Shropshire Council

SHREWSBURY NORTH WEST RELIEF ROAD

Appraisal Specification Report

70056211 - ASR
JUNE 2024

CONFIDENTIAL

Shropshire Council

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1. INTRODUCTION

1.1 PURPOSE OF THE REPORT

1.1.1. This document is the Appraisal Specification Report (ASR) for the Shrewsbury North West Relief Road (NWRR) scheme, a new single carriageway road linking the northern and western parts of Shrewsbury, completing the full ring of the outer bypass of Shrewsbury, enabling through traffic between the north and west of the town to avoid travelling through the town centre.

1.1.2. This ASR has been produced in support of the Full Business Case (FBC) for the NWRR scheme that is being developed on behalf of Shropshire Council and The Marches Local Enterprise Partnership[1] (LEP), the scheme promoters, to support an application for scheme funding from the Department for Transport (DfT) Large Local Majors programme.

1.1.3. It provides details of the proposed methodology for modelling and appraisal, to capture the scheme impacts and follows a similar methodology to that adopted for the Outline Business Case (OBC) which, following submission to the DfT in 2017, received conditional approval in 2018 with provisional funding for the scheme being awarded.

1.1.4. The DfT's Transport Analysis Guidance (TAG) and Value for Money Framework outline how appraisal should be undertaken and, in adherence with this guidance, this ASR will:

- define the scope, methodology and assumptions in the transport appraisal for the FBC, and how it will be supported by the available transport modelling tools
- provide a platform for agreement of the analytical approach, to be agreed as soon as possible, and to provide timely, agreed inputs to the appraisal process
- continue to be a live document and will be updated with any DfT feedback received

1.2. STRUCTURE OF THE REPORT

1.2.1. The structure of this ASR is as follows:

- Chapter 2 - Context of the Scheme
- Chapter 3 - Transport Modelling and Forecasting
- Chapter 4 - Economic Appraisal for the FBC

[1] The Marches Local Enterprise Partnership has now ceased trading and transferred all its functions to Shropshire Council working with Telford & Wrekin Council and Herefordshire Council, in line with the UK Government's plans for devolution.

2. CONTEXT OF THE SCHEME

2.1. GEOGRAPHIC LOCATION

2.1.1. Shrewsbury is located 47 miles west of Birmingham, and 12 miles east of the border with Wales, and is the principal town and administrative centre of Shropshire. It is an historic market town, which serves as a cultural and commercial centre for Shropshire and a large area of mid-Wales. It lies at the intersection of the A5, A458 and A49 (south) which are all part of the Strategic Road Network (SRN). Shrewsbury is also the focal point for other principal roads including the A53 (north) and the A49 (north) that are part of the Major Road Network (MRN) and the A458 (east) the A488 (west). The surrounding area is rural and sparsely populated.

2.1.2. Shrewsbury's defining physical characteristic is an almost complete natural loop of the River Severn, within which the mediaeval town developed. The river loop now encloses the present-day town centre, which has just three main points of entry by road and a largely unaltered medieval street pattern.

2.1.3. Present day Shrewsbury extends over a much wider area, with suburban development, mainly from the 19th and 20th centuries, extending outward from the river loop. There are out-of-town supermarkets and shopping centres to the north and south. Some traditional industry remains to the north of the town and there are newer employment areas at Battlefield to the north and London Road to the south east.

2.1.4. The suburbs of Shrewsbury form a broad crescent from Harlescott in the north to Copthorne and The Mount in the west. Within this crescent lie the main schools, colleges, hospitals, and public and private sector employment areas.

2.1.5. By contrast, the north-west sector of Shrewsbury is generally undeveloped and is mainly comprised of agricultural land. Settlement is sparse, with small, isolated farmsteads and properties scattered through the landscape. The River Severn meanders through this area, with steep wooded valley slopes and extensive floodplains, forming one of the main physical barriers dividing the landscape. The area is crossed by the Shrewsbury to Chester railway line, and by footpaths and other Public Rights of Way (PRoW).

2.2. SCHEME DESCRIPTION

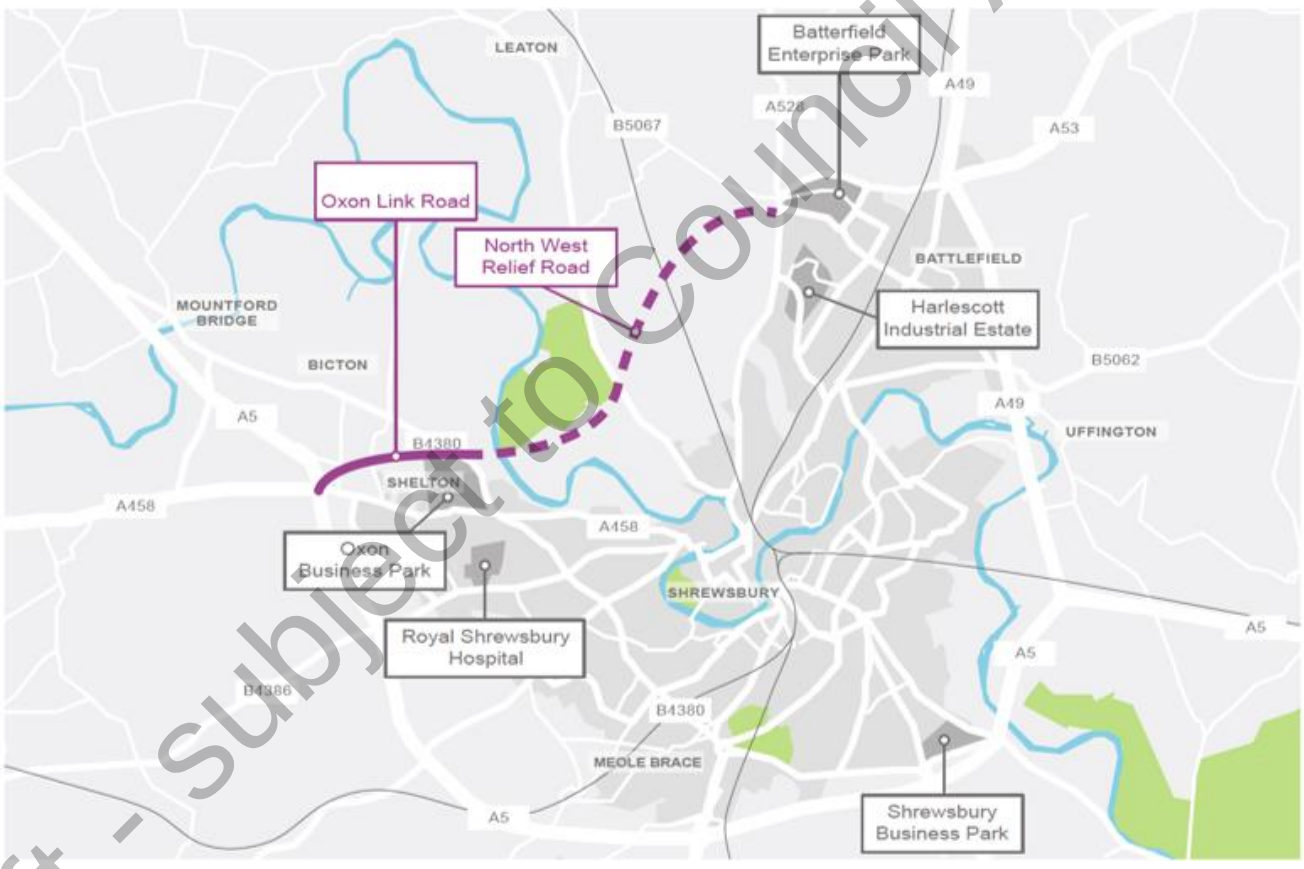
2.2.1. The NWRR scheme is located in the north-west of Shrewsbury. It will provide a new shorter and more direct link between the northern and western parts of Shrewsbury that are currently very poorly linked due to a lack of available highway infrastructure. It will comprise the following:

- A 7.3m wide single carriageway all-purpose 4.85km long road with 1.0m margins and a permitted speed limit of 60 mph, located in the north-west of Shrewsbury connecting the eastern end of the proposed Oxon Link Road (OLR) with the western end of the existing Battlefield Link Road that provides access to the Battlefield Enterprise Park
- The NWRR will be bounded on both sides by open space and will include a shared 3m wide footway / cycleway along the length of its southern side, addressing the severance of a number of local roads, footpaths and PRoW
- Construction of an equestrian culvert to divert the existing bridleway just to the east of the B4380 Holyhead Road Roundabout under the NWRR
- A 15.5m wide viaduct, approximately 584m in length, crossing the River Severn and its floodplain

- Two additional flood storage areas will be provided as a result of the works impinging the existing flood plain
- Landscaping, drainage schemes, increased flood storage, planting, and environmental mitigation work including the acquisition of Hencott Pool to enable habitat improvements
- Provision of a new at-grade four arm roundabout located on the B5067 Berwick Road to provide an interface between the NWRR and the B5067 Berwick Road
- A vehicular bridge to carry the NWRR over the Shrewsbury to Chester railway line
- Construction of an overbridge to carry the Marches Way Footpath and Accommodation Track over the NWRR
- Modification of the existing at-grade roundabout at the Ellesmere Road / Huffley Lane junction to incorporate an at-grade dumbbell roundabout

2.2.2. The location of the proposed NWRRR scheme is shown on Figure 2-1.

Figure 2-1 - Proposed NWRR location



2.2.3. Currently, links between the northern and western parts of Shrewsbury are very poor with north-west corridor through traffic having four main route options involving passing through the town centre, using the inner distributor ring road, using the full length of the existing A5 / A49 outer bypass, or using unsuitable and narrow local roads to the north-west of the town.

