highways england

A303 Amesbury to Berwick Down

TR010025

7.5 Combined Modelling and Appraisal Report

Appendix C: Transport Forecasting Package

Volume 7

APFP Regulation 5(2)(q)

Planning Act 2008

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

October 2018

Infrastructure Planning

Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

A303 Amesbury to Berwick Down

Development Consent Order 20[xx]

COMBINED MODELLING AND APPRAISAL REPORT

Appendix C: Transport Forecasting Package

Regulation Number:	Regulation 5(2)(q)
Planning Inspectorate Scheme Reference	TR010025
Application Document Reference	7.5
Author:	A303 Amesbury to Berwick Down Project Team, Highways England

Version	Date	Status of Version
Rev 0	October 2018	Application issue

Table of contents

Table of Figures

Table of Tables

Appendices

Appendix A: Uncertainty Log

Appendix B: Scheme plans for local schemes identified in Uncertainty Log

Appendix C: Comparison of unadjusted TEMPro to adjusted planning data

Appendix D: Busy period factoring sector system

Appendix E: Scheme plans

Appendix F: Assumptions for DCO construction Traffic Management modelling

Appendix G: Impact of known errors

Appendix H: Assignment convergence – Core scenario

Appendix I: AADT flow diagrams – Core scenario

Appendix J: Hourly flow diagrams – Core scenario

Appendix K: Journey times – Core scenario

Appendix L: Assignment convergence – High, low and alternative growth scenario

Appendix M: Demand model convergence – High, low and alternative growth scenario

Appendix N: AADT flow diagrams – High, low and alternative growth scenario

Appendix O: Journey times – High, low and alternative growth scenario

Appendix P: AADT flow diagrams – Core growth sensitivity test scenario

Appendix Q: Journey times – Core growth sensitivity test scenario

Appendix R: Flow diagrams – Construction scenario

Appendix S: Journey times – Construction scenario

Foreword

The A303 Amesbury to Berwick Down scheme ("the Scheme") forms part of a programme of improvements for upgrading the A303/A358 corridor, improving this vital connection between the South West and London and the South East and including the upgrade of remaining single carriageway sections on the route to dual carriageway. This investment is stated as a priority project in the National Infrastructure Plan and Government's commitment is confirmed in the Road Investment Strategy (2015-2020). Subject to achieving an approved Development Consent Order (DCO), preliminary works are planned to start in 2020 with the main construction works following in 2021, and the Scheme is due to open to traffic in 2026.

Objectives for the Scheme have been formulated both to address identified problems and to take advantage of the opportunities that new infrastructure would provide. The objectives are defined by the Department for Transport (DfT):

a. **Transport:** To create a high quality reliable route between the South East and the South West that meets the future needs of traffic;
b. **Economic Growth:** To enable growth in jobs and housing by providing a free flowing and reliable connection between the South East and the South West.
c. **Cultural Heritage:** To help conserve and enhance the World Heritage Site and to make it easier to reach and explore; and
d. **Environment and Community:** To improve biodiversity and provide a positive legacy for nearby communities.

The objectives would be achieved by providing a high quality, two-lane dual carriageway on the A303 trunk road between Amesbury and Berwick Down in Wiltshire. The Scheme would resolve traffic problems and, at the same time, protect and enhance the Stonehenge, Avebury and Associated Sites World Heritage Site ("WHS"). The Scheme would be approximately 8 miles (13km) long and comprise the following key components:

a. a northern bypass of Winterbourne Stoke with a viaduct over the River Till valley;
b. a new junction between the A303 and A360 to the west of and outside the WHS, replacing the existing Longbarrow roundabout;
c. a tunnel approximately 2 miles (3.3km) in length past Stonehenge; and
d. a new junction between the A303 and A345 at the existing Countess roundabout.

The Transport Forecasting Package details the assumptions made to produce the traffic forecasts and summarises the resulting traffic forecasts. The Transport Forecasting Package is one element of the Combined Modelling and Appraisal (ComMA) Report (Application Document 7.5) which documents the transport modelling and economic assessment process for transport schemes.

Executive summary

The A303 Amesbury to Berwick Down scheme involves replacing the existing single carriageway at Stonehenge with a dual carriageway, including the construction of a tunnel approximately 2 miles (3.3km) long, the construction of a northern bypass of Winterbourne Stoke and the construction of a flyover at Countess roundabout. The Scheme is one of three A303 / A358 corridor schemes that have been prioritised within the first Road Investment Strategy (RIS) period. Delivery of the RIS is the responsibility of Highways England.

A transport model of the A303 capable of showing the impacts on local roads close to the Scheme is required for traffic forecasting and economic appraisal. Traffic forecasts are required to determine the impacts of the Scheme on the A303, surrounding local road network and on the parallel SRN. Forecast traffic volumes are required to inform the scheme design, buildability, environmental impacts, traffic-related economics and to inform the procurement route.

To address this requirement the 'A303 Stonehenge SWRTM (DCO)' model has been developed as a refinement of Highways England's South West Regional Traffic Model (SWRTM) and the model developed to assess scheme options at Project Control Framework (PCF) for Major Projects Stage 2. Information from the existing models was augmented, particularly with the introduction of local demand data, local traffic counts and network refinements pertinent to the single scheme being taken forward at Stage 3 (the Development Phase).

Given the specific issues on the A303 caused by holiday traffic, a busy period model has also been developed based on data from summer Fridays, Saturdays and Sundays during July and August. The 'A303 Stonehenge SWRTM (DCO)' model will provide the evidence base for the Development Consent Order (DCO) application which will be submitted by Highways England and will subsequently provide evidence to questions raised by the Examining Authority during the DCO process. Separate microsimulation models have also been developed to assess the operational performance of the Scheme.

The base year, 2017, 'A303 Stonehenge SWRTM (DCO)' model was developed, calibrated and validated in accordance with guidance: this includes appropriate elements of the Department for Transport's (DfT) Web-based Transport Analysis Guidance (WebTAG) as well as guidelines produced during the development of the Highways England Regional Traffic Models (RTMs).

Traffic forecasts have been developed for the following years:

a. 2026 which has been taken as the opening year of the Scheme;

b. 2031 which provides an estimate of the scheme impact relatively soon after opening;

c. 2041 which provides an estimate of the scheme impact 15 years after opening; and

d. 2051 which is the year furthest in the future for which national travel demand projections are available.

Each forecast year has a model to represent each of the modelled hours:

a. AM Average Hour (07:00 to 10:00);

b. interpeak Average Hour (10:00 to 16:00) excluding busy days;

c. PM Average Hour (16:00 to 19:00) excluding busy days; and

d. busy Average Hour (10:00 to 19:00).

The model development for each modelled year follows the same process which is summarised as:

a. develop a reference for all day demand for travel;

b. develop a representation of the without scheme highway network and rail costs;

c. apply the reference demand to the without scheme highway network within the demand model;

d. allow the demand model to reach a stable estimate for demand of travel for each modelled period and within a day, referred to as the core demand, taking account of costs of highway travel and rail travel;

e. develop a representation of the with scheme network; and

f. apply the total daily core demand to the with scheme networks in the demand model to reach a stable forecast of demand for highway travel.

The initial estimate for the reference demand is developed using a combination of an Uncertainty Log and national growth forecasts published within the National Trip End Model (NTEM) and generated by the Trip End Model Program (TEMPro 7.2). The Uncertainty Log captures local developments by land use type and assigns a level of certainty to each by year. The developments are then converted into traffic demand which is allocated to the specific zones in the modelled area. Growth rates for Wiltshire and Test Valley were constrained at a district level to NTEM forecasts.

NTEM is a national database which considers changes in population at local authority level, changes in employment at local authority level and changes to economic factors such as household incomes at the national level.

The reference demand additionally includes trips from the Army Basing Programme (ABP) for Salisbury Plain. The Single Living Accommodation (SLA) developments on existing Ministry of Defence (MoD) land are not represented in the standard TEMPro forecasting process so SLA trip generation has been calculated and included in the forecast demand.

The reference demand assumes that travel costs remain the same over time, so is only considered to be the starting point before travel costs start to influence travel decisions. It is assumed that costs only influence demand for person related travel; growth in freight trips are based on DfT national transport modelling.

To develop the without scheme networks, the Uncertainty Log is again consulted to identify which schemes are likely to be in place by which year. No other modifications are made to the core models.

To complement the core forecasts and examine the impact of different growth assumptions and different development assumptions the 'A303 Stonehenge SWRTM (DCO)' model has been subjected to three sensitivity tests. The first two are common WebTAG tests, referred to as high and low growth. These modify the reference case demand in each year by a standard factor. The purpose of these tests is to demonstrate whether the Scheme is resilient to lower or higher overall demand. The high growth test is also used to examine whether the infrastructure is resilient to dealing with greater volumes of traffic.

The third sensitivity test has examined the impact of the Boscombe Down development, primarily to examine whether this development will have an adverse impact on the performance of the Scheme in terms of journey times on the A303.

In addition to exploring the performance of the network in the forecast years the 'A303 Stonehenge SWRTM (DCO)' model has been used to consider how the construction period will affect traffic. The construction phases have been represented by modifying junction layouts and including the location of speed limits taking assumptions which have been provided by third parties.

Outputs from each of the modelled hours have been combined using calculated annualisation factors to generate AADT values which are reported within the main body of this report. In addition to AADT values this report includes analysis of journey times on the A303 and other routes in the modelled area. Traffic flows for the modelled periods are included in Appendices. The AADT values from the forecasting are used for noise and air quality environmental assessments of the scheme impacts.

Outputs from each of the forecast models in matrix format are used for the economic appraisal of the Scheme. A matrix is a table of information with origin zone in each row, destination zone in each column and the zone to zone value in each cell. The economic appraisal requires matrices with the number of trips, the average travel time and average travel distance in each cell.

Travel demand is generally forecast to increase by a little less than 1% per annum in the core scenario, with higher local growth to 2026 reflecting increased demand from the Army Basing Programme. Traffic flow on the section of the A303 past Stonehenge is not forecast to increase without the Scheme, due to capacity constraints. The Scheme would remove this capacity constraint with demand forecast in 2041 to increase from 30,000 AADT (two-way) to 45,000 AADT. The main source of this increase is from diversion from other roads, in particular, The Packway.

On typical weekdays the Scheme is forecast to reduce travel times along the A303 by four to six minutes in 2041. The additional traffic along the A303 corridor is forecast to result in some additional congestion at single carriageway sections further to the west, partly offsetting these time savings for long distance journeys. During busy days the forecasts indicate that the substantial delay for traffic along the A303 would increase without the Scheme. The Scheme provides the capacity to address this congestion with forecast average busy day time savings of 19 minutes in 2041.

This report demonstrates that the 'A303 Stonehenge SWRTM (DCO)' model and the complementary operational models provide the appropriate evidence base for PCF Stage 3 and Stage 4, as the forecasts are taken from models which have been developed in accordance with best practice and industry guidance and which are shown to be both stable and consistent.

1 Introduction

1.1 Statement of the scheme objectives

Background

1.1.1 The A303 Amesbury to Berwick Down scheme forms part of the A303/A358 trunk route, which provides vital east-west connectivity between London and the South West and is also part of the Trans-European Network - Transport (TEN-T).

1.1.2 The A303 runs for approximately 93 miles (150 kilometres (km)) from Junction 8 of the M3 near Basingstoke towards Exeter. It carries traffic between the South East and Somerset, Devon and Cornwall as well as serving intermediate regional destinations and local small and medium sized settlements along the route.

Overview of the Scheme

1.1.3 The Scheme would be approximately 8 miles (13km) long and comprise the following key components:

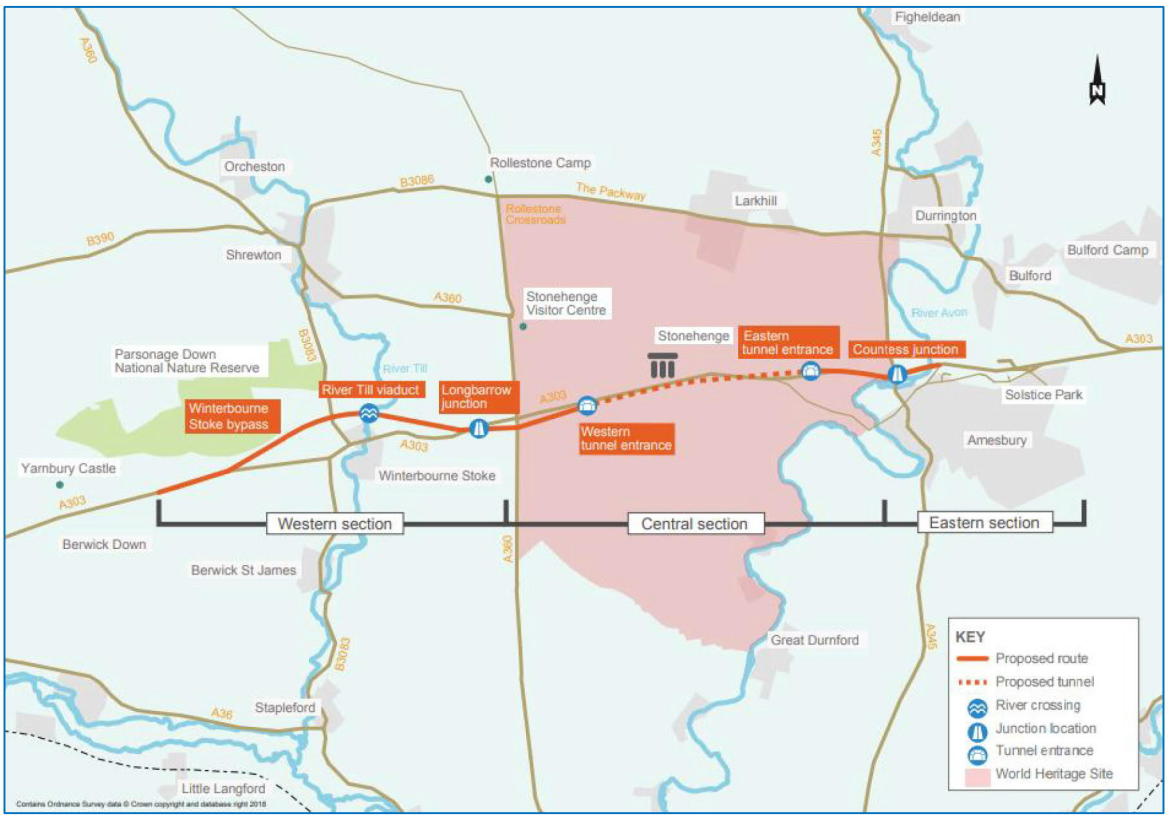
a. a northern bypass of Winterbourne Stoke with a viaduct over the River Till valley;

b. a new junction between the A303 and A360 to the west of and outside the WHS, replacing the existing Longbarrow roundabout;

c. a twin-bore tunnel approximately 2 miles (3.3km) long, past Stonehenge; and

d. a new junction between the A303 and A345 at the existing Countess roundabout.

1.1.4 The Scheme is described briefly in three route sections as shown in Figure 1-1.



Source: Figure 5.1 Scheme sections, A303 Amesbury to Berwick Down Public Consultation Booklet (February 2018)

Figure 1-1: Overview of the Scheme

a. Western section – Winterbourne Stoke bypass to Longbarrow junction

b. Central section – within the World Heritage Site

c. Eastern section – Countess junction to just beyond the Solstice Park junction

Western section

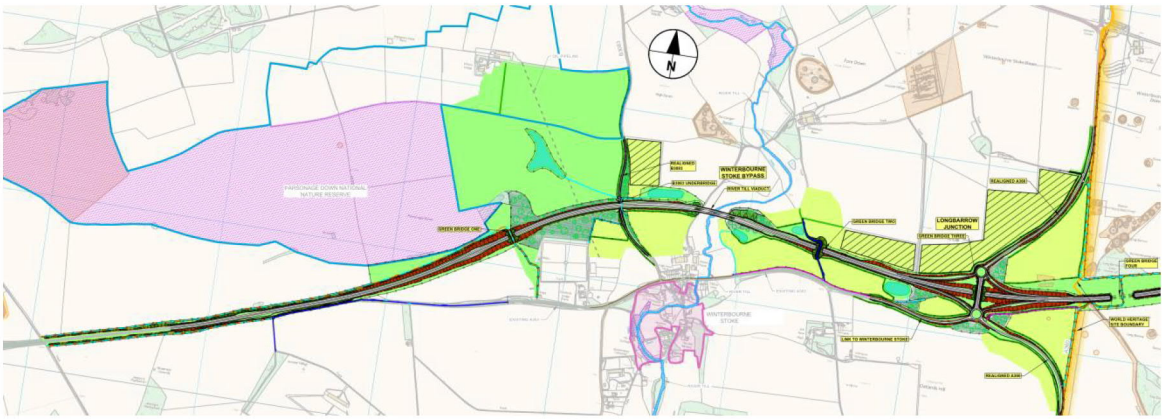


Figure 1-2: Western section

1.1.5 The Scheme would commence on the existing A303 approximately at Yarnbury Castle and would closely follow the existing A303 alignment, south of Parsonage Down NNR. It would then continue in a north easterly direction providing a bypass to the north of the village of Winterbourne Stoke.

1.1.6 A 'green bridge' would be constructed over the new A303 north-west of Scotland Lodge Farm near the south-east corner of Parsonage Down. This bridge would provide ecological and landscape connectivity across the Scheme and would form part of a non-motorised user (NMU) route and agricultural access route which would run from adjacent to a layby on the existing A303 to Parsonage Down and Yarnbury Castle. An area east of Parsonage Down would be used to create chalk grassland habitat using excavated chalk material arising from construction.

1.1.7 Local access from Winterbourne Stoke, northwards towards Shrewton, would be provided by the B3083. This access would be maintained by the provision of a single span bridge to carry the new A303 over the B3083. The proposed new bridge would be located approximately 50m to the west of the existing B3083. This location would necessitate the realignment of some 400m of the B3083 but would enable the B3083 to be kept open to traffic throughout the construction period other than for discrete periods to allow short duration specific activities to be undertaken (e.g. construction of tie-ins etc.). The clear span of the bridge would accommodate both the re-aligned B3083 and a segregated verge on the east side to allow cattle movements and equestrian use across the new alignment. The minimum headroom would be 5.35m.

1.1.8 The Scheme would continue in an easterly direction, crossing the River Till valley on a new twin deck viaduct. The River Till viaduct would carry the proposed A303 over the River Till SAC and SSSI and its floodplain. The viaduct would be designed to minimise impacts on the river below while balancing other environmental considerations, such as landscape and visual impacts. It would be a twin deck structure, with each deck approximately 14m wide and 210m long, and with a gap of approximately 7m between the decks. The road level on the bridge would be approximately 10m above the River Till where it crosses the river channel. The location of the piers would not be within the SAC or SSSI and would allow the existing bridleway (WST04) from Winterbourne Stoke to remain at its current location. An environmental screen, approximately 1.5m in height, would be installed on the southern parapet to help screen vehicle movements from locations to the south.

1.1.9 A second green bridge at the Winterbourne Stoke Public Right of Way (PRoW) WST06B would maintain the existing PRoW over the new A303 alignment and as with other green bridges would provide for ecological and landscape connectivity across the Scheme.

1.1.10 Continuing to the east, the Scheme would cross the line of the existing A303 approximately 700m west of the existing A360 Longbarrow roundabout. A new grade separated junction with the A360 is proposed to the west of the WHS boundary. This junction, known as the Longbarrow junction, would accommodate free-flowing traffic movements between the A360 and the A303. The junction would consist of two roundabouts connected by a short length of dual carriageway, carried over the A303 on a new green bridge with earth bunds on each side, to help mitigate visual impact and to provide ecological connectivity. The structure would be a single span bridge, with headroom of at least 5.35m. The roundabouts would be set below existing ground level.

1.1.11 Traffic lights would be required at the Longbarrow junction. The traffic lights could be used during both day and night. A link to the de-trunked A303 to the west,

accessing Winterbourne Stoke, would also be provided from the new Longbarrow junction.

Central section

Figure 1-3: Central section

1.1.12 As the Scheme crosses the line of the existing A360, it would enter into the WHS where it then follows closely the line of the existing A303.

1.1.13 The proposed alignment over the first c.1.0km of this section would generally be in a cutting varying in depth between approximately 7m and 10m. Approximately 2.5m to the top of the cutting would have a 1 in 2 grassed slope. The bottom of the cutting would comprise vertical retaining walls.

1.1.14 However, shortly after entering the WHS there would be a further green bridge (also known as a 'land bridge') that would be approximately 150m in length and would start approximately 150m from the western boundary of the WHS. In addition to an NMU route, this bridge would also provide visual and landscape connectivity between barrow groups to the north and south of the Scheme. The existing A303 through the WHS would be converted to a restricted byway.

1.1.15 The western tunnel portal would be located within the WHS, north west of Normanton Gorse, approximately 1.0km east of the existing Longbarrow roundabout and immediately to the south of the existing A303. The tunnel would commence with a fully grassed approximately 200m long over cut and cover tunnel before it becomes a bored tunnel. Tunnel service buildings would be located outside the tunnel portal.

1.1.16 The Scheme would then continue in tunnel in an easterly direction following an alignment that is broadly similar to the existing A303 but at a depth of up to approximately 50m.

1.1.17 The tunnel would be a twin-bore structure, approximately 1.9 miles (approximately 3 km) in length, and each tunnel bore would have an internal diameter of approximately 11.5m.

1.1.18 The two bores would be connected underground by a series of cross passages at regular intervals to allow for the safe evacuation of road users in the event of an incident in one of the bores.

1.1.19 The tunnel would contain a number of mechanical and electrical, operational and safety systems. The items of plant required to power and control these systems would predominantly be housed at the tunnel service buildings located outside of the tunnel.

1.1.20 The tunnel would emerge at the eastern tunnel portal through a short section of cut and cover tunnel approximately 85m in length extending eastwards from the bored tunnel section. The eastern tunnel portal would be located to the east of the King Barrow Ridge and The Avenue and just to the north of the existing A303. The portal approach would be in deep cutting formed with 1 in 2 grassed slopes.

1.1.21 The Scheme would then closely follow the line of the existing A303 to Countess roundabout.

Eastern section

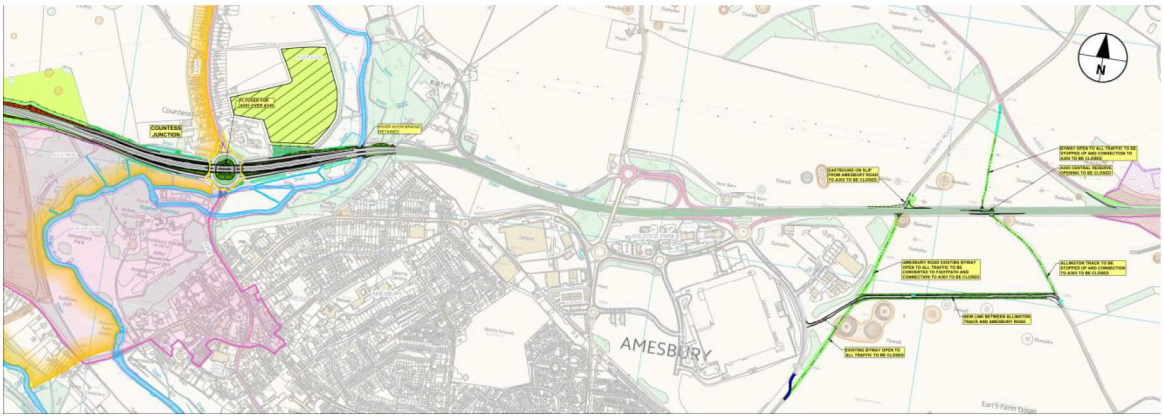


Figure 1-4: Eastern section

1.1.22 A new flyover above the existing roundabout would separate traffic going east-west along the A303 from traffic going north-south along the A345 Countess Road, with slip roads accommodating traffic movements between the two roads. The new flyover would include two single span bridges that would accommodate the existing roundabout traffic lanes. The minimum headroom of the bridges would be 5.35m.

1.1.23 Retaining walls would be required at this junction to support the A303 between the slip-roads. Noise barriers, approximately 1.8m high, would be installed along both sides of the flyover to help screen vehicles and to help attenuate vehicle noise at nearby houses.

1.1.24 There are two existing subways between the proposed eastern tunnel portal and Countess junction, which would be removed. Two new pedestrian crossings would be created around the existing Countess roundabout to provide north-south connectivity along Countess Road under the A303.

1.1.25 The Scheme would tie in with the existing A303 close to the existing River Avon Bridge, to the west of Solstice Park junction.

1.1.26 To the east of the Solstice Park junction there would be a number of changes to existing rights of way and to points of access to and from the A303.

Scheme objectives

1.1.27 Objectives for the Scheme have been formulated both to address identified problems and to take advantage of the opportunities the new infrastructure would provide. The objectives are defined in the Department for Transport's (DfT's) Client Scheme Requirements (CSRs) which respond directly to the need for change:

a. **Transport:** To create a high quality route between the South East and the South West that meets the future needs of traffic;

b. **Economic Growth:** To enable growth in jobs and housing by providing a free flowing and reliable connection between the South East and the South West;

c. **Cultural Heritage:** To help conserve and enhance the World Heritage Site (WHS) and make it easier to reach and explore; and

d. **Environment and Community:** To improve biodiversity and provide a positive legacy for nearby communities.

1.2 Status of the Scheme

1.2.1 The A303 Amesbury to Berwick Down scheme is being developed by Highways England (the applicant) as part of its responsibility to deliver the RIS and to operate, maintain and modernise the Strategic Road Network (SRN).

1.2.2 The Scheme is currently midway through Stage 3 of Highways England's Project Control Framework process for the delivery of Major Projects. This is also known as the Development Phase. The Scheme is one of three schemes being taken forward as part of Highways England's Major Project's Complex Infrastructure Programme (CIP), based on its scale and value. The Scheme has 'Tier 1' status at the Department for Transport (DfT).

