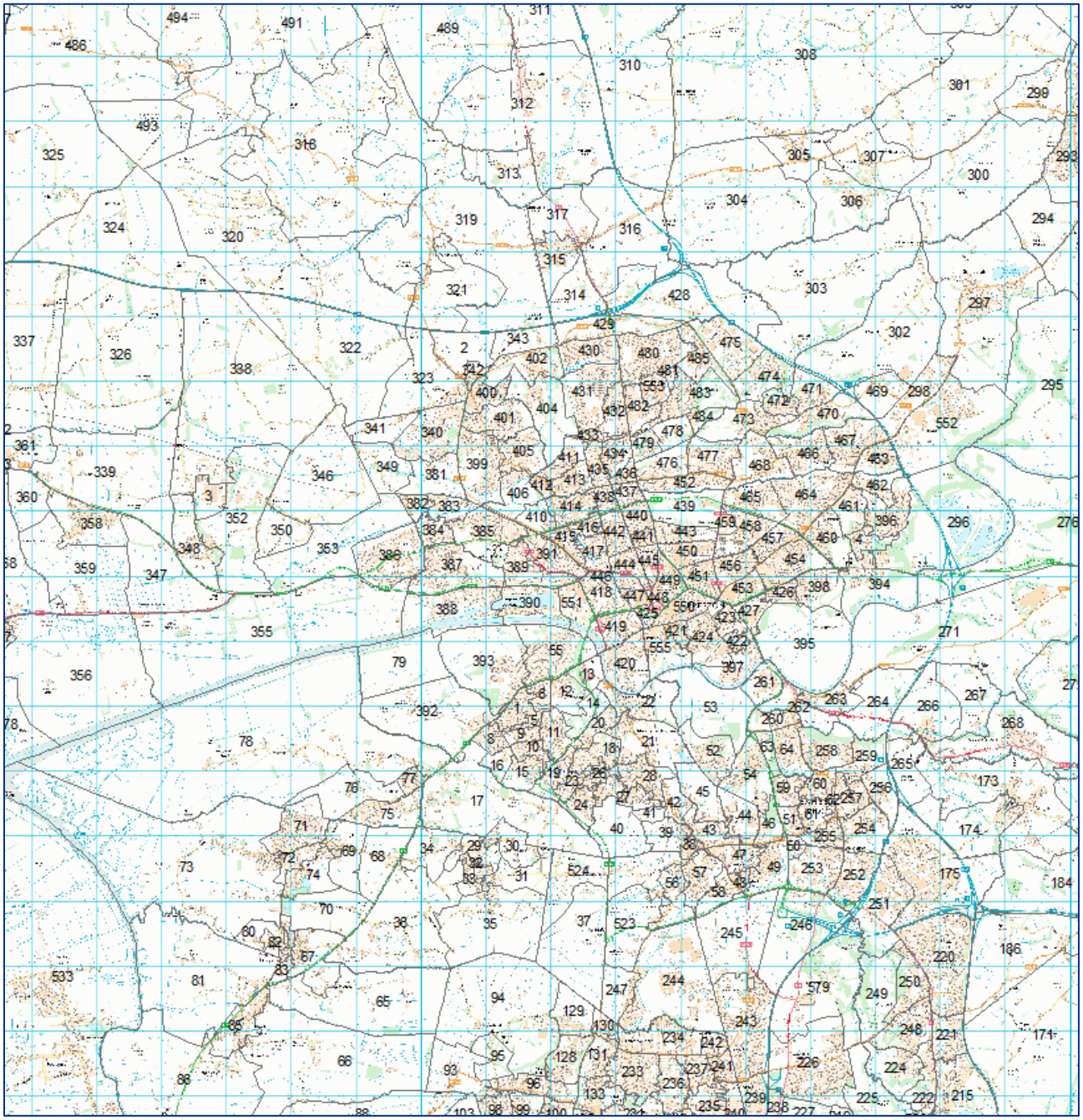


Figure 3-B: Zoning System Surrounding Preston

3.3.4 Model Time Periods

The CLHTM base year model has been defined as an average (Monday to Friday) weekday in October/November 2013. The CLHTM has the following modelled time periods:

- AM peak, peak hour from 08:00 – 09:00
- Interpeak, average hour from 10:00 – 16:00

- PM peak, peak hour from 17:00 – 18:00

These time periods can be extrapolated to represent appropriate time periods during forecasting, environmental and economic appraisals.

3.3.5 User Class Journey Purpose Segmentation

In terms of vehicle class and trip purpose, the following classifications have been modelled in the CLHTM assignment matrices:

- Car employers' business
- Car commuting
- Car other
- LGV
- HGV

3.3.6 Matrices

The CLHTM Base Year matrices have been developed using 2014 RSI data and calibrated to October/November 2013 traffic counts.

The highway prior matrix development process was split into three stages:

- Synthetic matrix development using demographic data to synthesise likely movements through the study area
- Observed matrix development, based on data collected from the RSI surveys
- Merging the synthetic and observed matrices

The methodology used to build the trip matrices with both surveyed and synthesised data is summarised in Figure 3-C.

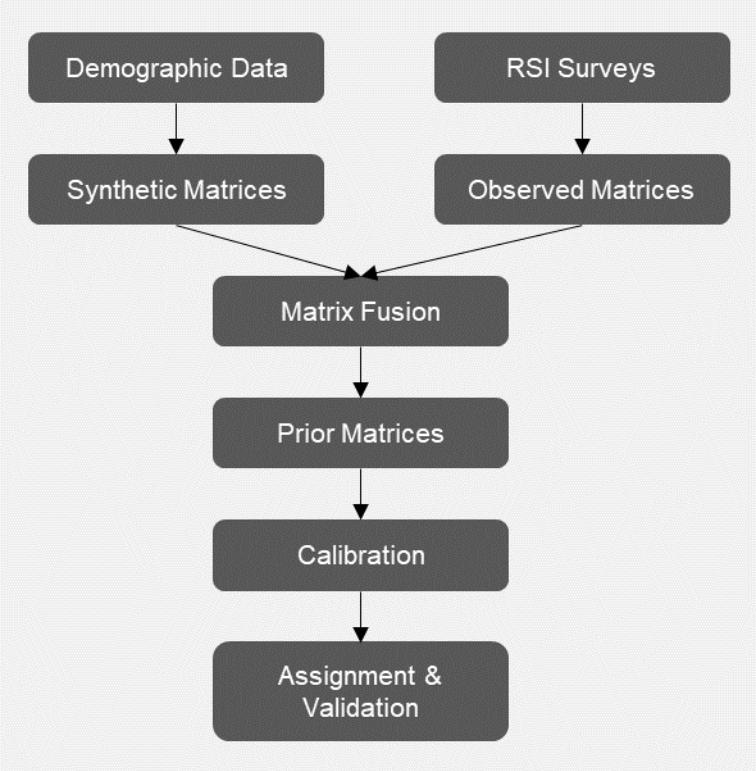


Figure 3-C: Base Year Matrix Development Procedure

3.4 Model Calibration and Validation

The model has been calibrated and validated using the measures and criteria recommended in WebTAG M3.1[2]. The model calibration and validation exercise was undertaken with the PWD scheme being the main focus and therefore, for the purpose of the A582 scheme assessment it was necessary to review the model performance in the A582 scheme anticipated impact area.

This section of the report reviews the CLHTM model's overall calibration and validation and identifies where the model needs improvements within the scheme area to ensure it is a robust tool to assess the impacts of the A582 scheme. This review considers the followings:

- Calibration and validation screenlines performance
- Calibration, validation and independent count sites performance
- Journey times within the model on identified key journey time routes

3.4.1 Calibration and Validation Screenlines

The locations of the screenlines used for CLTM calibration and validation along with the performance at each screenline are shown in Figure 3-D.

[2] https://www.gov.uk/government/publications/webtag-tag-unit-m3-1-highway-assignment-modelling

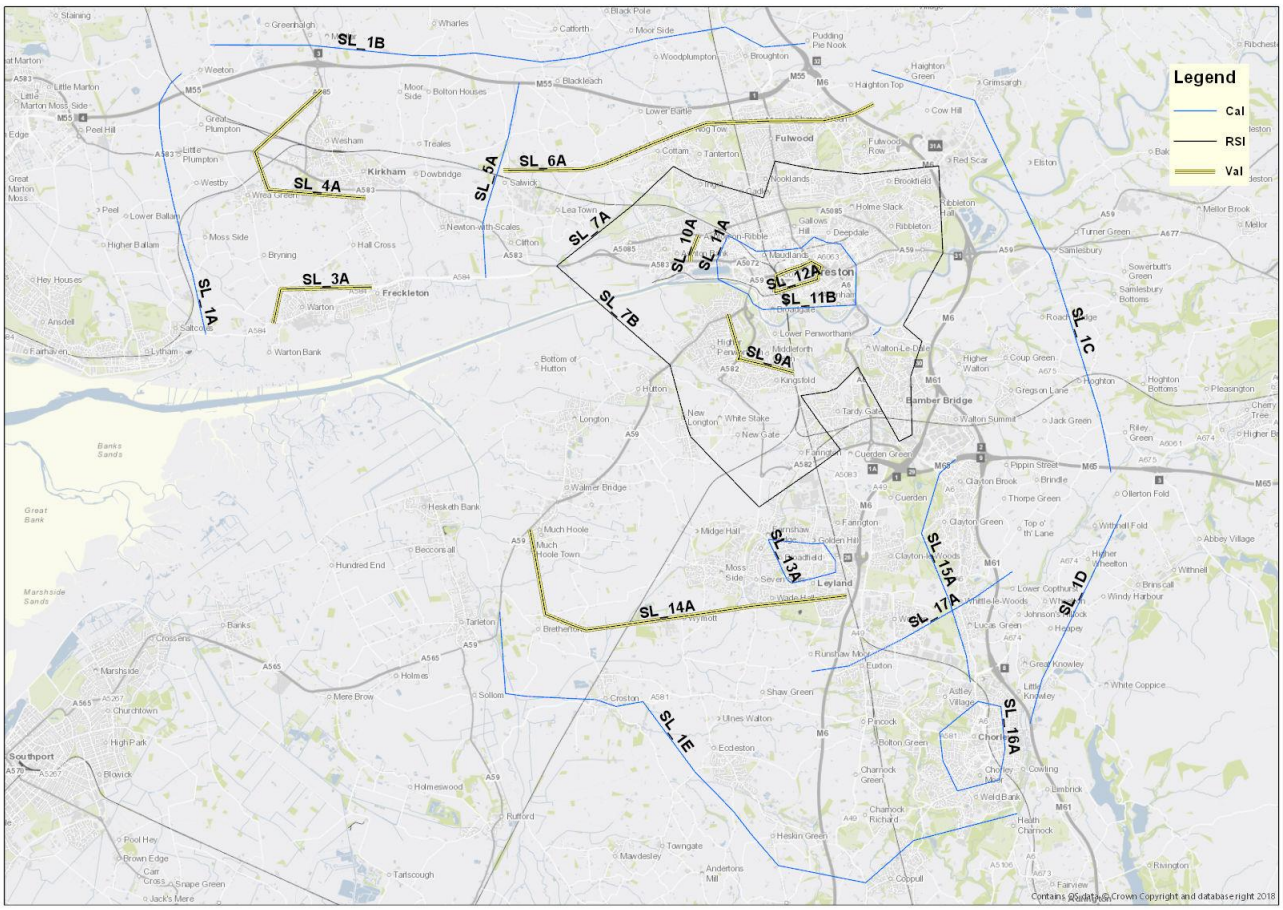


Figure 3-D: Location of Calibration and Validation Screenlines

A total of 28 calibration screenlines, 4 observed screenlines and 7 screenlines have been used in the CLHTM model. Table 3.1 shows that nearly all the screenlines in the current model pass the WebTAG criteria in each modelled time period.

Table 3.1: CLTM Screenline Performance for All Vehicles

Screenline Number	Direction (Towards Preston)	Type	AM Period Performance	IP Period Performance	PM Period Performance
SL_1A	Inbound	Calibration	PASS	PASS	PASS
SL_1B	Inbound	Calibration	PASS	PASS	PASS
SL_1C	Inbound	Calibration	PASS	PASS	PASS
SL_1D	Inbound	Calibration	PASS	PASS	PASS
SL_1E	Inbound	Calibration	PASS	PASS	PASS
SL_2A	Inbound	Calibration	PASS	PASS	PASS
SL_3A	Inbound	Validation	PASS	PASS	PASS
SL_4A	Inbound	Validation	PASS	PASS	FAIL
SL_5A	Inbound	Calibration	PASS	PASS	PASS

Screenline Number	Direction (Towards Preston)	Type	AM Period Performance	IP Period Performance	PM Period Performance
SL_6A	Inbound	Validation	PASS	FAIL	PASS
SL_7A	Inbound	Model Development	PASS	PASS	PASS
SL_7B	Inbound	Model Development	PASS	PASS	PASS
SL_8A	Inbound	Calibration	PASS	PASS	PASS
SL_9A	Inbound	Validation	PASS	PASS	PASS
SL_10A	Inbound	Validation	PASS	PASS	PASS
SL_11A	Inbound	Calibration	PASS	PASS	PASS
SL_11B	Inbound	Calibration	PASS	PASS	PASS
SL_12A	Inbound	Validation	FAIL	PASS	PASS
SL_13A	Inbound	Calibration	PASS	PASS	FAIL
SL_14A	Inbound	Validation	PASS	PASS	PASS
SL_15A	Inbound	Calibration	PASS	PASS	PASS
SL_16A	Inbound	Calibration	PASS	PASS	PASS
SL_17A	Inbound	Calibration	PASS	PASS	PASS
SL_1A	Outbound	Calibration	PASS	PASS	PASS
SL_1B	Outbound	Calibration	PASS	PASS	PASS
SL_1C	Outbound	Calibration	PASS	PASS	PASS
SL_1D	Outbound	Calibration	PASS	PASS	PASS
SL_1E	Outbound	Calibration	PASS	PASS	PASS
SL_2A	Outbound	Calibration	PASS	PASS	PASS
SL_3A	Outbound	Validation	PASS	PASS	PASS
SL_4A	Outbound	Validation	PASS	PASS	PASS
SL_5A	Outbound	Calibration	PASS	PASS	PASS
SL_6A	Outbound	Validation	PASS	PASS	PASS
SL_7A	Outbound	Model Development	PASS	PASS	PASS
SL_7B	Outbound	Model Development	PASS	PASS	PASS
SL_8A	Outbound	Calibration	PASS	PASS	PASS
SL_9A	Outbound	Validation	PASS	PASS	FAIL
SL_10A	Outbound	Validation	PASS	FAIL	PASS
SL_11A	Outbound	Calibration	PASS	PASS	PASS
SL_11B	Outbound	Calibration	PASS	PASS	PASS
SL_12A	Outbound	Validation	PASS	PASS	FAIL
SL_13A	Outbound	Calibration	PASS	PASS	FAIL
SL_14A	Outbound	Validation	FAIL	FAIL	FAIL
SL_15A	Outbound	Calibration	PASS	PASS	PASS
SL_16A	Outbound	Calibration	PASS	PASS	PASS
SL_17A	Outbound	Calibration	PASS	PASS	PASS

The screenlines performances across the whole model and specifically around the PWD are well within guidelines' recommended criteria. To ensure the model is also robust around the A582 scheme 9 screenlines were identified as key for the A582 scheme appraisal. These screenlines are shown in Figure 3-E.