2.2.4. Together with the A5 and A49 bypasses, the Battlefield Link Road and the planned OLR, the NWRR will provide the 'missing link', completing the full ring of the outer bypass of Shrewsbury.

2.2.5. As north-west corridor through traffic transfers to this new route, the existing north-west corridor through route options will all experience lower flows and congestion levels, and other journeys within

and around the town will also be able to transfer to more appropriate routes within the town's road hierarchy, reducing journey times and increasing the capacity and resilience of the local and strategic highway network.

2.2.6. In addition, with the outer bypass ring complete, all long distance through journeys will be able to bypass the town completely and vehicles will have the choice of travelling in either direction around the outer bypass based on their optimal route, helping to smooth flows out during periods of peak demand, reducing congestion levels, improving journey times and enabling the entire transport network to operate more efficiently and reliably.

2.2.7. The NWRR aims to improve the quality of life for people in Shrewsbury through supporting the delivery of the Shrewsbury Big Town Plan[2] and boosting the economic competitiveness of Shrewsbury and Shropshire by providing better connectivity and accessibility for both businesses and communities. In particular, the transfer of north-west corridor through traffic from routes passing through the town centre to the NWRR will reduce traffic volumes and congestion on both the northern and western approaches and on the Station Gyratory and Smithfield Road within the town centre. This in turn will:

- Reduce traffic noise and improve air quality in areas where people shop, work and live, and specifically within the town's Air Quality Management Area
- Support the delivery of Shropshire's BSIP by making bus journeys quicker, more reliable and more attractive
- Facilitate the potential road space reallocation required to deliver new active mode infrastructure, supporting the delivery Shropshire's LCWIP and encourage further modal shift to active modes of travel
- Improve road safety within the town centre
- Increase the attractiveness of Shrewsbury town centre, encouraging further regeneration and inward investment

2.2.8. The new river crossing provided as part of the scheme will enhance the resilience and reliability of Shrewsbury's transport network as it will add a flood resistant route to the existing network which is prone to frequent significant flooding events. Not only would the scheme provide a flood resistant route for north-west corridor traffic, by completing the outer bypass it would enable the outer bypass to operate more optimally during times of disruption with traffic able to utilise it in either direction to navigate around any blockages within the local road network.

2.2.9. The shared 3m wide footway and cycleway that will be provided adjacent to the southern side of the carriageway will help to facilitate the increased use of active modes and address the severance of a number of local roads, footpaths and PRoW.

2.2.10. The proposed scheme also includes the diversion of the existing PRoW along the route of the Marches Way long-distance footpath onto a new overbridge over the carriageway and the diversion

[2] Shrewsbury Big Town Plan, 2018

of the existing bridleway and footpath to the east of the B4380 Holyhead Road Roundabout underneath the new carriageway via an equestrian culvert, maintaining these key active travel links.

EXISTING PROBLEMS

2.2.11. A summary of the existing problems the scheme will address includes:

- Poor connectivity between the north and west of Shrewsbury for all modes of transport
- Traffic congestion in Shrewsbury town centre
- Traffic congestion on the northern and western approaches to the town
- Traffic congestion on Shrewsbury's outer bypass and inner distributor ring road
- Unreliable journey times and long delays
- 'Rat-running' traffic on unsuitable rural roads
- Inefficiency of the transport network, especially for buses
- Lack of network resilience
- Road accident and casualty numbers
- Poor air quality
- Carbon and other greenhouse gas emissions

OBJECTIVES

2.2.12. This section sets out specific objectives and strategic outcomes for the scheme. In line with DfT guidance, these have been developed and updated from those set out in the OBC.

2.2.13. The strategic outcomes define, at a high level, what the scheme aims to achieve, reflecting the strategic aims of Shropshire Council, the Government and other organisations. As there may be other factors affecting these outcomes, it may be difficult to directly measure the impact of the scheme.

2.2.14. For this reason, a set of SMART (Specific-Measurable-Achievable-Realistic-Time defined) specific objectives has been set. These are directly related to the scheme and achieving them will help to achieve the strategic outcomes.

2.2.15. The primary aim of the Shrewsbury North West Relief Road scheme is:

- To improve Shrewsbury as a place in which to live, work and invest, by reducing congestion to help unlock transformational change within the town centre.

2.2.16. The strategic, or high level, outcomes of the scheme are:

- Enhanced local and longer distance connectivity
- Reduced congestion and quicker, more reliable journey times
- Improved local and strategic network capacity, efficiency and resilience
- Supporting the delivery of the Shrewsbury Big Town Plan
- Enhancing the benefits of other transport scheme investment (e.g. the OLR and Shrewsbury Integrated Transport Plan)
- Protecting and enhancing Shrewsbury's built and natural environment
- Contributing towards Shropshire Council net zero targets
- Improved health, wellbeing and quality of life for local communities
- Improved road safety
- Facilitating the delivery of planned housing and economic growth in Shrewsbury and Shropshire

2.2.17. The specific, or intermediate, objectives of the scheme are:

- To improve connectivity and permeability between the north and west of Shrewsbury for all modes
- To reduce traffic congestion across Shrewsbury
- To improve network efficiency, resilience and journey time reliability
- To reduce rat-running traffic on unsuitable rural roads to the north-west of the town
- To improve facilities for active transport
- To reduce the number of people killed or seriously injured on roads in Shrewsbury
- To reduce greenhouse gas emissions associated with the use of the road network
- To improve local air quality in Shrewsbury town centre
- To support local economic growth and productivity
- To support the delivery of planned local housing growth and development
- To improve the quality of life for people in Shrewsbury

NOTE ON THE OXON LINK ROAD

2.2.18. The planned Oxon Link Road (OLR) involves the construction of a new 7.3m wide single carriageway all-purpose 2.05km long road between Churncote Roundabout and the B4380 Holyhead Road, along with associated infrastructure.

2.2.19. The core objectives of the OLR include improving resilience in the local road network, delivering Core Strategy housing targets, unlocking employment land, creating jobs, supporting economic growth and competitiveness, reducing road traffic accidents and allowing the form and function of the Welshpool Road to be altered in favour of more sustainable modes of transport.

2.2.20. The OLR is included in The Marches LEP's £75 million Growth Deal and is regarded by The Marches LEP as a precursor and an enabling project for the NWRR and was awarded £4.2m of Local Growth Deal Funding in 2015.

2.2.21. In July 2018, a detailed planning application for the OLR was submitted by Shropshire Council. However, this was formally withdrawn by Shropshire Council on 30 August 2019 as, for reasons of economy and speed, the Council decided to pursue the two previously separate OLR and NWRR schemes as a single project with a combined planning strategy.

2.2.22. Subsequently, in February 2021, the detailed planning application for the proposed NWRR scheme, incorporating the OLR, was submitted. This detailed planning application was formally approved on 31 October 2023, subject to additional conditions and the final wording of conditions being delegated to the Assistant Director of Economy and Place for agreement with statutory consultees and a signed Section 106 obligation from the relevant landowners to deliver off-site mitigation and the compensation strategy.

2.2.23. However, although the OLR will be delivered at the same time as part of the broader NWRR project, it is funded separately from the NWRR and so it is not included within the FBC for the NWRR. Therefore, the NWRR scheme description above and all subsequent NWRR scheme references within this document relate to the stand-alone NWRR scheme, excluding the OLR.

3. TRANSPORT MODELLING AND FORECASTING

3.1. INTRODUCTION

3.1.1. The appraisal process for the scheme for the FBC will follow a similar methodology to that for the Outline Business Case (OBC,) which is detailed in the sections below.