1.2.3 PCF Stage 3 will culminate with an application to the Planning Inspectorate (PINS) for a Development Consent Order (DCO). This is expected in September 2018.

1.3 Model purpose

Description of the model need

1.3.1 A transport model of the A303 and local roads around Stonehenge is required for traffic forecasting and economic appraisal purposes.

1.3.2 Traffic forecasts are required to determine the impacts of the Scheme on the A303, surrounding local road network and on the parallel SRN. Forecast traffic volumes (both in absolute volumes and changes due to the Scheme) are required to inform:

a. whether the Scheme addresses the identified transport problem;

b. scheme design standard requirements (e.g. against Design Manual for Roads and Bridges (DMRB) criteria for number of lanes, junction types, road standard);

c. the Environmental Statement (ES) through the impacts of changes brought about by the Scheme on air quality, noise pollution, health impacts and biodiversity assessment amongst others;

d. on the impacts of proposed construction and traffic management plans;

e. an assessment of transport user impacts of the Scheme, accident and construction impacts to the economy; and

f. procurement – providing traffic inputs as part of the assessment of the procurement route and associated financing strategy of the Scheme.

1.3.3 The traffic model must also be able to assess the cumulative impacts of other interventions on the A303 / A358 corridor, given Highways England's proposals for a high quality dual carriageway between London and the South West. Whilst the model need not (and does not) assess the impacts of the other schemes in detail (separate local models will be developed for those schemes), the model needs to be able to assess the impact of those other schemes on the A303 Amesbury to Berwick Down scheme.

Model heritage

1.3.4 The Transport Model Package, Appendix B to the Combined Modelling and Appraisal Report (Application Document 7.5) outlines the development of the base year traffic model.

Schemes to be tested

1.3.5 The principal aim of the model is to appraise the traffic and economic impacts of the A303 Amesbury to Berwick Down scheme as described in section 1.1.

1.4 Report purpose and structure

Project Control Framework Product

1.4.1 Highways England's Transport Planning Group (TPG) revised its list of expected PCF products in 2017. A formal Transport Forecasting Report (TFR) is no longer specified; instead the 'Transport Forecasting Package' must be prepared. The majority of the modelling task reporting will be encapsulated in an 'end of stage' Combined Modelling and Appraisal (ComMA) report.

1.4.2 The guidance states that the 'Transport Forecasting Package' must provide sufficient evidence to the TPG Business Partner to:

a. demonstrate the key assumptions that have been made while producing the future year forecasts; and

b. summarise the forecasts themselves.

Introduction to the Transport Forecasting Package

1.4.3 The Transport Forecasting Package sets out information, detail and evidence pertaining to the development of the future year forecasts as part of the Project Control Framework (PCF) Stage 3 work. The traffic forecasts from the 'A303 Stonehenge SWRTM (DCO)' model will underpin evidence at the Development Consent Order (DCO) application.

1.4.4 This report also includes the results from the assessment of the operational performance of junctions along the length of the Scheme for the design year of the Scheme. Chapter 7 reports on the development and provides the results of forecasts to assess the impact during the construction phase.

Report structure

1.4.5 The structure of this Transport Forecasting Package follows the Highways England guidance from the PCF portal for the relevant sections of ComMA (chapters 10 and 11). A crosscheck has been undertaken to ensure that Highways England's requirements as set out in Interim Advice Note (IAN) 106/08 are also met. Table 1-1 presents the structure from IAN 106/08 and provides cross-references to the relevant sections of this report.

Table 1-1: Interim Advice Note 106/08 contents guide for TFR

Content	Report Section	Comment
Study overview		
Statement of scheme objectives.	1.1	
Explanation of the purpose of the model and the schemes likely to be assessed using the model.	1.3, 2.1	
Opening Forecasting Approach		
Overview of forecasting approach, with reference to choice of opening and design year.	4.1	
Overview of approach with respect to the treatment of variable demand.	4.8	
Flowchart of process, identifying key inputs and outputs.	2.2	
Description of model form highlighting links to trip generation, trip distribution, mode choice, time of day model components.	2	Discussed in Transport Model Package, Appendix B to Combined Modelling and Appraisal Report (Application Document 7.5)
Forecast Network Development		
Overview of network development process, including discussion of choice of opening and design year.	4.1, 4.10	
Description of Do-Minimum (DM) schemes - plans showing routes with information of road standard and junction forms.	4.10 Appendix A Appendix B	
Justification for inclusion of DM schemes, including reference to sources - HA Committed / Local Plan / Developer schemes with anticipated scheme opening dates.	4.10 Appendix A	
Description of Do-Something schemes - plans showing routes with information of road standard and junction forms. Alternative Options to be modelled to be discussed and clearly identified.	4.11	

Content	Report Section	Comment
Assessment of the effect on base year model validation of any forecast network changes which are not part of the scheme itself but which have been introduced to ensure meaningful modelling of the scheme (e.g. addition of minor side roads in the forecast year to model the impact of junction improvements).	4.10.17, 4.13.3	
Explanation of any sensitivity tests to investigate the impact of certain schemes.	4.12	
Description of any changes in routing parameters, based on changes in 'Value of Time' and 'Value of Operating Costs', etc.	4.4	
Description of how additional costs (such as Tolls and Road User Charging) are applied to the calculation of route costs.	-	Reported in Transport Model Package, Appendix B to Combined Modelling and Appraisal Report (Application Document 7.5)
Forecast Network Development - Calibration		
Undertake checks of network structure to include: -Graphical review of network structure to identify missing links; -Checks of modelled link lengths vs crow-fly distance (requires accurate use of coordinate system); -Check model links are two way where appropriate and one-way links are accurately represented including slip roads; and -Check HGV access restriction are represented	-	Checks have been undertaken of the forecast network coding.
Undertake checks that link speeds on the network are realistic.	-	
Undertake checks to ensure delay calculations at junctions show they are operating realistically.	-	
Undertake checks that compare network structure between differing scenarios: -Base Year and Do Minimum -Base Year and Do Something -Do Minimum and Do Something	-	
Forecast Matrix Development		
Overview of matrix development process, including justification of chosen forecast years.	4.1	
Overview of forecast matrix development, clearly demonstrating the process involved in moving the base year matrix to forecast year matrix, ideally with flowchart.	4.7	
Description of how official national/local growth rates are used (i.e. NRTF and TEMPro).	4.3	
Comparison of growth rates based on other sources such as a 'Trip Generation Model' to NRTF and TEMPro.	4.3	
Explanation of how highway growth rates relate to other components of the model system, such as public transport trips.	2.2	

Content	Report Section	Comment
Explanation of any other growth rates used; such as those resulting from any 'Trip Generation-Distribution' modelling used.	4.6	
Description of how specific developments are reflected in the trip matrix, with information of any control methods used to change trip levels for existing trips.	4.2 4.6 Appendix A	
Explanation of how the various sources of growth are reconciled.	4.3	
Tabulation of growth rates used.	4.3, 4.7	
Derivation of daily flow levels, for AADT, AAWT for 12 / 16 / 18 / 24 hours from traffic model flows. E.g. 12 Hour AAWT = (2 * AM Peak) + (8 * Inter Peak) + (2 * PM Peak).	4.14	
Forecast Assignment Calibration		
Undertake initial checks of the assignments to confirm robustness of the traffic model prior to main assignments: -Undertake fixed demand assignments; -Compare traffic flows, traffic speeds and travel distances at global level; -Compare traffic routing for key movements likely to be of scheme interest, compare travel times and distances.	5.3, 5.4	These checks have been undertaken as part of the forecasting review.
Forecast Assignments		
Description of Forecasting Approach – including details of approach to Variable Demand Assessment using Elasticities and/or Full VADMA.	4	
Confirmation that elastic assignment approach used is compatible with base year.		RTM VDM approach used
Overview of Elastic Forecasting Parameters – including any changes to the generalised cost parameters.		
Details of 'Initial Assessment using Elasticities', including information elastic assignment method used and elasticity values assumed.		
Initial results on the number of trips suppressed/induced for each option compared to input demand from elastic process.		
Initial results of elastic approach on the economic benefit of the scheme based on 'TUBA' analysis of elastic process.		
Details of the justification to either undertake VADMA or not undertake VADMA.		
Overview of VADMA approach if adopted.		
Confirmation that VADMA approach used is compatible with base year.		
Overview of VADMA forecasting parameters - including any changes to the generalised cost parameters.	4.8	
Results on impact of VADMA on the number of trips suppressed/induced for each option compared to input demand.	5.3	
Results on impact of VADMA on the trip patterns compared to input demand.	5.3	
Results of VADMA on the economic benefit of the scheme based on 'TUBA' analysis.	-	

Content	Report Section	Comment
List of deviations from any default parameters used in the assignment software.		Reported in Transport Model Package, Appendix B to Combined Modelling and Appraisal Report (Application Document 7.5)
Justification of deviations from any default parameters used in the assignment software.		
Comprehensive list of assignments undertaken.	Table 4.14	
Statement of convergence stability (usually P>90% for 4 iterations).	5.2 Appendix H	
Statement of convergence proximity (usually ð<1%).	5.2 Appendix H	
Comparison of convergence with base year equivalent model.	-	
Presentation of Model Forecasts		
Diagrammatic presentation of forecast flows for DM and DS on key links.	Appendix I, J and N	
Discussion of key changes in traffic flows between the DM and the DS options.	5.4	
Summary of total link times and junction delays for DM and DS.	5.5 Appendix K	
Summary of key changes in delay at junctions, highlighting significant changes in delay between DM and DS, including diagram, if feasible.	5.6	
Summary of journey times along key corridors impacted by the DM and DS options.	5.5	
Discussion of key changes in delay and journey times between DM and DS options.	5.6	
Presentation of any alternative forecasts (e.g. feeding operational or environmental assessments).	5.7	
Diagrammatic presentation of key forecast flow differences arising from the scheme.	5.4	
Consider use of select link analyses on key scheme link(s) to compare DM and DS travel patterns.	-	
Discussion of scheme impacts in terms of key link flows and changes in key journey times: A) Comparing Do-Minimum conditions with forecast growth, against base year conditions. B) Comparing Do-Something conditions against Do-Minimum conditions.	5.4 5.5	
Presentation of key non-highway changes such as results from mode-choice or time of day modelling.	NA	
Details of the provision of traffic data for use in Economic Assessment.	-	
Details of the provision of traffic data for use in Environmental Assessment.	4.14	
Details of the provision of data for the Operational Appraisal of the scheme design.	6	

Content	Report Section	Comment
Summary		
Summarise key traffic flow changes for comparison between DM and alternative DS schemes.	8.2	
Summarise travel time and travel distance changes between DM and alternative DS schemes.	8.2	
Summarise non-highway impacts, primarily those on public transport, but may include findings from other elements of the modelling process.	-	
Summarise any key assumptions that may influence recommendations, with where possible indications of significance.	8.3	

1.4.6 Following this introductory chapter, the remainder of this Transport Forecasting Package is structured as follows:

a. Chapter 2 - Model overview;

b. Chapter 3 - Model standards;

c. Chapter 4 - Strategic model forecast assumptions;

d. Chapter 5 - Strategic model forecast results;

e. Chapter 6 - Operational assessment;

f. Chapter 7 - Construction and maintenance; and

g. Chapter 8 - Summary.

1.4.7 A list of abbreviations is provided after the summary. This consolidates key acronyms noted and previously expanded in the main text of this report.

1.4.8 The appendices can be found at the end of this document.

1.5 Complementary reports

1.5.1 Whilst this report can be read in isolation, it is recommended that this report be read in conjunction with the Combined Modelling and Appraisal Report (Application Document 7.5) and its Appendices. This will provide the full scope of the traffic modelling and economic appraisal work undertaken.

1.5.2 This Transport Forecasting Package is one of a number of Appendices to the Combined Modelling and Appraisal Report (Application Document 7.5) as follows:

a. Transport Data Package, Appendix A to the Combined Modelling and Appraisal Report;

b. Transport Model Package, Appendix B to the Combined Modelling and Appraisal Report;

c. Transport Forecasting Package, Appendix C to the Combined Modelling and Appraisal Report; and

d. Economic Appraisal Package, Appendix D to the Combined Modelling and Appraisal Report.

2 Model overview

2.1 Proposed uses of the model

2.1.1 As noted in chapter 1, the primary use of the 'A303 Stonehenge SWRTM (DCO)' model is to assess the traffic impacts of the A303 Amesbury to Berwick Down scheme and to provide inputs to the economic and environmental appraisal. In addition, it has been used to inform the buildability (construction and traffic management) of the Scheme, as well as the operation and design of its junctions.

2.1.2 In addition to appraising the core scenario, the model has also been used to assess the impacts of three alternative scenarios around the core assumptions. These include high and low growth scenarios, in accordance with guidance in WebTAG Unit M4, and an alternative local growth scenario. The model may also be used to undertake bespoke sensitivity tests at the request of stakeholders to provide additional supporting information – either as part of the DCO examination or for separate supporting activities. It is likely that the model will also be used in the future as part of a monitoring and evaluation strategy for the Scheme.

2.1.3 For many of the construction and design focussed activities for which traffic data will be required, traffic data from the model will be used as an input into more specialised operational models. A separate microsimulation model has been used for this purpose, with further information provided in section 4.13 and chapters 6 and 7.

2.2 South West Regional Traffic Model (SWRTM) structure

2.2.1 SWRTM is the highway assignment component of the wider Regional Traffic Model suite. Highways England developed the model suite to provide an evidence base for the future development of schemes on its SRN as part of the RIS.

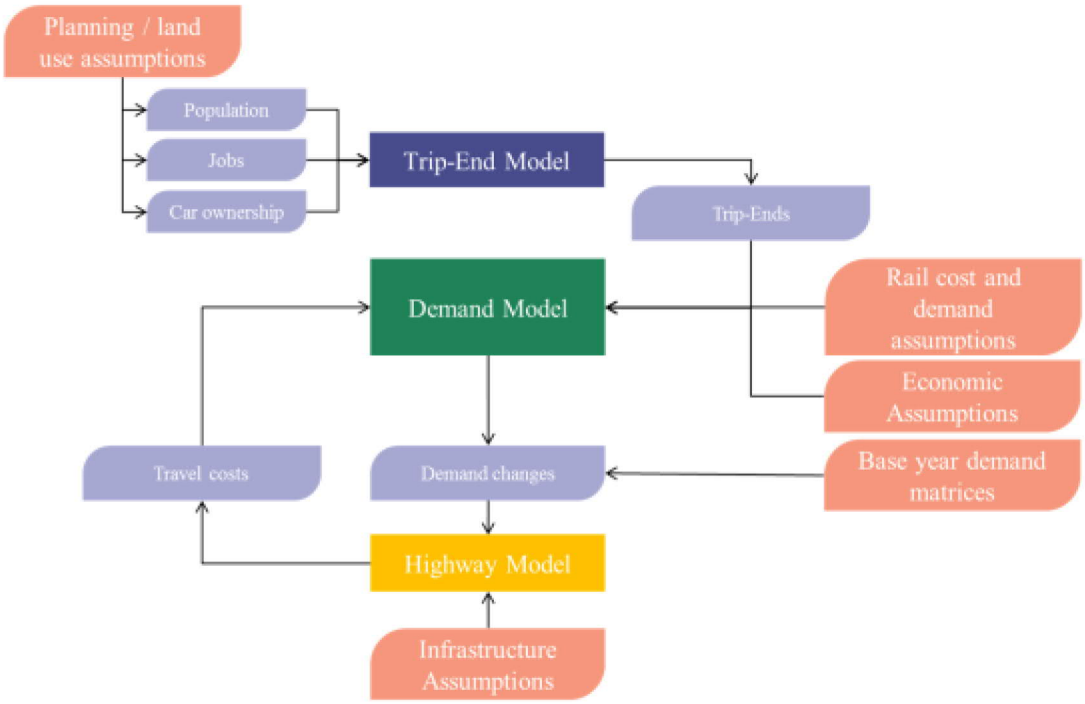
2.2.2 The suite of models is therefore aligned with the approach given in WebTAG, comprising:

a. a trip-end model, used for estimating the number of trips generated / attracted by a specific zone;

b. a variable demand model (VDM), used for estimating how travellers will respond to changes in their travel costs, including modal considerations; and

c. a highway assignment model, used for estimating travel costs and identifying the routes travellers may take through a congested road network.

2.2.3 Figure 2-1 provides an overview of the approach in flowchart form, as taken from the SWRTM MVR.



Source: Figure 4. South West Regional Traffic Model: Model Validation Report.

Figure 2-1: Regional Traffic Model (RTM) suite design

2.2.4 The 'A303 Stonehenge SWRTM (DCO)' model is a model for the sole purpose of appraisal of the A303 Amesbury to Berwick Down scheme. As such, it is different from its parent model – SWRTM DF3.0 – which was designed to assess the regional impacts of packages of significant (RIS) schemes as opposed to an individual scheme. The starting point for refinement of the model for PCF Stage 3 was the SWRTM DF3.0 model.

2.3 Overview of the strategic base year model

Base year and time periods

2.3.1 The base year of the model is 2017.

2.3.2 The neutral month model represents the average weekday in October 2017. The assignment models cover a single average hour from three periods:

a. AM average hour (07:00 to 10:00);

b. interpeak average hour (10:00 to 16:00); and

c. PM average hour (16:00 to 19:00).

2.3.3 The busy day model represents an average summer Friday to Sunday from 15th July to 28th August 2017. The busy day assignment model covers a single average hour from the period:

a. busy day average hour (10:00 to 19:00).

User classes

2.3.4 Five user-classes are represented in the 'A303 Stonehenge SWRTM (DCO)' highway assignment model. These user-classes are consistent between the neutral month and busy day period models and are as follows:

a. car business;

b. car commute;

c. car other;

d. light goods vehicles (LGVs), comprising freight and personal business trips based on the average proportions outlined in the WebTAG Databook; and

e. heavy goods vehicles (HGVs), comprising both ordinary goods vehicles type 1 (OGV1) and ordinary goods vehicles type 2 (OGV2).

2.3.5 It should be noted that the public transport demand included in the variable demand model covers three separate user-classes, all covering rail mode. These are:

a. rail commute;

b. rail other; and

c. rail business.

Assignment methodology

2.3.6 The assignment methodologies used for the forecasts are consistent with the methodologies used for the base modelling. The assignment methodology used in the model is a multi-user-class equilibrium assignment.

2.3.7 The busy day period model uses the PASSQ assignment method, to better represent the observed queuing that builds up over the duration of the modelled period. The busy day forecasts also incorporate a pre-load assignment, where a proportion of traffic is assigned first using uncongested times, representing a routeing decision that does not reflect perfect knowledge of the potential to reduce journey time by diverting onto the local road network.

2.3.8 The assignment methodology is fully described in section 4.7 of the Transport Model Package, Appendix B to the Combined Modelling and Appraisal Report (Application Document 7.5).

2.4 Overview of the operational base year model

Base year and time periods

2.4.1 The base year of the model is 2017.

2.4.2 The neutral month models represent a Wednesday in October 2017, covering each of the following peaks, with additional warm-up and cool-down periods:

a. AM peak hour (07:30 to 08:30);

b. interpeak average hour (10:00 to 16:00); and

c. PM peak hour (17:00 to 18:00).

2.4.3 The busy day model represents a six-hour period on a Friday in August 2017. The model covers the following period, with additional warm-up and cool-down periods:

a. summer period (12:00 to 18:00).

User classes

2.4.4 The operational model represents the following four user classes, and is consistent across each of the peak models:

a. Lights – Cars, Taxis and LGVs;

b. Mediums – Rigid Lorries;

c. Heavies – Articulated Lorries; and

d. buses.

Model methodology

2.4.5 There are two operational model networks; the Local Road network and the A303 Mainline network. Each network was built from OS Mapping, with Google Maps and on-site observations used to support the network build.

2.4.6 The A303 and Local VISSIM matrices have been developed directly from neutral and summer period observed classified count data.

2.4.7 General traffic was assigned using Origin-Destination matrices and route choice removed from the network to allow traffic assignment without convergence. The bus routes were input directly using the VISSIM PT (public transport) lines and routes.

2.4.8 The base model methodology is fully described in section 13 of the Transport Model Package, Appendix B to the Combined Modelling and Appraisal Report (Application Document 7.5).

2.5 Software platform

2.5.1 Several different software packages have been used in the development and refinement of the 'A303 Stonehenge SWRTM (DCO)' model. Aside from standard Microsoft Office packages used for data and model analysis, key specialist software used is given below:

a. ArcGIS versions 10.3 and 10.4

   i. Used for Geographical Information Systems (GIS) analysis supporting development of model inputs and display of model outputs.

b. SATURN version 11.3.12W

i. An industry standard highway assignment modelling package, used in the development of the RTMs and in many other UK-based highway models. This is the software used for the 'A303 Stonehenge SWRTM (DCO)' model.

c. DIADEM[1] version 6.3.3

i. An adapted version of the DfT's standard DIADEM v5.0 variable demand modelling software, with adaptations specifically for Highways England's RTMs.

d. HEIDI version 5.3

i. The Highways England Integrated DIADEM Interface (HEIDI) supports the operation of DIADEM with the RTMs and provides a set of SQL database back-ends to store model demand and results.

e. VISSIM[2] version 8.00-13

i. VISSIM is a microscopic, time-step and behaviour-based simulation model used to model urban traffic volumes and interactions. In the context of the A303 Amesbury to Berwick Down scheme, it has been developed to model the operational performance of the Scheme and its junctions.

[1] Dynamic integrated assignment and demand modelling (DIADEM). Department for Transport.
[2] Verkehr In Städten SIMulieren (VISSIM). PTV AG.

3 Model standards

3.1 Key guidance

3.1.1 Development of the 'A303 Stonehenge SWRTM (DCO)' model has built on top of the standard Highways England RTM guidance to which the SWRTM DF3.0 model was developed.

3.1.2 The further refinement of the model has followed guidance set out in the DfT's WebTAG. Most notably, this includes:

a. WebTAG Unit A1.3: User and Provider Impacts (March 2017);

b. WebTAG Unit M1.2: Data Sources and Surveys (January 2014);

c. WebTAG Unit M2: Variable Demand Modelling (March 2017);

d. WebTAG Unit M3.1: Highway Assignment Modelling (January 2014);

e. WebTAG Unit M4: Forecasting and Uncertainty (July 2017); and

f. WebTAG Databook (Interim May 2018 Databook provided by DfT).

3.2 Convergence criteria and standards

3.2.1 WebTAG Unit M3.1 §3 provides guidance on criteria and minimum acceptable values to which a highway assignment model should demonstrate assignment convergence. These are reproduced in Table 3-1 below.

Table 3-1: Summary of assignment model convergence measures

Measure of convergence	Base model acceptable values
Delta and %GAP	Less than 0.1%, or at least stable with convergence fully documented and all other criteria met.
Percentage of links with flow change (P) <1%	Four consecutive iterations greater than 98%
Percentage of links with cost change (P2) <1%	Four consecutive iterations greater than 98%
Source: Table 4, WebTAG Unit M3.1	

3.2.2 Recent experience has shown that %GAP values of less than 0.05% are routinely necessary if results from the model are to provide a robust basis for economic appraisal. The RTMs were designed with economic appraisal in mind and, in the case of SWRTM, the %GAP criterion was set much lower in the development of the original model, to a value of 0.025%.

3.2.3 For assessment of the A303 Amesbury to Berwick Down scheme, this tighter %GAP criterion of 0.025% has been retained in the 'A303 Stonehenge SWRTM (DCO)' model.

3.2.4 The target measure of convergence should be the same for 'without-scheme' and 'with-scheme' assignments. This may require a different number of iterations for

different network configurations and different matrices. Convergence is generally harder to achieve in congested conditions. Hence, more iterations may be required in the without-scheme network and in later forecast years.

3.2.5 The purpose of the model is to assess the benefits and impacts of the A303 Amesbury to Berwick Down scheme. When comparing the impact of a scheme in terms of traffic flows, journey times and economics, it is necessary to demonstrate that the differences between the 'without-scheme' and 'with-scheme' assignments are the result of real changes and not the result of modelling noise. This dictates the requirements for convergence and stability.

3.3 Variable demand model realism testing and convergence criteria

3.3.1 The variable demand model (VDM) retained the same convergence criteria as those used for all the RTMs. That is:

a. a demand / supply gap (%GAP) for the model system of 0.1%, reflecting WebTAG Unit M2; and

b. a sub-area gap for the Region of Focus of 0.2%.

4 Strategic model forecast assumptions

4.1 Forecast years

4.1.1 Traffic forecasts have been developed for the following forecast years, justification for modelling each of the years has also been provided below:

a. 2026

Description: Scheme opening year
Justification: Earliest likely opening year based on programme

b. 2031

Description: Economic appraisal intermediate year
Justification: TUBA guidance states that interpolation over more than 10 years should be avoided; hence an additional year is required between 2026 and 2041

c. 2041

Description: Design year (15 years after scheme opening)
Justification: DMRB Guidance, also needed for environmental appraisal

d. 2051

Description: Additional forecast year for economic appraisal
Justification: Reducing uncertainty in extrapolation from 2041 to end of 60 year appraisal period. NTEM dataset not available post 2051.

4.2 Uncertainty log

Demand

4.2.1 The first step in undertaking transport forecasts is to consider drivers of change not directly associated with transport networks and travel costs. These concern the nature of population and employment change, together with changes in car ownership and changes to the cost of travel. An uncertainty log was developed to define forecasting assumptions and inform the associated trip generation, in line with WebTAG Unit M4 Appendix A. The trip matrices represent several forecast years so the development sites have been allocated to certain forecast years based on the proposed build out rate and completion date identified in the uncertainty log.

4.2.2 A list of planning permissions was collated for all developments within the county of Wiltshire and the Test Valley district within Hampshire. Development outside these areas was retained from TEMPro 7.2.