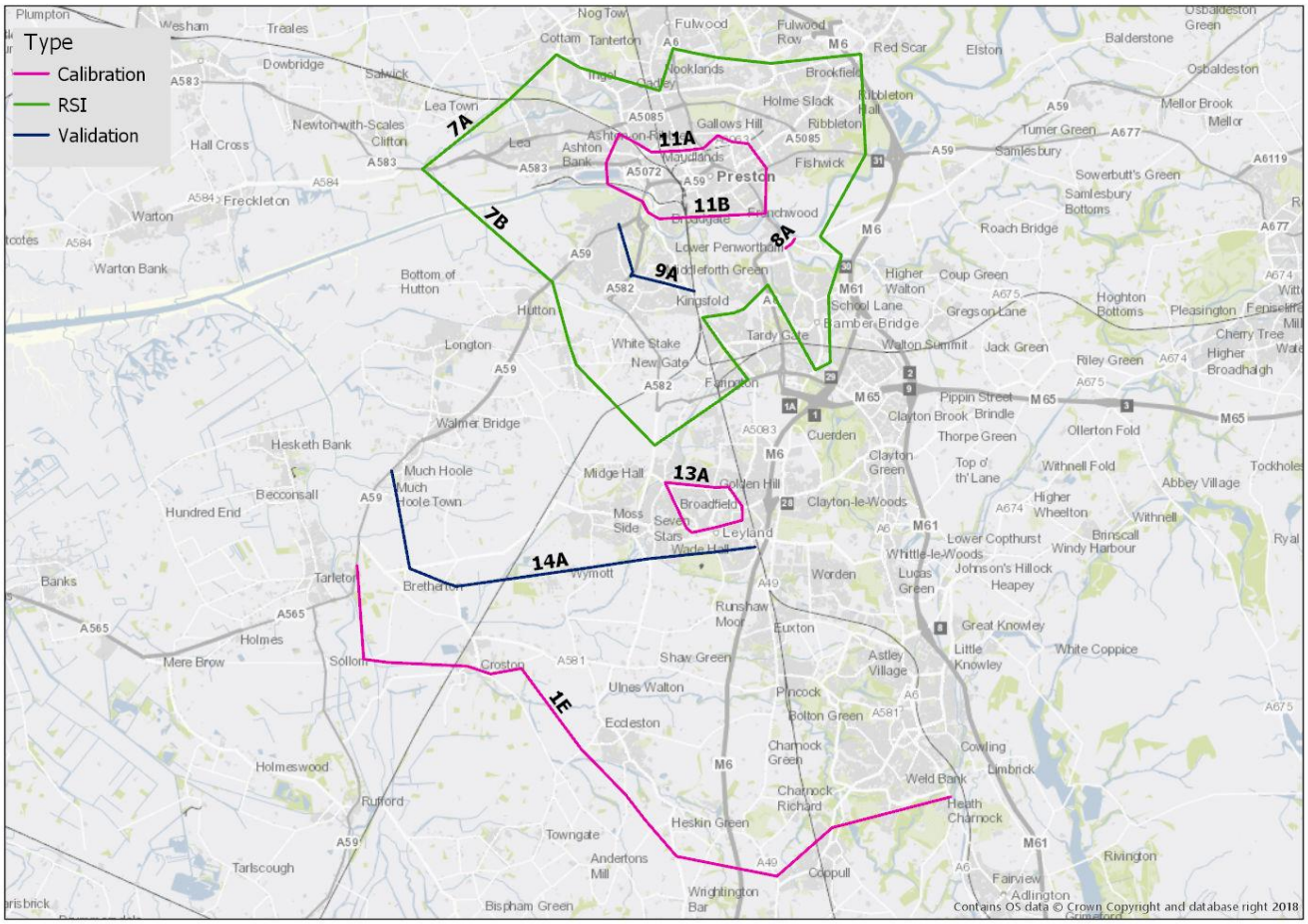


Figure 3-E: Map of all Relevant Screenlines to A582 Scheme

A review of the model performance on the key screenlines revealed that:

- Screenline 11B fails to meet the guidelines criteria in AM period with higher modelled flows against the observed counts
- Screenline 11B, 13A and 14A fail to meet the guidelines criteria in IP period with mix of higher and lower flows than observed counts
- Screenline 9A, 13A and 14A fail to meet the guidelines criteria in PM period with higher modelled flows compared to observed counts

The performance of the model along the validation screenlines show that across all time periods, the majority of screenlines for all vehicles and cars pass the WebTAG criteria, particularly in the AM and IP periods. It is evident however, that the model does not perform well on all screenlines near the scheme and further improvements are required. Table 3.2 provides a summary of performance of these screenlines.

Table 3.2: Screenlines Performance within A582 Scheme Area – All Vehicles

Screenline	Direction (Towards Preston)	Type	AM			IP			PM		
			Obs.	Model	PASS / FAIL	Obs.	Model	PASS / FAIL	Obs.	Model	PASS / FAIL
1E	Inbound	Calibration	4,085	3,997	PASS	2,683	2,664	PASS	3,267	3,193	PASS
7A	Inbound	Model Development	6,573	6,421	PASS	4,481	4,627	PASS	6,382	6,189	PASS
7B	Inbound	Model Development	6,831	7,072	PASS	4,910	5,006	PASS	6,444	6,435	PASS
9A	Inbound	Calibration	2,604	2,552	PASS	1,815	1,763	PASS	2,005	1,922	PASS
11A	Inbound	Calibration	5,433	5,311	PASS	5,168	4,945	PASS	5,395	5,341	PASS
11B	Inbound	Validation	5,257	5,387	PASS	3,100	3,188	PASS	3,147	3,299	PASS
13A	Inbound	Calibration	2,506	2,604	PASS	1,934	2,204	FAIL	2,121	2,225	PASS
14A	Inbound	Validation	2,117	2,172	PASS	1,648	1,697	PASS	2,196	2,228	PASS
1E	Outbound	Calibration	3,074	3,127	PASS	2,783	2,744	PASS	4,133	4,236	PASS
7A	Outbound	Model Development	5,702	5,825	PASS	4,368	4,541	PASS	6,310	6,236	PASS
7B	Outbound	Model Development	6,060	6,031	PASS	5,006	5,203	PASS	7,130	7,354	PASS
9A	Outbound	Calibration	1,449	1,409	PASS	1,855	1,779	PASS	2,610	2,790	FAIL
11A	Outbound	Calibration	4,330	4,437	PASS	4,971	4,570	FAIL	5,807	5,689	PASS
11B	Outbound	Validation	2,333	2,467	FAIL	3,150	3,280	PASS	5,438	5,405	PASS
13A	Outbound	Calibration	2,212	2,276	PASS	2,238	2,523	FAIL	2,816	3,074	FAIL
14A	Outbound	Validation	2,336	2,329	PASS	1,632	1,724	FAIL	2,328	2,548	FAIL

3.4.2 Calibration and Validation Counts

The majority of the counts are arranged along screenlines within the CLHTM. Some counts are independent from the screenlines. A map of all count sites is shown in Figure 3-F.

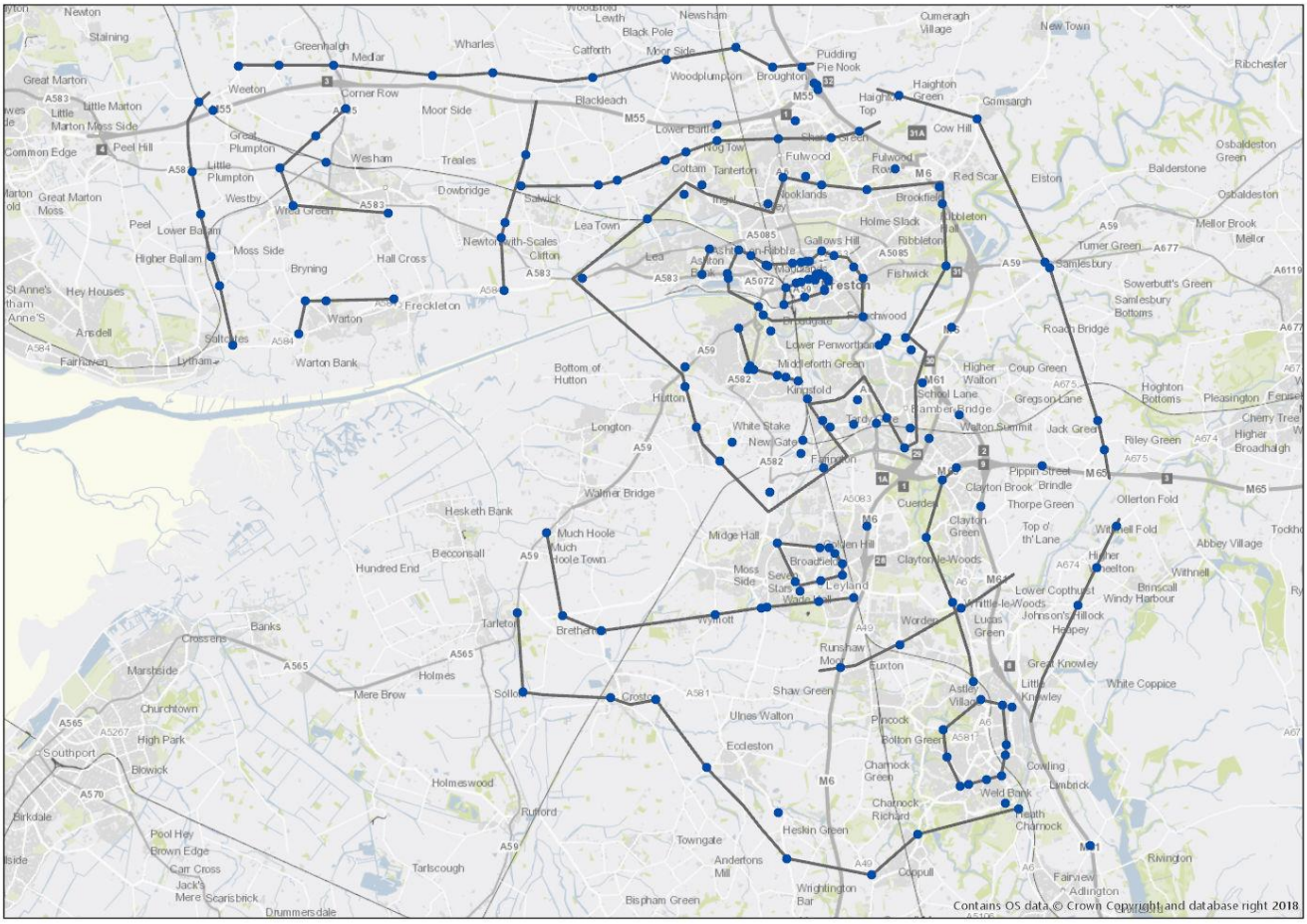


Figure 3-F: Map of Counts within CLTM

The performance of the model at these count sites is summarised in Table 3.3.

Table 3.3: CLTM Performance on Links with Observed Counts

WebTAG Guideline Values	Total Counts	Time Period	All Vehicles			Cars		
			% Compliant	PASS /FAIL	No. of Non-Compliant	% Compliant	PASS /FAIL	No. of Non-Compliant
Links meeting either WebTAG Criteria	Calibration - 241	AM	91%	Pass	22	90%	Pass	23
		IP	95%	Pass	11	95%	Pass	13
		PM	89%	Pass	26	91%	Pass	22
	Validation - 97	AM	81%	Fail	18	89%	Pass	11
		IP	82%	Fail	17	86%	Pass	14
		PM	78%	Fail	21	80%	Fail	19

The transport model's performance is within the recommended criteria for calibration links. The validation counts fail to meet the criteria, however they are close.

For the purpose of A582 scheme, the count sites were reviewed within the scheme area. Main links with counts were identified within the scheme area. These links are mainly located on A582 and the competing routes, namely A59 near the scheme and A6. The performance of these counts showed that further improvements to the model within the scheme area are required for a robust assessment of the scheme impacts. Figure 3-G shows the count sites performance in the PM peak period.