3.1.2. The appraisal process will be undertaken in accordance with DfT's TAG Unit A1.1 'Cost-benefit analysis' (November 2023) and Value for Money Framework (July 2017).

3.1.3. The main elements of the appraisal are:

- Production of forecast models with and without scheme for an opening year and a future forecast year, for a low, core and high demand forecast in line with TAG guidance
- An Appraisal Summary Table and a Value for Money (VfM) statement, prepared in accordance with TAG requirements, providing a concise summary of the economic, social, environmental and public account impacts that the proposed transport interventions may have, determining a concluding Benefit Cost Ratio (BCR)

3.2. OVERVIEW OF THE TRANSPORT MODEL

3.2.1. The Shrewsbury transport modelling suite was developed for Shropshire Council by WSP to support the OBC for the NWRR and consists of a SATURN highway assignment model combined with a Variable Demand Model in CUBE.

3.2.2. The model has a base validation year of 2017.

3.2.3. It was built in accordance with the DfT's Transport Analysis Guidance (TAG) and developed to accurately represent existing traffic conditions so that it could be used to predict the future traffic conditions with and without the NWRR.

3.2.4. The SATURN highway assignment model employs an iterative process of assigning flows and simulating delay. Within the fully modelled (simulation) area, capacity is restrained at junctions.

3.2.5. It is proposed that the FBC uses the same transport modelling suite that was created at OBC stage with updated forecasts, using the latest National Trip End Model (NTEM) forecasts, updated planning assumptions (from an updated uncertainty log) and latest scheme programme.

GEOGRAPHICAL COVERAGE OF THE MODEL

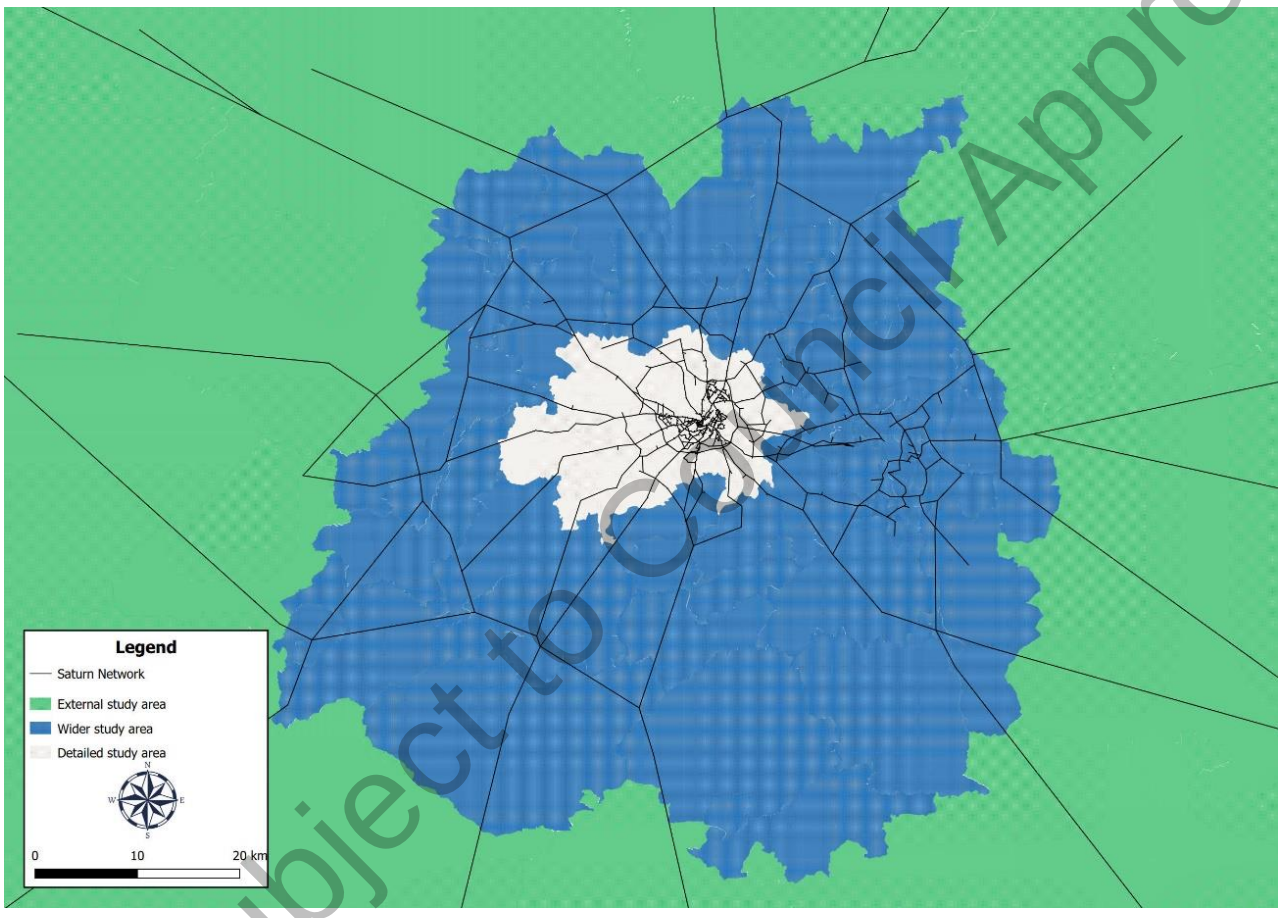
3.2.6. Figure 3-1 shows the geographical coverage of the SATURN model. For the purpose of the assessment of the scheme, the area of detailed modelling (shown in white) was identified, over which significant impacts of the scheme are certain. The wider study area for the scheme (shown in blue) covers the remainder of the County of Shropshire, along with Welshpool and Telford in a reduced level of detail, with the principal strategic routes being modelled and capacity restraint achieved using speed/flow curves and strategically important junctions.

3.2.7. The detailed and wider study areas combine to form the fully modelled (simulation) area which is considered large enough to capture the biggest impacts expected due to the scheme and includes areas where impacts are quite likely but are not expected to be large. The modelled highway network within the fully modelled (simulation) area is described in more detail in the Local Model

Validation Report (LMVR) (TR002 report from December 2017) which is included in Appendix B (and will be included in a supporting appendix to the FBC).

3.2.8. The external study area covers the remainder of England, Wales and Scotland and includes a simplified network allowing traffic to enter the fully modelled area at the correct location without capacity restraint. It includes a skeletal network of buffer links with approximate distances to allow the demand model to capture the full trip length.