4.2.3 The following Local Plan documents were also analysed for sites to be included which presently do not have planning permission:

a. Wiltshire Core Strategy Adopted January 2015; and

b. Test Valley Borough Revised Local Plan DPD, Adopted Local Plan 2011 – 2029) (January 2016).

4.2.4 The sites listed included all residential developments, employment, education, health and leisure facilities. This list formed the basis for the uncertainty log.

4.2.5 The information extracted for the purposes of traffic modelling for each site included specific details of each site to inform the trip generation forecasts including:

a. size of development (number of dwellings, employment gross floor area);

b. timing and phasing of development;

c. location (in terms of both grid reference, parish / model zone and TEMPro zone);

d. completion year; and

e. level of uncertainty (according to WebTAG guidance).

4.2.6 Appendix A presents the demand uncertainty log.

4.2.7 The initial list of developments was reviewed to select sites that were of sufficient magnitude materially to influence the traffic forecasts using the following criteria:

a. removal of housing sites that had 50 dwellings or less;

b. removal of employment sites with a gross floor area of 1,000 square metres or less; and

c. removal of sites with a net neutral or negative trip generation identified in the transport assessment.

4.2.8 The sifted list is mapped in Figure 4-1 for the full uncertainty log, and in Figure 4-2 for developments near the Area of Detailed Modelling.

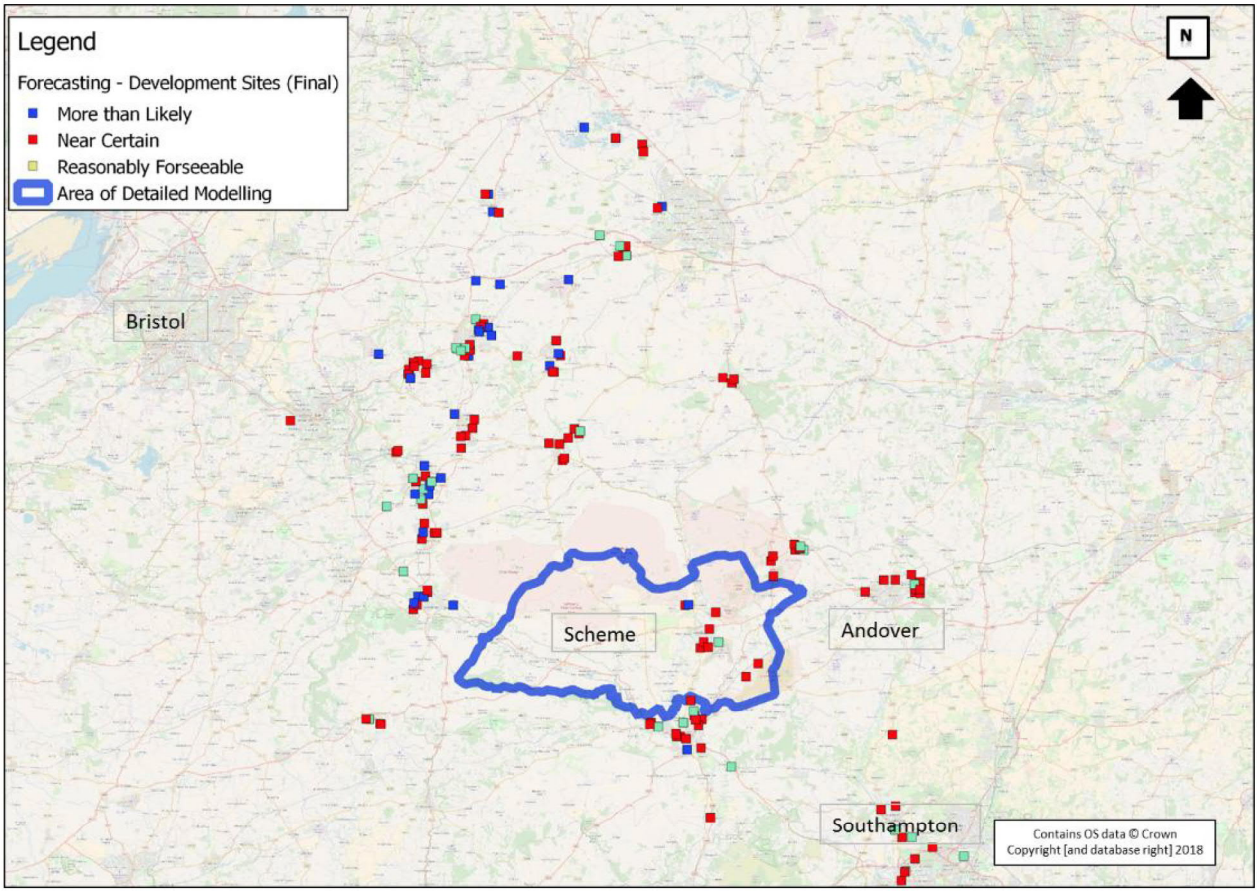


Figure 4-1: Sifted uncertainty log developments

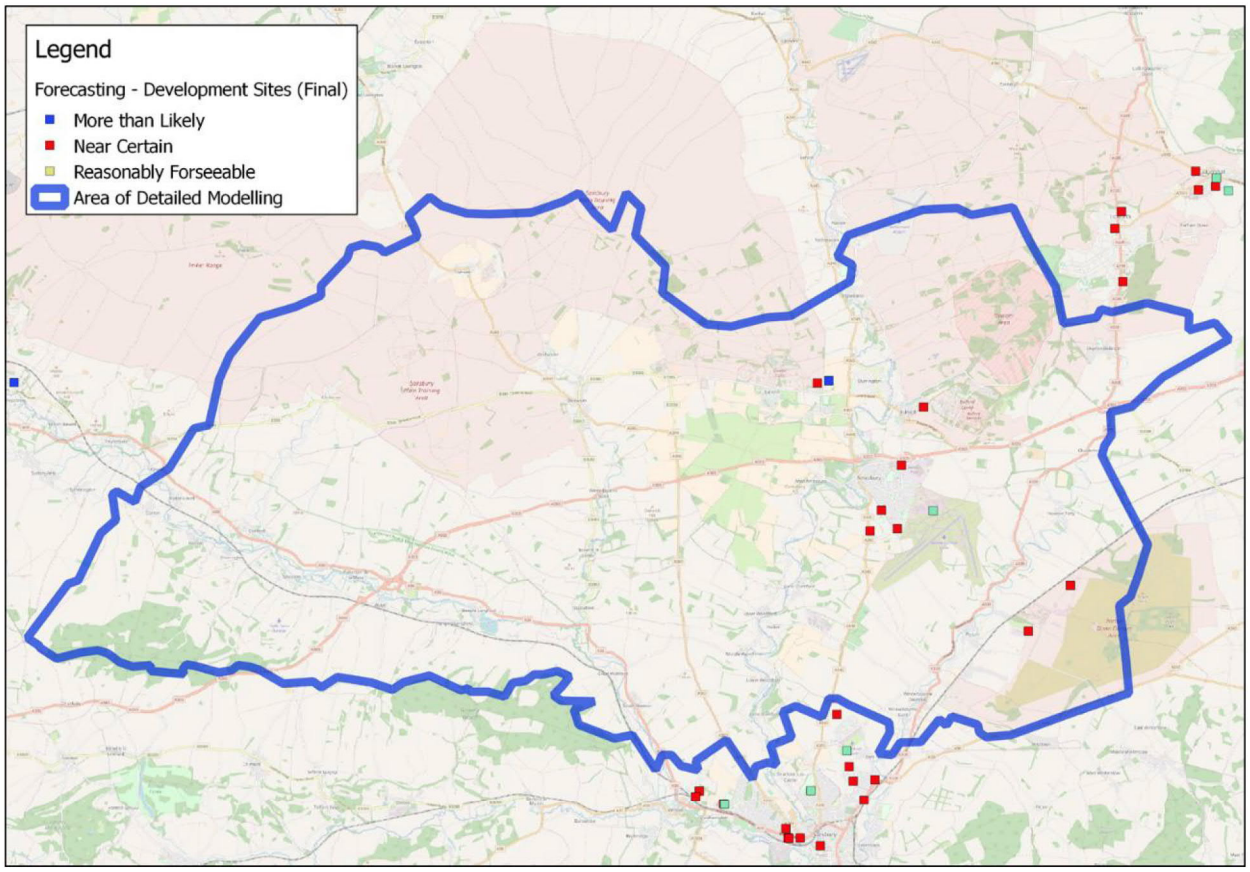


Figure 4-2: Sifted list of developments (AoDM)

4.2.9 Where the information from the planned developments was incomplete, assumptions have been made to interpret the plans as set out in Table 4-1.

Table 4-1: Planning data assumptions

Item	Assumption
Land use of the development site	For sites where employment land uses are known, but the split of land use is not, an even distribution has been assumed i.e. if B1, B2, B8 known, it has been assumed that each has been assigned 33.33%.
	For sites where employment land uses are not known, it has been assumed that the site is of mixed land use.
	Where land size is not known, Ordnance Survey open data mapping has been used to estimate the site size.
Build out rate of the development site	Where unspecified, all developments < 500 dwellings have been assumed to be built by 2026.
	Where unspecified, all developments < 10,000 sqm of employment area have been assumed to be built by 2026.
	Where unspecified, all developments with either > 500 dwellings or >10,000 sqm of employment area have been assumed to be built by 2031 (the end of the local plan).
	Where unspecified, it has been assumed that for all developments with either > 500 dwellings or >10,000 sqm of employment area, 50% of the development site would be built by 2026.

4.2.10 Members of the relevant local planning policy team were invited to comment upon the uncertainty log. The project shared a draft of the uncertainty log on 29th January 2018 with Wiltshire Council and received comments on the 14th February 2018. The project team also shared a draft of the uncertainty log on 7th February 2018 with Hampshire County Council. This request was forwarded onto Test Valley Borough Council at the behest of Hampshire County Council on 15th February with comments received on 8th March 2018.

4.2.11 The comments received were focused on either altering the certainty of the development listed, or changing the assumed build year from that given by the assumptions (detailed in Table 4-1) to reflect the latest information available. The comments received were incorporated into the uncertainty log.

Uncertainty classifications

4.2.12 The uncertainty log allocates developments into one of four categories defined by the likelihood that they will be implemented. These categories are taken from WebTAG Unit M4 Table A2 as shown in Table 4-2 below.

Table 4-2: Classification of future inputs

Table A2 Classification of Future Inputs		
Probability of the Input	**Status**	**Core Scenario Assumption**
Near certain: The outcome will happen or there is a high probability that it will happen.	Intent announced by proponent to regulatory agencies. Approved development proposals. Projects under construction.	This should form part of the core scenario
More than likely: The outcome is likely to happen but there is some uncertainty.	Submission of planning or consent application imminent. Development application within the consent process.	This could form part of the core scenario [Refer to Section Developing the Core Scenario]
Reasonably foreseeable: The outcome may happen, but there is significant uncertainty	Identified within a development plan. Not directly associated with the transport strategy/scheme, but may occur if the strategy/scheme is implemented. Development conditional upon the transport strategy/scheme proceeding. Or, a committed policy goal, subject to tests (e.g. of deliverability) whose outcomes are subject to significant uncertainty	These should be excluded from the core scenario but may form part of the alternative scenarios
Hypothetical: There is considerable uncertainty whether the outcome will ever happen.	Conjecture based upon currently available information. Discussed on a conceptual basis. One of a number of possible inputs in an initial consultation process. Or, a policy aspiration	These should be excluded from the core scenario but may form part of the alternative scenarios

Source: WebTAG Unit M4 Appendix A

Employment site area conversion to number of jobs

4.2.13 The total employment area has been converted into the number of jobs. The ratio of jobs to square metres has been taken from the Employment Density Guide

published by the Homes and Communities Agency[3]. Where a range of values is given for a class the average value has been used.

4.2.14 The employment areas have been converted from site area to gross floor area using a factor of 0.2 for non-industrial employment and 0.9 for industrial and retail, as calculated from the Employment Density Guide. This ratio recognises that sites are a mix of buildings with employees and ancillary functions such as car parks, access roads, service yards and landscaping.

4.2.15 In the instance of land use class C2 - boarding schools the Employment Density Guide does not contain any information regarding the number of employees per square metre of employment area. In this instance data were downloaded from TRICS in order to get an average number of employees per sqm of employment area to apply to the site. There were, on average, 10.88 jobs per 1,000 sqm of employment area.

4.2.16 In the instance of Land Use Class C2 – Barracks the Employment Density Guide does not contain any information regarding the number of employees per sqm of employment area. In this instance, the Army Rebasing Programme Transport Assessments prepared in 2015 for the Defence Infrastructure Organisation were reviewed to ascertain the change in number of military personnel at each barracks site. Separate Transport Assessments were produced for Army Rebasing Programme developments in Larkhill, Bulford, Ludgershall and Tidworth. In the Transport Assessments, the additional future trips (cars, HGVs) to/from each of the barrack sites was estimated by increasing existing traffic flows on a pro-rata basis in accordance with the increase in military personnel (as detailed in the Transport Assessment) at each site.

4.2.17 In the instance of Land Use Class C2 – Nursing Homes / Assisted Living the Employment Density Guide does not contain any information regarding the number of employees per sqm of employment area. In this instance data was downloaded from TRICS in order to get an average number of employees per bedroom to apply to the site. There were, on average, 0.56 jobs per bedroom.

Supply

4.2.18 Proposed highway infrastructure improvements were also included in the uncertainty log. The SWRTM DF3.0 uncertainty log was used as a starting point for identifying schemes covering the South West region. This was reviewed and refined drawing on evidence from the following sources:

a. schemes promoted by Highways England on the SRN;

b. ongoing schemes [near certain or more than likely];

c. schemes that are part of the Road Investment Strategy (RIS) period 1, for development between 2015 and 2020 [near certain or more than likely];

[3] HCA Employment Density Guide 3rd Edition, Nov 2015

d. schemes on the A303 corridor forming part of the emerging RIS period 2, for development between 2021 and 2026 [reasonably foreseeable or hypothetical]; and

e. schemes promoted by Local Highway Authorities.

4.2.19 Each highway infrastructure improvement has been added to the uncertainty log with the following information:

a. level of uncertainty (according to WebTAG guidance);

b. scheme opening year; and

c. location.

4.2.20 Appendix A presents the supply uncertainty log.

4.3 NTEM / RTF

4.3.1 Growth forecasts for cars have been calculated using the TEMPro 7.2 software and NTEM 7.2 dataset. Growth forecasts have been calculated for 2026, 2031, 2041 and 2051.

4.3.2 Growth factors have been calculated for the following geographical areas:

a. Test Valley & Wiltshire at District level (i.e. Wiltshire 001, 002 etc.) using alternative assumptions based on information captured in the uncertainty log;

b. SW & SE at County level (i.e. Test Valley, Winchester, Southampton etc.); and

c. Everything else at regional level (i.e. East Midlands, Wales etc.).

4.3.3 Section 4.7 discusses the process of how reference case demand matrices were developed, and elaborates on how NTEM and RTF data were used in this process.

4.3.4 Table 4-3 and Table 4-4 compare the number of households and jobs relating to developments captured in the uncertainty log against the number of households (HHs) and jobs forecast in TEMPro 7.2. Comparisons are presented for 2026 and 2031 only as all development captured in the uncertainty log is expected to be fully built by 2031.

Table 4-3 Growth in households and jobs (2017 to 2026)

	TEMPro 7.2		Uncertainty Log		Difference	
District	HHs	Jobs	HHs	Jobs	HHs	Jobs
Wiltshire	14,740	7,567	14,369	5,170	-371	-2,398
Test Valley	5,632	2,360	4,801	573	-831	-1,787

Table 4-4 Growth in households and jobs (2017 to 2031)

	TEMPro 7.2		Uncertainty Log		Difference	
District	HHs	Jobs	HHs	Jobs	HHs	Jobs
Wiltshire	22,759	10,777	22,332	17,378	-427	6,601
Test Valley	8,443	3,225	5,321	2,481	-3,122	-744

4.3.5 The planning data captured in the uncertainty log have been constrained to TEMPro growth at a district level. Where the total number of households or jobs captured in the uncertainty log is less than what is forecast in TEMPro, the distribution of the remaining development is based on the distribution of the unadjusted NTEM dataset.

4.3.6 Table 4-5 summarises the TEMPro growth for Wiltshire and Test Valley. Planning data have been constrained to these totals for each forecast year.

Table 4-5: NTEM 7.2 household and employment totals ('000)

	2017		2026		2031		2041		2051	
District	HHs	Jobs	HHs	Jobs	HHs	Jobs	HHs	Jobs	HHs	Jobs
Wiltshire	206	253	221	261	229	264	243	272	258	281
Test Valley	52	68	58	70	61	71	66	73	71	76

4.3.7 Table 4-6 shows the resulting growth in household and employment totals for Wiltshire and Test Valley relative to the base year.

Table 4-6: NTEM 7.2 household and employment growth relative to base year

	2017		2026		2031		2041		2051	
District	HHs	Jobs	HHs	Jobs	HHs	Jobs	HHs	Jobs	HHs	Jobs
Wiltshire	-	-	7%	3%	11%	4%	18%	7%	25%	11%
Test Valley	-	-	11%	3%	16%	5%	26%	8%	36%	11%

4.3.8 Appendix C compares the TEMPro growth at an MSOA level against the planning data (after constraining to TEMPro growth at district level). Comparisons have been presented for 2026 and 2031 only, as growth from 2031 onwards is based on TEMPro growth.

4.3.9 LGV and HGV growth is based on NTM RTF March 2015 forecasts. Growth forecasts have been calculated for 2026, 2031, 2041 and 2051. Table 4-7 show the growth forecasts for the South West region for LGVs and HGVs respectively.

Table 4-7: RTF LGV and HGV growth (south west)

Vehicle Type	2017	2021	2026	2031	2041	2051
LGV	-	11%	24%	36%	58%	81%
HGV	-	3%	6%	9%	16%	24%

4.4 Generalised cost parameters

4.4.1 PPM and PPK values represent forecast fuel price, vehicle efficiency and values of time trends and were provided by Highways England TPG. The values were calculated in accordance with the standard formulation given in WebTAG Unit A1.3. The input values and parameters have been provided by the DfT using draft values as an early release of the May 2018 WebTAG Databook.

4.4.2 The PPM and PPK values used for each time period and forecast year are shown in Table 4-8.

Table 4-8: Generalised cost parameters

2017									
Vehicle Type	Purpose	PPM				PPK			
		AM	IP	PM	Busy	AM	IP	PM	Busy
Car	Business	30.61	31.36	31.05	30.86	12.34	12.34	12.34	12.34
	Commute	20.53	20.86	20.60	20.53	5.87	5.87	5.87	5.87
	Other	14.16	15.08	14.83	14.65	5.87	5.87	5.87	5.87
LGV	Average	21.63	21.63	21.63	21.55	13.51	13.51	13.51	13.51
HGV	Average	21.96	21.96	21.96	21.87	48.07	48.07	48.07	48.06
2026									
Vehicle Type	Purpose	PPM				PPK			
		AM	IP	PM	Busy	AM	IP	PM	Busy
Car	Business	33.59	34.42	34.07	34.39	11.84	11.84	11.84	11.84
	Commute	22.53	22.89	22.60	22.87	5.61	5.61	5.61	5.61
	Other	15.54	16.55	16.27	16.33	5.61	5.61	5.61	5.61
LGV	Average	23.74	23.74	23.74	24.01	13.75	13.75	13.75	13.75
HGV	Average	24.10	24.10	24.10	24.37	51.51	51.51	51.51	52.74
2031									
Vehicle Type	Purpose	PPM				PPK			
		AM	IP	PM	Busy	AM	IP	PM	Busy
Car	Business	36.66	37.57	37.19	37.64	11.42	11.42	11.42	11.42
	Commute	24.59	24.98	24.67	25.04	5.50	5.50	5.50	5.50
	Other	16.96	18.07	17.76	17.87	5.50	5.50	5.50	5.50
LGV	Average	25.91	25.91	25.91	26.28	13.59	13.59	13.59	13.59
HGV	Average	26.31	26.31	26.31	26.68	53.66	53.66	53.66	54.95
2041									
Vehicle Type	Purpose	PPM				PPK			
		AM	IP	PM	Busy	AM	IP	PM	Busy
Car	Business	44.33	45.43	44.97	45.48	11.15	11.15	11.15	11.15
	Commute	29.73	30.21	29.83	30.25	5.49	5.49	5.49	5.49
	Other	20.51	21.85	21.48	21.59	5.49	5.49	5.49	5.49
LGV	Average	31.34	31.34	31.34	31.76	13.48	13.48	13.48	13.48
HGV	Average	31.81	31.81	31.81	32.24	55.04	55.04	55.04	56.36
2051									
Vehicle Type	Purpose	PPM				PPK			
		AM	IP	PM	Busy	AM	IP	PM	Busy
Car	Business	53.34	54.86	54.31	55.22	11.33	11.33	11.33	11.33
	Commute	35.90	36.49	36.03	36.73	5.70	5.70	5.70	5.70
	Other	24.77	26.39	25.94	26.21	5.70	5.70	5.70	5.70
LGV	Average	37.84	37.84	37.84	38.55	13.73	13.73	13.73	13.73
HGV	Average	38.42	38.42	38.42	39.14	56.51	56.51	56.51	57.86

4.5 Demand forecasting – dependent development

4.5.1 WebTAG Unit A2-2 'Induced Investment' describes a dependent development as having a clear intention to be developed at a specific site and which requires complementary investment in transport to proceed as the existing transport network cannot reasonably accommodate the additional traffic associated with the development.

4.5.2 All land use developments identified during the forecasting process are considered to be independent of the A303 Amesbury to Berwick Down scheme. The impacts of new housing will be therefore integrated into transport appraisals through existing methods and there is no requirement to assess dependent development.

4.6 Demand forecasting – explicitly modelled developments

4.6.1 This section details the developments which have been explicitly modelled in the core scenario.

4.6.2 The Army Basing Programme (ABP) for Salisbury Plain outlines the future laydown of army units in the UK as units move back from Germany. The key proposals of the ABP on Salisbury Plain are:

a. 'Behind the Wire' development on existing MoD land, consisting of Single Living Accommodation (SLA), catering and extensive new build and some conversion of existing technical accommodation, including workshops, garages, armouries, stores and offices to cater for an expected increase of approximately 4,000 military personnel; and

b. Service Families Accommodation (SFA) consisting of approximately 1,200 new houses.

4.6.3 Planning applications for new housing for the SFA development have been captured in the uncertainty log. The SLA developments have not been captured in the uncertainty log and are not therefore represented in the standard TEMPro forecasting process. Accordingly, SLA trip generation has been calculated separately based on trip rates and predicted increase in military personnel numbers detailed in the Salisbury Plain Training Area ABP Transport Assessments[4] and included in the forecast demand. The distribution of these SLA trips has been based on existing zone trip distribution as land use is not expected to change significantly from what is currently on site. Table 4-9 shows the total hourly trips growth assumed for SLA development.

4.6.4 Based on information in the Transport Assessments, the developments are expected to be fully built out by 2020, and therefore are represented in all forecast years.

[4] Larkhill Service Family Accommodation Transport Assessment Report prepared for the Defence Infrastructure Organisation dated 14 April 2015 - https://unidoc.wiltshire.gov.uk/UniDoc/Document/File/MTUvMDU5NTAvRlVMLDYyNzUwMw== [Last accessed 07 September 2018]

Table 4-9: Explicitly modelled development trips – Army Rebasing SLA

	AM Peak		Interpeak / busy day		PM Peak	
Area	**Arrive**	**Depart**	**Arrive**	**Depart**	**Arrive**	**Depart**
Larkhill	245	15	47	34	39	234
Bulford	43	35	10	9	19	33
Tidworth	37	9	7	5	6	28
Perham Down / Ludgershall	15	0	2	1	0	11
Upavon	16	1	3	2	2	12
Total	**356**	**60**	**68**	**50**	**66**	**318**

4.6.5 The following developments listed in the uncertainty log have also been identified as needing to be modelled as absolute rather than incremental change in the core scenario due to the proposed development being a 'Greenfield' site, or due to the proposed development land use being significantly different to the existing land use type. In each instance, nearby zones of a similar land use have been identified to inform an appropriate trip distribution.

Table 4-10: Explicitly modelled development trips

Reference	Zone	Development Land Use	HHs	Jobs	Nearby Zone	Greenfield / Land Use?
15/04736/OUT	20889	C2 C3 (total 2,500dw), mixed development (150,000sqm)	2,500	2,972	22578	Land Use
15/12363/OUT	20966	C3 (1,500dw), C2, B1, B2, D1, A1-4, D2	1,500	1,823	20956	Land Use
15/01800/OUT	20875	A1, A2, A3, A4, A5, B1, B2, B8, C2, & D1 (Assumed 6,000sqm each) C3 (1200 Dw)	1,200	1,189	20878	Land Use
15/12351/OUT	20966	C3 (700dw), D1, A1, A2, A3, A5	700	892	20956	Land Use
S/2011/0517	20912	C3 (450dw), A1 (250sqm), B1 (24,000sqm, D1 (250sqm)	450	518	20911	Land Use
17/06370/FUL	22435	C3 (94 dw)	94	0	22438	Greenfield
14/06624/FUL	22573	A1 (30sqm), A3 (283sqm), B1A (1,239sqm), B2 (4,056sqm), B8 (2,877sqm)	0	120	22574	Greenfield
N/13/00308/OUT	20926	B1A (4,100 SQM), B1B (4,200 SQM), B1C (4,200 SQM), B2 (12,500 SQM), B8 (25,000 SQM)	0	570	20927	Land Use
17/03417/OUT	20972	B8 (92,900 SQM)	0	1,086	20956	Land Use
17/03547/WCM	20989	B1, B2, B8 (Splits Unknown)	0	1,049	21012	Land Use

4.7 Demand forecasting - reference forecasts

4.7.1 WebTAG Unit M4 defines reference forecasts as an intermediate step to producing the without-scheme and with-scheme forecasts. It uses the growth in trip ends over the forecasting period (which are constrained to NTEM 7.2 growth using the TEMPro software at a suitable level of spatial detail), but does not take into account changes in cost.