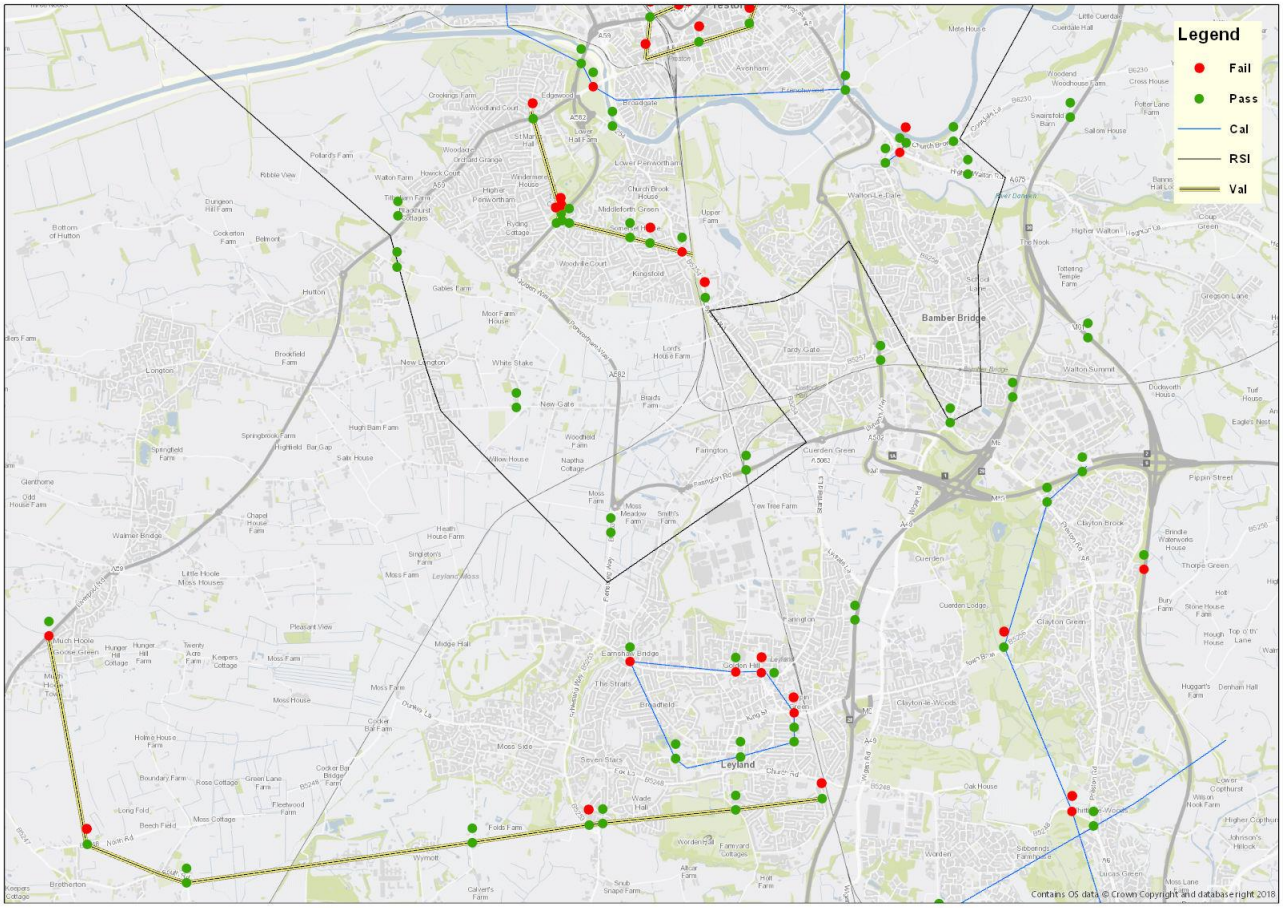


Figure 3-G: Performance of Calibration and Validation Count Sites

Upon further investigation into the counts, a few count sites that have been used in the calibration and validation exercise of the PWD in South Ribble area, were identified to have been observed over a single day. These counts were compared to the other counts nearby which have been captured over a longer period. This exercise resulted in removal of two counts from calibration screenline 13A and 1 count from screenline 9A.

3.4.3 Journey Time Validation

Trafficmaster were used to provide the average journey time for each of the identified journey time routes. Where the data was missing the moving car observer data was used. The routes, each bi-directional, cover all key roads in Preston, A582, and the full extent of the SRN in Central Lancashire. These are presented in Figure 3-H.

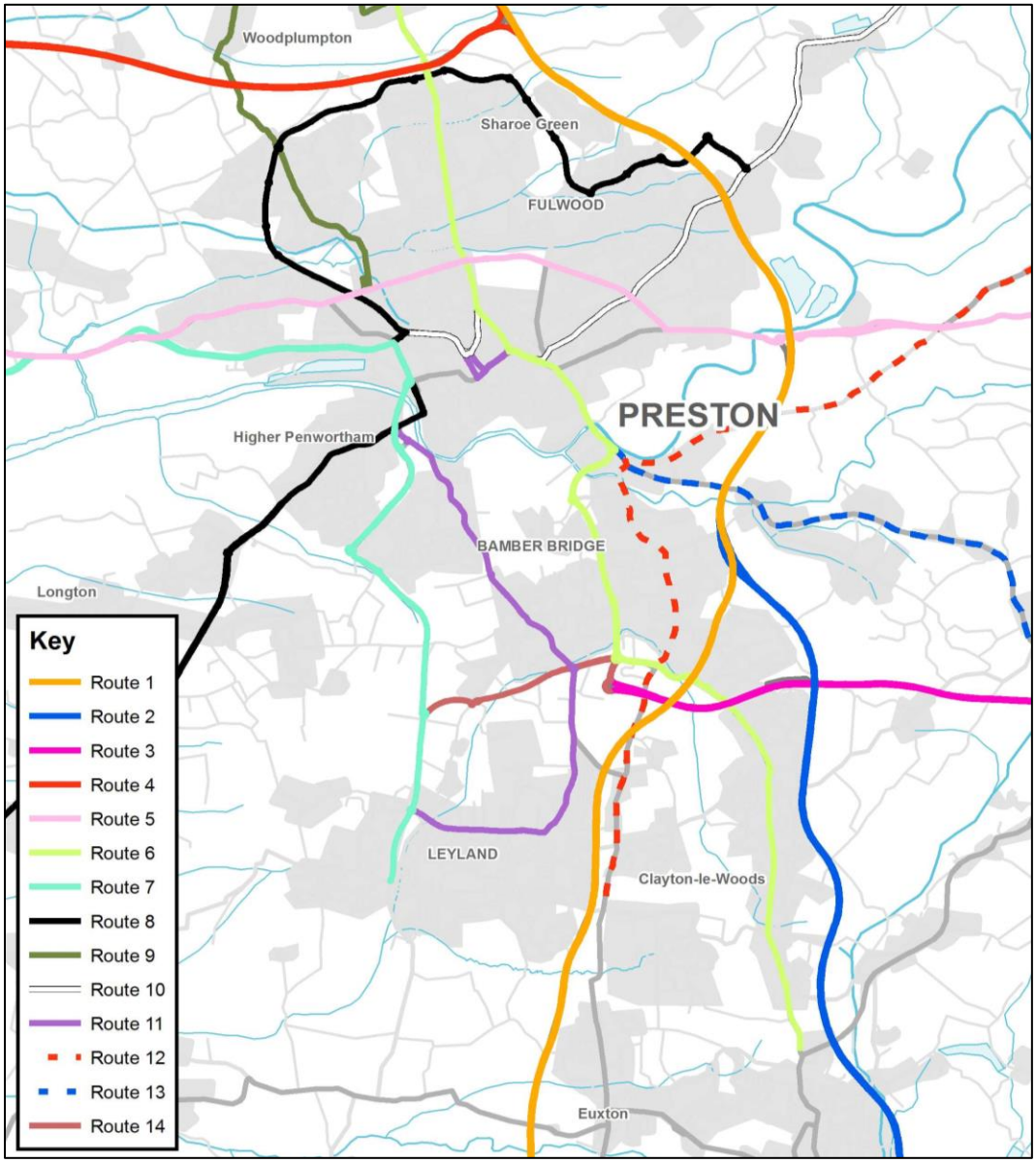


Figure 3-H: Journey Time Routes

Journey times within the model have been compared against the observed times.

The model's journey time within the A582 scheme area was reviewed and summarised in Table 3.4.

Table 3.4: Comparison of Modelled Journey Time against the Observed

Description	Route	Total Observed Journey Time (s)	Total Modelled Journey Time (s)	Difference	Time Period	WebTAG Compliant
Route 6	6 SB	2,059	2,161	102	AM	Pass
	6 NB	2,248	2,437	189	AM	Pass
Route 7	7 SB	1,416	1,594	178	AM	Pass

Description	Route	Total Observed Journey Time (s)	Total Modelled Journey Time (s)	Difference	Time Period	WebTAG Compliant
	7 NB	1,530	1,698	168	AM	Pass
Route 8	8 NB	2,184	2,282	98	AM	Pass
	8 SB	2,054	2,317	263	AM	Pass
Route 11	11 NB	1,789	1,993	204	AM	Pass
	11 SB	1,764	1,966	202	AM	Pass
Route 14	14 EB	339	346	7	AM	Pass
	14 WB	274	322	48	AM	Pass
Route 6	6 SB	1,897	2,086	189	IP	Pass
	6 NB	1,934	2,191	257	IP	Pass
Route 7	7 SB	1,382	1,548	166	IP	Pass
	7 NB	1,318	1,497	179	IP	Pass
Route 8	8 NB	1,787	1,962	175	IP	Pass
	8 SB	1,883	2,123	240	IP	Pass
Route 11	11 NB	1,516	1,789	273	IP	Fail
	11 SB	1,632	1,885	253	IP	Fail
Route 14	14 EB	274	308	34	IP	Pass
	14 WB	252	297	45	IP	Pass
Route 6	6 SB	2,129	2,462	333	PM	Fail
	6 NB	2,299	2,426	127	PM	Pass
Route 7	7 SB	1,820	2,035	215	PM	Pass
	7 NB	1,509	1,711	202	PM	Pass
Route 8	8 NB	1,902	2,156	254	PM	Pass
	8 SB	2,440	2,548	108	PM	Pass
Route 11	11 NB	2,061	2,068	7	PM	Pass
	11 SB	2,311	2,276	-35	PM	Pass
Route 14	14 EB	386	344	-42	PM	Pass
	14 WB	342	338	-4	PM	Pass

The above results show that routes 6 and 11 are slower in the model compared to the observed journey times. A closer look at route 6 in the PM period revealed that the journey times are not within the criteria for the northern section of the route to Preston. However, route 11 is slower than observed times for both directions. This route is parallel to A582 and therefore needs to be improved.

Better journey time validation may be achieved after calibration and validation process for model demand. If this was not achieved, junction saturation flow may need improving to represent these routes more accurately in the model.

3.5 Model Improvements

A series of changes have been made to the model to achieve a better match against the WebTAG criteria, however, given the stage of the appraisal (e.g. SOBC) and time constraints a proportionate approach to re-calibration was adopted. The aims of recalibration included:

- To achieve screenline performance close to WebTAG criteria on screenlines near the scheme namely 9A, 11B, 7B and 14A
- To ensure close match with the link counts on A582, A59 and A6 to the south of Preston as the key routes expected to be affected by the A582 upgrade
- To achieve close match with the observed for sections of journey time routes on A582, A59 and A6 to the south of Preston

The following steps have been used to achieve the above goals:

- Demand matrix has been adjusted through sector factoring process
- Re-running Matrix Estimation with a focus on A582, A59 and A6 counts in the expected area of impact
- Screenline 11B has been changed from a calibration to a validation screenline as part of this exercise
- Screenline 9A counts were used individually within the Matrix Estimation process
- Demand have been slightly adjusted post Matrix Estimation to achieve a closer match against counts on key links

The model performance following the changes is summarised in sections below.

3.5.1 Screenlines Performance

Table 3.5 provides a summary of the performance of the screenlines within the scheme study area.

Table 3.5: Screenlines Performance within A582 Scheme Area – All Vehicles

Screenline	Direction (Towards Preston)	Type	AM			IP			PM		
			Obs.	Model	PASS / FAIL	Obs.	Model	PASS / FAIL	Obs.	Model	PASS / FAIL
1E	Inbound	Calibration	4,085	4,083	PASS	2,683	2,669	PASS	3,267	3,251	PASS
7A	Inbound	Model Development	6,573	6,573	PASS	4,481	4,451	PASS	6,382	6,470	PASS
7B	Inbound	Model Development	6,831	6,868	PASS	4,910	4,902	PASS	6,444	6,425	PASS
9A	Inbound	Calibration	2,604	2,475	PASS	1,815	1,752	PASS	2,005	1,913	PASS
11A	Inbound	Calibration	5,433	5,416	PASS	5,168	5,086	PASS	5,395	5,463	PASS
11B	Inbound	Validation	5,257	5,308	PASS	3,100	3,251	PASS	3,147	3,316	PASS
13A	Inbound	Calibration	2,506	2,565	PASS	1,934	2,076	FAIL	2,121	1,987	FAIL
14A	Inbound	Validation	2,117	2,004	PASS	1,648	1,677	PASS	2,196	2,208	PASS
1E	Outbound	Calibration	3,074	3,037	PASS	2,783	2,735	PASS	4,133	4,123	PASS
7A	Outbound	Model Development	5,702	5,704	PASS	4,368	4,369	PASS	6,310	6,310	PASS

Screenline	Direction (Towards Preston)	Type	AM			IP			PM		
			Obs.	Model	PASS / FAIL	Obs.	Model	PASS / FAIL	Obs.	Model	PASS / FAIL
7B	Outbound	Model Development	6,060	6,034	PASS	5,006	5,050	PASS	7,130	7,174	PASS
9A	Outbound	Calibration	1,449	1,429	PASS	1,855	1,768	PASS	2,610	2,698	PASS
11A	Outbound	Calibration	4,330	4,296	PASS	4,971	4,869	PASS	5,807	5,772	PASS
11B	Outbound	Validation	2,333	2,325	PASS	3,150	3,211	PASS	5,438	5,140	PASS
13A	Outbound	Calibration	2,212	2,339	FAIL	2,238	2,285	PASS	2,816	2,711	PASS
14A	Outbound	Validation	2,336	2,447	PASS	1,632	1,715	PASS	2,328	2,481	FAIL

As it can be seen the majority of the screenlines within the study area are passing the WebTAG criteria. Screenline 14A outbound direction fails marginally in the PM time period. The count sites that fail to meet the WebTAG criteria on this screenline are far from the scheme and are not on key routes identified for this study, namely A59, A6 or A582.

Furthermore, screenline 13A fails in various time periods. This screenline however is a boundary around Leyland and only concerns the movements to and from Leyland. The impact of this screenline failing is not significant due to the fact that the screenline 7B which is located between Leyland and the scheme meets all WebTAG criteria. On the other hand, the differences between the observed and modelled flows on this screenline are not significant and the performance of the screenlines in the study area is suitable for the SOBC purposes.

Detailed information on the performance of the screenlines will be provided in the addendum to the CLHTM LMVR.

3.5.2 Individual Counts Performance

Figure 3-I, Figure 3-J and Figure 3-K show the counts performance for all vehicles within the study area.