Figure 3-1 - Model extent

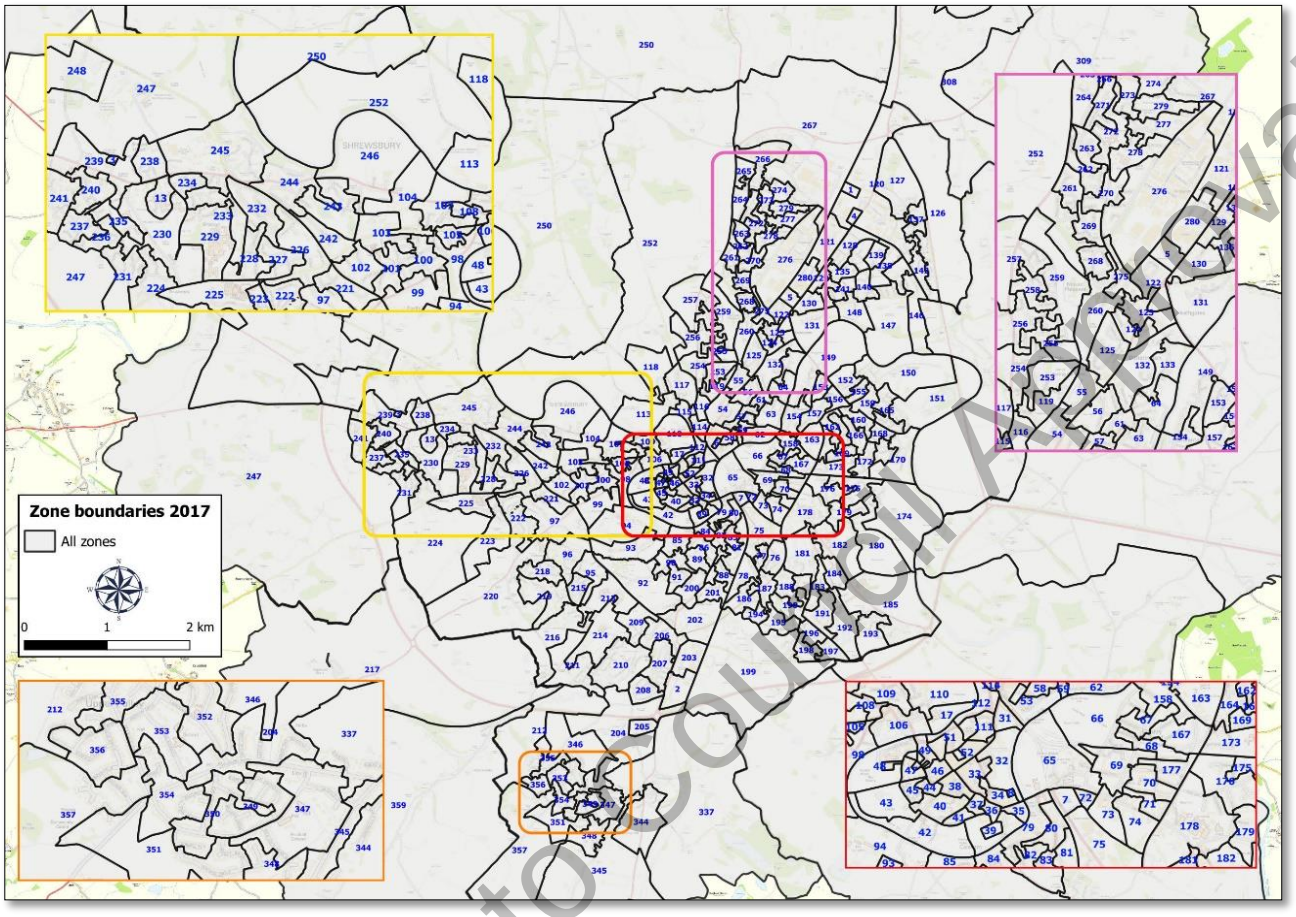


MODELLED ZONE STRUCTURE

3.2.9. The model comprises 416 zones, with the greatest level of detail being within the detailed study area, in particular within Shrewsbury town centre and in close proximity to the proposed scheme.

3.2.10. The zoning structure within Shrewsbury conurbation is illustrated in Figure 3-2.

Figure 3-2 - Zoning system within the Shrewsbury conurbation



TRAFFIC DATA

3.2.11. The traffic data which underpinned the 2017 base year model was obtained from:

- Automatic traffic counts at 80 locations in 2017
- Manual classified counts (MCC) at over 64 locations in 2017
- Car park surveys at 22 locations in 2017
- Journey time surveys with Automatic Numberplate Recognition (ANPR) surveys at 5 sites in 2017
- Roadside Interview Surveys (RSIs) at 3 locations in 2017
- Mobile phone origin / destination data for the study area in 2017
- Data from pre-2017 including: ANPR, MCC, ATC, queue surveys, Trafficmaster

TRIP MATRIX DEVELOPMENT

3.2.12. Base year trip matrices were developed for 2017. Three time periods were modelled in order to replicate trip patterns over a typical weekday:

- AM peak hour (08:00 - 09:00), representing the AM peak period (07:00 – 10:00)
- Interpeak average hour (10:00 - 16:00)
- PM peak hour (17:00 - 18:00), representing the PM peak period (16:00 – 19:00)

3.2.13. The peak hours for both the AM and PM peak periods were established by reviewing daily traffic flow profiles based upon average Monday to Friday flows obtained from Automatic Traffic Counts

(undertaken as part of the 2017 survey programme) and 2017 WebTRIS data, with count sites being selected in order to provide a spread across the model study area.

3.2.14. Five user classes were defined within the SATURN model:

- Car - Employers Business
- Car - Journey between home and work ("Commute")
- Car - Other trip purposes
- Light Goods Vehicle (Personal and Freight)
- Heavy Goods Vehicle (OGV1 and OGV2)

3.2.15. Further details are provided in the Traffic Data Collection Report (TR001 report from December 2017) which is included in Appendix A (and will be included in supporting appendix to the FBC).

3.2.16. The process of matrix estimation and model calibration was carried out in accordance with guidance set out in TAG Unit M3. The model validation was based upon the model comparison against observed flows and journey time data in line with TAG Unit M3.1.

3.2.17. The model validation process demonstrated that the base year traffic model provided a very good representation of the current traffic demands and conditions and provided a reliable basis from which to prepare forecasts of future traffic growth and scheme appraisal.

3.2.18. The development of the 2017 base year traffic model and its calibration / validation is fully documented in the Local Model Validation Report (LMVR) (TR002 report from December 2017) which is included in Appendix B (and will be included in supporting appendix to the FBC).

FORECASTING METHODOLOGY

3.2.19. The modelled assessment years for the OBC were:

- Base Year (2017)
- Opening Year (2022)
- Future Year (2037)

3.2.20. The forecasting process comprised the following stages:

- Define and develop future year travel demand (associated with land use and travel pattern changes)
- Define and develop future year supply (future highway network changes)
- Undertake fixed matrix Do Minimum and Do Something forecasting
- Undertake variable demand matrix Do Minimum and Do Something forecasting
- Report model outputs

3.2.21. The Forecasting Report included the 'uncertainty log' detailing the predicted land use changes and described the development of the future year trip matrices.

3.2.22. In accordance with TAG Unit M4, three demand growth scenarios were included within the OBC appraisal:

- Core demand
- Low demand
- High demand

3.2.23. The following future networks were developed for the OBC:

- Do Minimum – including the OLR and all planned highway network changes in 2022 and 2037
- Do Something - as the Do Minimum but with the addition of the NWRR scheme

3.2.24. The traffic demands in both the Do Minimum and Do Something models were identical.

3.2.25. For the assessment of the NWRR scheme a variable demand approach (VDM) was adopted, whereby trips in the demand matrix can vary according to demand in other cells of the trip matrix and costs in the cells of the cost matrix. In accordance with TAG Unit M.2, the Shrewsbury VDM employed a pivot-point model that uses cost changes to estimate changes in the number of car trips from a base matrix. The development of this demand model is detailed in the Demand Model Report (TR005 report from February 2018).

2024 MODEL VERIFICATION

3.2.26. In 2024, a model verification was undertaken as part of the continuous monitoring and assessment of the existing NWRR traffic model performance. The 2017 base demand was updated to 2023 using the latest NTEM 8.0 and NRTP forecasts and a Do-Minimum network was developed from 2017 base using the forecasting assumptions applicable in March 2024.

3.2.27. This updated 2023 forecast model was compared to observed traffic data gathered from the Shrewsbury Annual 2023 traffic survey. This exercise verified the model's robustness as a forecasting tool and confirmed that it will provide a good representation and baseline for assessing the impact of the NWRR on traffic patterns and the economic impact of introducing the scheme. This model verification is detailed in the "2023 Model Verification Technical Note".

3.3. PROPOSED MODEL UPDATE AND FORECASTING METHODOLOGY FOR FBC

MODEL BASE YEAR

3.3.1. The model base year of 2017 will be maintained as per the OBC and any changes in demand or network will be addressed in the FBC.

FORECASTING METHODOLOGY

3.3.2. For the FBC, a revised set of forecasts will be developed following a similar general methodology to the OBC submission, with the following updates:

- The Variable Demand Model structure will be retained as per the OBC
- The forecasts will be updated to refresh the uncertainty logs for demand (committed housing and employment developments) and supply (committed highway infrastructure)
- The forecast growth will be constrained to NTEM 8 assumptions for cars, updating from NTEM 7.2
- The growth factors for light goods vehicle (LGV) and heavy goods vehicles (HGV) will be based on NRTP 22, updating from previous Road Traffic forecasts (RTF 18)
- The forecast models will be based on the latest version of the TAG Databook (currently TAG Databook v1.22, released in November 2023)
- The forecast model will be re-run based on the following forecast years:
  - 2027 - Opening year
  - 2042 – First forecast year (15 years after opening)
  - 2050 – Second forecast year (aligned with the Government's net zero target)

- Scenarios will be developed in line with the latest DfT Common Analytical Scenarios (CAS) guidelines to understand the impact of alternative growth outcomes. The proposed CAS are detailed in Table 3-1.