4.7.2 The forecasting databases are set up to produce NTEM v7.2 growth forecasts for cars, whilst also including the processes to produce LGV and HGV growth (based on NTM RTF - March 2015) for 2026, 2031, 2041 and 2051.

4.7.3 Alternative assumptions were applied to the NTEM v7.2 growth forecasts using the TEMPro software, based on the household and job growth expected from the proposed development information listed in the uncertainty log. Growth rates for Middle Layer Super Output Areas (MSOA) within Wiltshire and Test Valley were adjusted accordingly and constrained at a district level, as discussed in Section 4.3.

4.7.4 Growth rates calculated at an MSOA level were applied to the appropriate model zones. Each development listed in the uncertainty log was allocated to a specific model zone based on its geographical location, allowing growth rates at a model zone level to reflect the locations and scale of proposed developments. Growth rates were disaggregated from MSOA to zone level as follows:

a. for MSOAs which did not include any development listed in the uncertainty log, the growth rate calculated was applied to all zones contained within the MSOA in question. In the absence of any detailed planning data, it is assumed that growth will be distributed evenly throughout the MSOA; and

b. for MSOAs which included developments listed in the uncertainty log, it was concluded that the zones in which the developments were located would represent a higher proportion of the overall growth within the MSOA. Similarly, zones which did not include a development listed in the uncertainty log would contribute to a lower proportion of the total growth within the MSOA.

4.7.5 Through adapting the SWRTM forecasting tool (HEIDI) to the 'A303 Stonehenge SWRTM (DCO)' model zone system, growth rates were calculated for the following demand segments, modes and time periods (Table 4-11).

Table 4-11: Demand segments

Mode	Segment Number	Trip Purpose	Detail
Car = Mode 1	1	HBEB	All Day PA Growth factors
	2	HBW	All Day PA Growth factors
	3	HBO	All Day PA Growth factors
	4	NHBEB	OD Growth Factors for all time periods
	5	NHBO	OD Growth Factors for all time periods
PT = Mode 2	1	HBEB	All Day PA Growth factors
	2	HBW	All Day PA Growth factors
	3	HBO	All Day PA Growth factors
	4	NHBEB	OD Growth Factors for all time periods
	5	NHBO	OD Growth Factors for all time periods

4.7.6 Growth rates were input into HEIDI so that the location and scale of proposed developments was represented.

4.7.7 The explicitly modelled demand at the local army camps (section 4.6) was allocated to the home based car other demand segment. Trips were allocated as fixed demand (i.e. so that trip totals are unaffected by the variable demand model process). Given the nature of travel for military purposes as not attuned to the standard assumption for home to work for non-military travel, the assumption was made to include these trips within the home based other segment.

4.7.8 The growth in port and airport trips, has been represented using standard RTM forecasting assumptions and methodology as documented in the SWRTM Traffic Forecasting Report §4.2, and in the SWRTM Model Validation Report §6.3.5.

4.7.9 Figure 4-3 and Figure 4-4 illustrate the trip end growth for 2026 and 2041 respectively. Figure 4-3 shows a concentration of higher growth in Amesbury, Larkhill, Durrington and Bulford. A high concentration of development is also shown in north Salisbury and Tidworth/Ludgershall. Figure 4-4 shows that between 2026 and 2041, higher growth in trip ends is forecast in the Stapleford, Stoford and Steeple Langford area.

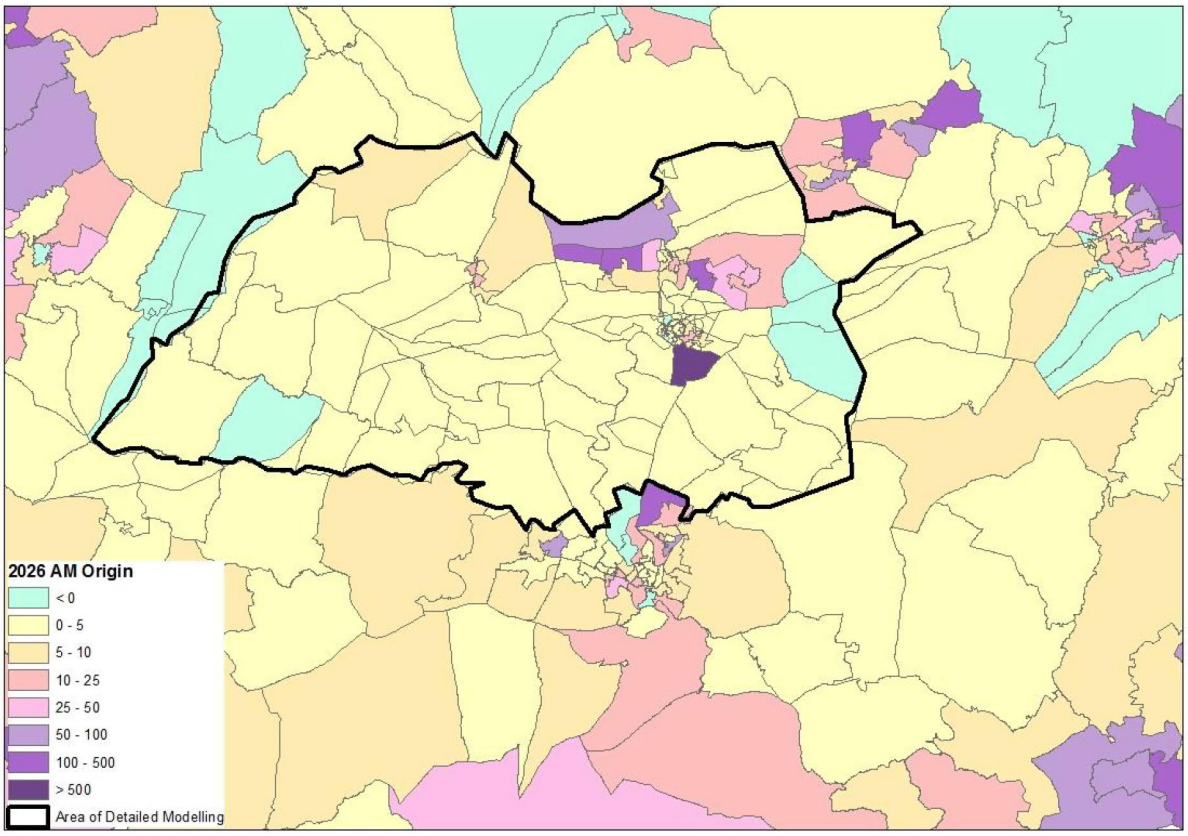


Figure 4-3: 2017 to 2026 AM trip end growth

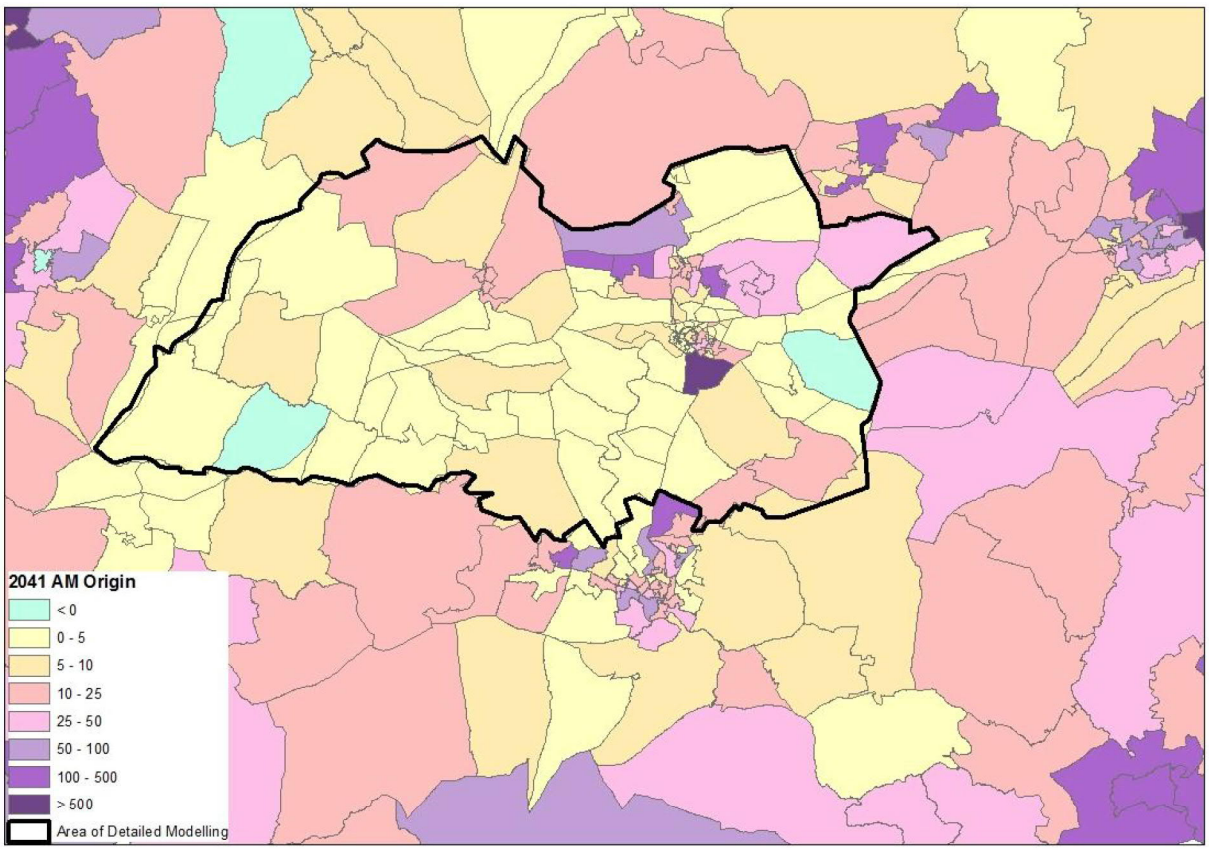


Figure 4-4: 2017 to 2041 AM trip end growth

4.8 Demand forecasting – variable demand

4.8.1 The variable demand model (VDM) applies changes in travel generalised cost to forecast changes in travel behaviour. The responses modelled include:

a. macro time period choice;

b. mode choice; and

c. destination choice.

4.8.2 The following assumptions have been input into the VDM:

a. generalised cost coefficients – calculated from early advice of the May 2018 WebTAG Databook provided by DfT;

b. rail cost skims are unchanged from SWRTM and were disaggregated to the new zoning system inheriting the parent zone cost where zones have been split;

c. vehicle occupancy values are unchanged from SWRTM and follow standard RTM guidance; and

d. outbound, return and tour proportions, used to convert 24-hour PA tours to average hour OD trips for home-based purposes, are unchanged from SWRTM.

4.8.3 The SWRTM adjustment factors (known as fitting-on factors), which are applied to convert the output from the demand model to highway assignment matrices, have been calculated from a single iteration run of the base model through VDM, comparing the input and output assignment matrices.

4.8.4 The following values of time for public transport were used, based on the early advice provided from the DfT regarding the then forthcoming update for the May 2018 WebTAG Databook.

Table 4-12: Public transport – values of time in VDM

Year	PT				
	HBEB	HBW	HBO	NHBEB	NHBO
	VoT p/hr	VoT p/hr	VoT p/hr	VoT p/hr	VoT p/hr
2017	2679.14	1087.54	496.39	2679.14	496.39
2026	2940.12	1193.48	544.74	2940.12	544.74
2031	3208.99	1302.62	594.55	3208.99	594.55
2041	3880.67	1575.27	719.00	3880.67	719.00
2051	4686.37	1902.33	868.28	4686.37	868.28

4.9 Busy day forecasting methodology

Matrix build

4.9.1 WebTAG Unit M4 'Forecasting and Uncertainty' does not give detailed guidance upon the forecasting of busy day models. The project team decided that the most appropriate way of deriving future demand for the busy day model was to apply growth factors from the neutral month inter-peak models.

4.9.2 Growth factors were derived for each sector-to-sector movement and applied to individual zone-to-zone movements. Within the South West region and areas immediately adjacent, the sectors are formed by historic counties. Outside of the South West the sectors are formed by regions or aggregations thereof. The full sector system is shown in Appendix D whilst Figure 4-5 shows the sectors used in the vicinity of the Scheme.

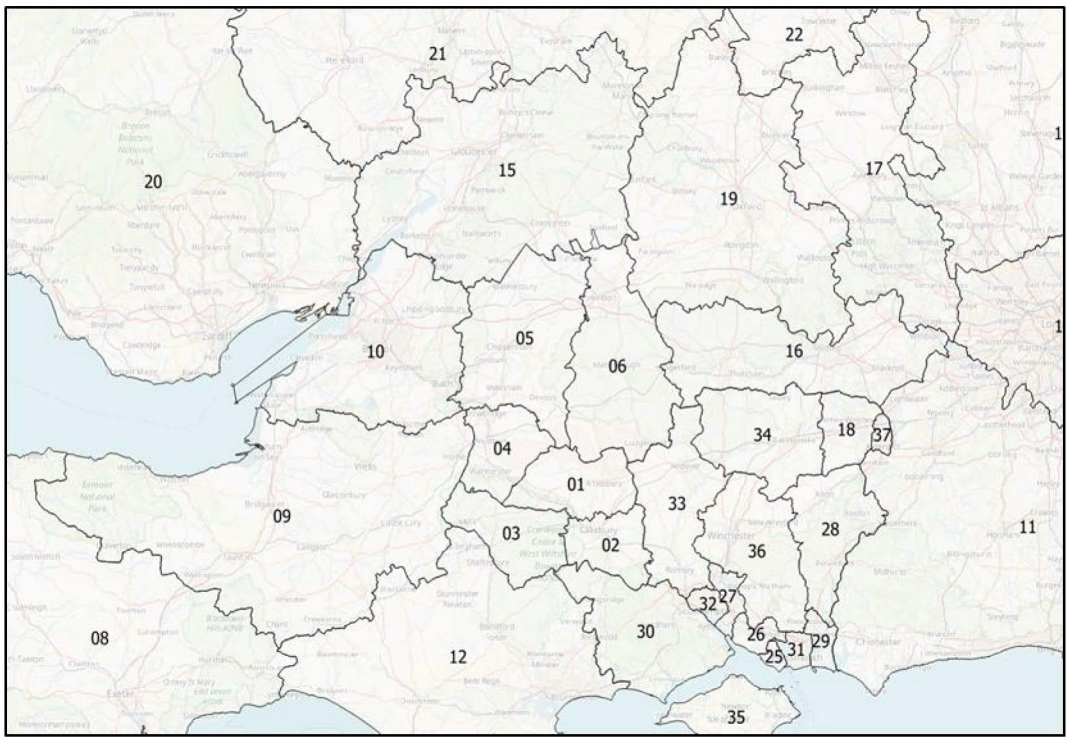


Figure 4-5: Busy day factoring sector system

4.9.3 For user classes 4 and 5 (LGVs & HGVs) the standard method of 'furnessing' the growth factors as derived from NTM was applied.

4.9.4 As with the busy day base model a proportion of the home based other trip purpose was segmented into a separate user class. This user class was developed in order to simulate the effects of incomplete route knowledge. The proportion of trips segmented remains consistent with the base year, assuming the same routeing behaviour.

4.10 Supply forecasting - without scheme network

Introduction

4.10.1 The highway network was developed, following the uncertainty log guidance set out in WebTAG Unit M4.

Without scheme coding

4.10.2 Schemes classified as being either 'near certain' or 'more than likely' have been included in the 'core' scenario. Schemes categorised as either 'reasonably foreseeable' or 'hypothetical' have been excluded.

4.10.3 It should be noted that the other A303 / A358 corridor schemes that are being planned in RIS period 1 have been included in the 'core' scenario. This follows discussion and advice with Highways England's Transport Planning Group (TPG), which confirmed that any scheme contained within a published RIS, including all Road Investment Programme (RIP), Smart Motorway Projects (SMP) and Complex Infrastructure Project (CIP) schemes, should be considered as 'more than likely' as the 'outcome is likely to happen but there is some uncertainty'. This definition therefore covers the RIP schemes in RIS1 to the west of Stonehenge: the A303 Sparkford to Ilchester improvement; and the A358 Taunton to Southfields scheme.

4.10.4 In addition, a review of more local schemes in the vicinity of the AoDM has been undertaken. This has identified a number of schemes in the local area for delivery following the 2017 base year. These comprise:

a. a new roundabout on The Packway, to access planned MoD development as part of the wider army re-basing works at Larkhill, which is located just east of the existing junction of The Packway / Tombs Road and additionally involves the stopping up of The Packway / Tombs Road junction; and

b. minor junction improvements in Bulford, involving the conversion of priority junctions to mini-roundabouts as part of highway improvements in the area for the high-load diversionary route, leading back to Solstice Park.

4.10.5 Scheme drawings for the above local road improvements are provided in Appendix B.

4.10.6 With regard to the busy day model, the capacity restraint on the link between Longbarrow and Countess in the base model has been retained in all without scheme forecast scenarios.

4.10.7 The schemes identified for inclusion in the forecast years are mapped in Figure 4-6.

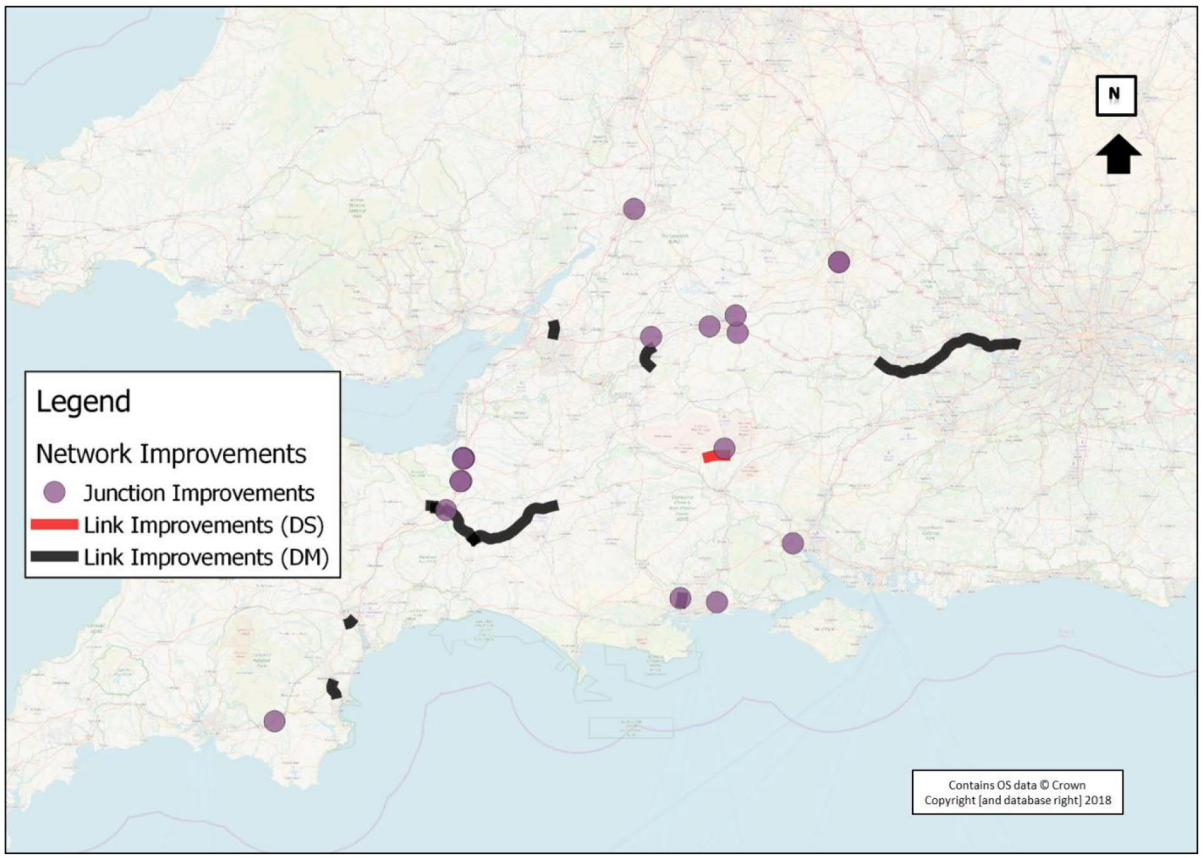


Figure 4-6: Schemes identified in uncertainty log

Network scheme coding

4.10.8 Network coding for the schemes has been derived from a number of different sources.

4.10.9 Where a scheme has previously been coded in SWRTM DF3.0, that scheme definition has been used. The coding from this has been extracted from the model and implemented within the 'A303 Stonehenge SWRTM (DCO)' model forecast year networks. The coding applied was independently reviewed.

4.10.10 Coding for the A303 Sparkford to Ilchester scheme was been provided by the consultant team supporting Highways England in its DCO application. As the scheme is at PCF Stage 3 and has been through a Preferred Route Announcement (PRA), a single option is available. The coding for this scheme has been applied appropriately in the 'A303 Stonehenge SWRTM (DCO)' model.

4.10.11 Coding for the A358 Taunton to Southfields scheme has also been provided by the consultant team supporting Highways England. As the scheme is at the Options Phase (PCF Stage 2), more than one option is available. Following TPG guidance, a project team advised that the most likely option (at that point in time) was the 'Pink route' taken to consultation in early 2018. As per the A303 Sparkford to Ilchester scheme, any amendments made to the coding to ensure compatibility with the 'A303 Stonehenge SWRTM (DCO)' model networks have followed the RTM coding guidance.

4.10.12 Other planned schemes have been coded followed the RTM coding guidance. Checks of the coding have been undertaken to ensure the network builds appropriately and that any warnings or errors generated by SATURN have been reviewed and coding amended if necessary.

Fixed speed areas

4.10.13 Fixed speed areas exist within SWRTM DF3.0, following the RTM coding conventions, representing large urban areas. Here the network is coded with less detail (fixed speeds, unlimited capacities through junctions) due to large zones and limited supply coverage. Speeds on links were fixed in the base year to observations from Trafficmaster data. Examples of fixed speed urban areas include Bristol, Exeter, Plymouth, Portsmouth and Southampton.

4.10.14 For these fixed speed urban areas speed assumptions applied in forecast years were calculated from the change in speeds predicted by the National Transport Model (NTM) Road Traffic Forecasts 2015 Scenario 1 (RTF15s1). This ensures consistency in approach and ensure that the 'A303 Stonehenge SWRTM (DCO)' model is consistent with RTM forecasting guidance.

Buffer networks

4.10.15 Buffer network coding has been taken from the SWRTM DF3.0 networks provided. As with the fixed speed areas, this ensures consistency with the standard SWRTM DF3.0 networks and the RTF15s1 speed changes as per the RTM coding guidance.

Convergence coding

4.10.16 Model assignment instability in the 2041 and 2051 forecasts has been investigated and has identified an inconsistency between network capacity and demand growth, which impacted on the model convergence. It has therefore been assumed that the highway operator would make routine minor enhancements to the network reflecting their obligations. These assumed refinements to the

network were typically eradicating flare lanes and improving signal timings to accommodate the forecast demand.

4.10.17 The network enhancements were not required along the A303 corridor or within, or near, the Area of Detailed Modelling. The network enhancements were instead located in areas such as Okehampton, Portsmouth, Reading, Bristol and Plymouth.

4.11 Supply forecasting - with scheme network

4.11.1 The following section sets out scheme assumptions.

4.11.2 The information is presented from west to east along the A303 mainline, with a final sub-section providing any scheme information related to any scheme works off of the A303. Reference drawings are listed at Appendix E. The assumptions for the Scheme are as follows:

Western end of scheme

a. The Scheme is a dual carriageway tied in with the existing A303 dual carriageway at Berwick Down, west of Winterbourne Stoke.

Winterbourne Stoke bypass

a. The A303 mainline will pass over the B3083.

b. It is understood that the B3083 underbridge will be constructed offline, to allow for the B3083 to remain open during construction works.

c. The realigned B3083 will be 5.5 metres wide as it passes under the new A303.

Longbarrow interchange

a. The overbridge between the two dumb-bell roundabouts will be dual carriageway with two lanes in each direction for the A360, separated by a central reservation.

b. Both of the dumb-bell roundabouts will feature two circulatory lanes.

c. All the on- and off-slips to and from the A303 mainline will be single lane. These will flare to two lanes at the roundabout stoplines. Flare lengths will be determined to accommodate forecast traffic volumes.

d. The current assumption is that there will be no signal control at Longbarrow junction during day time hours. However, it is understood that, due to issues surrounding lighting in the vicinity of the World Heritage Site, the junction will be unlit and therefore will require traffic signal operation at night. As the traffic modelling is for neutral and busy days between 07:00 and 19:00, it is assumed that the junction will not be under signal operation in these periods.

e. The arrangement and location of Longbarrow junction is based on the proposed 3.3 kilometre long tunnel.

Stonehenge tunnel

a. The tunnel will be dual carriageway throughout.

b. The tunnel is 3.3 kilometres long (as above).

Countess roundabout

a. Stonehenge Road will be closed for public traffic as part of the Scheme.

b. Single lane slip-roads (both on- and off-slips) are to be assumed, flaring to two lanes at the roundabout stoplines. Flare lengths in the final design will be designed to accommodate the forecast traffic.

c. The circulatory is assumed to be three lanes.

d. The A303 flyover will be dual-carriageway (i.e. two lanes).

e. The current scheme assumption is that the gyratory will be signalised. This is due to the need to provide pedestrian crossings on east-facing slips, so signalising the whole gyratory is required to ensure the gyratory is not blocked when the pedestrian crossings are called. Signalisation of Countess roundabout will therefore be coded in the traffic model.