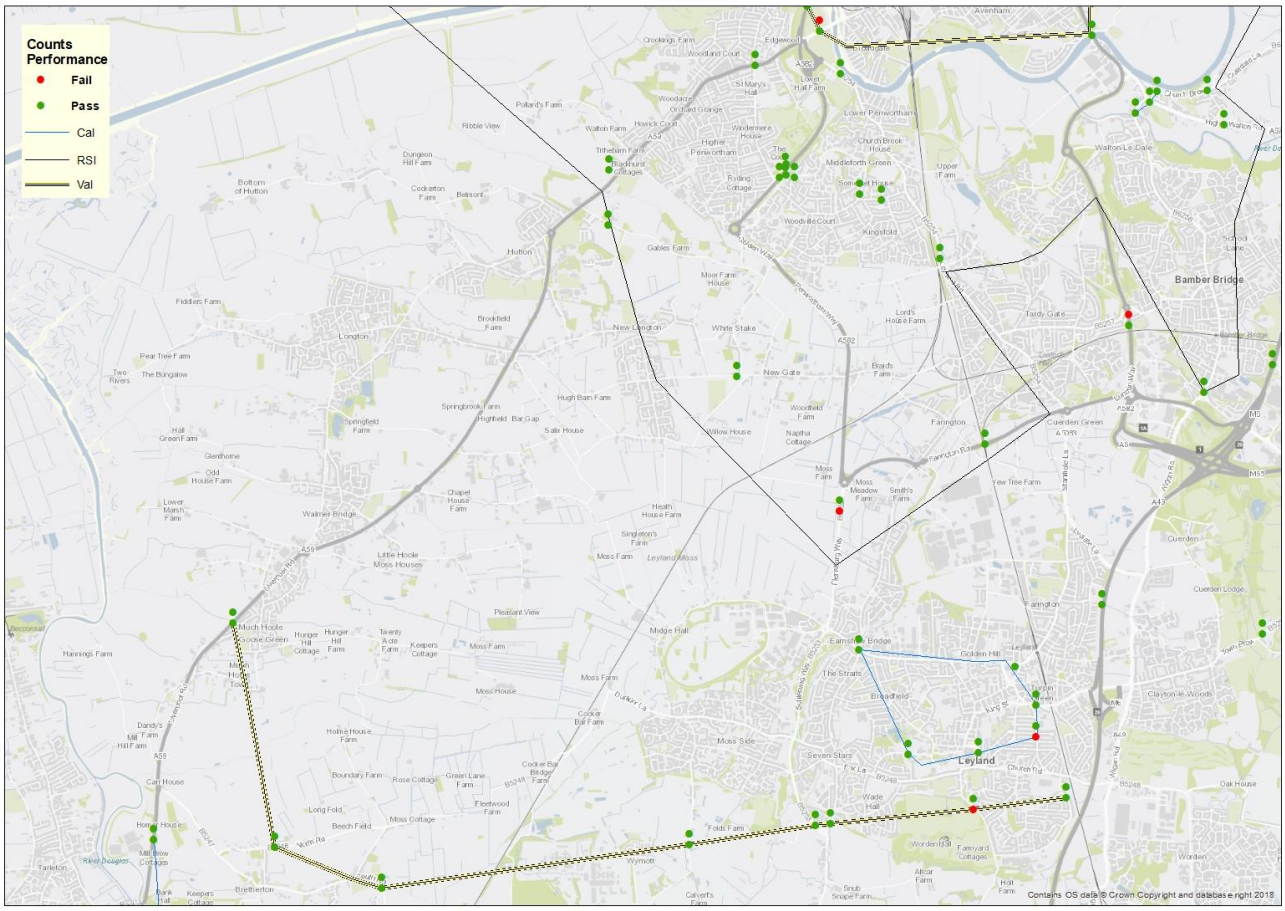


Figure 3-I: Performance of Calibration and Validation Count Sites - AM All Vehicles

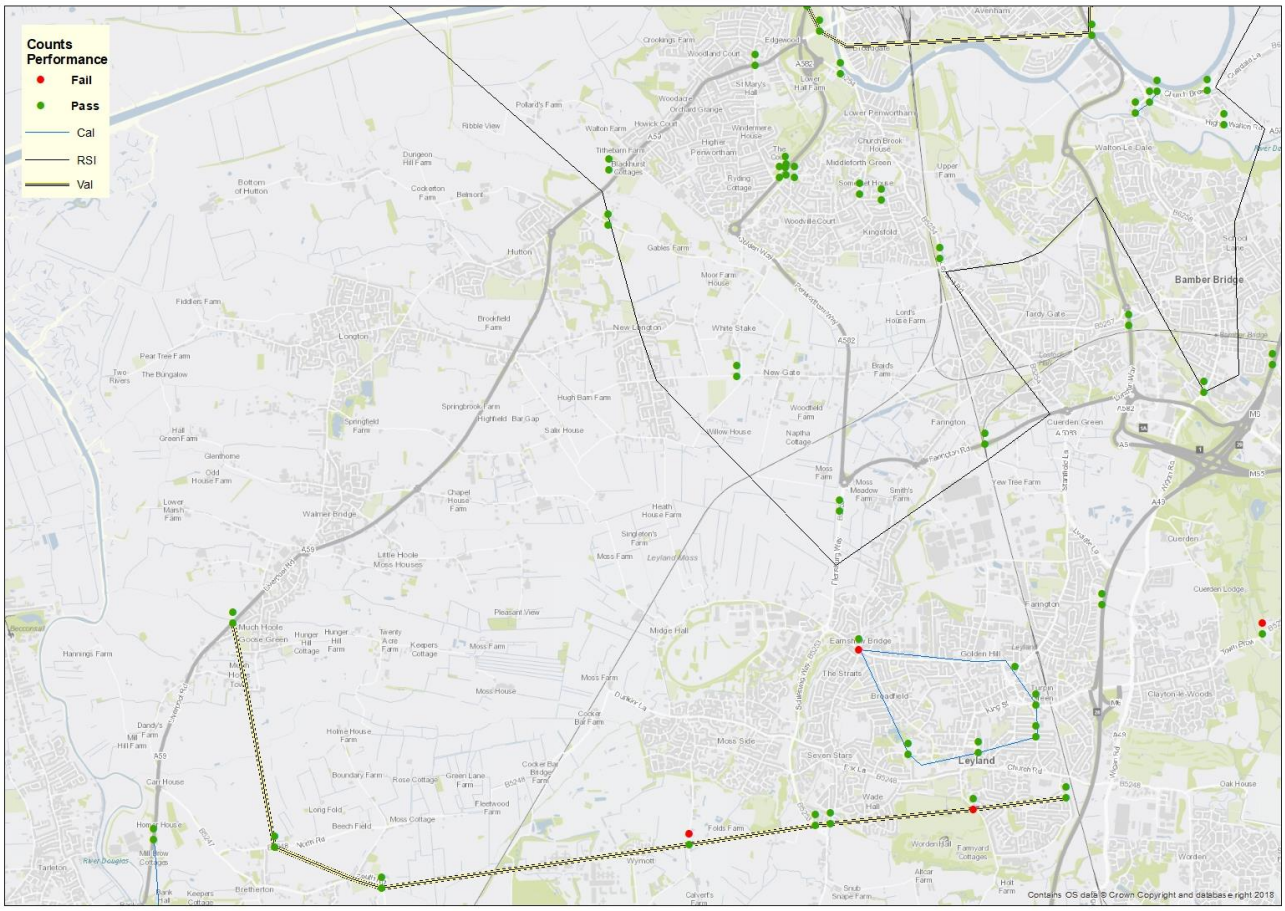


Figure 3-J: Performance of Calibration and Validation Count Sites - IP All Vehicles

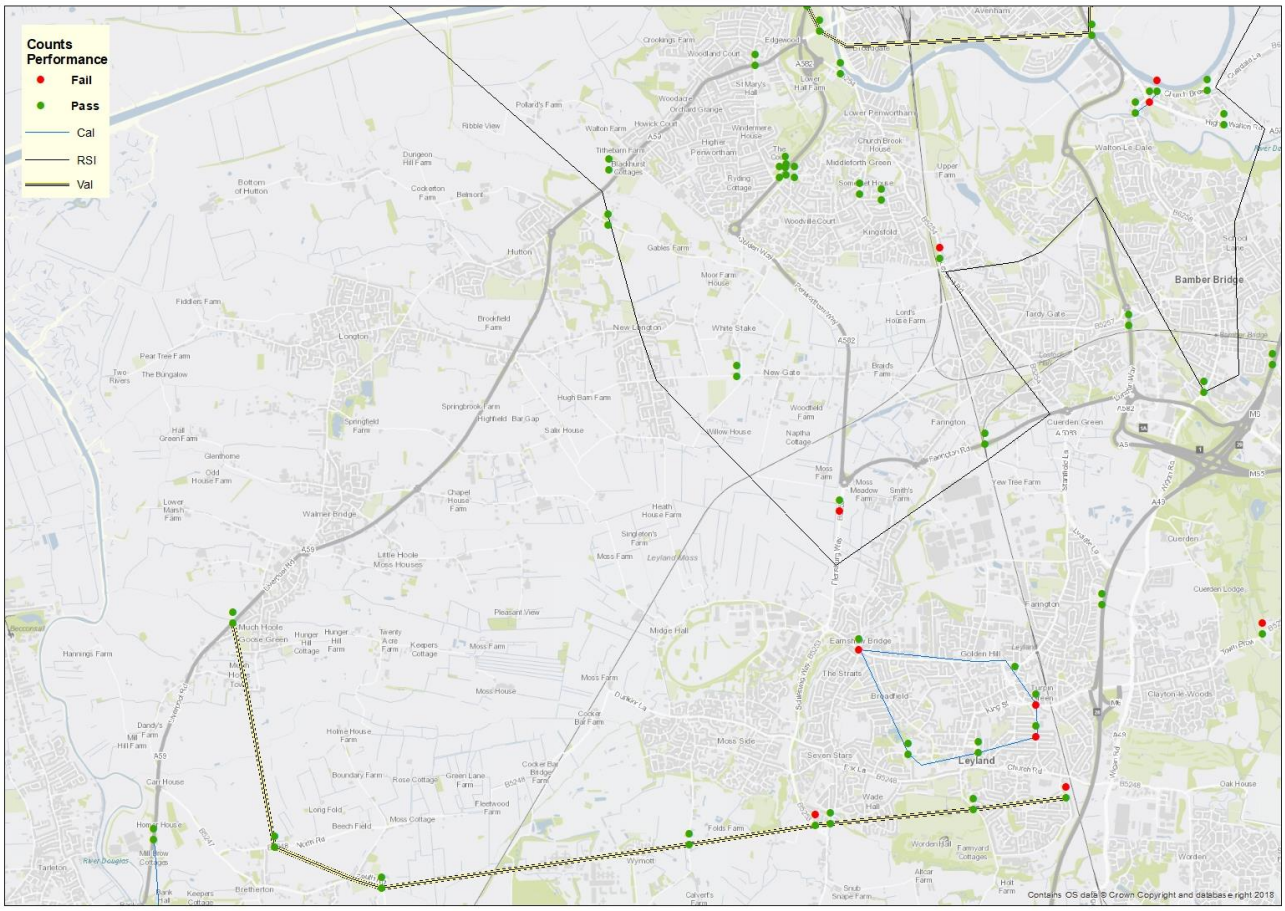


Figure 3-K: Performance of Calibration and Validation Count Sites - PM All Vehicles

The changes to the model show a significant improvement to the model. The majority counts on key routes namely A6, A59 and A582 pass the WebTAG criteria. It can be considered that the counts validate well against the observed data and the model can be considered suitable for the appraisal of the scheme for the purpose of SOBC. Further details of all counts performance will be provided in the addendum to the CLHTM LMVR.

3.5.3 Journey Time Routes Performance

Following the changes to the model the performance of the journey time routes was investigated. Table 3.6 provides a summary of the journey time routes covering the study area.

Table 3.6: Comparison of Modelled Journey Time against the Observed

Description	Route	Total Observed Journey Time (s)	Total Modelled Journey Time (s)	Difference	Time Period	WebTAG Compliant
Route 6	6 SB	2059	2119	60	AM	Pass
	6 NB	2248	2344	96	AM	Pass
Route 7	7 SB	1416	1606	190	AM	Pass
	7 NB	1530	1688	158	AM	Pass
Route 8	8 NB	2184	2252	68	AM	Pass

Description	Route	Total Observed Journey Time (s)	Total Modelled Journey Time (s)	Difference	Time Period	WebTAG Compliant
	8 SB	2054	2310	256	AM	Pass
Route 11	11 NB	1789	2044	255	AM	Pass
	11 SB	1764	1947	183	AM	Pass
Route 14	14 EB	339	360	21	AM	Pass
	14 WB	274	315	41	AM	Pass
Route 6	6 SB	1897	2083	186	IP	Pass
	6 NB	1934	2166	232	IP	Pass
Route 7	7 SB	1382	1571	189	IP	Pass
	7 NB	1318	1517	199	IP	Pass
Route 8	8 NB	1787	1956	169	IP	Pass
	8 SB	1883	2098	215	IP	Pass
Route 11	11 NB	1516	1793	277	IP	Pass
	11 SB	1632	1883	251	IP	Pass
Route 14	14 EB	274	307	33	IP	Pass
	14 WB	252	293	41	IP	Pass
Route 6	6 SB	2,129	2,327	198	PM	Pass
	6 NB	2,299	2,345	46	PM	Pass
Route 7	7 SB	1,820	2,093	273	PM	Pass
	7 NB	1,509	1,733	224	PM	Pass
Route 8	8 NB	1,902	2,120	218	PM	Pass
	8 SB	2,440	2,403	37	PM	Pass
Route 11	11 NB	2,061	2,100	39	PM	Pass
	11 SB	2,311	2,235	76	PM	Pass
Route 14	14 EB	386	338	48	PM	Pass
	14 WB	342	331	11	PM	Pass

The investigation of the journey time routes reveals that all the routes pass the WebTAG criteria. Further details of all journey time routes performance will be provided in the addendum to the CLHTM LMVR.

3.6 Variable Demand

The Variable Demand Model (VDM) for the CLHTM is set up in DIADEM (Dynamic Integrated Assignment and Demand Modelling).

Table 3.7 indicates the responses included in the VDM.