Table 3-1 – Common Analytical Scenario commentary

CAS scenario	Decision / Comment
Low economy	**Included** as, in this scenario, population, employment and GDP all experience lower levels of growth than the core scenario. This would reduce travel demand and incomes compared to the core scenario. Lower incomes would result in a lower value of time. In this scenario the benefits of the scheme in terms of journey time savings would be lower than in the core scenario through less scheme beneficiaries, better conditions in the DM scenario (less traffic) and reduced valuation of time savings. Lower population growth and lower earnings would reduce the demand and peoples' willingness-to-pay (WTP) for active travel improvements, thereby reducing the benefits of the cycling and pedestrian infrastructure delivered as part of the scheme. This scenario will reduce the level of benefit the scheme delivers compared to the core scenario
High economy	**Included** as ,in this scenario, population employment and GDP would all see higher levels of growth than the core scenario. This would increase travel demand and incomes. Higher incomes would increase peoples value of time. In this scenario the benefits of the scheme in journey time savings would be higher than the core scenario through more scheme beneficiaries, worse conditions in the DM scenario (more traffic) and increased valuation of time savings. Higher population and higher earnings would increase the demand and peoples' willingness-to-pay' (WTP) for active travel improvements, thereby increasing the benefits of the cycling and pedestrian infrastructure delivered as part of the scheme. This scenario will increase the level of benefit the scheme delivers compared to the core scenario
Regional	**Included** as, in this scenario, there would be redistribution of national economic growth, with out-migration from London, the South-East and the East of England, leading to increased economic growth across the rest of the country. In Shropshire this would mean an increase in resident population as people moved into the area, particularly within Shrewsbury. Over time employment opportunities would also relocate to where the working age population are, and the economic performance of the area would increase compared to the core scenario. This will increase travel demand in both the Do Minimum and Do Something and increase the number of beneficiaries of the scheme in the Do Something, increasing the benefits of the scheme
Behavioural Change	**Not included.** This scenario is the only scenario to explicitly incorporate the COVID-19 pandemic. It assumes a world in which people embrace new ways of working, shopping and travelling. Trends, such as flexible and remote working, and online shopping, which emerged in the past decades and were accelerated by the pandemic. As a result, people travel less and for different reasons. However, the recent traffic trends suggest that the traffic levels are recovering to pre-pandemic levels, hence this scenario has been excluded
Technology	**Not included** as this scenario assumes that there would be a high uptake of connected autonomous vehicles (CAVs). However, CAV infrastructure is poor within the West Midlands and specifically Shropshire and expected to be similar in the near future. Electric vehicle (EV) ownership / use is also among the lowest within the West Midlands, and in comparison to other UK regions (i.e. London, South East, South West, East of England) according to latest the licensing statistics (https://www.gov.uk/government/statistics/vehicle-licensing-statistics-2021/vehicle-licensing-statistics-2021), hence excluded

CAS scenario	Decision / Comment
Decarbonisation, vehicle-led	**Not included.** as this scenario assumes that there would be a high uptake of EVs for both private cars and freight, with no adjustment to increase the current costs of electric vehicles. However, EV infrastructure is poor within the West Midlands and specifically Shropshire, and this is not expected to change in the near future. Electric vehicle (EV) ownership / use is also among the lowest within the West Midlands, and in comparison to other UK regions (i.e. London, South East, South West, East of England) according to latest the licensing statistics (https://www.gov.uk/government/statistics/vehicle-licensing-statistics-2021/vehicle-licensing-statistics-2021), hence excluded
Decarbonisation, mode-balanced	**Not included.** as this scenario assumes that there would be a high uptake of EVs for both private cars and freight with running costs of electric vehicles being equalised with internal combustion engine vehicles. However, EV infrastructure is poor within the West Midlands and specifically Shropshire, and this is not expected to change in the near future. Electric vehicle (EV) ownership / use is also among the lowest within the West Midlands, and in comparison to other UK regions (i.e. London, South East, South West, East of England) according to latest the licensing statistics (https://www.gov.uk/government/statistics/vehicle-licensing-statistics-2021/vehicle-licensing-statistics-2021), hence excluded

3.3.3. The forecasts for the 'without scheme' and 'with scheme' cases will be developed in-line with TAG, referencing the updated uncertainty logs and including infrastructure improvements and developments as identified by their uncertainty rating.

3.3.4. The updated model forecasts will be reported in an updated NWRR Forecasting Report (to be included as an appendix to the FBC), including details of overall growth forecasts and forecast scheme impacts by comparing the 'without scheme' and 'with scheme' model runs.

4. ECONOMIC APPRAISAL FOR THE FBC

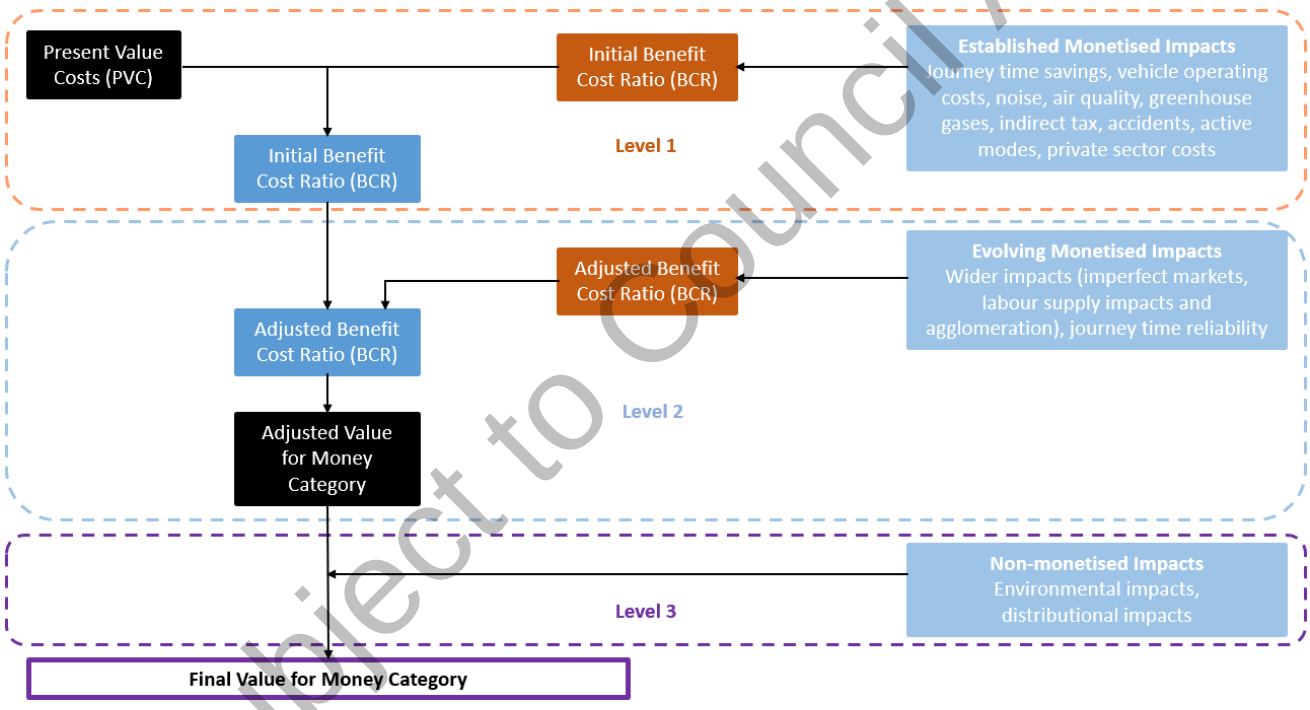
4.1. INTRODUCTION

4.1.1. As within the OBC, only the preferred highway option (based on the refined design developed since 2017) will be appraised using the economic appraisal tools and methods as set out within this ASR.

4.1.2. The appraisal will be described in the updated Economic Dimension of the FBC, with more detail provided within an updated Economic Appraisal Report (EAR) supporting the FBC.

4.1.3. The analysis supporting the scheme appraisal for FBC will follow a similar methodology to that for the OBC, utilising the updated model forecasts as outlined in the previous chapter. This is summarised in Figure 4-1 below.

Figure 4-1 - Appraisal methodology



4.2. SCHEME IMPACTS / BENEFITS

4.2.1. Scheme impacts will be captured in the following categories as of the DfT VfM Framework:

- Established monetised impacts (to produce an initial Benefit Cost Ratio) - level 1 impacts
- Evolving monetised impacts (to produce an adjusted Benefit Cost Ratio) - level 2 impacts

4.2.2. The following appraisal tools are proposed as followed for the OBC, which fit into the above categories:

Level 1 impacts (established monetised impacts)

- User benefit appraisal (using TUBA) to capture changes in journey time, vehicle operating costs and indirect tax
- Impacts to road users during periods of road maintenance (will be assessed using TUBA, based on SATURN model forecast with road works in place)

- Accident appraisal (using COBALT) to capture changes in road safety
- Active mode appraisal (using the AMAT) to capture changes in physical activity
- Monetised benefits/dis-benefits from changes to noise, local air quality and greenhouse gas emissions - using established methods

Level 2 impacts

- Wider economic impacts
- Journey time reliability

TRANSPORT ECONOMIC EFFICIENCY (TEE)

4.2.3. Economic benefits from time and vehicle operating cost savings will be calculated using a TUBA assessment based on the with and without scheme forecasts described in Chapter 3 above. TUBA compares the costs associated with the Do-Minimum and Do-Something scenarios to establish the value of the savings in travel time and vehicle operating costs. By comparing all construction and associated costs with the traffic benefits, conventionally over a 60 year period from opening of the first phase, a Benefit to Cost Ratio (BCR) is calculated. The assessment will employ the latest version available of the TUBA software that aligns with the latest TAG Databook available.