Eastern end of the Scheme

a. The route will tie-in to the east of the River Avon.

b. The existing A303 mainline beyond this point will be retained as is.

Solstice Park junction

a. No changes are proposed to Solstice Park junction as part of the Scheme.

Minor at-grade accesses east of Solstice Park

a. Amesbury Road, north of the A303, will be converted to a northbound only movement for general traffic between the A303 and the A3028 Double Hedges.

b. The A3028 Double Hedges will be retained mostly as is – i.e. as a single carriageway, southbound only slip to the A303. The assumption for coding in the model is that there are no changes from the current arrangement.

c. Allington Track will be stopped-up, with no access to the A303. The existing private track between Allington Track and Amesbury Road will be upgraded, providing a connection between Allington Track and Solstice Park via a connection at Equinox Drive.

Rollestone Cross junction

a. This is the only scheme works assumed off the A303.

b. The existing B3086 (southern arm) will be realigned (to the west of the existing B3086) to provide a wider turning circle to The Packway (eastern arm) as part of the upgrade of the route for high-vehicles / diversion.

c. New priorities will exist at this junction. The existing priority movement (The Packway east-to-west) will be removed. Priority will instead be given to the movements between The Packway (eastern arm) and the B3086 (southern arm). The Packway, B3086 (western arm) will become the minor arm and have to give-way.

Speed limits

4.11.3 This section sets out the speed limit assumptions for the Scheme, as per the current design. A reference speed limit diagram for the Scheme is included in Appendix E, along with a separate diagram indicating speeds at Rollestone Cross. The assumptions for the Scheme are as follows:

a. the mainline will be assumed to be national speed limit for dual carriageway throughout (i.e. 70 mph, or 113 km/h);

b. the new slip roads at Countess roundabout and Longbarrow interchange will be national speed limit (i.e. 60 mph, or 97 km/h);

c. the local roads approaching Longbarrow interchange (the re-routed A360 and the old, de-trunked A303 from Winterbourne Stoke) will be national speed limit (i.e. 60 mph, or 97 km/h);

d. the A345 approaches to Countess roundabout will retain their current speed limits. The A345 has a speed limit of 30 mph (48 km/h) south of the roundabout and 40 mph (64 km/h) north of the roundabout; and

e. the realigned B3086 at Rollestone Cross will have a reduced 40 mph (64 km/h) speed limit through the new arrangement.

Scheme coding assumptions

4.11.4 Coding of the Scheme in the strategic model used standardised values (e.g. saturation flows, speed flow curves) that are consistent with those used in the base year model. These followed the Highways England Regional Traffic Model (RTM) coding guidelines.

4.11.5 Distances were measured from AutoCAD drawings, overlaid on the existing network using GIS software. These distances were coded into the traffic model.

4.11.6 In the case of signal timings, staging and phasing, these are largely retained from the base model. At Countess roundabout, the only signalised junction that is part of the Scheme, signal timings were updated using information derived from the local junction model.

Tunnel speed flow curve

4.11.7 A speed flow curve has been used to simulate the effects of vehicles running through a tunnel. The project team used Trafficmaster GPS data from the A3 Hindhead Tunnel. The site is considered a suitable proxy to the A303 Amesbury to Berwick Down scheme tunnel through the WHS as both sites are dual carriageway and operating under a national speed limit with monitoring from average speed-cameras.

4.11.8 The Trafficmaster data covers one full year from the period July 2016 to June 2017. Individual Trafficmaster GPS records are collated to give the average speed of traffic for each hour on each day across the whole year.

4.11.9 Count data were extracted from WebTRIS at the two MIDAS sites at each end of A3 Hindhead Tunnel (A3/0446A & A3/0046B and A3/0469A & A3/0469B) and averaged to get an approximate mid-link flow by hour and day across the year.

Both directions were combined in order to derive a single speed-flow curve for a D2AP tunnel.

4.11.10 Comparing the average speed and mid-link flow, piecewise linear regression analysis of the data points gives a speed-flow relationship similar to the original COBA curves. There are two distinct slopes between zero-flow and the flow breakdown and then from the flow breakdown up to the link capacity.

4.11.11 Linear regression fits to the median travel speed within defined speed bands. Speed banding aimed to minimise the absolute error between the observed average speed and the fitted speed.

4.11.12 The piecewise linear relationships are converted to power curves for use within SATURN following standard guidance for calculating the various parameters as detailed in chapter 15 of the SATURN manual.

4.12 Alternative scenarios

High and low growth scenarios

4.12.1 The high and low growth neutral month forecasts consist of forecasts based on a proportion of base year demand added or subtracted from the demand in the core scenario, as stated in paragraph 4.2 of WebTAG Unit M4. The proportion is based on a parameter, p, which varies by mode. Between 1 and 36 years, n, after the base demand, the proportion of base year demand is $p\sqrt{n}$.

4.12.2 As stated in WebTAG, the value of p is 2.5% for highway demand, and 2.0% for the rail public transport demand. This leads to the following proportions of base demand used to generate the high and low growth reference demand.

Table 4-13: High and low growth proportions

Year	Years from Base, *n*	Proportion of base demand, $p\sqrt{n}$	
		Highway	Public Transport
2026	9	0.075	0.06
2031	14	0.09354	0.07483
2041	24	0.12247	0.09798
2051	34	0.14577	0.11662

4.12.3 No additional variation has been made to the treatment of local uncertainty for the high and low scenarios.

4.12.4 No changes have been made to the network assumptions from the core scenario.

High and low growth scenarios: busy day

4.12.5 The process for deriving growth in busy day traffic for the high and low growth scenarios applied the process for the core scenarios; as described in Section 4.9.1, applying forecast growth for the neutral month on a sectored basis for car purposes and the high/low growth factors for freight.

4.12.6 The method applied differed from the method set out in WebTAG Unit M4 in order to incorporate a variable demand response into the busy day forecasts. A check was undertaken that verified that the change in demand applied to the busy day matrix was consistent with the proportion of base year demand defined in Table 4-13.

Alternative local growth scenario

4.12.7 WebTAG Unit M4 paragraph 5.1.1 states that significant sources of local uncertainty may be tested.

4.12.8 A scenario has been developed which includes potential development at Boscombe Down. The site, a military aircraft testing site, located east of Amesbury is currently run, managed and operated by QinetiQ. The aerospace company Boeing is considering development at the site, along with QinetiQ, which would result in the provision of a significant number of jobs, some of which would be 'behind the wire'. The development is not currently listed in Wiltshire's Local Plan, although there is ongoing work to prepare a transport assessment. The purpose of the scenario is to test the resilience of the Scheme to a substantial increase in employment adjacent to it.

4.12.9 Given the status of the Boscombe Down proposals there are no documented assumptions to be drawn upon. Based on a discussion with Wiltshire Council[5] it was agreed that a test assuming an additional 15,000 jobs at Boscombe Down would provide an adequate representation. Reflecting assumptions on typical trip rates, mode share and that some military staff would be based on-site, an assumption of there being 4,300 trips to and from the site per weekday was similarly assumed.

4.12.10 Trips were distributed to other zones using the trip distribution from the Solstice Park zone, with the totals by period as shown in Table 4-14.

Table 4-14: Boscombe Down development trips

Time Slice	Trips		
	Arrivals	Departures	Total
08:00-09:00	1118	146	1264
10:00-16:00	223	244	466
17:00-18:00	113	900	1013

4.12.11 It was decided that the process for deriving growth in busy day traffic for the alternative growth scenario would follow the process for the core scenarios; as described in section 4.9.1. It is acknowledged that this method dilutes the impact of trips related to the Boscombe Down development. This is because the growth, which in the neutral month is input to / from one specific zone, is instead spread throughout the sector. The advantage of this approach is that it retains the forecast representation of redistribution of travel arising from the development.

[5] 22 February 2018

4.12.12 The alternative scheme assessment preceded the development of a Transport Assessment for the Boscombe Down site. Therefore, any potential proposed mitigation for the site or detailed information on planned connectivity was unknown.

4.12.13 Given the size of the proposed development, the alternative scenario has assumed that the developer would have to ensure appropriate access arrangements. To ensure that the model test does not constrain the forecast demand these have been assumed to comprise:

a. provision for capacity enhancement at Solstice Park to allow for the junction to operate effectively with the development in place;

b. a link road between Allington Track and Solstice Park; and

c. improved connectivity between Allington Track and the A338.

4.12.14 In coding the above network enhancements into the 'A303 Stonehenge SWRTM (DCO)' model alternative scenario networks, the following assumptions have been made to ensure adequate access capacity is represented, but not to suggest that these are necessary or part of any development related transport plan:

a. The link from the A338 to Allington Track is assumed to enhance the existing local track past Arundel Farm, widening to a full two lanes (one in each direction). Where the entrance track meets the A338 a new flared approach has been assumed at the priority junction to deliver sufficient capacity to allow for the additional trips forecasts from the development;

b. The proposed link from Allington Track to Solstice Park follows the boundary fence of the existing Boscombe Down site, subsequently connecting with Equinox Drive to allow access to Solstice Park. This route allows traffic to or from the site to access the A303 without passing through Amesbury or using the existing Allington Track junction onto the A303 (which, as noted previously, is stopped-up in the 'Do Something' scenario);

c. The existing southern roundabout at Solstice Park has assumed widened approach arms on Equinox Drive (to two lanes at entry) to provide adequate capacity to accommodate traffic exiting the enlarged Boscombe Down site; and

d. The southern exit to the site is currently via a mini roundabout on Stockport Road/Main Road. In this alternative scenario, the mini roundabout was upgraded to a standard roundabout with one lane entry on the two existing links and a widened entry from Boscombe Down providing two lanes at the stop-line. This was a further enhancement to ensure adequate capacity to access the enlarged Boscombe Down development.

4.12.15 In addition to the above network enhancements, the zone containing the new development was given a secondary loading point on the new link between Allington Track and Solstice Park. This is in addition to the existing loading point currently used for access to the Boscombe Down site east of Amesbury. It was

assumed that additional access / egress provision would be made on the eastern side of the site.

Construction scenarios

4.12.16 For the purposes of the EIA and the traffic assessment, two principal phases of the construction programmed for the main works have been identified. These correspond:

a. Phase 1, when Winterbourne Stoke bypass, Longbarrow junction and Countess roundabout flyover are under construction (likely 2021-2023); and

b. Phase 2, when the construction of the tunnel is the primary construction activity (2024 onwards). The Winterbourne Stoke bypass, Longbarrow junction and Countess roundabout flyover constructed in the prior phase are now operational.

4.12.17 The construction programme will be refined through detailed design of the Scheme with appropriate regard to reducing the overall impacts during construction. Short term variations within the two identified phases have not been appraised as part of the traffic assessment.

4.12.18 A technical note explaining the assumptions made regarding the traffic management plans in order to determine changes needed to the network coding, as well as the assumed traffic during the construction phases, is in Appendix F.

4.12.19 The planning data have been reviewed and it has been determined that over three quarters of the local growth expected between 2017 and 2026 is due for completion before 2022. In consequence, the traffic is expected to grow on both the local and strategic road network by less than 10% during the 5 year construction period. This change is within the tolerances defined for traffic model validation and accordingly we have adopted the 2026 without scheme traffic forecasts as a suitable basis against which to assess impacts during construction.

4.12.20 Table 4-15 details the trips associated with the construction phase that have been added to the matrices.

Table 4-15: Construction scenario - Additional trips

Vehicular Trips	Phase 1				Phase 2			
	AM	IP	PM	Busy day	AM	IP	PM	Busy day
Construction traffic	22	22	22	16	8	8	8	6
Civil & Tunnel workforce traffic	8	23	8	14	8	25	8	15

4.12.21 Trips to and from the construction sites, and between the construction sites, were included. Three new zones were created to represent construction sites at Longbarrow, Countess and the eastern tunnel portal. Trips to and from the construction sites model medium to long distance freight trips to and from quarries to the north, south, east and west of the Scheme.

4.12.22 For the workers' commuting trips it was assumed that trips would originate within the Area of Detailed Modelling and travel to one of the three construction sites. The distribution of trips is based on the population in each zone.

Summary of forecast scenarios

4.12.23 Table 4-16 summarises the forecast scenarios.

Table 4-16: Summary of forecast scenarios

Scenario		Modelled Years	Demand	Supply
1.	Core	2026, 2031, 2041, 2051	Near certain and more than likely developments. Constrained to TEMPro.	Near certain and more than likely infrastructure schemes.
2.	High growth	2026, 2031, 2041, 2051	Proportion of base year demand added to demand in the core scenario.	As core scenario
3.	Low growth	2026, 2031, 2041, 2051	Proportion of base year demand subtracted from demand in the core scenario.	As core scenario
4.	Alternative growth	2026, 2031, 2041, 2051	Near certain and more than likely developments. Reasonably foreseeable and hypothetical developments in the Area of Detailed Modelling.	Near certain and more than likely infrastructure schemes. Reasonably foreseeable and hypothetical schemes in the Area of Detailed Modelling.
5.	Construction	2022, 2024	As 2026 plus construction traffic.	Main traffic management phases: 2022: before Winterbourne Stoke bypass is part-opened 2024 subsequent period to complete tunnel construction

4.13 Operational modelling forecast assumptions

Network assumptions

4.13.1 The operational model networks include the same network assumptions as detailed in sections 4.10 and 4.11. The drawings used to inform the operational model network are illustrated in Appendix E with relevant drawings referenced in Table 4-17.

Table 4-17: Operational modelling with scheme drawings

Scenario	Drawing
Lead up to Countess Roundabout and flyover	HE551506-AMW-HGN-SW_ML_M00_Z-SK-CH-5001-P07.1 to HE551506-AMW-HGN-SW_ML_M00_Z-SK-CH-5005-P07.1
Longbarrow Roundabout	
Winterbourne Stoke Bypass	
Rollestone Camp	HE551506-AMW-HGN-SW_ML_M00_Z-SK-CH-5006-P01.1
Double Mini Roundabout	A089116-10-35-12-307 Traffic Signs and Road Markings
Single Mini Roundabout	A089116-10-35-12-207-A - Traffic Signs and Road Markings
The Packway Mini Roundabout	A89116-10-28-C-1010 Proposed Roundabout Layout Plan

4.13.2 Key assumptions for flare lengths at Longbarrow roundabout in the model are as follows:

a. flare lengths have been matched to the drawing provided, as in Table 4-17; and

b. the A360 northbound approach requires a flare length of at least 25m with both lanes signed to the north overbridge, as this is the dominant flow which can block back to the one lane section during busy periods.

4.13.3 Additional changes to the forecast networks from the base network are specified below:

a. Initial forecast year runs indicated occasional ‘stalemate’ or ‘lock-up’ situations with overly cautious right turning vehicles giving way on The Packway. Priority rules were amended in the forecast year local network to ensure the models were realistic.

b. In the local model only, forecast year congestion was observed on the southbound destination/exit link on Countess Road where traffic leaves the local model; this was a single lane exit with green time matching the southbound phase at Countess roundabout. The exit link approaching the signal was widened from 1 lane to 3 lanes to closer replicate the stop-line at Countess roundabout.

c. The stop-line behaviour on Solstice Park Avenue at the roundabout junction with Porton Road was amended in the Do Something network. The forecast flows showed a significant increase in the level of traffic through this stop-line and resulted in significant queuing not seen in the base models. In light of this, the stop-line behaviour was reviewed; priority rules and reduced speeds were adjusted based on video footage and observed data. The changes do not completely resolve the issue but gives more realistic behaviour at the junction.

d. Signal timings at Countess roundabout have been adjusted to suit the change in forecast year traffic demand.

4.13.4 Note that the network changes in a, b and c above were applied to ensure the forecast year models ran realistically, and resolved specific issues that were not present in the base year and would not impact on previously reported base year model results.

Traffic flow assumptions

4.13.5 Forecast year traffic flows in the operational model were produced by applying the absolute differences obtained from cordons of the without scheme and with scheme SATURN average hour models for both mainline and local networks. Cordon origin-destination matrices were generated for each time period, AM, PM, inter-peak and busy-day, for base minus[6] and future year assignments. The absolute difference in traffic flow was calculated for each OD movement, and added to the base VISSIM peak hour matrices separately for the light and HGV vehicle types represented in the VISSIM model.

Construction modelling assumptions

4.13.6 The operational model base mainline networks were updated to produce a phase 1 and 2 construction scenario model for AM, PM and 'busy day' periods. The networks were updated according to the changes detailed in the construction model technical note contained in Appendix F.

4.13.7 Three additional construction zones were included in the model to represent the three construction sites, as follows:

a. an additional arm on the new northern Longbarrow roundabout to represent the main Longbarrow compound site;

b. a "left in, left out" access near Stonehenge cottages to represent the eastern tunnel portal site; and

c. the secondary construction site at Countess roundabout has been included as part of the existing service area zone.

4.13.8 The forecast traffic flows in the operational model, for the two construction scenarios, were produced using the same method as for the core networks as detailed above. The forecast flows from the SATURN construction models were used to generate an absolute difference which was then applied to the base VISSIM peak hour flows. The additional construction worker user class was combined with the lights vehicle class; the additional construction HGV class was included as a separate class in the operational models to allow for accurate route definitions.

4.13.9 Where the construction phases resulted in new merge/diverge sections, the merge behaviour defined in the base operational model was applied.

[6] assignment of the base year network without the roadworks on The Packway

4.14 Calculation of annualisation factors

Data used – traffic flows

4.14.1 To calculate annualisation factors traffic flows per hour were obtained for both directions on the A303 from WebTRIS for the following sites between 01/07/2016 and 30/06/2017:

a. west of Winterbourne Stoke TMU site 5588/1 (westbound) and TMU site 5588/2 (eastbound); and

b. west of Solstice Park TMU site 5593/1(eastbound) and TMU site 5594/1(westbound).

4.14.2 Any days that had zero flows at any hour on any of the individual sites were omitted from the calculations, with allowance for these missing periods.

Busy period identification

4.14.3 Trafficmaster journey time data on the A303 were used to identify "busy days" (i.e. days that experienced the biggest delays in journey times). Average journey times per day were then calculated by averaging the eastbound and westbound journey times per day between 01/07/16 and 30/06/17 (the latest full annual period for which data were available).

4.14.4 An overall median journey time was then calculated for weekday journey times during October 2016, the median journey time is 16m 2s.

4.14.5 Delay on a day was calculated as follows:

Delay = Average journey time – Median October weekday journey time

4.14.6 Any days with delays above 7m 30s have been identified as busy days. A total of 64 busy days were identified between 07/07/16 and 30/06/17. The threshold of 7m 30s was selected so that the average (flow weighted) delay observed on these 64 busy days was consistent with the average delay observed in the summer period represented in the model (i.e. Friday, Saturday and Sundays over the 7 weeks selected in July and August school summer holiday period). A review of the 64 days with the longest delays confirmed that these are aligned to school holiday and half term periods.

Busy period annualisation factors

4.14.7 The annualisation factors were obtained by calculating the total flow recorded at the count sites across the year by the observed flow in the modelled period as shown in Table 4-18. The hours of the year were aligned to the four periods represented in the transport model as follows:

a. busy day: 10 am – 7pm on the 64 days of the year with the largest observed delay;

b. AM Peak: 7-10 am on all working weekdays;

c. PM Peak: 4-7 pm on all working weekdays that do not occur on busy days; and

d. interpeak: all other hours of the year.

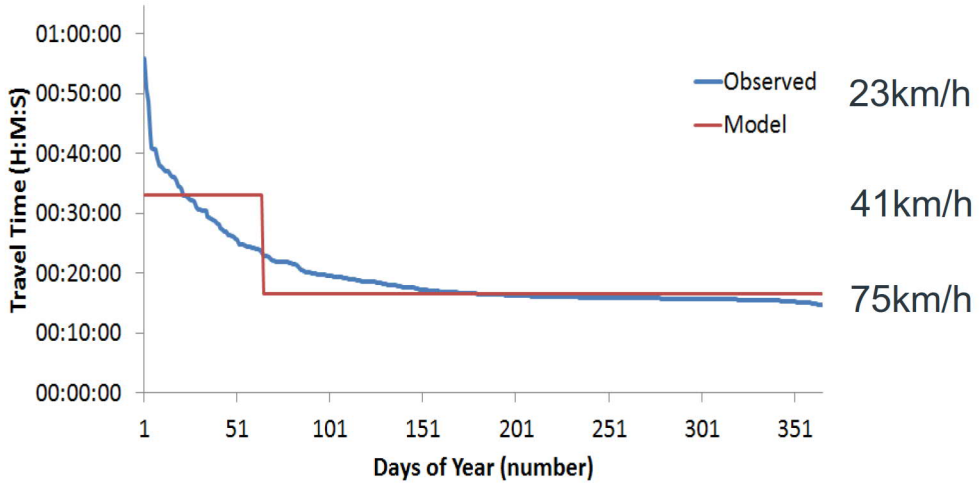
Table 4-18 Annualisation factors by period

Period	Count (both Sites)	Annual Traffic	Annualisation Factor
Busy day	4,265	2,520,082	591
AM Peak	3,523	2,741,734	778
PM Peak	3,998	2,519,848	632
Inter Peak	3,886	12,255,928	3,154

4.14.8 The 24 hour AADT flow was calculated from the individual modelled hours (AM, IP, PM and Busy) and identified annualisation factors using the below formula:

$$24\text{hour AADT} = \frac{(\text{Busy period} \times 591) + (\text{AM Peak} \times 778) + (\text{PM Peak} \times 632) + (\text{IP} \times 3154)}{365}$$

4.14.9 In addition to verifying that applying the annualisation factors reproduced observed AADT on the A303 past Stonehenge, the annualised average delay calculated from the model was compared with the average delay observed in the Trafficmaster data, to confirm that the average annual delay was reproduced. Figure 4-7 illustrates the observed journey time by day of year (in blue) ordered by length of delay and illustrates how the modelled journey time represents this variation.



Source: 2016-2017 Trafficmaster data: A338-A36, 23km section of A303

Figure 4-7: Annualised average delay

4.15 Changes to assumptions - additional sensitivity test

4.15.1 The following changes to the forecast assumptions have been identified since completion and issue of the forecasts for use in the environmental and economic assessments:

a. release of WebTAG May 2018 Databook;

b. early advice from DfT of Road Traffic Forecasts 18; and

c. change in scheme design at Rollestone Cross.

4.15.2 There are some changes to the early advice version of the WebTAG May 2018 Databook used to prepare the traffic forecasts and the version published by the DfT on 31st May 2018. The GDP forecasts have changed in earlier years (2019-2025), which would result in lower VoTs and there are some other changes in vehicle efficiencies over time. These changes are likely to have a minor impact on the traffic forecasts.

4.15.3 Table 4-19 shows the RTF 2015 growth assumptions and the early advice RTF 2018 growth assumptions.

Table 4-19: RTF 2015 and 2018 LGV and HGV growth (south west) comparison

Source	Vehicle Type	2017	2021	2026	2031	2041	2051
RTF 2015	LGV	-	11%	24%	36%	58%	81%
	HGV	-	3%	6%	9%	16%	24%
RTF 2018 (early advice)	LGV	-	6%	11%	17%	33%	45%
	HGV	-	-1%	-1%	-1%	1%	3%

4.15.4 This shows a reduction in LGV growth of almost half compared to the RTF 2015 growth factors. There is a reduction in HGV growth until 2031 and small increases in 2041 and 2051 in the RTF 2018 forecasts. These changes would have an impact on the forecast LGVs and HGVs.

4.15.5 There is a minor change in the alignment of the Rollestone Cross junction. It is likely that this would have a minor impact on the traffic forecasts as it would only result in journey time changes in the order of a few seconds.

4.15.6 Reviews of the forecasts have identified the following errors in the inputs:

a. trips associated with the Army Rebasing Programme were inputted as the transpose (i.e. arrivals have been applied as departures and vice versa);

b. busy period sector growth factors were applied to the incorrect sectors from sector 5 onwards; and

c. differences in distances coded in the with and without scheme scenarios between Countess roundabout and Solstice Park junction of 45m westbound and 135m eastbound.

4.15.7 Sensitivity testing was therefore undertaken to determine the impact of the first two input errors. Further detail is provided in Appendix G. The difference in the distances would have a minor impact on the traffic forecasts as this would only result in journey time changes in the order of a few seconds.

4.15.8 The sensitivity testing with the transposed Army Rebasing trips concluded that the flow differences on the A303 were minor and were unlikely to have a material impact on the A303 corridor. As the trips were transposed the two-way flows are

similar and therefore will not have a material impact on the environmental assessment.

4.15.9 The sensitivity testing correcting the busy period factoring showed small changes in the Area of Detailed Modelling. This along with the fact that the proportion of the AADT which the busy period time segment accounts for, means that this was unlikely to have a material impact on the environmental assessment. The corrected busy period model has however been used in the economic assessment as outputs from the whole model are incorporated.

4.15.10 A sensitivity test for the core growth scenario has been carried out which incorporates the revisions to the scheme design and to DfT forecasting advice, as well as correcting the errors. These forecasts are reported in section 5.7.18 onwards.

5 Strategic model forecast results

5.1 Introduction

5.1.1 This section of the report presents the traffic forecasts.

5.1.2 The first section explains the need for stability in the forecasting process and reports on the assignment and demand model convergence in order to demonstrate stability in the forecasts.

5.1.3 The next section presents the core scenario forecasts: the effects of different demand drivers, the outcome in terms of forecast traffic volumes and travel times, and the forecast effects of the Scheme.

5.1.4 The final section reports on the forecast uncertainty and includes results from the sensitivity testing for low, high and alternative local growth scenarios.

5.2 Model convergence

5.2.1 Well converged models are required to provide stable, consistent and robust model results and to differentiate between changes related to an intervention from those associated with model instability or noise. This section outlines the convergence and stability performance of the traffic forecasts.