Table 3.7: Scope of VDM

Modelled	Not Modelled
Trip Frequency (for optional trip purposes)	Mode choice

Modelled	Not Modelled
Trip Distribution	Time of day choice
Cost damping	Micro time choice

The PWD demand model responses to change in fuel cost are realistic and within the requirements of WebTAG Unit M2. However, in view of the changes to the Base Model as discussed above the VDM realism test has been re-run to make sure the VDM is still suitably sensitive to future changes in travel cost as a result of the A582 scheme.

As the initial run for the realism test, the parameters from the last successful run for PWD were used. Because the results of the run did not achieve the criteria as in WebTAG the parameters were slightly adjusted in line with WebTAG guidance. Table 3.8 provides a summary of these parameters used in the two realism tests.

Table 3.8: Car Fuel Cost Elasticities - Parameters

Run #	Distribution Parameter Trip (Lambda)						Cost Damping			Frequency
	Commute	Employer Business	Other	Commute	Employer Business	Other	Commute	Employer Business	Other	Other
1	Equal or less than Median	-25%	-25%	AM: -0.06 IP: -0.055 PM: -0.065	-0.050	-0.068	-	d'=k= 20000m, alpha: AM =0.6 IP= 0.63 PM=0.5	d'=k= 20000m, alpha: AM =0.6 IP=0.62 PM=0.5	0.08
2	Equal or less than Median	-25%	-25%	AM: -0.06 IP: -0.055 PM: -0.065	-0.050	-0.068	-	d'=k= 20000m, alpha: AM =0.6 IP= 0.63 PM=0.5	d'=k= 20000m, alpha: AM =0.6 IP=0.62 PM=0.6	0.08

The realism test results are provided in Table 3.9, Table 3.10, Table 3.11 and Table 3.12.

Table 3.9: Car Fuel Cost Elasticities - AM Results

	Commute	Employer Business	Other	Overall
Target Elasticity	-0.25 to -0.3	near -0.1	near -0.4	-0.30 to -0.35
1	-0.29	-0.10	-0.43	-0.30
2 (Final Run)	-0.29	-0.10	-0.43	-0.30

Table 3.10: Car Fuel Cost Elasticities - IP Results

	Commute	Employer Business	Other	Overall
Target Elasticity	**-0.25 to -0.3**	**near -0.1**	**near -0.4**	**-0.30 to -0.35**
1	-0.29	-0.11	-0.42	-0.32
2 (Final Run)	-0.29	-0.11	-0.42	-0.32

Table 3.11: Car Fuel Cost Elasticities - PM Results

	Commute	Employer Business	Other	Overall
Target Elasticity	**-0.25 to -0.3**	**near -0.1**	**near -0.4**	**-0.30 to -0.35**
1	-0.30	-0.11	-0.49	-0.34
2 (Final Run)	-0.30	-0.11	-0.45	-0.34

Table 3.12: Final Run Results for Car Fuel Cost Elasticities

Time Period	Matrix Based			
	Commute	Employer Business	Other	Overall
Target	**-0.25 to -0.30**	**Near -0.1**	**Near -0.4**	**-0.30 to -0.35**
Elasticity Results_12 Hour (excl. weekends)	-0.30	-0.1	-0.43	-0.32
Elasticity Results_12 Hour (incl. weekends)	-0.29	-0.1	-0.42	-0.32

The tables above indicate final demand model calibration results, based on the changes outlined above. The resulting elasticities (based on all non-fixed trips which are subject to variable demand) have:

- All-purpose all day elasticities on the right side of -0.3 (result -0.31, is in range of -0.30 to -0.35);
- Commute elasticity (by period and all day) close to the all-purpose values;
- Employers business elasticities have a weaker response;
- Other purpose elasticities have a stronger response;
- IP elasticity for all-purposes is higher than AM but marginally lower than PM. Whilst the proportion of Other trips is higher in IP which would normally result in higher IP elasticity when compared to AM and PM, the calibrated PM Other elasticity, as demonstrated in the table above, is higher than IP Other. This results in higher overall PM elasticity. This pattern is considered acceptable given that WebTAG guidance indicates that there is little or no empirical evidence to support the pattern that IP should be higher than peak periods.

4. Forecast Transport Model

4.1 Overview

The impacts of a scheme are based on the differences between forecasts of the without-scheme and with-scheme scenarios.

The forecast 'With' and 'Without' scheme networks will be coded into the CLHTM model in line with DfT WebTAG guidance, and based on the latest scheme design information.

For each forecast year, without scheme and with scheme scenario network will be created as follows:

- Without Scheme network includes any committed infrastructure schemes within the area of detailed modelling expected to be completed by the A582 scheme opening or design year.
- With Scheme networks will have the committed infrastructure developments included in the 'without scheme' network for the corresponding year as well as the A582 scheme.

The forecast networks will be developed, with minor amendments, from the existing PWD model.

The forecast matrices will be developed in line with the WebTAG guidance- specifically TAG Unit M4 and using the PWD FBC uncertainty log information, with minor amendments reflecting latest planning status of key developments within the A582 area of impact.

Three forecast years will be developed, which in line with WebTAG guidance will be constrained to NTEM v7.2 and RTF18 and will exclude any housing and employment developments dependent on the scheme.

4.2 Forecast Years

In order to demonstrate the long-term benefits of proposed transport interventions three forecast years will be used:

- The first forecast year is 2022, providing a suitable projected opening year for the scheme
- The second forecast year is 2037, providing a long-term design year 15 years after the scheme has been implemented
- A third forecast year of 2042 has also been developed

4.3 Uncertainty Log

TAG Unit M4 recommends the production of an Uncertainty Log for the purpose of summarising the local planning assumptions in relation to the nature, timing, size and other details of the future developments.

The uncertainty log from the PWD FBC produced in 2018 in collaboration with the local councils will be used with minor amendments related to change in planning status of key developments in South Ribble.

As it is not practical to consider every potential development within the defined Local Area, minor developments which were not expected to have any impact on the forecasts have been removed from the uncertainty log. The criteria for removing a development from the uncertainty log have been defined as follows:

- For housing development: < 50 dwellings

- For employment development: < 50 jobs

In line with TAG only those development sites which could be categorised as ‘Near Certain’ or ‘More than Likely’ based on Table A2 of TAG Unit M4 were included in the Core Scenario. This represented the most likely outcome and forms the basis for the scheme appraisal.

Previously the committed development in Cuerden was excluded from the forecast model for PWD scheme. For A582 scheme this development will be excluded as well since the development is deemed to be dependent on the scheme. The housing development at Pickering Farm is also considered dependent subject to LCC confirmation, and therefore will be excluded from the Core forecasts.

No other change to the uncertainty logs for developments and transport schemes will be recorded as part of this re-forecasting exercise.

4.4 Forecast Network

As mentioned in the previous section, the uncertainty log from the PWD scheme will be used for transport schemes. These transport schemes have been previously agreed with LCC and Highways England and are included in the PWD forecast models. Therefore, no change to the Do Minimum will be made. Within the Do Something scenario updates will be made to include the proposed changes to the A582 based on the latest designs, with the rest of the model expected to be consistent with the PWD FBC model.

The PWD forecast models were created in line with WebTAG unit M-4, where schemes deemed to have a sufficient level of certainty of being developed were coded into the forecast networks. Schemes currently under construction or identified as having a construction likelihood of ‘near certain and more than likely’ were included in the core model scenario.

The modelling of these schemes was informed by drawings made available to the project team.

In addition, fixed speeds on buffer links will be adjusted in line with RTF road speed forecasts.

The values of time (VOT) in pence per minute (PPM) and vehicle operating costs (VOC) in pence per kilometre (PPK) will be updated for each forecast year to represent changes in the perceived VOT and VOC in line with WebTAG (November 2018).

4.5 Forecast Demand

This section contains information on how the forecast demand matrices will be developed in accordance with guidance outlined in WebTAG Unit M-4.

The future year demand forecasting methodology is consistent with the PWD FBC TFR previously approved by DfT.

Forecast demand for travel will be generated using national, regional and local data sets to inform the amount of travel growth that could be expected from the base year.

Data used to calculate traffic growth for the PWD will be used for this assessment and includes:

- TEMPRO planning assumptions and growth factors – NTEM v7.2 dataset
- RTF18 growth factors for GV trips
- Data from Preston City Council on employment and housing developments
- Data from Fylde Council on employment and housing developments
- Data from South Ribble on employment and housing developments
- Transport assessments and Development Site Masterplans

Figure 4-A below shows a flowchart illustrating the methodology for creating reference case matrices (i.e. fixed demand) for cars to be used in VDM. Forecast matrices for GV trips are produced by applying growth factors for principle roads in England using RTF18.

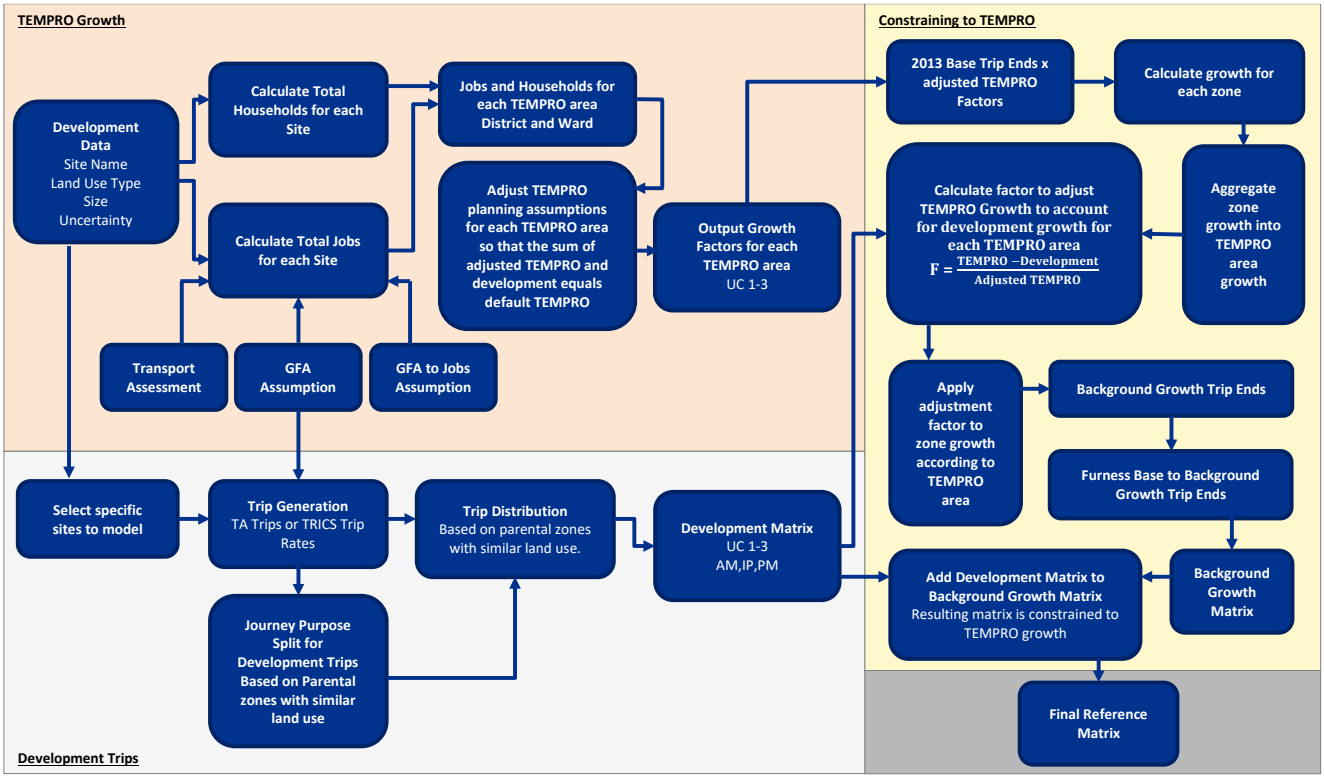


Figure 4-A: Car Demand Forecasting Methodology

In summary, the development details obtained from the local authorities along with TRICS trip rates and trips extracted from Transport Assessments were used to generate development trips.

These trips were distributed using parental zones in the base year to create a development matrix for each trip purpose and time period.

Jobs and households associated with future developments were aggregated by TEMPRO area and subtracted from NTEM forecast jobs and houses using the Alternative Assumptions to derive adjusted TEMPRO growth factors.

The adjusted factors have been applied to the Base year trips to produce the background growth matrix.

The development matrix was then added to the background matrix to create a final Core reference case matrix constrained to TEMPRO, as recommended by WebTAG. Subsequently, these matrices will be used in the variable demand model, pivoted from the base year skim costs to capture the changes in demand pattern as a result of the travel cost changes.

5. Economic Assessment

5.1 Overview

Economic Assessment involves the determination of costs and benefits of a scheme using travel demand, traffic flows, journey times and other inputs from a traffic model.

By comparing the costs with the benefits of a scheme over a 60-year assessment period, a Benefit Cost Ratio (BCR) can be calculated, which is an indicator of the value for money of the scheme.

In line with HM Treasury's appraisal requirements, non-monetised impacts of the scheme should also be considered as part of the Value for Money assessment.

This chapter provides a general description of the economic appraisal approach proposed for the A582 South Ribble Western Distributor Upgrade scheme.

5.2 Economic Assessment Approach

The scheme is designed to promote economic growth whilst simultaneously delivering transport user benefits and business competitive advantage. Therefore, the focus of the economic assessment will be on capturing both traditional sources of scheme benefits, alongside wider economic benefits.

A WebTAG standard assessment requires consideration of the following impacts:

- Transport Economic Efficiency (TEE) benefits, consisting of two elements:
  - Travel time and Vehicle Operating Cost (VOC) benefits and disbenefits
  - Travel time and VOC benefits and disbenefits because of construction and maintenance activities
- Change in taxes
- The impact of the scheme on accidents
- The Environmental Impacts (air quality, noise, greenhouse gases)
- Journey time reliability
- Wider Economic Benefits

Each of the above elements informs the overall Value for Money of the scheme and is considered within the Appraisal Summary Table (AST). However, only some of these elements are currently included within the Analysis of Monetised Costs and Benefits (AMCB) and the calculation of the Initial Benefit to Cost Ratio (BCR).

Figure 5-A includes a flow-chart which displays how the costs and impacts feed into the AST and VfM statement.