4.2.4. Annualisation factors will be applied to expand the benefits from each distinct modelled time period to represent the full appraisal period across the whole year. The annualisation factors were recalculated for the FBC based on 2023 dataset. These factors were derived through analysis of traffic flow data from various count sites around Shrewsbury for which traffic flow data was available for all 12 months. The modelled AM and PM peak hours were expanded using the relationships between the observed average three-hour period flows and the single peak hour flows, for the AM and PM peak hours respectively. The modelled interpeak hour represents an average hour in the 6-hour interpeak period and was expanded appropriately using a factor of 6.

4.2.5. The updated annualisation factors are presented in Table 4-1.

4.2.6. Table 4-1 provides a summary of the key assumptions to be adopted as part of the TUBA assessment.

4.2.7. Results of the core scenario, the agreed Common Analytical Scenarios (CAS) and the sensitivity tests will be reported.

4.2.8. We do not intend to appraise construction impacts as the scheme will be constructed largely offline.

Table 4-1 - TEE TUBA assumptions

Item	Assumptions / Notes
Software	The latest TUBA version, consistent with the latest TAG Databook (currently TUBA Version 1.9.17, consistent with TAG Databook v1.22, released in November 2023)
Current year	2024 (defines the first year in which the discount rate is applied)
Appraisal period	60 years after scheme opening, in line with TAG requirements
Forecast year trip, time and distance matrices from traffic model	Construction period: 2025-2027 Opening year: 2027 First forecast year: 2042 Second forecast year: 2050 Final year: 2086
User classes	The 5 user classes defined within the SATURN traffic model will be split into the 7 user classes below by disaggregating LGVs and HGVs. LGV's will be split into Personal and Freight and HGVs using disaggregation factors derived using the WebTAG assumptions. HGVs will be split into Medium (OGV1) and Heavy Goods Vehicles (OGV2) based on traffic composition data from local traffic counts. Trip, time and distance matrices for each of the seven user classes will be input into TUBA.: Car - Employers Business Car - Journey between home and work ('Commute') Car - Other trip purposes Light Goods Vehicle (LGV - Personal) Light Goods Vehicle (LGV- Freight) Heavy Goods Vehicle (OGV1) Heavy Goods Vehicle (OGV2)
Economic Parameters	Economic parameters (such a Value of Time) are defined in the standard TUBA Economic File
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.
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 derived from local traffic counts, as described in paragraph 4.2.4 above. The annualisation factors calculated based on 2023 count data are shown below: AM peak (07:00 - 10:00) = 651 Interpeak (10:00 - 16:00) = 1550 PM (16:00 - 19:00) = 667

JOURNEY TIME RELIABILITY IMPACT

4.2.9. Reliability is defined in TAG as variation in journey time that transport users are unable to predict. It is expected that the scheme will provide journey time reliability benefits through alleviating congestion and also by providing additional resilience in the network.

4.2.10. Following the method used within the OBC, reliability will be appraised in line with TAG Unit A1.3, Section 6.3 (Reliability – urban roads) using updated outputs from the model as outlined in Section 3 above and the relationships shown below, based on the calculation of the standard deviation of journey times from journey time and distance for each O-D (origin-destination) pair.

Reliability benefit $= -\sum \Delta\boldsymbol{\sigma_{ij}} \left(\frac{T_{ij2}+T_{ij1}}{2}\right) \times \mathbf{0.4} \times \boldsymbol{VOT}$

Where: $\Delta = \mathbf{0.0018}\left(\left(\boldsymbol{t_{ij2}}\right)^{\mathbf{2.02}} - \left(\boldsymbol{t_{ij1}}\right)^{\mathbf{2.02}}\right) \boldsymbol{d_{ij}}^{\mathbf{-1.41}}$

VOT = value of time (£/sec)

$\boldsymbol{t_{ij1}}$ and $\boldsymbol{t_{ij2}}$ = the journey times, before and after the change, from i to j (seconds)

$\boldsymbol{d_{ij}}$ = the journey distance from i to j (km)

4.2.11. It should be noted that journey time reliability benefits will not be included in the calculation of the initial BCR of the scheme but will be reported as an adjusted BCR and Value for Money statement alongside other benefits with lower levels of assurance.

REGENERATION

4.2.12. A specific regeneration report is no longer a requirement of TAG.

4.2.13. Regeneration impacts, supporting narrative, and explanation of the mechanism behind which the scheme will support regeneration in the scheme area will be provided to meet these requirements.

WIDER IMPACTS

4.2.14. The scheme falls within the core of a Functional Urban Region. In line with the OBC approach, an assessment will be made of wider transport impacts using WSP's WITA 2.0 emulator. This uses the same calculations as WITA and has been used and accepted on multiple business case submissions to DfT. The methodology will follow TAG unit A2.1 'Wider Economic Impacts Appraisal' as the following impacts are considered to be important / applicable to the scheme:

- Labour supply impacts
- Output change in imperfectly competitive markets
- Move to more / less productive jobs
- Agglomeration impacts

NOISE

4.2.15. A quantitative, monetised appraisal of noise impacts will be undertaken, updating the analysis undertaken at OBC. The appraisal will be undertaken in line with TAG Unit A3 'Environmental Impact Appraisal'. The assessment uses an 'impact pathway' approach covering a range of impacts including:

- annoyance
- sleep disturbance

- health impact, including heart disease, stress and dementia

4.2.16. A 3D digital noise model of the bypass and existing highway network will be created using CadnaA noise modelling software to predict the levels of road traffic noise at the nearby existing and proposed sensitive receptors, where applicable, accounting for topography and screening. Road traffic noise predictions will be undertaken in accordance with the technical memorandum Calculation of Road Traffic Noise (CRTN) (1988) and adopting modifications detailed in Appendix A of the Design Manual for Roads and Bridges (DMRB) LA 111 Noise and vibration, Revision 2 (LA 111).

4.2.17. The assessment will consider the noise and vibration effects arising in the following scenarios:

- the opening year, with and without the proposed scheme
- the future year (the 15th year after opening), with and without the proposed scheme

4.2.18. The model will take into consideration the assumptions regarding committed developments which have been included in the traffic data for the scenarios above.

4.2.19. Two-way traffic data is input in the model for road links within approximately 1km of the proposed scheme, using 18 hour (06:00-00:00) Annual Average Weekday Traffic flow, speed and HDV percentage (all vehicles with an unladen weight of greater than 3.5 tonnes are classified as heavy vehicles.

4.2.20. The results from the noise model will be analysed and the TAG noise workbook will be completed to provide a monetary valuation of the scheme's impact with respect to noise, using the latest TAG noise workbook version.

4.2.21. In addition, an assessment will be undertaken in line with TAG Unit A4.2 'Distributional Impact Appraisal'. The assessment considers noise impacts on children and older people, as well as the differential impact on income groups.

AIR QUALITY

4.2.22. A quantitative, monetised appraisal of air quality impacts will be undertaken, updating the analysis undertaken at OBC. The appraisal will be undertaken in line with TAG Unit A3 guidance on Air Quality Impacts and will involve:

- Quantitative assessment based on modelling to determine vehicle emissions of NOx and fine particulate matter ($PM_{2.5}$) with and without the scheme in the opening and future year (15 years after opening), and dispersion modelling to determine road contributed annual mean concentrations of NOx and $PM_{2.5}$ at relevant receptors in the scenarios. Concentrations will be predicted by dispersion modelling using ADMS-Roads model software.
- Monetary valuation of the Air Quality Impacts will be undertaken using the impact pathways approach, which accounts for changes in human exposure to annual mean NO_2 and $PM_{2.5}$ concentrations at relevant receptors and overall emissions of NOx and $PM_{2.5}$ to determine the effects of impacts that do not directly affect households such as ecosystem damages.

4.2.23. As mentioned above, the modelling for this appraisal will be based on that undertaken for the OBC. The dispersion modelling undertaken will be updated in line with the latest available traffic data, Scheme opening year, local monitoring, and will use emission factors / background mapping based on EFTv12.0.