Assignment convergence

5.2.2 Appendix H shows the core scenario assignment model convergence results for:

a. all forecast years (2026, 2031, 2041, 2051);

b. all modelled time periods; and

c. without scheme and with scheme scenarios.

5.2.3 The core scenario assignment models almost all converge to the WebTAG criteria outlined in Section 3.2. The only assignment model which fails to meet the criteria is the 2031 without scheme PM peak core model and that model only fails marginally.

5.2.4 Further, the 2031 forecast year does not include the changes to the network reflecting the need for credible consistency between network capacity and demand, as outlined in Section 4.10.16. The poorly converging nodes in this model are located away from the Area of Detailed Modelling in Bridgwater, Bristol and Bidford-on-Avon.

5.2.5 A sensitivity test was carried out to examine whether the lack of convergence materially impacted on the Area of Detailed Modelling by terminating the run with one loop fewer than the stopping criteria. A comparison of the flow differences between these two assignments shows no changes in flow in the Area of Detailed Modelling and minor changes of less than 10 PCUs (less than 1%) in the wider Fully Modelled Area. This demonstrates that, despite this forecast not quite achieving the convergence criteria, the flows in the Area of Detailed Modelling are stable and suitable for analysis going forward.

Demand model convergence

5.2.6 Table 5-1 shows the core scenario demand model convergence summary for with and without scheme scenarios for all forecast years.

Table 5-1: Demand model convergence – core scenario

	Year	Loops	Full Model GAP	Sub-Area GAP	Full Model Converged ?	Sub-Area Converged ?
Without scheme	2026	9	0.03%	0.18%	Yes	Yes
	2031	12	0.02%	0.17%	Yes	Yes
	2041	14	0.02%	0.18%	Yes	Yes
	2051	12	0.02%	0.18%	Yes	Yes
With scheme	2026	9	0.03%	0.16%	Yes	Yes
	2031	11	0.03%	0.20%	Yes	Yes
	2041	14	0.02%	0.18%	Yes	Yes
	2051	20	0.02%	0.22%	Yes	No

5.2.7 The forecast demand model convergence meets the criteria, with one exception being the 2051 with scheme scenario.

5.2.8 To check the stability of the demand model, an exploratory test was run on an earlier version of the 2051 forecast. This version, at that point of the model's development, did not include the network changes made to improve convergence detailed in section 4.10.16 and will therefore be less stable than the final model forecast.

5.2.9 The demand model was run for an additional loop (by changing the parameter 'maximum number of iterations' of DIADEM to 16 loops instead of 15 loops) and this showed that an additional loop of DIADEM had no appreciable impact on traffic flows within the Area of Detailed Modelling across the neutral month peak hour models. The difference in flows is shown in Figure 5-1. The change in traffic flows is less than 1% which shows that the model flows are stable in the Area of Detailed Modelling.

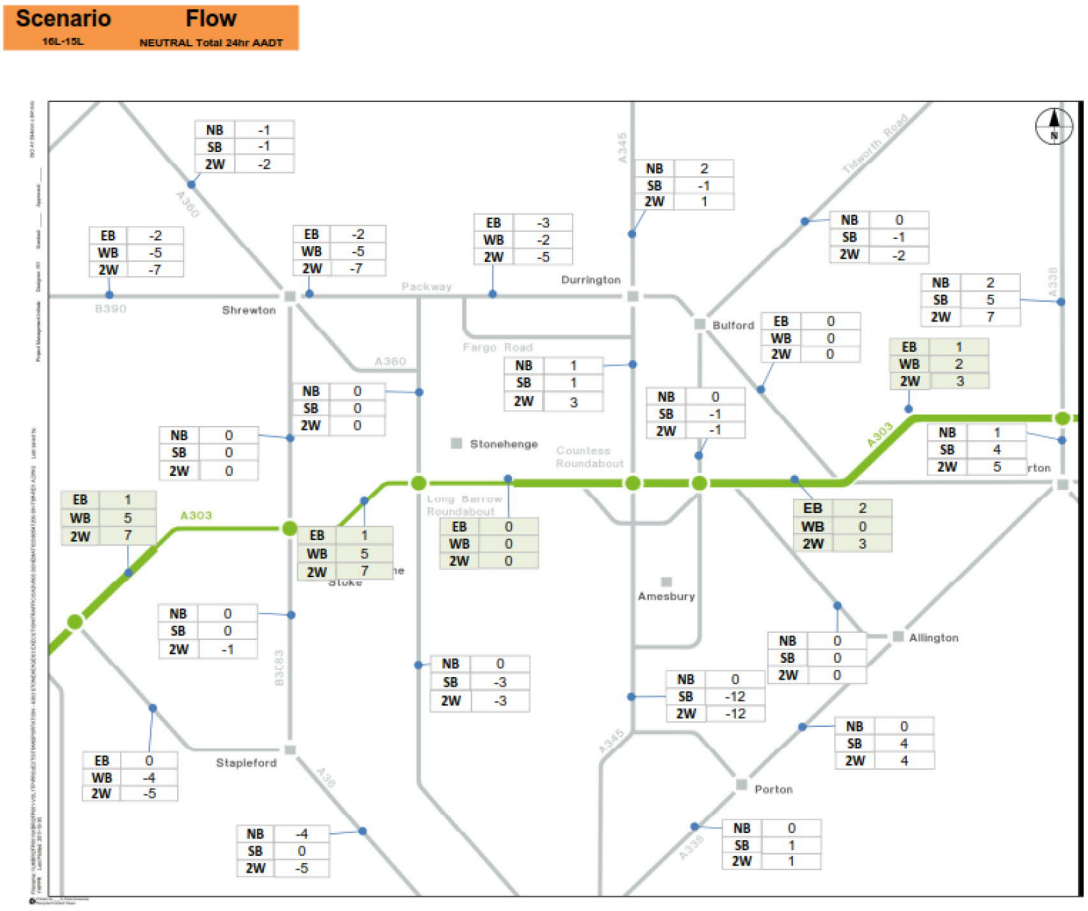


Figure 5-1: Impact of additional DIADEM loop (AADT flow difference)

5.2.10 Analysis of traffic flow changes in the wider model area shows that there are some changes in Portsmouth, Bristol and Basingstoke.

5.2.11 There is therefore some instability in the traffic forecasts in these areas. This is sufficiently far away from the Scheme to not be impacting upon traffic flow in the Area of Detailed Modelling. However, the less stable demand convergence in these areas reduces the Sub Area Gap.

Summary

5.2.12 Model flows are shown to be stable and robust in the Area of Detailed Modelling. The results are therefore suitable for use in the scheme appraisal and the operational and environmental assessments in this area.

5.2.13 There are some areas of instability in the wider model area which may need further investigation in the economic assessment as this would use outputs from the whole model area.

5.3 Demand

Reference demand

5.3.1 Table 5-2 shows the matrix totals for each forecast year, time period and vehicle type.

Table 5-2: Matrix totals - reference case

Time Period	Vehicle Type	2017	2026 reference	2031 reference	2041 reference	2051 reference
AM	Car	4,473,285	4,844,867	5,009,626	5,339,812	5,673,247
	LGV	663,971	819,959	900,655	1,048,820	1,196,952
	HGV	307,240	328,647	341,276	368,960	397,205
IP	Car	3,986,915	4,391,469	4,561,125	4,889,233	5,217,123
	LGV	633,285	782,020	858,959	1,000,211	1,141,428
	HGV	294,257	314,753	326,847	353,355	380,400
PM	Car	5,363,817	5,903,470	6,109,460	6,527,949	6,962,854
	LGV	536,484	662,537	727,752	847,494	967,209
	HGV	192,401	205,804	213,713	231,051	248,739

5.3.2 Figure 5-2 and Figure 5-3 compare the expected number of households against 24 hour home based trip productions for 2026 and 2041 respectively. The plots demonstrate the correlation between planning data and reference demand at an MSOA level and appropriately reflect typical household trip rates.

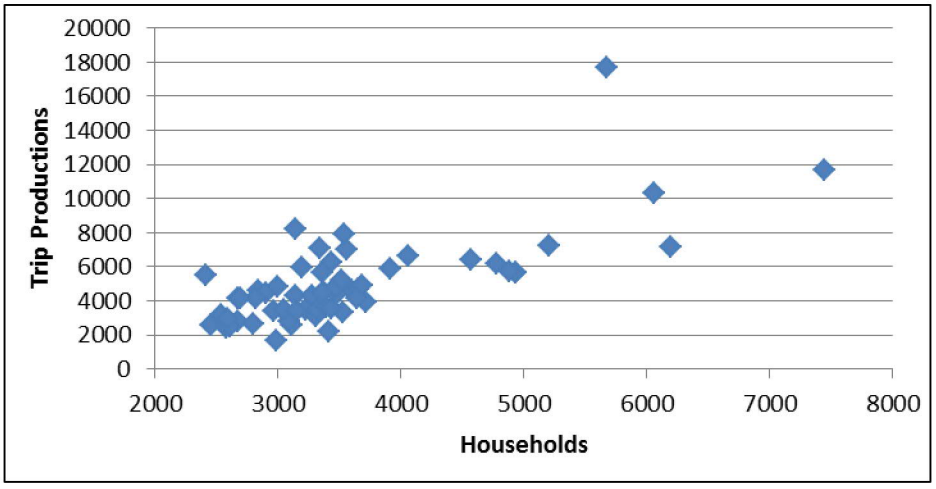


Figure 5-2: Number of households v trip productions (2026 24 hour home based)

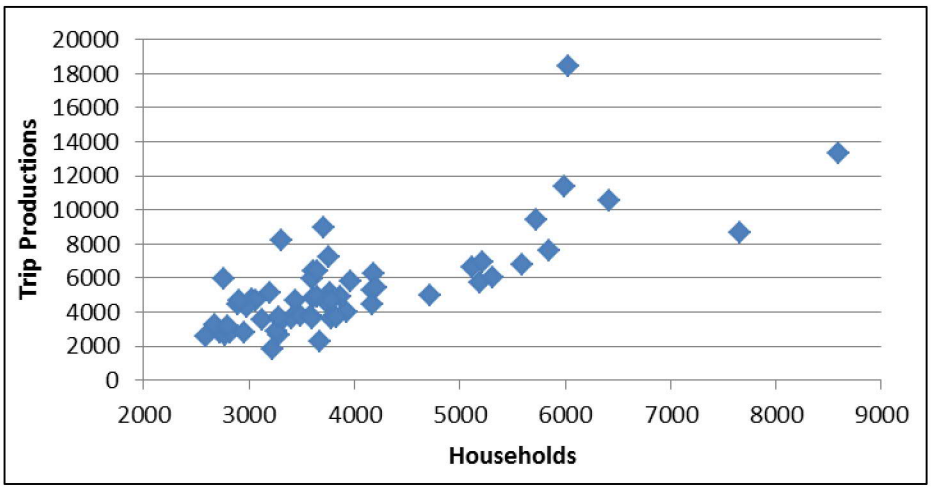


Figure 5-3: Number of households v trip productions (2041 24 hour home based)

5.3.3 Figure 5-4 and Figure 5-5 illustrate the pattern of household growth in 2026 and 2041 respectively. Household growth figures are calculated using the NTEM 7.2 database and take into account local planning data captured in the uncertainty log.

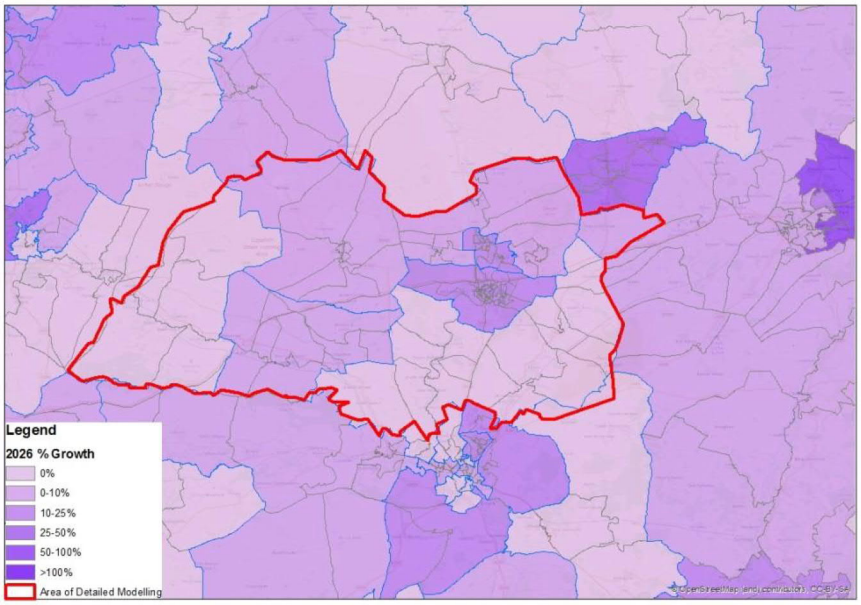


Figure 5-4 Household % growth (2026)

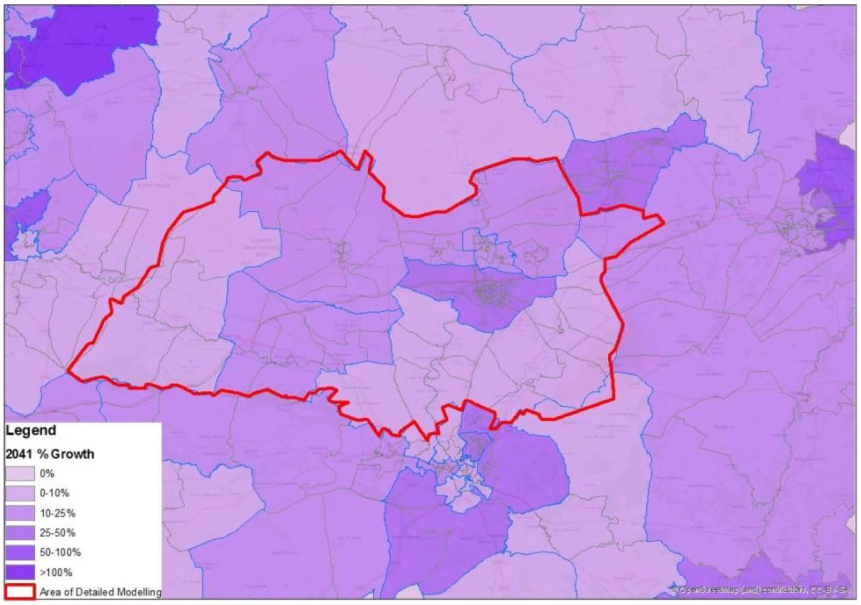


Figure 5-5 Household % growth (2041)

5.3.4 As discussed in Section 4.6, the Single Living Accommodation (SLA) developments which are part of the Army Rebasing Programme are not captured in the NTEM database. SLA development is expected to cater for 4,000 military personnel and was allocated between Larkhill, Bulford, Tidworth, Perham Down and Upavon.

Variable demand

5.3.5 Table 5-3 shows the matrix totals for the reference case, with scheme and without scheme scenarios for each forecast year and time period.

Table 5-3: Matrix totals – reference case, without and with scheme scenarios

Time period	Scenario	2017	2026	2031	2041	2051
AM	reference case	4,473,285	4,844,867	5,009,626	5,339,812	5,673,247
	without scheme	-	4,868,997	5,034,083	5,365,622	5,701,275
	with scheme	-	4,869,009	5,034,130	5,365,581	5,701,271
IP	reference case	3,986,915	4,391,469	4,561,125	4,889,233	5,217,123
	without scheme	-	4,375,148	4,543,524	4,869,516	5,196,429
	with scheme	-	4,375,158	4,543,516	4,869,537	5,196,435
PM	reference case	5,363,817	5,903,470	6,109,460	6,527,949	6,962,854
	without scheme	-	5,862,564	6,067,169	6,483,401	6,916,765
	with scheme	-	5,862,484	6,067,106	6,483,345	6,916,675
Busy	reference case	3,815,765	-	-	-	-
	without scheme	-	4,205,485	4,377,024	4,700,678	5,019,153
	with scheme	-	4,205,612	4,377,135	4,700,853	5,019,374

Sector comparison without scheme to with scheme

5.3.6 In order to further ascertain the impact of the variable demand process a sector comparison has been carried out. The coarser sector system which arranges the zones into 8 groups is shown in Figure 5-6.

Figure 5-6: Coarse sector system for VDM analysis

5.3.7 Table 5-6 shows the growth in demand between the base matrix and 2026 reference demand matrix, whilst Table 5-4 and Table 5-5 show the absolute values in the base and reference demand matrices respectively. This shows the forecast growth which is the change due to population and car ownership with travel costs being equal.

Table 5-4: Coarse sector system – base matrix (sector totals, '000, core scenario)

Sector	1	2	3	4	5	6	7	8	Total
1 (Cornwall, Devon & Somerset)	2,752	30	2	58	9	6	2	1	**2,861**
2 (Dorset)	33	1,062	55	11	1	6	-	1	**1,169**
3 (Hampshire)	2	53	1,594	34	6	124	2	6	**1,822**
4 (Wiltshire, Bristol & Gloucester)	58	11	35	3,276	104	109	4	19	**3,616**
5 (Wales & Midlands)	10	1	6	104	15,422	176	306	-	**16,025**
6 (South East)	7	6	123	110	182	18,856	20	1	**19,306**
7 (North & Scotland)	2	0	2	4	306	19	21,367	-	**21,701**
8 (AoDM)	1	1	6	19	0	1	-	29	**58**
Total	**2,864**	**1,164**	**1,825**	**3,617**	**16,031**	**19,297**	**21,703**	**58**	**66,559**

Table 5-5: Coarse sector system – reference case matrix (sector totals, '000, core scenario, 2026)

Sector	1	2	3	4	5	6	7	8	Total
1 (Cornwall, Devon & Somerset)	3,008	32	3	62	10	7	2	1	**3,126**
2 (Dorset)	35	1,142	60	12	1	7	0	1	**1,258**
3 (Hampshire)	3	57	1,766	38	7	137	2	7	**2,016**
4 (Wiltshire, Bristol & Gloucester)	62	11	39	3,595	112	120	5	24	**3,967**
5 (Wales & Midlands)	10	1	7	111	16,755	191	330	0	**17,405**
6 (South East)	7	7	137	121	197	20,846	22	2	**21,339**
7 (North & Scotland)	2	0	2	5	330	20	23,346	0	**23,706**
8 (AoDM)	1	1	8	24	0	2	0	38	**74**
Total	**3,129**	**1,252**	**2,020**	**3,968**	**17,412**	**21,329**	**23,708**	**74**	**72,891**

Table 5-6: Coarse sector system – Base matrix vs. reference case matrix (Relative differences, core scenario, 2026)

Sector	1	2	3	4	5	6	7	8	Total
1 (Cornwall, Devon & Somerset)	9%	7%	9%	8%	9%	10%	9%	4%	**9%**
2 (Dorset)	7%	8%	8%	4%	7%	9%	8%	10%	**8%**
3 (Hampshire)	9%	8%	11%	10%	10%	11%	10%	22%	**11%**
4 (Wiltshire, Bristol & Gloucester)	8%	4%	10%	10%	7%	10%	8%	28%	**10%**
5 (Wales & Midlands)	9%	8%	10%	7%	9%	8%	8%	30%	**9%**
6 (South East)	10%	9%	11%	10%	8%	11%	10%	16%	**11%**
7 (North & Scotland)	9%	8%	10%	9%	8%	9%	9%	48%	**9%**
8 (AoDM)	3%	9%	21%	27%	30%	15%	47%	30%	**27%**
Total	**9%**	**8%**	**11%**	**10%**	**9%**	**11%**	**9%**	**28%**	**10%**

5.3.8 There is nearly 30% growth in the demand forecast by 2026 in the Area of Detailed Modelling, which is consistent with the growth in demand in part due to the increase in population that includes the Army Rebasing.

5.3.9 Table 5-7 shows the absolute differences in trip distribution between the reference case and the without scheme matrix in the 2026 scenario. Table 5-8 shows the relative differences in trip distribution between the reference case and the without scheme matrix in the 2026 scenario.

Table 5-7: Coarse sector system – reference case matrix vs. without scheme matrix (absolute differences, core scenario, 2026)

Sector	1	2	3	4	5	6	7	8	Total
1 (Cornwall, Devon & Somerset)	-5,518	780	206	1,752	2,529	644	204	81	**677**
2 (Dorset)	806	-3,346	1,170	507	208	317	30	26	**-282**
3 (Hampshire)	195	1,134	-5,465	1,144	872	2,222	209	224	**536**
4 (Wiltshire, Bristol & Gloucester)	1,524	488	1,353	-38,535	33,447	2,525	433	-156	**1,079**
5 (Wales & Midlands)	2,041	190	802	18,486	-46,623	6,610	13,902	46	**-4,547**
6 (South East)	630	313	2,030	2,397	8,814	-11,154	1,484	105	**4,619**
7 (North & Scotland)	200	35	205	424	15,376	1,357	-26,675	7	**-9,071**
8 (AoDM)	78	24	261	-164	55	109	7	-338	**33**
Total	**-44**	**-382**	**561**	**-13,989**	**14,678**	**2,630**	**-10,405**	**-4**	**-6,955**

Table 5-8: Coarse sector system – reference case matrix vs. without scheme matrix (relative differences, core scenario, 2026)

Sector	1	2	3	4	5	6	7	8	Total
1 (Cornwall, Devon & Somerset)	-0.2%	2.5%	7.8%	2.8%	24.5%	9.0%	10.1%	8.9%	**0.02%**
2 (Dorset)	2.3%	-0.3%	2.0%	4.3%	15.7%	4.8%	9.8%	2.4%	**-0.02%**
3 (Hampshire)	7.7%	2.0%	-0.3%	3.0%	12.5%	1.6%	9.3%	3.0%	**0.03%**
4 (Wiltshire, Bristol & Gloucester)	2.4%	4.3%	3.5%	-1.1%	30.0%	2.1%	9.0%	-0.6%	**0.03%**
5 (Wales & Midlands)	19.6%	14.1%	11.6%	16.6%	-0.3%	3.5%	4.2%	17.6%	**-0.03%**
6 (South East)	8.6%	4.4%	1.5%	2.0%	4.5%	-0.1%	6.7%	6.4%	**0.02%**
7 (North & Scotland)	9.8%	10.3%	9.4%	9.1%	4.7%	6.7%	-0.1%	10.0%	**-0.04%**
8 (AoDM)	8.0%	2.4%	3.4%	-0.7%	21.0%	6.6%	10.0%	-0.9%	**0.04%**
Total	**0.00%**	**-0.03%**	**0.03%**	**-0.35%**	**0.08%**	**0.01%**	**-0.04%**	**-0.01%**	**-0.01%**

5.3.10 Table 5-8 shows that overall the without scheme matrix has fewer trips in it than the reference case. This implies congestion is increasing at a faster rate than the increase in the value of time (and associated perceived reduction in monetary cost) resulting in fewer trips using car, an outcome referred to as trip suppression.

5.3.11 The absolute changes in movements to and from the Area of Detailed Modelling offset the suppression of trips wholly within the Area of Detailed Modelling suggesting that there is a trend towards longer trip lengths.

5.3.12 Table 5-9 shows the absolute difference in trip distribution between the without scheme and with scheme models in the 2026 core scenario and Table 5-10 shows the relative change.

Table 5-9: Coarse sector system – without scheme matrix vs. with scheme matrix (absolute differences, core scenario, 2026)

Sector	1	2	3	4	5	6	7	8	Total
1 (Cornwall, Devon & Somerset)	-509	-15	72	23	16	321	1	60	**-31**
2 (Dorset)	-14	-64	20	0	2	34	0	12	**-10**
3 (Hampshire)	63	18	-113	89	1	-20	-2	-34	**2**
4 (Wiltshire, Bristol & Gloucester)	10	-3	89	-228	13	87	0	31	**-1**
5 (Wales & Midlands)	15	2	-1	15	-59	12	0	-1	**-17**
6 (South East)	321	36	-24	103	12	-402	-1	-4	**41**
7 (North & Scotland)	1	0	-2	0	0	0	0	0	**-1**
8 (AoDM)	60	11	-45	24	-1	-8	0	-13	**27**
Total	**-53**	**-14**	**-3**	**26**	**-17**	**22**	**-2**	**51**	**11**

Table 5-10: Coarse sector system – Without scheme matrix vs. with scheme matrix (Relative differences, core scenario, 2026)

Sector	1	2	3	4	5	6	7	8	Total
1 (Cornwall, Devon & Somerset)	0.0%	0.0%	2.5%	0.0%	0.1%	4.1%	0.1%	6.0%	**0.0%**
2 (Dorset)	0.0%	0.0%	0.0%	0.0%	0.1%	0.5%	0.0%	1.1%	**0.0%**
3 (Hampshire)	2.3%	0.0%	0.0%	0.2%	0.0%	0.0%	-0.1%	-0.4%	**0.0%**
4 (Wiltshire, Bristol & Gloucester)	0.0%	0.0%	0.2%	0.0%	0.0%	0.1%	0.0%	0.1%	**0.0%**
5 (Wales & Midlands)	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.3%	**0.0%**
6 (South East)	4.0%	0.5%	0.0%	0.1%	0.0%	0.0%	0.0%	-0.2%	**0.0%**
7 (North & Scotland)	0.1%	0.0%	-0.1%	0.0%	0.0%	0.0%	0.0%	-0.4%	**0.0%**
8 (AoDM)	5.7%	1.0%	-0.6%	0.1%	-0.4%	-0.5%	-0.4%	0.0%	**0.0%**
Total	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.1%**	**0.0%**

5.3.13 In total the variable demand modelling adds 11 trips into the 2026 with scheme matrix in comparison to the without scheme matrix; which given the size of the matrix (as shown in Table 5-5) is an extremely minor change.