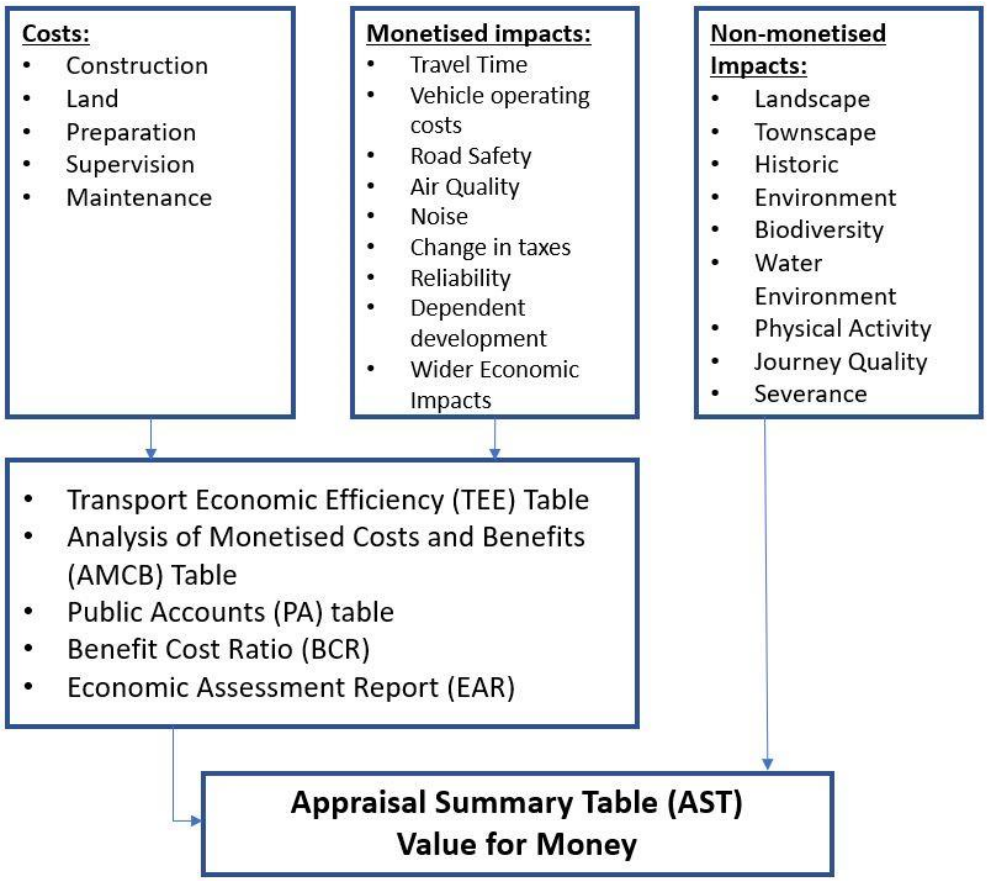


Figure 5-A: Scope of Value for Money Assessment

5.3 Appraisal Period

In line with WebTAG guidance, the impacts of the scheme will be assessed over the 60-year period after the scheme opens, capturing the planned period of scheme development and implementation. The 60-year appraisal period for the scheme is 2022-2081.

The transport model provides estimates for three years: the opening year (2022), the design year (2037) and the final year (2042). The results of the model will be interpolated and extrapolated to cover the whole appraisal period of 60 years. To ensure conservative approach to calculation of scheme benefits it is assumed that there will be no growth in traffic flows after the final year.

5.4 Discounting

Costs and benefits occur in different years throughout the assessment period, for example the construction costs occur before the scheme opens, whilst the benefits occur in the 60 years afterwards. In addition, it is considered that benefits that accrue now are considered to be more valuable than those that accrue further into the future. Therefore, to compare benefits and costs, it is essential that they are all converted to a common base and a common value (known as the present value year).

The process used is called discounting, and the present value year is currently 2010. Discounting will be undertaken internally within the computer programs mentioned above, using the standard DfT discount rates of 3.5% per year for the first 30 years of appraisal and 3.0% per year thereafter.

Costs can also be in different price bases. To enable comparisons to be made between such costs, they will need to be adjusted so that they are all in a common price base. The unit of account must also be consistent between costs and benefits to allow comparison between the two. There are two different units of accounts:

- Market price unit of account – this refers to the prices paid by consumers for goods and services and therefore includes indirect taxation (e.g. VAT).
- Factor cost unit of account – this excludes indirect taxation. Prices paid by government bodies are usually quoted in the factor cost unit of account as any tax paid is recovered by the government and is therefore ignored.

While scheme benefits are calculated in market prices, scheme costs are usually quoted as factor costs. The scheme costs will therefore be adjusted to market prices for economic assessment purposes – this is done within the economic assessment software.

5.5 Costs for Economic Assessment

Costs can be defined as the total amount of money spent on constructing and maintaining the scheme. The costs are therefore referred to as Scheme costs and Maintenance costs:

- Scheme costs are construction costs, land costs, preparation costs (planning and designing the scheme) and supervision costs during the scheme construction.
- Maintenance costs are the cost of people, machinery and materials required to maintain the highway network. These costs are also known as the Capital Costs of Maintenance.

The estimation of scheme costs is a crucial part of the scheme appraisal.

As mentioned above economic assessment considers both the actual cost of the scheme, together with any changes in the capital cost of maintenance in future years.

The costs used in scheme appraisal differ from the outturn costs used for funding decisions. Costs for scheme appraisal will be adjusted to the DfT's standard present value year for appraisal (2010) to allow direct comparison with the monetised benefits, and the costs are in calendar years. Scheme costs used for funding submissions are the outturn costs in the expected years of expenditure and are in financial years converted to market price units of account.

Base cost estimates for construction, land / property, preparation / administration and supervision, including adjustment for risk and inflation will be provided by the scheme promoter, LCC. It is assumed that cost estimates derived will meet the following criteria, and will be checked against them:

- Costs are based on the latest scheme design
- Expenditure in calendar years
- Exclude any costs already incurred
- Exclude both recoverable and non-recoverable VAT
- Exclude any costs that are present in both the Do-Minimum and the Do-Something scenarios
- Costs to be incurred by Central Government and local government are provided separately
- Include the amount of developer contribution if any

Jacobs will make further adjustment for investment costs because of Optimism Bias (OB). In line with WebTAG an additional 44% uplift of the scheme cost is recommended at the Strategic Outline Business Case stage (TAG Unit A1.2: Table 8).

The adjusted costs will be entered into TUBA to derive the Present Value Cost (PVC) for construction, land/ property and preparation and administration.

The Capital Cost of Maintenance is the cost of people, machinery and materials to maintain the highway network. Maintenance cost will be derived using typical maintenance profiles and costs provided in Part 2, Chapter 4 of the QUADRO manual, designed for such assessments. The maintenance costs will be entered into TUBA together with other scheme costs to derive operating costs and total PVC of the scheme.

5.6 Transport Economic Efficiency – TUBA

The tool proposed to conduct the economic appraisal of journey times and vehicle operating costs in accordance with guidelines outlined in WebTAG is TUBA (Transport User Benefit Appraisal). The latest approved version at the time of the economic assessment will be used, at the time of writing this is 1.9.12.

TUBA is the industry-standard software used to derive the TEE (Transport Economic Efficiency) of a scheme. It considers both the Business and Consumer Traveller Impacts and the Private Sector Provider Revenues and Costs elements of the WebTAG requirements.

TUBA will take demand, time, distance and cost matrices for each of the modelled future years by vehicle type, journey purpose and time period. These matrices will be skimmed from the forecast transport models once completed. From these inputs, journey time benefits are calculated, and it does this by comparing the travel times in the Without Scheme situation with those in the With Scheme scenario. TUBA then applies monetary values (known as Values of Time (VOT)) to derive the monetary benefits of those time savings over the standard 60-year appraisal period.

TUBA also calculates Vehicle Operating Cost (VOC) changes which occur over the standard 60-year appraisal period due to changes in costs associated with such items as fuel, maintenance, and wear and tear. These occur because of changes in speed and distance when the scheme is implemented and can include both positive and negative values depending upon the scheme's impact on traffic flows and routing.

In accordance with best practice, the results of the TUBA assessments will be checked at a sector level (as it would be difficult to do this assessment at a zonal level). Other checks will include:

- Analysis of benefits by time period and journey purpose
- Benefits profile over 60-year period
- Analysis of benefits by size of time-saving

Additionally, TUBA warnings will be closely checked to ensure that the results are logical, and the input data was loaded correctly.

A summary of TUBA assessment assumption is provided in Table 5.1.

Table 5.1: TUBA assumptions

Item	Assumptions/Notes
Software	TUBA Version 1.9.12 (current version)
Current year	2019 (defines the first year in which the discount rate is applied)
Appraisal period / Horizon year	60 years after scheme opening, in line with WebTAG requirements

Item	Assumptions/Notes
Forecast year trip, time and distance matrices from traffic model	Opening year: 2022 Design year: 2037 Final year: 2042
User classes	Trip, time and distance matrices for the following user classes will be input into TUBA: • Car Employer's Business • Car Commuting • Car Other • LGV • HGV
Economic Parameters	Economic parameters (such as Value of Time) are defined in the standard TUBA Economic File provided for TUBA 1.9.12 (based on November 2018 WebTAG, consistent with economic parameters used in the model).
PCU Factor	The trip matrices obtained from SATURN are in passenger car units (PCUs). These will be converted into vehicles as TUBA requires matrices in vehicles. A PCU factor of 2 will be applied to the HGV matrices, with no adjustment made to the car or LGV matrices which have a PCU factor of 1.
Annualisation factors for modelled time periods (AM, IP, PM weekday)	In accordance with the TUBA guidance, the modelled time periods will be converted to annual time periods using annualisation factors. Modelled peak periods (AM and PM) will be extended using annualisation factors. Annualisation factors will be taken from the PWD appraisal, unless analysis of the traffic flow on the A582 shows a different traffic flow profile. Off-peak and Weekend benefits will not be assessed. WebTAG recommends including Off-Peak and Weekends in the assessment only if they have been specifically modelled.

5.7 Transport Economic Efficiency – Construction Delays

During the construction of the scheme, it is likely that some delays will be experienced by the road users. These delays can be kept to a minimum using effective traffic management and significant off-line construction but are unlikely to be removed all together. This results in travel time and VOC disbenefits on the existing network that should be considered as part of the AMCB.

QUADRO is the industry-standard software and will be used for the appraisal of the delays to road users using the standard economic parameters within the program.

Construction activities, traffic management arrangements and diversion routes will be coded into QUADRO, which will then be run to simulate the impact of the construction activities on travel times, VOC and accidents on the existing network.

Table 5.2 provides a summary of the key assumptions that will be adopted as part of the analysis of the scheme.

Table 5.2: Construction Delay Assumptions

Item	Assumptions/Notes
Software	QUADRO 2018 (current version)
Construction work profiles and durations	The following traffic management during construction assumptions have been made: • Most sections of online widening will require full-time traffic management for the entire construction period, consisting of narrow lanes and closure of the other lane, and a reduced speed limits of 40mph. • It is assumed that four Weekend night closures are each essential to upgrade junctions of the A582 with the A6 and the M65 connection and the A582 with the Croston Road. While two weekend night closures are assumed for the junction upgrades of the A582 with Watkin Lane and Chain House Lane. For junctions that are already upgraded along the A582, it is assumed that a night closure along the route is needed to tie in the dual carriageway works with the junctions at B5253, Pope Lane and Millbrook Way • As a number of the construction phases require complete road closures and the appropriate diversion routes were identified by the design team. For most closures, a 6-km diversion route was identified. This diversion route is of a lower standard than the A582 due to the lack of alternative routes and is primarily via the B5254 at a much lower speed of 30mph.
Modelling scenarios	• The Opening Year Without Scheme scenario will be used as the basis of appraisal. The appraisal will therefore assume opening year traffic volumes.
Current year	• 2019 (defines the first year in which the discount rate is applied)

5.8 Transport Economic Efficiency – Maintenance Delays

Delays will be experienced by road users during periods of maintenance in both the existing situation and the With Scheme situation. In the existing situation, delays caused by maintenance are likely to be significant due to traffic diversions on to alternative routes or running at significantly reduced capacity.

Traffic flows in the With Scheme scenario are likely to increase because of more traffic using the scheme. However, it is expected that maintenance delays would be relieved because of an upgraded carriageway as well as other improvements.

Also, in the With Scheme scenario, less maintenance would be required because the scheme would have been newly constructed (i.e. the “maintenance holiday” effect). There is therefore a mixture of increases and decreases in delays during maintenance.

QUADRO is the industry-standard software and will be used for the appraisal of the delays to road users using the standard economic parameters within the program.

Maintenance activities, traffic management arrangements and diversion routes will be coded into QUADRO, which will then be run to simulate the impact of the maintenance activities on traffic on A582 and surrounding network. Table 5.3 provides a summary of the key assumptions that will be adopted as part of the analysis.

Table 5.3: Maintenance work profiles and durations

Software	QUADRO 2018 (current version)

Maintenance work profiles and durations	Jacobs will use professional judgement and examples from similar schemes to make suitable assumptions. Maintenance works profiles and durations will be based on the typical maintenance profiles and costs provided in Part 2, Chapter 4 of the QUADRO manual, designed for such assessment. Delays during bridge inspections/maintenance for the existing and proposed structures will be excluded.
Modelling scenarios	• The roadworks will be modelled using QUADRO • Only significant maintenance activities will be coded into QUADRO
Traffic Flows	The traffic flows for the modelled year closest to the year when maintenance is scheduled will be used in QUADRO: • Without Scheme AADTs for Opening Year/Design Year/Final Year • With Scheme AADTs for Opening Year/Design Year/Final Year
Current year	2019 (defines the first year in which the discount rate is applied)
Appraisal period	60 years after scheme opening, in line with WebTAG requirements

5.9 Accident Benefits

In line with WebTAG, COBALT will be used to derive the accident benefits of the scheme. COBALT compares the predicted numbers of accidents with and without the scheme and converts them into monetary values by multiplying the numbers of accidents by their monetised costs.

The benefits for each year are discounted to 2010 and summed over the 60-year assessment period.