4.2.24. In accordance with latest guidance from DfT in TAG Unit A3, this assessment of Greenhouse Gases (GHG), hereafter referred to as carbon, will consider carbon emissions over the whole lifecycle of the scheme, including user carbon (emissions associated with scheme users, such as changes in emissions due to network alterations or modal-shift), capital carbon (emissions associated with scheme construction) and operational carbon (emissions associated with scheme operation and maintenance).

4.2.25. The tasks that will be undertaken as part of the carbon impact assessment and appraisal to support the FBC are summarised in Table 4-2.

Table 4-2 - Carbon impact appraisal tasks

Task	Description
Initial analysis for early insights	Analysis to obtain an early understanding of likely quantification results, prior to input data being available, to inform design decisions and maximise opportunities to reduce impacts
Carbon reduction workshop	Workshop with design team to influence carbon outcomes and identify any additional opportunities to reduce impacts. See paragraph 4.2.26 for further details
Quantification of Whole Life Carbon (WLC) Impacts	Quantification of the scheme's whole-life carbon impact in tonnes of carbon dioxide equivalent (tCO2e). See paragraphs 4.2.27 to 4.2.31 for further details
Monetisation of WLC Impacts	Monetisation (£) of the quantified impact (tCO2e) using TAG carbon values. See paragraphs 4.2.32 to 4.2.34 for further details
Reporting of carbon impacts in FBC	Reporting of the carbon impact as part of the business case. See paragraphs 4.2.35 to 4.2.37 for further details

Carbon Reduction workshop

4.2.26. A carbon reduction workshop will be held to understand and influence the carbon impact of the scheme, in line with PAS2080 principles, and to identify any additional opportunities to reduce impacts. The workshop will be facilitated by carbon analysts and attended by key design team members and project managers.

Quantification of whole-life carbon impacts

4.2.27. The quantification of carbon impacts will predominantly use appraisal, modelling and cost estimation outputs described elsewhere in this ASR. It will apply industry standard methodologies to calculate carbon impacts. Several tools bespoke to different impacts will be used in these carbon calculations, but the workings and results will be collated within WSP's Carbon Zero Appraisal Framework for the purpose of bringing these individual calculations and the supporting qualitative assessment together in a consistent, transparent format that can be easily audited. This also enables a Carbon Zero Summary Report to be produced.

4.2.28. The proposed scope and methodology are outlined in Table 4-3. This includes reference to the relevant PAS2080 lifecycle stage for each impact.

Table 4-3 - Scope and methodology of carbon assessment

Impact Category	Impact	Input Data	Carbon Calculation Methodology
User emissions / operational carbon	Modal shift (B8)	Changes in vehicle kms travelled as calculated through the Active Mode Appraisal Toolkit during the assessment of physical activity impacts	Carbon emissions relating to this input data will be calculated using TAG data on fuel consumption and will account for the proportions of the vehicle type (A1.3.8), fuel type (A1.3.9), forecast fuel consumption parameters (A1.3.11) and emission factors (A3.3)
	Changes in general traffic flows (B8)	Link by link outputs from the traffic model. For each link this will provide AADT, %HDV, speed and link length	Carbon emissions from link-by-link model outputs will be calculated using TAG data and emission factors (the same fundamental methodology described for modal-shift). An analysis will also be undertaken using the EFT methodology to align with latest DfT expectations and mitigate the risk of a potential later requirement to conduct this assessment. Using both methodologies will enable either to be used for the FBC as is decided appropriate
Capital carbon	Product manufacture (A1-A3)	Material estimates produced as part of the cost estimation process	In accordance with EN 15978, all items listed in the Bill of Quantities (BoQ) will be quantified. When appropriate, assumptions (agreed with the project team) will be used. Materials will be assigned relevant carbon factors from the Inventory of Carbon and Energy (ICE) v3 database and where appropriate metrics will be adjusted using material densities sourced from relevant Environmental Product Declarations and / or technical documents
	Transport to site (A4)	Default Royal Institution of Chartered Surveyors (RICS) scenarios and carbon conversion factors (UK Government)	In the absence of detailed information on supply locations, transport to site will be calculated using RICS default scenarios for transportation distances by material type. These assumptions include an allowance for interim stops at storage depots and / or distribution centres. Carbon conversion factors produced by UK Government (2021) will then be applied based an assumed average rigid HGV with average laden as per the Department for Business, Energy, and Industrial Strategy (BEIS) carbon conversion factors. The analysis will also capture the departure of HGVs from the project site (unladen HGVs)
	Construction process (A5)	Cost benchmark and material estimates produced as part of the cost estimation process	A figure of 1.18 tCO_2e/£100k, from the RICS Whole life Carbon Assessment for the Built Environment (2017) of project value will be used to calculate emissions associated with the construction and installation process. This

Impact Category	Impact	Input Data	Carbon Calculation Methodology
			figure has been adjusted in accordance with the consumer price index from the 1.4tCO_2e/£100k published in March 2015
	Replacement (B4)	Reference Service Life information of materials detailed in the Bill of Quantities	It will be assumed that the majority of items would be replaced in a without-scheme case, given this is an improvement to existing infrastructure. Where the scheme introduces new items, it will be assumed that items will be replaced on a like-for-like basis once the Reference Service Life (RSL), or specified lifespan is reached
	Deconstruction (C1)	Construction calculations (A5)	Emissions associated with deconstruction of an asset (C1) are likely to be similar, but less than those associated with the construction (A5) of an asset. For this reason, deconstruction emissions will be assumed to be 75% of construction emissions (A5)
	Transport (C2)	None required	In absence of scheme-specific information, a default distance of 50kms will be used for the transportation of waste (C2) to disposal sites, including interim stations. The means of transport is assumed as average rigid HGV with average laden as per BEIS carbon conversion factors
	Waste Processing for Recovery (C3)	Default emission factors as per ICE database	It will be assumed that in 60 years, when the Reference Service Period (RSP) ends, 100% of material will be recycled. For this reason, C3 (waste processing for reuse, recovery and recycling) will be quantified opposed to C4 (disposal emissions). The assessment will include carbon emissions associated with the treatment and processing of materials and/or components prior to reaching the end-of-waste state. In absence of specific information default emission factors will be used as per the ICE (v3) Database
Additional impacts	Land use change	BNG inputs such as habitat type, age, habitat area/length	TBC

4.2.29. The lifecycle modules / impacts it is proposed are out of scope and not quantified are:

- B1 (Use) - refers to emissions arising from the life of a building from its components such as blown insulation and paints. B1 is not expected to be significant for this scheme and insufficient data is available to quantify this proportionately so it will be excluded.
- B2 (Maintenance) - Over a 60 year RSP, it is assumed minimal maintenance is required as a result of scheduled replacement of items considered in module B4 (Replacement). It has been assumed that emissions associated with maintenance would be comparable to the without-scheme case.

- B3 (Repair) - Over a 60 year RSP, it is assumed minimal maintenance will be required. Module B3 is intended to provide a reasonable allowance for repairing unpredictable damage. Given existing methods of quantifying emissions associated with construction processes (based on cost) it will be assumed that module A5 includes an allowance for repair. No further quantification will be included to account for B3 emissions, and it is assumed that emissions associated with repair would be comparable to the without-scheme case.
- B5 (Refurbishment) - is defined as a planned alteration or improvement to the physical characteristics of the building in order for it to cater for the desired future function identified and quantified at the outset. Refurbishment will not be quantified as a change in use has been identified.
- B6 - B8 (Operational energy and water use, and other operational processes) - this is not expected to be a significant change from the without scheme case (e.g. similar highway lighting) so will not be quantified.

4.2.30. These impacts out of scope however will be considered qualitatively within WSP's Carbon Zero Appraisal Framework and reported qualitatively where relevant to decision-making.

4.2.31. Carbon impacts will be quantified under both a Core scenario and up to two others to assess sensitivity tests (alternative assumptions of traffic growth and/or fleet mix, for example). Capital carbon impacts will remain the same in each scenario, but operational user emission impacts will be tested under alternative fleet mix and growth assumptions.

Monetisation of carbon impacts

4.2.32. The whole-life carbon impacts calculated using the methods described above will be monetised by applying the values in Table A3.4 of the latest version of the TAG Databook (currently TAG Databook v1.22, released in November 2023).

4.2.33. As of November 2021, the values in TAG 3.4 refer to both traded and non-traded carbon, and the monetisation of carbon impacts will include both cases in line with the latest TAG expectations.

4.2.34. To ensure the full costs of the carbon impacts of the scheme are integrated into the Economic Dimension, all impacts be monetised using the same values in TAG 3.4 and included in the monetised value of carbon. A BEIS policy paper on 'Valuation of greenhouse gas emissions: for policy appraisal and evaluation' (September 2021) states that 'any emission increases or savings resulting from policies (either traded or non-traded) should be considered and valued during appraisal. For emissions in the traded sector, appropriate adjustments should be made to account for any existing carbon pricing in the market prices of goods or services.