5.3.14 There are some changes in distribution due to the Scheme, the most notable difference is the increase in trips from Sector 1 to 8 and vice versa; implying that the Scheme increases demand between the Area of Detailed Modelling and Cornwall, Devon and Somerset. There is also an increase in long distance trips between Cornwall, Devon and Somerset and the South East as well as Hampshire, which are reasonable demand responses to the Scheme. Changes in movements that are likely to pass through the Scheme largely comprise trips between sectors 1 and 2 (Cornwall, Devon, Somerset and Dorset) with sector 6 (south east) and between sector 3 (Hampshire) and sectors 1, 2 and 4). The Table shows an additional 973 trips forecast between these sectors. Redistribution within the sectors presented would also result in additional trips using the A303 rather than other routes.

5.3.15 The sector analysis was also carried out utilising a more granular sector system. This is shown in Figure 5-7.

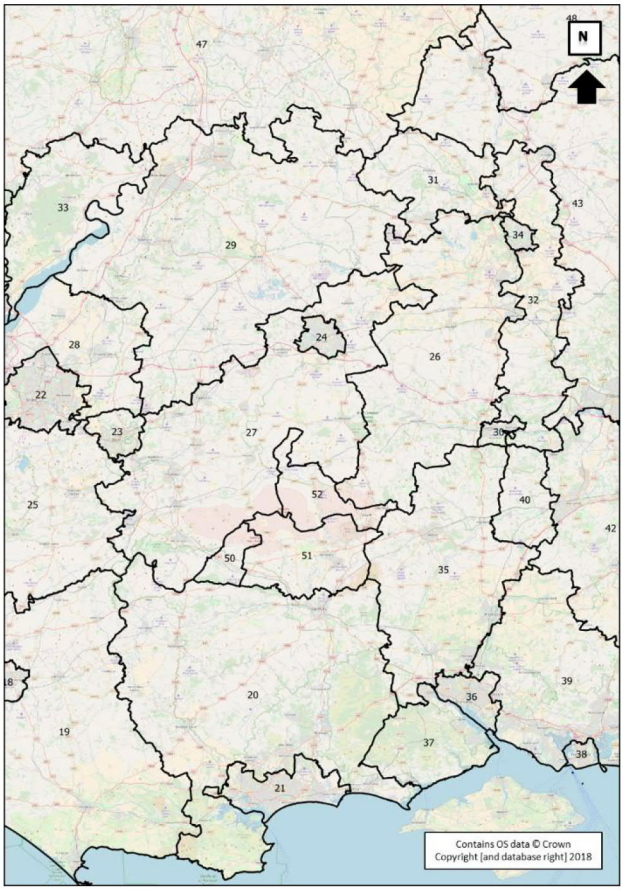


Figure 5-7: Granular sector system - AoDM

5.3.16 Table 5-11 and Table 5-12 show the impact of variable demand modelling on trip distribution within the Area of Detailed Modelling. It is noted that the reduction in trips between local sectors is minor; with a reduction in trips of less than 1% (125 trips) between the with scheme matrix and the without scheme matrix in 2026 and 4% (2,152 trips) in 2041. There is no notable difference between the distribution of trips within these sectors; the reduction in more local trips is consistent with the redistribution to longer trips also shown in Table 5-9 and Table 5-10, indicating some redistribution to use the A303 of a few hundred trips.

Table 5-11: Impact of VDM on trip distribution within the Area of Detailed Modelling (core scenario, 2026)

Trips Generation (OD) in Sectors	2017			2026								
	Base			Core Scenario - Reference Case			Core Scenario - Post VDM Without Scheme			Core Scenario - Post VDM With Scheme		
	50	*51*	*52*	*50*	*51*	*52*	*50*	*51*	*52*	*50*	*51*	*52*
50 (AoDM West)	38	234	8	35	215	9	34	214	10	34	219	11
51 (AoDM East)	235	28,599	4,399	213	37,487	4,871	212	37,152	4,893	216	37,131	4,877
52 (East Dorset-South Wilts; North of AoDM)	8	4,463	8,498	9	4,961	9,536	10	4,971	9,302	11	4,957	9,283

Table 5-12: Impact of VDM on trip distribution within the Area of Detailed Modelling (core scenario, 2041)

Trips Generation (OD) in Sectors	2017			2041								
	Base			Core Scenario - Reference Case			Core Scenario - Post VDM Without Scheme			Core Scenario - Post VDM With Scheme		
	50	*51*	*52*	*50*	*51*	*52*	*50*	*51*	*52*	*50*	*51*	*52*
50 (AoDM West)	38	234	8	35	203	10	32	201	10	32	207	12
51 (AoDM East)	235	28,599	4,399	199	39,179	5,060	196	37,671	5,106	202	37,622	5,075
52 (East Dorset-South Wilts; North of AoDM)	8	4,463	8,498	9	5,150	9,848	10	5,176	9,139	12	5,149	9,105

5.4 Core scenario: traffic flows

Traffic flows in Area of Detailed Modelling

5.4.1 Traffic flow diagrams showing the Annual Average Daily Traffic (AADT) in the core scenario are included in Appendix I for:

a. all forecast years (2026, 2031, 2041, 2051);

b. without scheme and with scheme scenarios; and

c. core growth scenarios.

5.4.2 Traffic flow diagrams showing the average hourly flow are included in Appendix J for:

a. the forecast years 2026 and 2041;

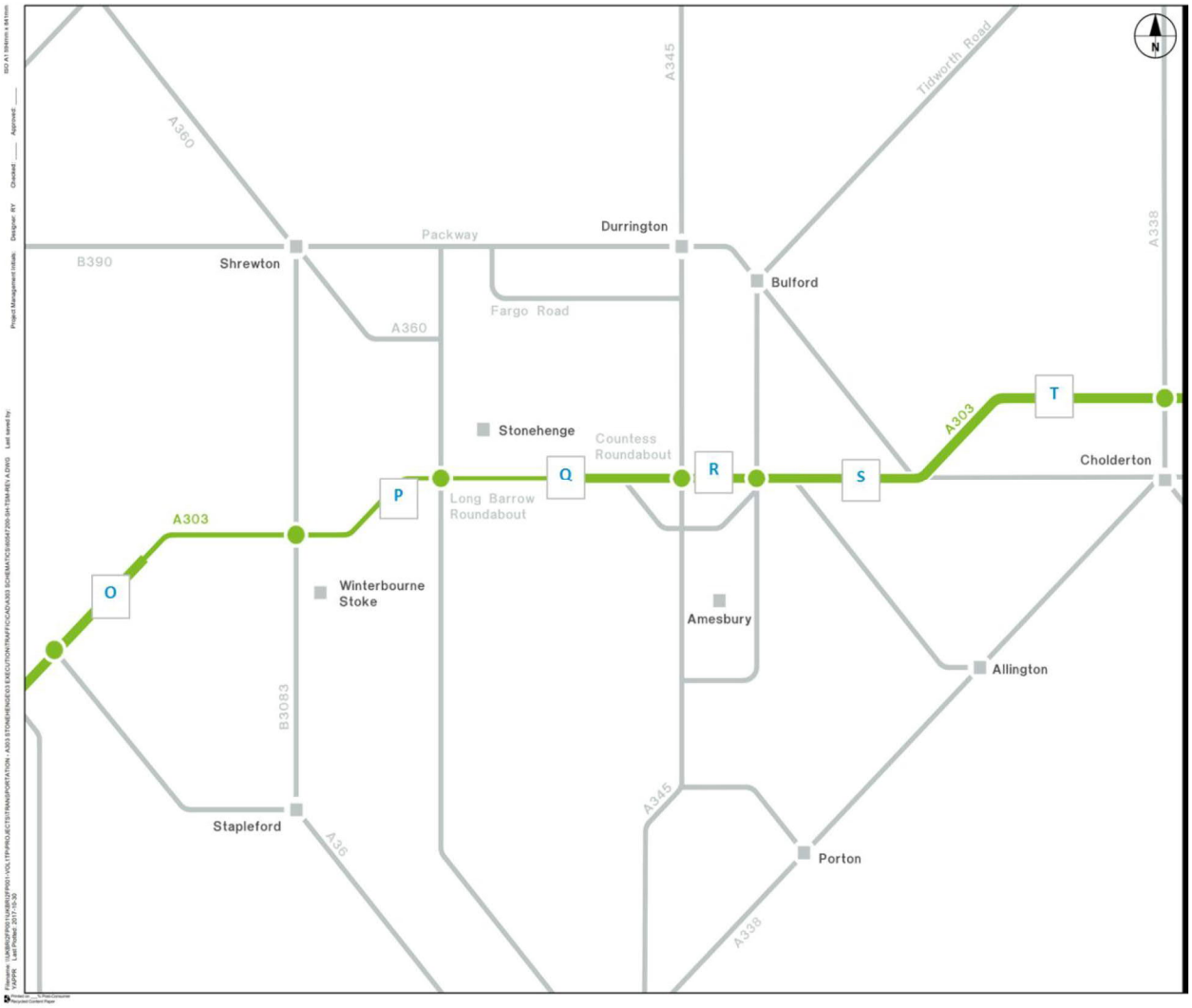
b. all modelled time periods;

c. without scheme and with scheme scenarios; and

d. core growth scenarios.

A303

5.4.3 Figure 5-8 shows the sections of the A303 for which flows are reported.



O	North of Wylye (A36 to B3083)	R	East of Amesbury (Countess to Solstice Park)
P	East of Winterbourne Stoke (B3083 to Longbarrow)	S	South of Bulford (Allington Track to Double Hedges)
Q	West of Amesbury (Longbarrow to Countess)	T	North of Cholderton (Double Hedges to A338)

Figure 5-8: Location of A303 sections

5.4.4 Table 5-13 shows how traffic volumes increase over time on each section of the A303 in the AoDM without the Scheme.

Table 5-13: A303 AADT without scheme

AADT						
Section of A303	**Direction**	**2017**	**2026 without scheme**	**2031 without scheme**	**2041 without scheme**	**2051 without scheme**
North of Wylye (A36 to B3083)	EB	9,800	11,700	12,400	13,400	13,900
	WB	9,900	11,500	12,100	12,900	13,300
East of Winterbourne Stoke (B3083 to Longbarrow)	EB	9,900	11,800	12,500	13,400	14,000
	WB	10,300	12,000	12,600	13,300	13,800
West of Amesbury (Longbarrow to Countess)	EB	12,500	14,300	15,200	16,000	15,900
	WB	13,000	15,100	15,700	16,100	16,000
East of Amesbury (Countess to Solstice Park)	EB	13,800	16,800	17,800	19,200	20,000
	WB	12,800	15,100	15,900	17,100	17,900
South of Bulford (Allington Track to Double Hedges)	EB	15,100	18,500	20,000	21,400	22,000
	WB	16,500	19,400	20,700	21,900	23,000
North of Cholderton (Double Hedges to A338)	EB	17,100	21,000	22,700	24,400	25,200
	WB	16,400	19,300	20,500	21,700	22,800

5.4.5 The increases are consistent for sections and years except for the section between Longbarrow and Countess where the operational capacity appears to constrain the AADT (two way) to approximately 30,000 vehicles per day.

5.4.6 Table 5-14 and Table 5-15 below show the change in traffic volume between the without and with scheme scenarios.

Table 5-14: A303 AADT without and with scheme scenarios 2026

AADT					
Section of A303	**Direction**	**2026 without scheme**	**2026 with scheme**	**Difference**	**% Difference**
North of Wylye (A36 to B3083)	EB	11,700	14,200	2,500	21%
	WB	11,500	14,600	3,100	27%
East of Winterbourne Stoke (B3083 to Longbarrow)	EB	11,800	14,200	2,400	20%
	WB	12,000	14,600	2,600	22%
West of Amesbury (Longbarrow to Countess)	EB	14,300	18,500	4,200	29%
	WB	15,100	18,700	3,600	24%
East of Amesbury (Countess to Solstice Park)	EB	16,800	19,300	2,500	15%
	WB	15,100	17,700	2,600	17%
South of Bulford (Allington Track to Double Hedges)	EB	18,500	20,500	2,000	11%
	WB	19,400	21,200	1,800	9%
North of Cholderton (Double Hedges to A338)	EB	21,000	23,000	2,000	10%
	WB	19,300	21,100	1,800	9%

Table 5-15: A303 AADT without and with scheme scenarios 2041

AADT					
Section of A303	**Direction**	**2041 without scheme**	**2041 with scheme**	**Difference**	**% Difference**
North of Wylye (A36 to B3083)	EB	13,400	17,300	3,900	29%
	WB	12,900	17,800	4,900	38%
East of Winterbourne Stoke (B3083 to Longbarrow)	EB	13,400	17,300	3,900	29%
	WB	13,300	17,800	4,500	34%
West of Amesbury (Longbarrow to Countess)	EB	16,000	22,700	6,700	42%
	WB	16,100	22,800	6,700	42%
East of Amesbury (Countess to Solstice Park)	EB	19,200	23,600	4,400	23%
	WB	17,100	21,400	4,300	25%
South of Bulford (Allington Track to Double Hedges)	EB	21,400	24,600	3,200	15%
	WB	21,900	24,700	2,800	13%
North of Cholderton (Double Hedges to A338)	EB	24,400	27,400	3,000	12%
	WB	21,700	24,500	2,800	13%

5.4.7 The with scheme traffic volumes are greater than the without scheme flows by a notable amount and particularly where the constraint on the volume of traffic between Longbarrow and Countess has been removed as the two-way AADT by 2041 is forecast to increase by over 40% to more than 45,000 vehicles.

5.4.8 The evidence from Table 5-13 to Table 5-15 demonstrates that demand along the A303 without the Scheme is being constrained. This constraint on the route is removed when the Scheme is implemented.

5.4.9 The variable demand evidence does indicate that there is an element of redistribution of trips which is contributing to the increased volume of traffic on the A303, for example there are more trips between the Cornwall, Devon and Somerset sector and the south east throughout the day.

Screenline flows

5.4.10 To understand the extent of rerouting onto the A303 at Stonehenge that is forecast to occur with completion of the Scheme, analysis has been undertaken of flows through a north/south screenline through the network.

5.4.11 The screenline analysed extended from the M4 at the north through to the A31 at the south and incorporated The Packway, A4 and A36 and other roads as shown in Figure 5-9.

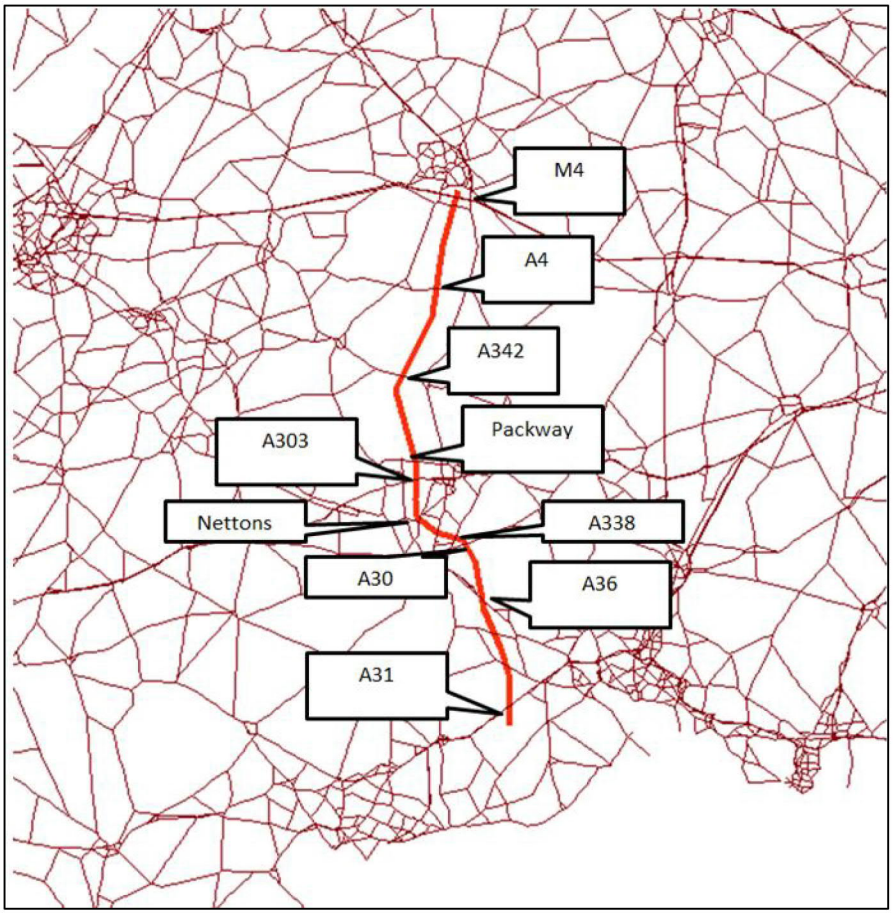


Figure 5-9: Screenline of east/west flows

5.4.12 The 2026 screenline analysis shows a flow increase of 1.1% with the Scheme in place compared to the without scheme scenario.

Table 5-16: 2026 screenline flows (two way AADT)

	Name	2017	2026 without scheme	2026 with scheme
North of A303	M4	64,200	81,500	80,600
	A4	10,000	11,300	11,200
	A342	7,300	8,700	8,500
	N of A303	2,900	3,800	3,800
	Packway	4,800	6,900	4,100
A303	A303	25,500	29,400	37,200
South of A303	S of A303	6,500	7,600	7,600
	S of A303	3,100	3,000	3,000
	Nettons	1,400	1,700	1,500
	S of A303	14,400	18,300	18,400
	A338	6,000	8,000	8,100
	A36	17,500	19,300	19,200
	A30	11,200	12,300	11,600
	A31	60,200	70,100	70,000
Total		235,000	281,800	284,800

5.4.13 There is an increase on the A303 which is due to the route becoming relatively more attractive than the alternatives when the Scheme is in place. The screenline shows a number of the key competing routes and indicates that most of these are forecast to carry less traffic in the with scheme scenario than without scheme.

5.4.14 The screenline comparison, together with the change in inter-sector flows discussed in Section 5.3, demonstrate that the majority of the increase in traffic forecast to use the A303 arises from traffic re-routeing from other E-W roads, together with moderate re-distribution arising mainly from an increase in long distance trips between counties to the east and west of Wiltshire and in part between an increase in local trips starting and finishing near the Scheme and making longer journeys along the A303.

5.4.15 As Table 5-9 shows, with the Scheme in place, the A303 becomes a more attractive route for longer distance trips to and from Cornwall, Devon and Somerset, from the south east. Within the AoDM and Wiltshire sectors the route is attractive to traffic heading in both directions. The route does not impact many trips to and from the Midlands, Wales, the north and Scotland.

Local roads – without the Scheme

5.4.16 Modelled traffic flows for the 2017 base year and for the forecast years are set out in Appendix I and Appendix J. Figure 5-10 summarises the forecast change in traffic flows, without the Scheme, between the model base year, 2017, and 15 years after the assumed opening year of the Scheme, 2041 and Figure 5-11 shows the percentage change forecast relative to the modelled 2017 traffic volumes.

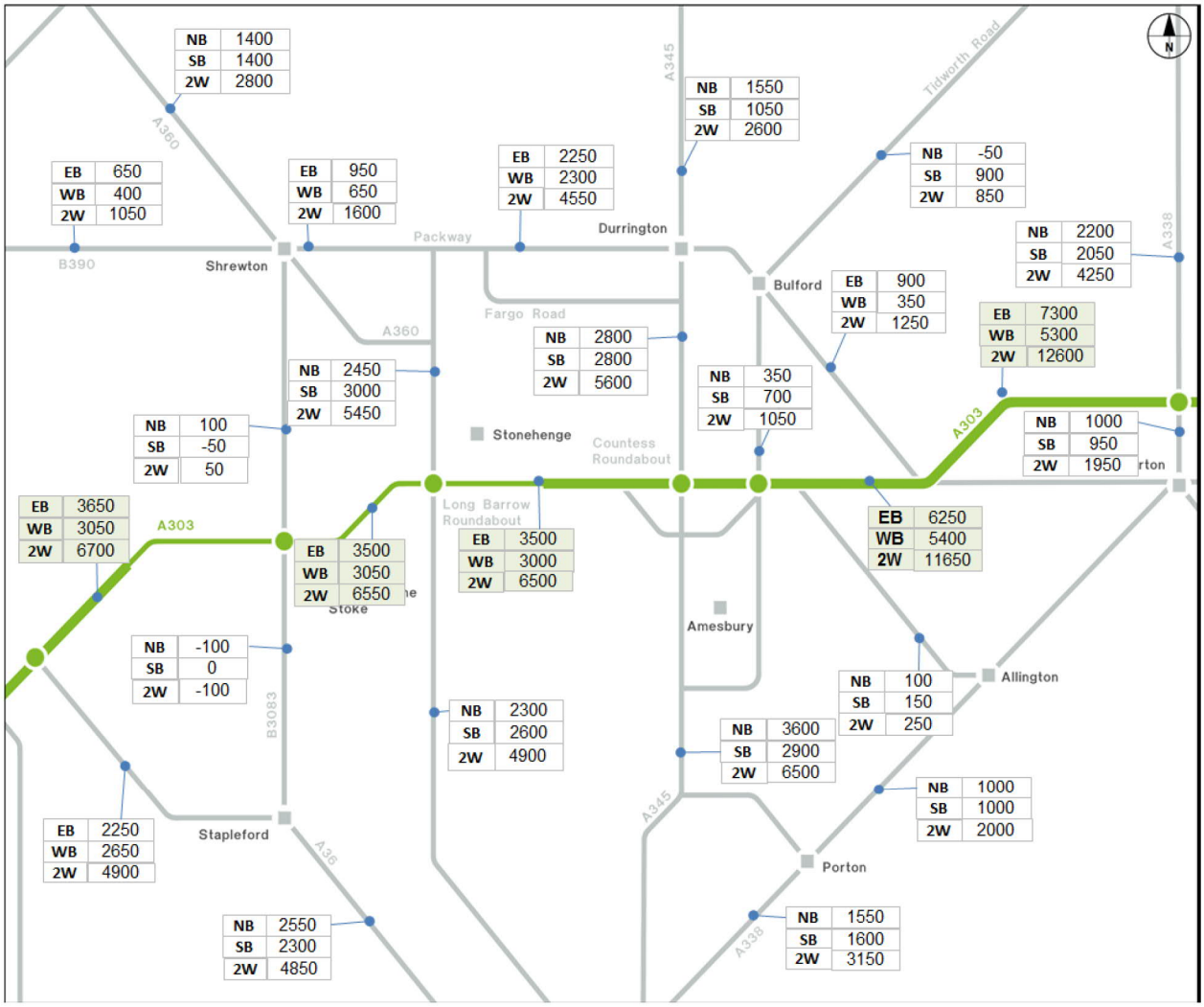


Figure 5-10: Forecast change in daily traffic 2017 – 2041 without the Scheme (Vehicles, AADT)

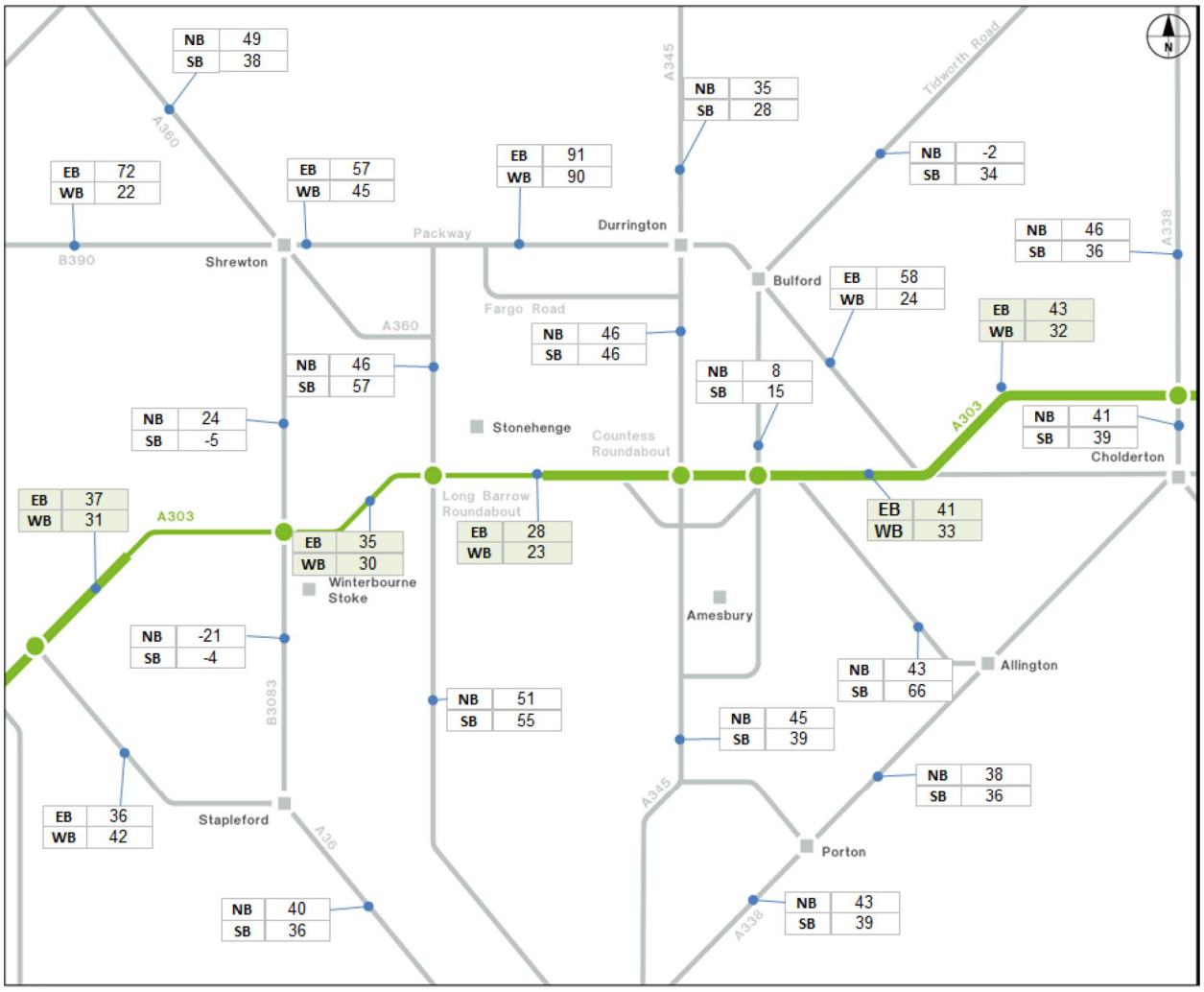


Figure 5-11: Forecast % change in AADT 2017 – 2041 without the Scheme

5.4.17 A notable impact is the increase in traffic on The Packway. As discussed in paragraph 5.4.5 the A303 reaches capacity which means that trips which are being made in the area around the Scheme start to seek alternative routes, with The Packway being the most attractive alternative.