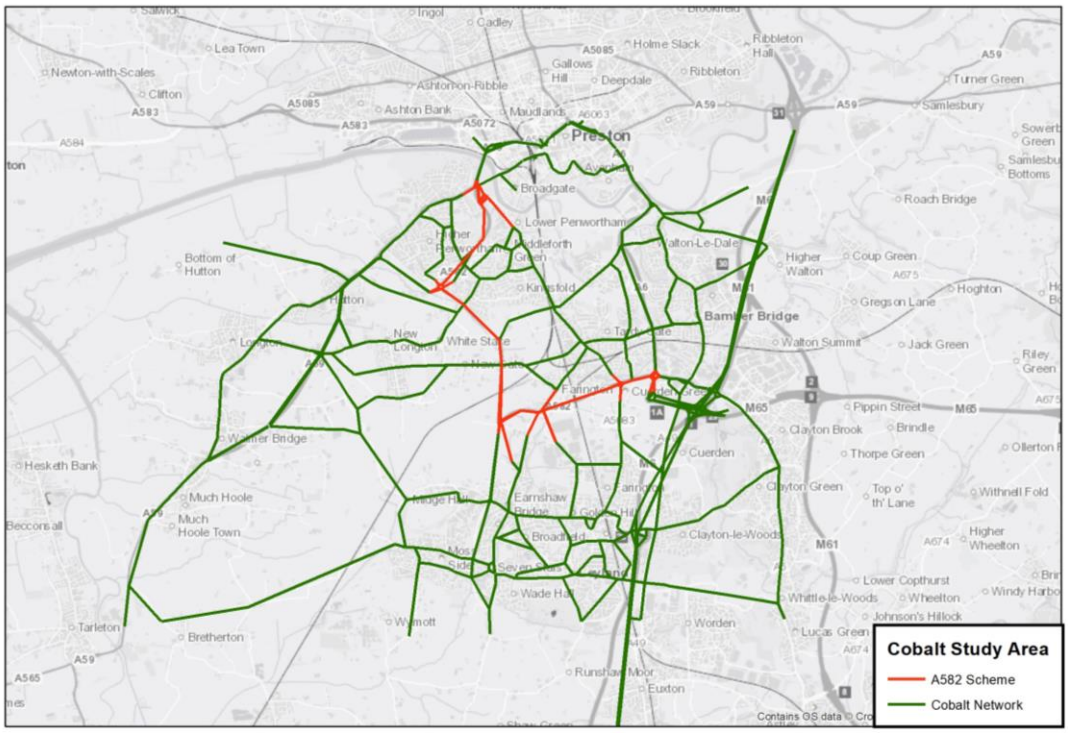
COBALT uses nodes and links to represent the Base, Do Minimum and Do Something highway networks.

The COBALT network for the scheme will cover all roads and junctions where the model predicts a significant change in flow between Do Minimum and Do Something scenarios (taken to be a change in flow of 10% or more).

Table 5.4 provides a summary of key assumptions that will be adopted as part of the analysis.

Table 5.4: Accident Benefits Analysis Assumptions

Items	Assumptions/Notes
Software	COBALT Version 2013.2 (current version) (with Version 2018.1 of the Parameter file)
COBALT Network	The COBALT network is produced in GIS and will comprise of a series of links and junctions. The network construction is carried out in accordance with the COBALT guidance. The node-link structure will be based directly on the traffic model; however, the COBALT network includes only roads where the traffic model predicts a significant change in flow (taken to be a change in flow of 10% or more). An early exercise has been undertaken to identify where these changes take place by comparing the 'with scheme' and 'without scheme' scenarios using a forecast model developed for the PWD scheme. The identified study area for the COBALT assessment for A582 scheme is shown below.

Items	Assumptions/Notes
	 The COBALT network will only include separate assessment of links and junctions in the vicinity of A582 where online improvements are to be made. The rest will be modelled as combined network.
Accident Data	• STATS 19 Personal Injury Accident (PIA) data for the latest available complete five-year period (2013-2017) will be obtained from the government website for Fatal, Serious and Slight accidents only (Not including Damage Only). • The accidents will be plotted in GIS and be assigned to the COBALT links and junctions as appropriate. • As stated in Paragraph 3.1.1 of the COBALT User Guide, the program will automatically remove 20 metres from either side of a link as accidents on these parts of a link are covered by junction accident rates. Checks will be carried out to ensure that where there are no junctions on either side of a link, 40m is added on to the link length to ensure that the correct length is used by COBALT. • Checks will be made that the accidents have been correctly assigned to the links and junctions by cross-referring the location with the accident description. • If a link has no observed accidents over the five-year period, either the accident rate will be calculated using the assumption of 0.5 accident over 5 years or it will be joined with an adjacent link with at least one accident over the five-year period provided that type, speed and AADT flow is the same for the amalgamated links. • All new Do Something links and junctions will use the default accident rates.
Traffic Flows	Annual Average Daily Traffic (AADT) traffic flows from the traffic model.

5.10 Environmental Benefits

The environmental impacts which will be assessed and included into the calculation of the scheme Value for Money include Air Quality, Noise and Greenhouse Gas emissions.

Changes in traffic flows caused by the introduction of the scheme will result in changes in greenhouse gas emissions from vehicles, depending on changes in flows, speeds and distance travelled.

The standard Greenhouse Gases Spreadsheet from WebTAG Unit A3 will be used to calculate the total carbon dioxide emissions (tonnes) for the life of the scheme.

The spreadsheet outputs information on carbon dioxide emissions per year. Benefits are output in tonnes and as a monetary value (PVB).

The Air Quality Worksheet from WebTAG Unit A3 will be used to calculate the change in Air Quality for the life of the scheme. The Local Air Quality is not expected to have any material impact on the BCR and therefore is excluded from this stage of the scheme appraisal. Should the scheme progress to the OBC stage, Local Air Quality will be analysed in line with WebTAG. Regional Air Quality (NOx) benefits will be output as a monetary value (PVB) and included in the BCR.

Changes in traffic flows can also result in changes in noise, depending on whether properties are located adjacent to affected roads or not. The standard Noise Spreadsheet from WebTAG Unit A3 will be used to calculate the change in noise levels during the life of the scheme, the change in numbers of people “annoyed” and the monetary value of those changes (PVB).

Interim Advice Note (IAN) 185/15 provides guidance on the process that should be adopted to provide speeds information for Noise and Air Quality assessments. Analysis of the performance of modelled speeds on individual links compared against observed speeds is required. Modelled speeds will then be adjusted (pivoted) to better reflect observed speeds and to provide a weighted 18-hour AAWT speed that is then assigned to a relevant Speed Band. The Speed Band information will then be used within air quality and noise modelling and assessment.

The traffic flows and speeds will be extracted from the CLTM model.

The monetised environmental impacts will be included within the AMCB table and the BCR.

5.11 Journey Time Reliability

Journey time reliability relates to the variability of journey times that users are unable to predict.

The reliability benefits of the scheme can be captured and monetised, however they are not included in the scheme AMCB table and will be included in the adjusted BCR.

The standard tool to assess the journey time reliability benefits of rural roads is MyRIAD which is only applicable to motorway and dual carriageway improvement schemes. With A582 scheme, it is possible to infer the likely change in variability by comparing the level of variability on different sections of the existing route.

Once the A582 dualled, it is assumed that road users on A582 between Golden Way and Stanifield Lane will experience the level of reliability currently experienced on the dual carriageway section between Broad Oak Lane and Penwortham Triangle. This section is adjacent to the scheme, and hence experiences broadly similar traffic flows and seasonal variation.

For each section, variability in journey time was measured across a sample of journey time observations taken from the DfT Trafficmaster GPS data.

It is important to distinguish between unpredictable and predictable variation in journey times. To ensure that the analysis only captures unpredictable variation, journey time will only measure and compare separately across specific times of the day (AM, Inter-peak and PM periods), days of the week (Monday – Thursday, Friday, and Saturday – Sunday) and months of the year (on any neutral month that has captured Golden Way GPS data with no works on the road).

The assessment will be undertaken in three steps:

- calculation of average journey times for a sample of hours over a month period for each section of the A582 scheme
- calculation of the standard deviation of average journey times across this sample for a Do Minimum and Do Something scenario
- application of monetary values and the 'reliability ratio' (the ratio of the benefit of a 1-minute change in the standard deviation of journey times and a 1-minute change in travel time) to convert changes in standard deviation into a monetised benefit.

The reliability ratio is defined as the ratio of the value of a one-minute change in journey time variability to the value of a one-minute change in journey times. WebTAG Unit A1.3 (May 2018) suggests a reliability ratio of 0.4 (meaning that a one-minute improvement in variability is worth 0.4 minutes of travel time savings).

5.12 Wider Impacts

5.12.1 Introduction to Wider Economic Impacts

The A582 scheme SOBC will calculate, using methodologies discussed above, the 'standard' economic impacts from building the scheme. These impacts primarily consist of user benefits due to time savings, but also include impacts from changes in the number of accidents, journey time reliability, changes in delays during road maintenance, and from the scheme's environmental impacts.

However, research has shown that under certain circumstances, additional benefits can arise as the impact of transport improvements is transmitted into the wider economy. These are termed wider economic impacts. The theory behind these impacts and methodologies to assess them are described in TAG Unit A2.

The A582 scheme is likely to generate some of these wider economic impacts. As such, they will be assessed in line with TAG and will form part of the scheme's overall business case.

5.12.2 Economic Narrative

Improvements to the road network can affect economic growth in a number of ways such as raising productivity, enabling new developments, facilitating trade and supporting employment. The mechanisms by which a given scheme will impact the economy will therefore differ depending on the scheme itself and its local context. As a consequence, the methods by which schemes' impacts on the economy should be appraised need to be determined on a case-by-case basis.

An Economic Narrative will be produced for the A582 scheme, exploring the context of the local economy, and justifying why the scheme is needed to achieve the economic objectives set out in the Strategic Case. It will identify what impacts the scheme is expected to have, list which impacts are being assessed and define the methodologies used to do so.

The Economic Narrative will build upon the information provided in this section of the ASR. It will form part of an overall 'Economic Impact Report' to be appended to the Economic Assessment Report.

5.12.3 Impacts to be Assessed

As described above, the forthcoming Economic Narrative will explore the context of the local economy and define exactly what impacts the A582 scheme is expected to have. Prior to that narrative being developed, and based on the work currently produced as part the scheme development, the following wider economic impacts (as defined in TAG Unit A2) have been identified as being likely to occur:

- Productivity improvements due to agglomeration impacts ('static clustering');
- Increased business competitiveness ('output change in imperfectly competitive markets');
- Labour supply impacts; and,
- Facilitating Investment ('dependent development').

The first three of these impacts are consistent with the 'Level 2 – Implicit Land Use Change' level of analysis defined in Table 2 of TAG Unit A2.1 (shown below).

Benefits from 'dependent development' – as listed in the 'Level 3' level of analysis – will also be captured. However, the other impacts identified within Level 3 will not be assessed.

Table 2 - Relationships between Wider Economic Impacts, Levels of Analysis and Land Use assumptions

	Level 1 (Initial BCR)	Level 2 (Adjusted BCR)	Level 3 (Indicative Monetised Impacts or Non-Monetised Impacts)
Fixed Land Use	User benefits →		→
		Static Clustering →	→
Implicit Land Use Change		Output Change in Imperfectly Competitive Markets →	→
		Labour Supply Impacts →	→
Explicit Land Use Change			Dependent Development
			Move to More/Less Productive Jobs
			Dynamic Clustering
			Supplementary Economic Modelling

*Note that the arrows signify the previous levels of analysis are required

5.12.4 Productivity Improvements due to Agglomeration Impacts

Increasing productivity is a national priority. Productivity is the key long-term determinant of the rate of economic growth, and the UK continues to face a significant productivity gap compared with other industrial nations. Transport is key for improving the productivity of businesses, with the link between investing in transport infrastructure and enabling economic growth through increasing productivity and trade being supported by academic and applied research.

One way in which transport investment can improve productivity by providing better links to other businesses and sources of labour. This effect of this increase in 'economic density' is known as agglomeration.

The A582 scheme is expected to reduce travel costs, and therefore increase economic density. As a result, there are likely to be increases in productivity due to agglomeration impacts. Where agglomeration is assessed based on reducing travel costs only, and without considering explicit changes in the location of economic activity, it is known in TAG Unit A2 as 'static clustering'.

Agglomeration impacts are likely to be greater from transport improvements near already densely clustered urban centres. TAG Unit A2 identifies a number of 'Functional Urban Regions': schemes that fall within or nearby these areas are more likely to receive agglomeration benefits. The A582 schemes lies within the Preston Functional Urban Region as shown in Appendix A of TAG Unit A2.4. Agglomeration impacts will therefore be assessed.

Use of WITA Software

WITA software will be used for the agglomeration assessment. This is presently maintained in Beta form by Atkins, and is provided without maintenance support. This lack of support represents a risk to the agglomeration assessment. A new version of WITA is expected to be released in 2019. However, due to the timescales involved, this version will not be used.

Model Area and Zoning System

The same model used to inform the scheme's TUBA assessment will be used for WITA. A new zoning system will be used within the WITA analysis, in order to reconcile the traffic model data (based on the model's zoning system) and economic data (at Local Authority District (LAD) level).

The Wider Impacts study area should be limited to the area in which the traffic model provides a good estimate of the generalised costs of travel. Agglomeration calculations are based on the idea of 'effective density', which is a measure of how well an area is connected to everywhere else. An incorrect estimation of the base generalised costs would lead to an incorrect base case level of effective density, and hence an incorrect estimation of the impact resulting from any changes in agglomeration caused by the transport intervention.

For this reason, it may be necessary to extract WITA benefits for only a core area of the model, for which the number of trips and generalised cost of travel are modelled in detail. Although benefits would be extracted for this core area only, WITA's calculations would be based on inputs which cover the full traffic model area. This is to allow full estimates of effective density based on all trips to or from the core area to be made.

Non-Car Modes

The existing TUBA assessment does not include data on public transport trips, or walking / cycling. However, the guidance states that the assessments should consider all modes.

Given the high level of car use in the area, an initial Wider Impacts estimate will be made based on highway trips only, excluding public transport (PT) and walking trips. Following this, a sensitivity test will be run incorporating PT and walking trips. The necessary PT and walk demand skims will be created based on factoring the car demand skims (using Census 'Journey to Work' data to inform the level of PT & walk demand relative to car). Cost skims will be developed based on appropriate assumptions (e.g. PT cost based on factoring the car costs, walk costs calculated based on an assumed speed per traveller).