Reporting of carbon impacts

4.2.35. Carbon impacts will be reported in the following formats / locations:

- The AST, CST and GHG workbooks in the Economic Dimension will report the whole-life carbon impact and its monetary cost. Reporting in the AST and workbooks will follow TAG Unit A3.
- A carbon assessment summary presented in WSP's Carbon Zero Appraisal Framework will provide a clear, plain-language summary of whole-life carbon impacts including a qualitative description of impacts, to be referenced by decision-makers or designers looking to understand the carbon impact of the scheme.

4.2.36. Carbon impacts will be reported against the following timescales:

- Over the whole 60 year appraisal period
- Within each active statutory carbon budget period
- Construction start date (2025) to 2050

4.2.37. Key background assumptions used in the assessment will be reported as part of a methodology note attached to the Carbon Zero summary.

LANDSCAPE; TOWNSCAPE; HISTORIC ENVIRONMENT; BIODIVERSITY; WATER ENVIRONMENT

4.2.38. The impact on these sub-objectives will be assessed using the methods outlined in TAG Unit A3. The analysis for FBC will refresh the OBC analysis accounting for any further evidence gathered and/or change in scheme design. The qualitative assessments will draw the updated forecasts from the transport modelling. It is anticipated that there will be minimal change in the overall impacts from what was reported in the OBC.

PHYSICAL ACTIVITY

4.2.39. The impact of this sub-objective was assessed qualitatively in the OBC. However, for the FBC, the DfT's Active Mode Appraisal Toolkit (AMAT) will be utilised to appraise the proposed walking and cycling infrastructure improvements comprising the scheme.

4.2.40. This ensures that the calculation of benefits is in accordance with DfT guidance, as set out in Transport Analysis Guidance Unit A5.1. The value for money provided by these schemes can thus be consistently compared against other proposals.

4.2.41. In line with new guidance (released for the Active Travel Fund 4) a 40 year appraisal period will be adopted.

4.2.42. The AMAT calculates impacts linked to an increase in cycling and walking, and benefits to existing users of these modes. These benefits relate to three key areas:

- Mode shift (e.g. away from private car use)
- Health improvements
- Journey quality

4.2.43. Within these three areas, monetised costs and benefits are attributed to a number of impacts that are presented in Table 4-4.

4.2.44. The DfT guidance on active mode appraisal provides a full explanation of these benefits, and the external sources from which they are derived.

Table 4-4 - Impacts appraised in the Active Mode Appraisal Tool

Benefit Area	Benefit	Impacts Assessed
Health	Reduced risk of premature death	Improved health, due to increased physical activity
	Absenteeism	Reduced levels of absenteeism from employment due to increased physical activity
Journey quality	Journey ambience	Improved experience due to the provision of cycling or walking infrastructure
Mode shift	Congestion benefit	Reduced vehicle kilometres travelled, which reduces the level of congestion experienced by road users
	Infrastructure	Reduced vehicle kilometres travelled, which reduces the impact on infrastructure and thus highway maintenance costs
	Accidents	Reduced vehicle kilometres travelled, which reduces the number of road accidents (rather than the direct impact on cycling safety)
	Local air quality	Reduced vehicle kilometres travelled, resulting in less pollutants emitted
	Greenhouse gases	Reduced vehicle kilometres travelled, resulting in less greenhouse gases emitted

JOURNEY QUALITY

4.2.45. This sub-objective will not be assessed.

SAFETY BENEFITS

4.2.46. In line with TAG, DfT's accident appraisal software, COBALT (Cost and Benefit to Accidents – Light Touch), will be used to appraise the safety impact 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.

4.2.47. 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).

4.2.48. Table 4-5 provides a summary of key assumptions that will be adopted.

Table 4-5 - Accident benefits appraisal assumptions

Item	Assumptions
Software	The latest COBALT version and associated parameter file, consistent with the latest TAG Databook (currently COBALT Version 2.6, released in January 2024 using the parameter file consistent with TAG Databook v1.22, released in November 2023)
COBALT Network	The COBALT network will be constructed in GIS and will comprise of a series of links and junctions. The network construction will be carried out in accordance with the COBALT guidance. The node-link structure will be based directly on the traffic model; however, the COBALT network will include only roads where the traffic model predicts a significant change in flow (taken to be a change in flow of 10% or more).
Accident data	STATS 19 Personal Injury Accident (PIA) data for the latest available five-year period (excluding the COVID-19 pandemic affected years of 2020 and 2021) will be obtained from the government website for Fatal, Serious and Slight accidents (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 those accidents 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 flow data	Annual Average Daily Traffic (AADT) traffic flows from the traffic model

SECURITY; ACCESS TO SERVICES; AFFORDABILITY; SEVERANCE; OPTION AND NON-USE VALUES

4.2.49. The impact on these sub-objectives will be assessed qualitatively using the methods outlined in TAG Unit A4.1.

COSTS TO BROAD TRANSPORT BUDGET

Base costs

4.2.50. Scheme costs will be contractor tendered costs (replacing the estimates from the OBC) and Shropshire Council expenditure. They will include:

- Investment costs, including:
  - construction costs
  - land and property costs
  - preparation and administration
- Operating, maintenance and renewal costs, to estimate the whole life costs for the scheme

4.2.51. These costs will provide the base cost estimate. A real cost adjustment will be applied to the base costs to account for general inflation and construction inflation.

Optimism-bias / risk adjustment

4.2.52. Optimism bias will be applied to the scheme costs at 20%, in line with TAG guidance provided in TAG A1-2 for a road scheme at FBC stage.

4.2.53. However, if the re-run Quantified Risk Assessment outputs exceed 20%, then we would use that higher risk-adjustment value.

Re-basing

4.2.54. The costs above will then be re-based to the Departments Base Year - 2010.

Discounting

4.2.55. In order to present scheme costs in Present Values, scheme costs will then be discounted back to 2010. A discount rate of 3.5% will be applied for the first 30 years with a 3% discount rate applied thereafter.

Market price-adjustment

4.2.56. Costs will be converted from factor costs to market prices using the indirect tax correction factor of 1.19, contained within the latest version of the TAG Databook.

INDIRECT TAX REVENUES

4.2.57. A TUBA assessment will be used to capture these impacts based on the with and without scheme forecasts described in Chapter 3 above. The assessment will employ the latest version available of the TUBA software that aligns with the latest TAG Databook available. Results of the core scenario and the agreed Common Analytical Scenarios (CAS) and sensitivity tests will be reported.

4.3. DISTRIBUTIONAL IMPACT ANALYSIS

4.3.1. The distributional impact analysis will be updated to account for changes in social impact assessment since the OBC for those elements in scope.

4.4. SENSITIVITY TESTS

4.4.1. We propose to undertake the following sensitivity tests:

- Three Common Analytical Scenarios (CAS) as detailed in Table 3-1, Regional, High and Low economy scenarios.
- Alternative levels of optimism bias allowance (associated with different stages of business case)
- A switching value analysis to determine how a change in costs or benefits will affect the Value for Money category

4.5. SUMMARY

4.5.1. An Appraisal Specification Summary Table is provided in Table 4-6.

Table 4-6 - Appraisal Specification Summary Table

Impacts	Sub-impacts	Type of assessment output (Quantitative/ Qualitative/ Monetary/ Distributional)
Economy	Business users & transport providers	Monetary, quantitative
	Reliability impact on business users	Monetary, quantitative
	Regeneration	Qualitative
	Wider Impacts	Monetary, quantitative
Environmental	Noise	Monetary, quantitative
	Air Quality	Monetary, quantitative
	Greenhouse gases	Monetary, quantitative
	Landscape	Qualitative
	Townscape	Qualitative
	Heritage of historic resources	Qualitative
	Biodiversity	Qualitative
	Water environment	Qualitative
Social	Commuting and Other users	Monetary, quantitative
	Reliability impact on commuting and Other users	Monetary, quantitative
	Physical activity	Monetary, quantitative
	Journey quality	Not assessed
	Accidents	Monetary, quantitative
	Security	Distributional
	Access to services	Distributional
	Affordability	Distributional
	Severance	Distributional
	Option values	Not assessed
Public Accounts	Cost to broad transport budget	Monetary
	Indirect tax revenues	Monetary

4.6. REPORTING

4.6.1. An updated Economic Appraisal Report will be produced in autumn 2024 with associated TAG worksheets and tables including revised TEE, PA, AMCB and AST for DfT to review as part of the FBC submission.

4.6.2. The analysis will also be reported in the Economic Dimension of the FBC to be submitted to the DfT in December 2024.

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