5.12.5 Induced Investment: Output Change in Imperfectly Competitive Markets

These impacts will be assessed using the same WITA run used for agglomeration benefits. The benefits are calculated within WITA as 10% of the TUBA Business User benefits (excluding freight).

5.12.6 Labour Supply Impacts

Road improvements may generate labour supply effects by encouraging people to enter employment who would otherwise have been put off by high commuting costs. As the A582 scheme reduces commuting costs, some impact on labour supply may be expected.

This impact will be assessed using the same WITA run used for agglomeration benefits.

5.12.7 Facilitating Investment: Dependent Development

Investment in housing and businesses may be facilitated by reducing transport costs: long-term commitments to transport investment allow for private investment to respond.

Central Lancashire is the county's most economically productive area and its main growth location, hence the continued effective operation of the area's transport network is essential if Preston, South Ribble and Lancashire as a whole is to remain competitive both nationally and internationally. The A582 scheme is a key component of a programme of measures set out in the Central Lancashire Highways and Transport Master Plan that collectively will support the scale of development set out in the approved Central Lancashire Core Strategy and mitigate its impact on the transport network. By 2026, Central Lancashire is expected to have 22,200 additional homes.

5.12.8 Which developments are dependent on the A582 upgrade?

To include the benefits from unlocking dependent developments within a transport scheme's business case, it must be proven that the development is truly dependent on the transport scheme.

TAG Unti A2.2 (paragraph 3.1.5) defines dependent development as follows:

"Dependent development refers to a specific plot of land, which requires a complementary transport investment in order for a residential or non-residential development to proceed; in the absence of a transport scheme, the transport network would not provide a 'reasonable level' of service to new and/or existing users. The development may have planning permission conditional on a transport investment but this is not a prerequisite for it to be considered dependent."

There are two developments in the study area which are considered to be dependent on the scheme:

- Residential development "Pickerings Farm"
- Employment development "Cuerden Strategic Site".

The A582 dualling is one of the four major City Deal schemes which will cumulatively support the full development of commercial and housing schemes in the City Deal area, one of which is Pickerings Farm.

The development is currently at the pre planning application stage (planning application is expected to be submitted in May 2019). The dependency of the site on the scheme is further evidenced in the South Ribble Local Plan which states referring to Pickerings Farm:

"The upgrading of the A582 South Ribble Western Distributor to improve capacity on the existing A582 between Cuerden and Penwortham Triangle will support this development."

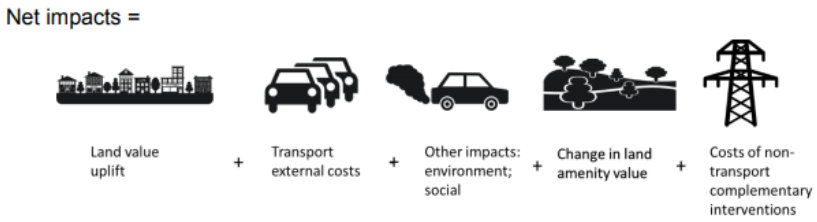
The Cuerden Strategic Site will be accessed through the new arm of the M65 terminus which is part of the A582 dualling scheme and is therefore dependent on the scheme.

5.12.9 Land Value Uplift

The benefits to society from the dependent developments will be captured through assessment of the land value uplift. Land value uplift measures the difference between the price of land in its new and former uses and represents the private gain to land owners. It provides a convenient way of estimating the economic value of a development which is dependent on a transport intervention.

Land value uplift benefits for A582 scheme will be calculated in line with TAG Unit A2.2 and the DfT's *'Capturing housing impacts in transport appraisal'* case study document (2018), and will consistent with the methodology set out in the Ministry of Housing, Communities and Local Government (MHCLG) appraisal guide.

The value of the dependent development is calculated according to the following formula:



The land values for the new and former uses will be calculated using Valuation Office Agency land price data.

Transport external costs are the costs imposed on existing transport users by new users of the network, such as increased levels of congestion. These will be calculated in line with TAG Unit A2.2, based on a TUBA assessment of scenarios with and without the dependent development in place.

Land amenity value is the level of pleasantness of the area, and is the difference in amenity value before and after the development. Values for different land types are typically taken from the TAG databook *'Valuing Housing Impacts Workbook*'. Non-transport complementary interventions are the costs of other infrastructure such as schools and other utilities that are also required to deliver the housing.

5.12.10 Additionality

The extent to which a road improvement increases the size of the national economy (i.e. are 'additional') will depend on the extent to which leakage, deadweight, displacement and multiplier effects are expected to occur. These are defined as follows:

- **Leakage effects** – the extent to which economic growth take place outside of target area of the Government intervention
- **Deadweight effects** – the extent to which the economic growth would have occurred anyway without the Government intervention.
- **Displacement effects** – the extent to which economic growth in one location results in lower growth elsewhere in the target area.
- **Multiplier effects** – the extent to which a rise in economic growth is 'multiplied' by increased business and consumer spending, known as 'indirect' and 'induced' multiplier effects respectively.

A scheme may therefore increase economic growth at the local but not national levels if resources are displaced from other areas. For example, increased employment in the construction sector and its supply chain due to a road investment may increase employment in one area at the expense of jobs elsewhere in the country.

In order to assess a scheme's value for money it is necessary to assess its impacts at the national level. It is therefore necessary to assess the extent to which the benefits from the Cuerden Strategic Site and Pickerings Farm development are 'additional' nationally. Leakage effects are not expected to be significant, as all impacts are expected within the United Kingdom. Deadweight effects are considered to already have been accounted for within Section 5.12.8 of this note. Multiplier effects will be incorporated into the assessment based on MHCLG guidance. The most significant impact for consideration will be Displacement effects.

It should be noted that displacement effects are not relevant the other Wider Economic Impacts assessed for the A582 scheme, such as raising productivity or increasing the labour supply. Those impacts are not expected to displace economic growth as they do not divert resources away from other productive activities.

5.12.11 Reporting

An Economic Impact Report will be produced as an appendix to the Economic Assessment Report of the A582 Business Case. This will incorporate the Economic Narrative, as well as the results of each Wider Economic Impact assessment.

In the Economic Case, the benefits from the following will be included within an Adjusted BCR:

- Productivity improvements due to agglomeration impacts ('static clustering');
- Increased business competitiveness ('output change in imperfectly competitive markets'); and,
- Labour supply impacts.

Land value uplift benefits from dependent developments will not be included within any BCR. Investment in the road network may not be sufficient to enable economic growth on its own. Adequate major road infrastructure is a necessary but not sufficient condition for economic growth to be realised. For example, new housing may be dependent not only on improvements to Lancashire County Council's road network but also investment in local services such as schools and hospitals. For these reasons, there is more uncertainty around the benefits from dependent developments. The benefits will be considered within the overall Value for Money decision, but not included in the scheme BCR. As noted in Section 5.12.10 above, only benefits which are additional at the national level will be included in the economic case.

5.12.12 GVA benefits

The Economic Case uses an entirely welfare-based approach for assessment. However, the impact of scheme on jobs and GDP may be of interest in the Strategic Case, to understand how well the scheme supports local and regional economic growth objectives. One of the objectives of the scheme is to facilitate development of the Cuerden Strategic site with more than 6000 new jobs.

The change in GVA is based on the assumption that each job will have a 'persistence' in the economy of 10 years, i.e. the GVA benefit for each job is accrued for 10 years.

The estimated number of new jobs in each year is multiplied by a typical 'GVA per job' value for the local area. This GVA value is based on typical GVA per job for the 'Mid Lancs' NUTS3 geography, adjusted to 2/3rd of the average to reflect the likely lower wage profile of jobs created by Cuerden development. GVA growth of 1.5% per year in real terms was assumed.

Adjustments will be made to account for the displacement, leakage, deadweight and multiplier effects described earlier in this report.

6. Overview of Deliverables and Risks

6.1 Introduction

This section summarises the deliverables that will be provided to the DfT as part of the current scope of works.

6.2 Reports, Assessments, Data and Model Outputs

Schedule of products for the delivery of the business case is provided in Table 6.1.

Table 6.1: Schedule of Business Case Products Delivery

Item	Format	Date of Draft
Appraisal Specification Report	Report	26/04/2019
Options Assessment Report	Report	24/06/2019
Local Model Validation Report Addendum	Report Update	15/05/2019
Traffic Forecasting Report	Report Update	15/05/2019
Economic Assessment Report	Report	10/06/2019
Appraisal Summary Table and Transport Analysis Guidance (TAG) Worksheets	Worksheets	24/06/2019
Strategic Outline Business Case (Economic and Strategic Cases)	Report	24/06/2019

6.3 Risks

All assumptions made as part of the appraisal shall be documented within the relevant reports and the Strategic Outline Business Case document. All key assumptions will be provided to LCC and DfT during ongoing discussions.

Key, potential risks identified at this time are listed below:

- Results are counter-intuitive and further work is required
- The existing transport model is not a robust tool to assess the impacts of the scheme
- There is a delay in the receipt of Trafficmaster GPS data from DfT
- Delays in estimation and submission of scheme costs
- Changes to the scheme design/scope during the appraisal
- Changes to the appraisal guidance
- Assurance programme goes beyond the submission date

Risks will be controlled and mitigated in line with Risk Mitigation Plan and through continued liaison with the LCC and DfT throughout the process. Any of these risks may delay the programme above in section 6.2.

Appendix A. ASST

Impacts	Sub-impacts	Estimated Impact in OAR	Level of uncertainty in OAR	Proposed proportionate appraisal methodology	Reference to evidence and rationale in support of proposed methodology	Type of Assessment Output (Quantitative/ Qualitative/ Monetary/ Distributional)
Economy	Business users & transport providers	Not estimated	Not estimated	TUBA assessment of travel time, VOC benefits and QUADRO assessment of construction and maintenance delay benefits based on the comparison of modelled With and Without Scheme scenarios.	Scheme is likely to bring about journey time savings for road users by offering a more attractive route and upgraded junctions along the route. Delays during the maintenance of A582 is expected to reduce because the scheme enables traffic managements without closure of the road. On the other hand the scheme construction will cause disbenefit to the road users. Industry standard approach TAG A1-3 will be used.	Monetary
	Reliability impact on Business users	Not estimated	Not estimated	Change in the journey time variability	By upgrading the single carriageway section of A582, the journey time reliability is expected to improve. The reliability (taken as a SD of observed travel times) of the current dual carriageway section of A582 will be assessed and compared to the single carriageway section. The same amount of reliability on the scheme is expected when delivered. This comparison enables quantifying the change in reliability and value of time will be applied to derive monetary values for business users.	Monetary
	Regeneration	Not estimated	Not estimated			

	Wider Impacts	Not estimated	Not estimated	WITA v2.00 will be used.	The wider impact benefits of the scheme will be calculated using the DfT's Wider Impacts in Transport Analysis (WITA) software. WITA software will be used to calculate the following impacts: - Productivity Improvements due to Agglomeration Impacts - Induced Investment: Output Change in Imperfectly Competitive Markets - Labour Supply Impacts In addition, dependent development benefits of the scheme will be derived through analysis of Land Value Uplift	Monetary
Environmental	Noise	Not estimated	Not estimated	WebTAG Worksheet	Industry Standard Approach TAG A3, A4-2	Monetary/ Quantitative/
	Air Quality	Not estimated	Not estimated	WebTAG Worksheet	Industry Standard Approach TAG A3, A4-2 (excluding Local AQ)	Monetary/ Quantitative/
	Greenhouse gases	Not estimated	Not estimated	WebTAG Worksheet	Industry Standard Approach TAG A3	Monetary/ Quantitative
	Landscape	Not estimated	Not estimated	WebTAG Worksheet	Industry Standard Approach TAG A3	Qualitative
	Townscape	Not estimated	Not estimated	WebTAG Worksheet	Industry Standard Approach TAG A3	Qualitative
	Heritage of Historic resources	Not estimated	Not estimated	WebTAG Worksheet	Industry Standard Approach TAG A3	Qualitative
	Biodiversity	Not estimated	Not estimated	WebTAG Worksheet	Industry Standard Approach TAG A3	Qualitative
	Water Environment	Not estimated	Not estimated	WebTAG Worksheet	Industry Standard Approach TAG A3	Qualitative

Social	Commuting and Other users	Not estimated	Not estimated	TUBA & QUADRO	Scheme is likely to bring about journey time savings for road users by offering a more attractive route and upgraded junctions along the route. Delays during the maintenance of A582 is expected to reduce because the scheme enables traffic managements without closure of the road. On the other hand, the scheme construction will cause disbenefit to the road users. Industry standard approach TAG A1-3 will be used.	Monetary
	Reliability impact on Commuting and Other users	Not estimated	Not estimated	Estimation of variability	By upgrading the single carriageway section of A582, the journey time reliability is expected to improve. The reliability of the current dual carriageway section of A582 will be assessed and compared to the single carriageway section. The same amount of reliability on the scheme is expected when delivered. This comparison enables quantifying the change in reliability and value of time will be applied to derive monetary values for Commuting and Other users.	Monetary
	Physical activity	Not estimated	Not estimated	WebTAG Worksheet	Industry Standard Approach TAG A4-1	Qualitative
	Journey quality	Not estimated	Not estimated	WebTAG Worksheet	Industry Standard Approach TAG A4-1	Qualitative

	Accidents	Not estimated	Not estimated	COBALT analysis for the area where traffic flows change by more than 10% between With and Without scheme scenarios	Improving road safety is not a key objective of the scheme. However, the scheme can potentially generate accident benefits as the traffic will use a safer dual carriageway road. Industry Standard Approach TAG A4-1, A4-2	Monetary/ Quantitative/
	Security	Not estimated	Not estimated			None
	Access to services	Not estimated	Not estimated			None
	Affordability	Not estimated	Not estimated	Affordability benefits as a function of change in VOC for DI Analysis	Industry Standard Approach TAG A4-2	
	Severance	Not estimated	Not estimated	Qualitative assessment in line with WebTAG A4-1	Industry Standard Approach TAG A4-1, A4-2	Qualitative/
	Option values	Not estimated	Not estimated			None
Public Accounts	Cost to Broad Transport Budget	Not estimated	Not estimated	To be provided by LCC (Should include QRA, Optimism Bias, inflation adjustment)	TAG A1-2	Monetary
	Indirect Tax Revenues	Not estimated	Not estimated	Calculated within TUBA	Industry Standard Approach TAG A1-3	Monetary