Local roads – impact of the Scheme

5.4.18 Figure 5-12 shows the change in daily traffic flows on the local road network forecast to result from the Scheme in 2041, by direction and for the total two way volume (2W). Changes along the A303 are shaded and are discussed in sections 5.4.3 to 5.4.1.

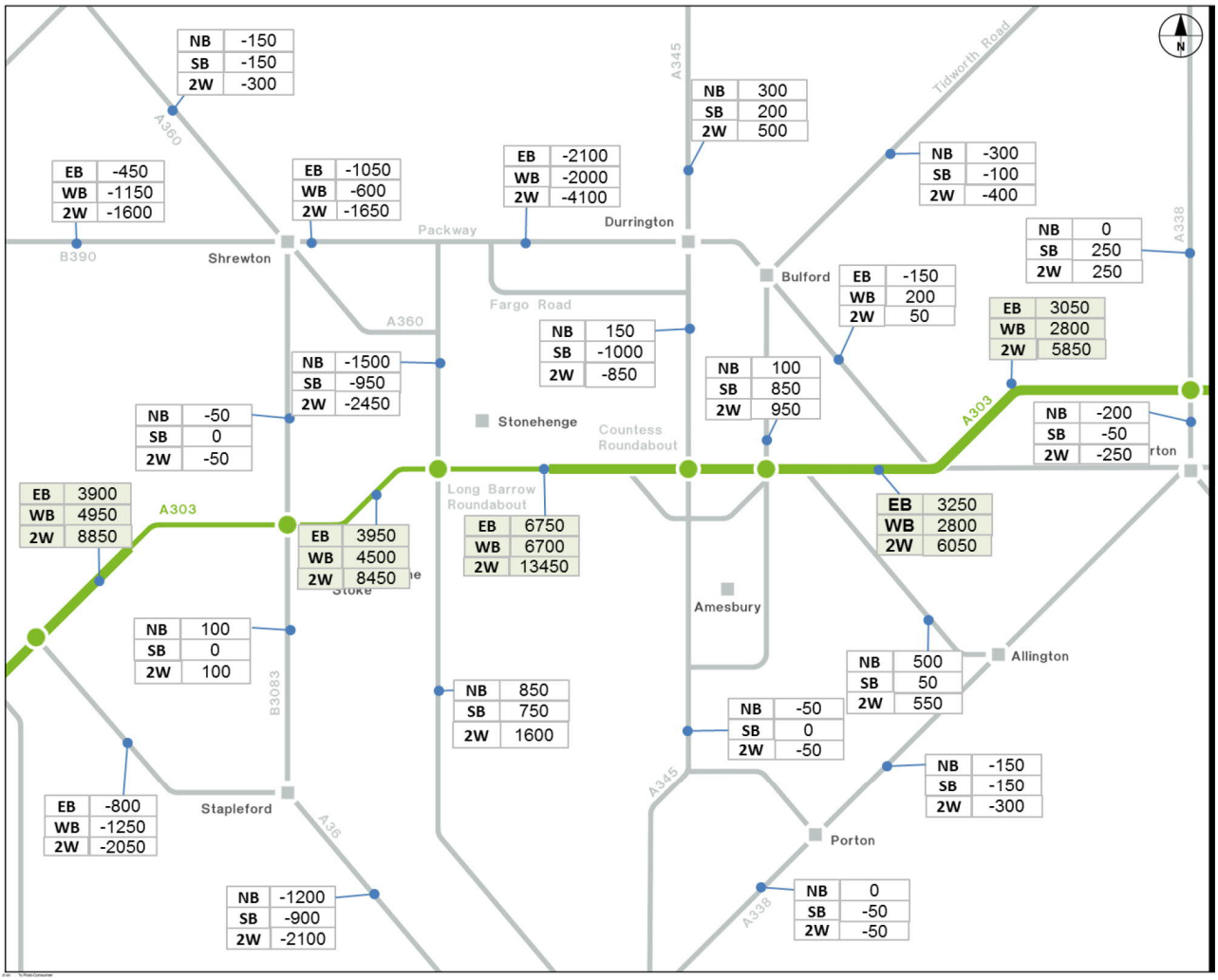


Figure 5-12: Change in daily traffic (2041 AADT vehicles) forecast to result from the Scheme

5.4.19 The main local impacts of the Scheme are the reduction of trips on the existing A303 alignment through Winterbourne Stoke and the reduction in trips on The Packway which is shown in Figure 5-12.

5.4.20 This reduction along The Packway is complemented by other reductions north of the A303 including the B390 through Shrewton and the A360/B3086 between Longbarrow roundabout and Rollestone Cross. These changes represent a reduction of just over 40% of traffic that would be forecast to use these roads without the Scheme.

5.4.21 These reductions in flow reflect the effects of:

a. local re-routeing to benefit from the reduced journey times delivered by the Scheme along the A303, for example by using the A303/A36 between Amesbury and Warminster rather than The Packway/B390; there are larger changes forecast westbound on the B390 west of Shrewton reflecting the forecast delays turning right onto the A36, relative to the ease of turning left from the A36 to travel eastbound; and

b. through A303 traffic which diverts (rat-runs) onto the local road network to avoid severe delays on busy days; combining both effects, the traffic volumes

on busy days along The Packway are forecast to reduce by 75% as a result of the Scheme.

5.4.22 Little change in traffic is forecast for traffic flows on the B3083 north/south through Winterbourne Stoke, the main change being access to Berwick St James for the A303 west becoming to the south and via the A36. There is some rerouting at the Rolleston junction with vehicles forecast to access the A360 at Airman's Corner (Stonehenge Visitor Centre), rather than through the centre of Shrewton.

5.4.23 The Scheme is forecast to have little net impact on traffic volumes to the east for Durrington. While there are routeing changes evident on The Packway the increase in traffic from Bulford and Durrington accessing the A303 rather than using The Packway is offset by a reduction in traffic from Amesbury accessing The Packway. The main change evident is a forecast increase in use of Salisbury Road between Bulford and Solstice junction (950 vehicles represents less than a 10% increase), together with a corresponding reduction (850 vehicles per day, about 5%) in traffic forecast to use the A345 between Durrington and Countess roundabout.

5.4.24 To the south of the A303 the largest change is forecast to be some re-routeing for areas to the north west of Salisbury to access the A303 /west via the A360 rather than the A36, due to the journey time savings delivered by the Scheme along the new Winterbourne Stoke Bypass relative to the existing route through Winterbourne Stoke. The forecast reduction of just over 2000 vehicles per day on the A36 and 1600 vehicles on the A360 represent a change of about 10%.

5.4.25 Within north Amesbury, the closure of the existing A303 means that Stonehenge Road can no longer serve traffic from Amesbury to the west. The dominant change is forecast to be re-routeing of traffic from the Woodford Valley and Stonehenge Road, instead to use Church Street and High Street to access the A303 via Countess roundabout with the Scheme, broadly 500 trips per day.

5.4.26 To the west of Amesbury the Scheme would include stopping up of the direct connection between Allington Track and the A303 and instead providing a link to Equinox Drive within Solstice Park. While traffic volumes are low, this is forecast to improve access to north Amesbury and through Solstice junction to Bulford, with an increase of about 500 vehicles per day forecast to use Allington Track rather than taking alternative minor routes from the A338 to the A345.

5.4.27 The traffic forecasts indicate no material changes on the A345 south of Amesbury or A338 and other roads to the north of Salisbury (other than the re-routeing between A360 and A36 previously discussed). On busy days the forecasts suggest that there may be some small additional demand for the A338/A36 route, arising from delays on the A303 past Stonehenge without the Scheme, that the Scheme would alleviate.

5.5 Core scenario: Journey times

5.5.1 Appendix K shows the journey time results for:

a. all forecast years (2026, 2031, 2041, 2051);

b. all modelled time periods;

c. without scheme and with scheme scenarios; and

d. core / high / low / alternative local growth.

5.5.2 Figure 5-13 and Figure 5-14 show the journey time routes considered in this Transport Forecasting Package.

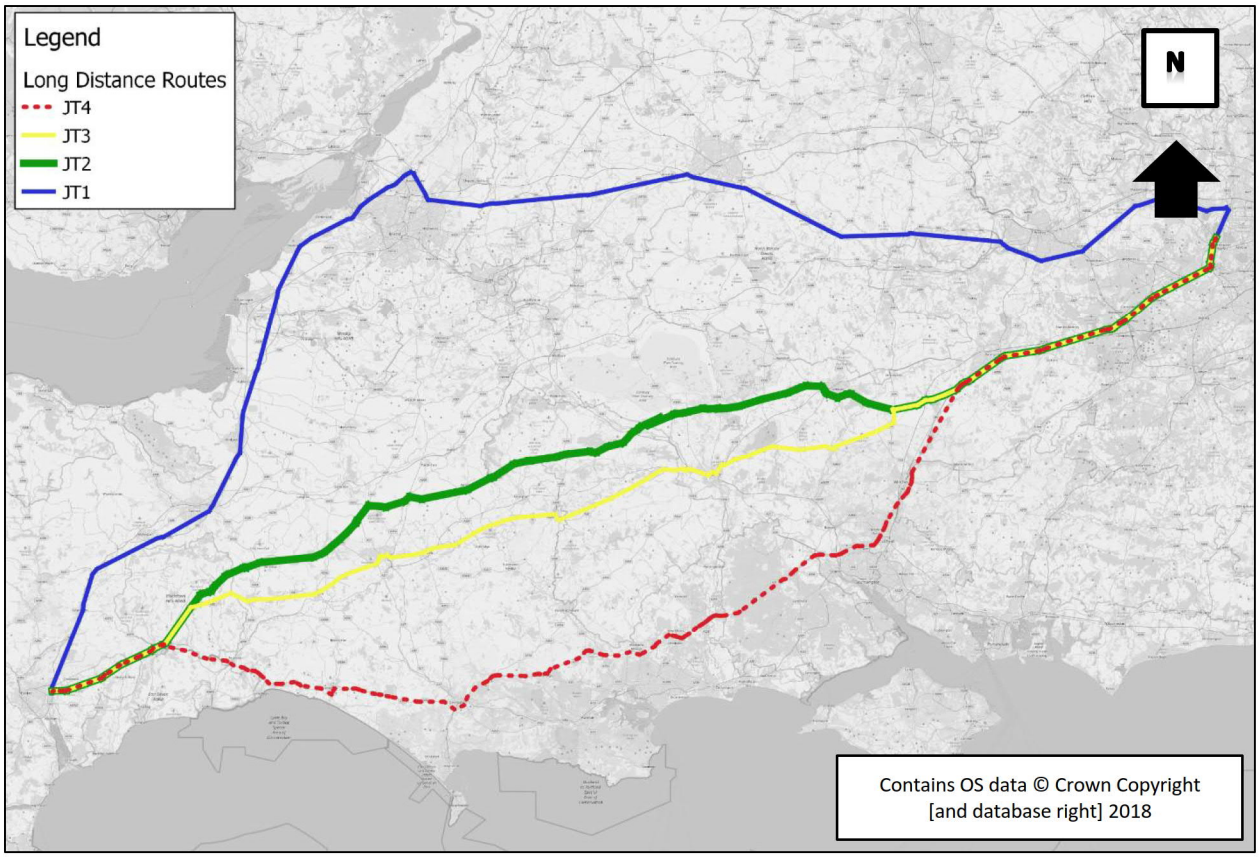


Figure 5-13: Journey time routes (long distance)

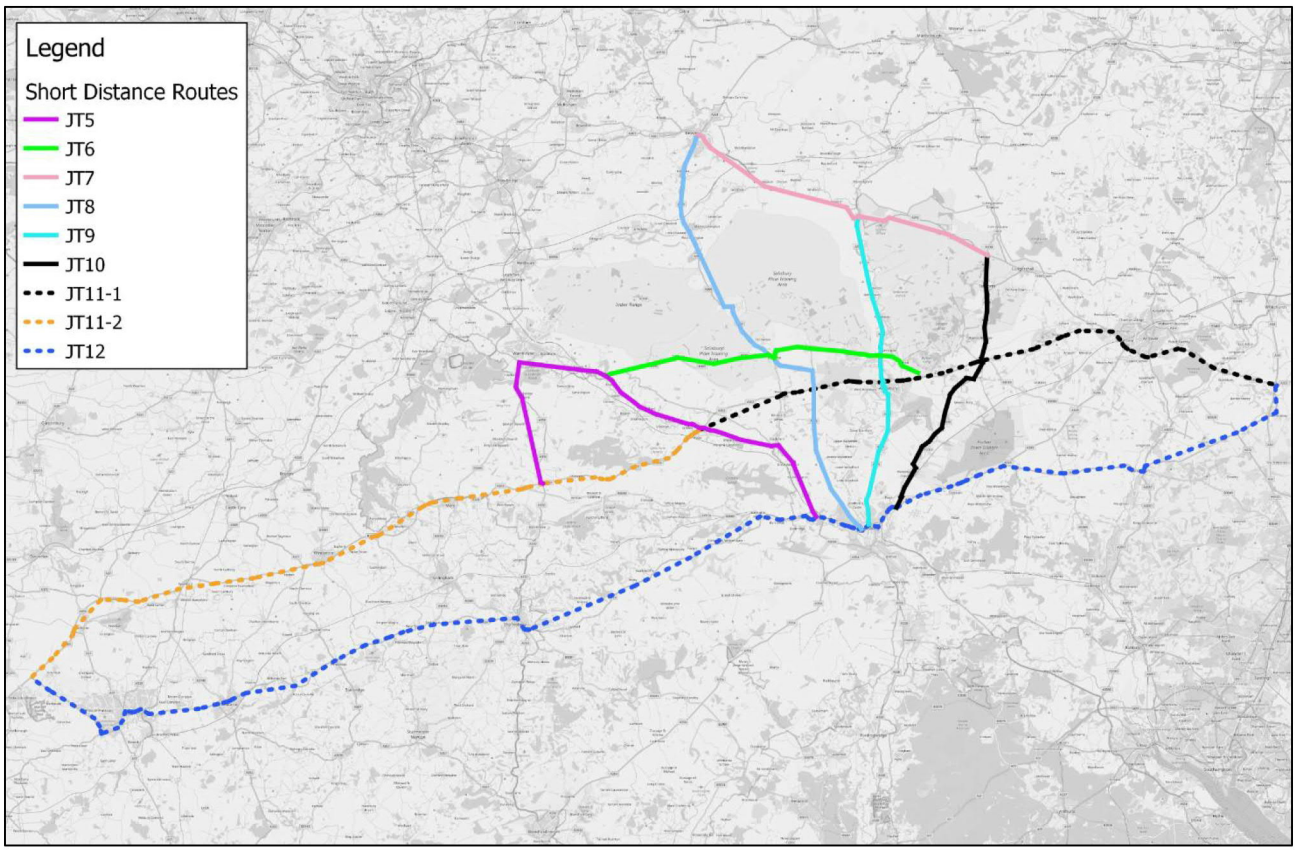


Figure 5-14: Journey time routes (short distance)

Scheme extent

5.5.3 Table 5-17 shows journey times for 2017, 2026 and 2041 for the A303 between the A34 and A36, without the Scheme.

Table 5-17: A303 - A34 to A36 journey times, without the Scheme

Without the Scheme					
Route	**Time Period**	**Direction**	**2017 (hh:mm:ss)**	**2026 (hh:mm:ss)**	**2041 (hh:mm:ss)**
11-1 A303: A34 to A36	AM	WB	00:29:57	00:30:42	00:32:12
		EB	00:31:46	00:33:22	00:35:45
	IP	WB	00:30:21	00:31:03	00:32:24
		EB	00:30:09	00:30:57	00:32:39
	PM	WB	00:31:06	00:32:12	00:34:30
		EB	00:29:59	00:30:54	00:32:03
	Busy day	WB	00:40:36	00:43:24	00:50:32
		EB	00:37:57	00:42:33	00:48:53

5.5.4 There are consistent forecast increases in journey times on the section of the A303 between the A34 and A36 for all neutral time periods; the increase in the 2041 forecast compared to 2017 is between two and nearly four minutes. The increase in 2041 in the busy period is almost 10 minutes westbound and 11 minutes eastbound.

5.5.5 Table 5-18 shows journey times for the year 2026 for route 11-1, which includes the Scheme section of the A303.

Table 5-18: A303 - A34 to A36 journey times, 2026

2026						
Route	**Time Period**	**Direction**	**Without scheme (hh:mm:ss)**	**With scheme (hh:mm:ss)**	**Difference**	**% Difference**
11-1 A303: A34 to A36	AM	WB	00:30:42	00:27:25	-00:03:17	-11%
		EB	00:33:22	00:28:57	-00:04:25	-13%
	IP	WB	00:31:03	00:27:40	-00:03:23	-11%
		EB	00:30:57	00:27:44	-00:03:13	-10%
	PM	WB	00:32:12	00:28:39	-00:03:33	-11%
		EB	00:30:54	00:27:51	-00:03:03	-10%
	Busy day	WB	00:43:24	00:28:56	-00:14:28	-33%
		EB	00:42:33	00:29:04	-00:13:29	-32%

5.5.6 In the scheme opening year (2026) there are modelled journey time savings in both directions on the A303 between the A34 and A36 as a result of the Scheme. This applies to all time periods during the neutral months, with journey time savings amounting to over three minutes. For a busy day, the average journey time saving due to the Scheme is over 14 minutes westbound and 13 minutes eastbound.

5.5.7 Table 5-19 provides forecast journey times for the year 2041.

Table 5-19: A303 - A34 to A36 journey times, 2041

2041						
Route	**Time Period**	**Direction**	**Without scheme (hh:mm:ss)**	**With scheme (hh:mm:ss)**	**Difference**	**% Difference**
11-1 A303: A34 to A36	AM	WB	00:32:12	00:27:55	-00:04:17	-13%
		EB	00:35:45	00:29:55	-00:05:50	-16%
	IP	WB	00:32:24	00:28:12	-00:04:12	-13%
		EB	00:32:39	00:28:23	-00:04:16	-13%
	PM	WB	00:34:30	00:29:46	-00:04:44	-14%
		EB	00:32:03	00:28:26	-00:03:37	-11%
	Busy Period	WB	00:50:32	00:31:05	-00:19:27	-38%
		EB	00:48:53	00:30:38	-00:18:15	-37%

5.5.8 In the 2041 model the time savings increase further. With the exception of eastbound during the PM peak, all journey time savings are at least 4 minutes. For a busy day the time savings increase to more than 18 minutes in both directions.

Local journey time routes

5.5.9 Full details of the journey times for these routes are included in Appendix K. The local routes are represented by routes five to ten.

5.5.10 Table 5-20 and Table 5-21 provide selected local journey times for the year 2026 and 2041 respectively.

Table 5-20: Selected local journey times (6 – The Packway, 8 - A360, 9 – A345), 2026

2026						
Route	Time Period	Direction	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference
6	AM	WB	00:26:14	00:26:08	-00:00:06	0%
		EB	00:26:21	00:26:11	-00:00:10	-1%
	IP	WB	00:25:26	00:25:17	-00:00:09	-1%
		EB	00:25:02	00:25:15	00:00:13	1%
	PM	WB	00:26:45	00:26:25	-00:00:20	-1%
		EB	00:25:36	00:25:47	00:00:11	1%
	Busy day	WB	00:27:48	00:25:43	-00:02:05	-7%
		EB	00:27:37	00:25:22	-00:02:15	-8%
8	AM	NB	00:37:32	00:37:57	00:00:25	1%
		SB	00:38:06	00:38:40	00:00:34	1%
	IP	NB	00:36:20	00:36:47	00:00:27	1%
		SB	00:36:43	00:37:09	00:00:26	1%
	PM	NB	00:37:32	00:37:56	00:00:24	1%
		SB	00:37:52	00:38:26	00:00:34	1%
	Busy day	NB	00:36:49	00:37:22	00:00:33	1%
		SB	00:37:01	00:37:39	00:00:38	2%
9	AM	NB	00:27:54	00:27:35	-00:00:19	-1%
		SB	00:30:53	00:30:33	-00:00:20	-1%
	IP	NB	00:27:25	00:27:23	-00:00:02	0%
		SB	00:28:11	00:28:17	00:00:06	0%
	PM	NB	00:29:52	00:29:53	00:00:01	0%
		SB	00:29:15	00:29:22	00:00:07	0%
	Busy day	NB	00:27:37	00:27:09	-00:00:28	-2%
		SB	00:29:18	00:28:31	-00:00:47	-3%

5.5.11 The 2026 forecasts indicate that there is little change in most local journey times as a result of the Scheme. There is an increase in modelled journey times of around 30 seconds in all time periods for the route on the A360 (route 8). The increase in journey time is due to the length of this route being extended by 0.4km around Longbarrow junction with the Scheme in place.

5.5.12 In the busy period the journey times on The Packway (route 6) improve with the Scheme by over two minutes in both directions. This is due to traffic routeing via the A303 with the Scheme instead of using The Packway. There is also a reduction in journey times of almost a minute on the A345 southbound (route 9).

Table 5-21: Selected local journey times (6 – The Packway, 8 - A360, 9 – A345), 2041

2041						
Route	**Time Period**	**Direction**	**Without scheme (hh:mm:ss)**	**With scheme (hh:mm:ss)**	**Difference**	**% Difference**
6	AM	WB	00:27:21	00:26:41	-00:00:40	-2%
		EB	00:27:09	00:26:24	-00:00:45	-3%
	IP	WB	00:25:57	00:25:32	-00:00:25	-2%
		EB	00:25:17	00:25:24	00:00:07	0%
	PM	WB	00:27:54	00:27:02	-00:00:52	-3%
		EB	00:25:54	00:26:00	00:00:06	0%
	Busy day	WB	00:29:40	00:26:19	-00:03:21	-11%
		EB	00:29:31	00:25:36	-00:03:55	-13%
8	AM	NB	00:38:30	00:39:00	00:00:30	1%
		SB	00:39:10	00:39:50	00:00:40	2%
	IP	NB	00:37:09	00:37:36	00:00:27	1%
		SB	00:37:39	00:38:09	00:00:30	1%
	PM	NB	00:38:21	00:39:00	00:00:39	2%
		SB	00:38:59	00:39:36	00:00:37	2%
	Busy day	NB	00:37:41	00:38:15	00:00:34	2%
		SB	00:38:18	00:38:51	00:00:33	1%
9	AM	NB	00:28:49	00:28:31	-00:00:18	-1%
		SB	00:32:03	00:31:29	-00:00:34	-2%
	IP	NB	00:28:08	00:28:04	-00:00:04	0%
		SB	00:29:13	00:29:08	-00:00:05	0%
	PM	NB	00:30:59	00:30:51	-00:00:08	0%
		SB	00:30:36	00:30:24	-00:00:12	-1%
	Busy day	NB	00:28:33	00:27:50	-00:00:43	-3%
		SB	00:31:18	00:29:30	-00:01:48	-6%

5.5.13 In the 2041 forecasts, journey times as a result of the Scheme improve further on The Packway, where average savings are forecast to increase to over three minutes westbound and nearly four minutes eastbound during a busy day and the A345 southbound, where savings increase to almost two minutes. The journey time increases on the A360 remain at around 30 seconds, a similar level to 2026.

5.5.14 The journey time routes illustrate a modest net improvement to local travel conditions arising from the Scheme.

A303 corridor

5.5.15 Table 5-22 shows journey times in the year 2026 for the wider A303 corridor. This includes route 2, which runs from J13 of the M25 to J29 of the M5 via the A303 together with the shorter section, route 11 running from the A30/A34 junction to the east of Andover to Martock, which is further broken down into two sections, 11-1 and 11-2. 11-1 was discussed previously, while 11-2 includes the section of the A303 to the west of the Scheme (the route sections are illustrated in Figure 5-13 and Figure 5-14).

Table 5-22: A303 corridor journey times, 2026

2026						
Route	**Time Period**	**Direction**	**Without scheme (hh:mm:ss)**	**With scheme (hh:mm:ss)**	**Difference**	**% Difference**
2	AM	WB	02:39:18	02:36:31	-00:02:47	-2%
		EB	02:39:33	02:35:54	-00:03:39	-2%
	IP	WB	02:40:42	02:38:28	-00:02:14	-1%
		EB	02:35:20	02:32:59	-00:02:21	-2%
	PM	WB	02:48:57	02:46:40	-00:02:17	-1%
		EB	02:37:48	02:35:34	-00:02:14	-1%
	Busy day	WB	03:04:29	02:55:58	-00:08:31	-5%
		EB	02:52:51	02:42:52	-00:09:59	-6%
11	AM	WB	01:08:19	01:05:25	-00:02:54	-4%
		EB	01:10:21	01:06:22	-00:03:59	-6%
	IP	WB	01:10:18	01:07:46	-00:02:32	-4%
		EB	01:07:46	01:04:56	-00:02:50	-4%
	PM	WB	01:11:00	01:08:16	-00:02:44	-4%
		EB	01:06:53	01:04:10	-00:02:43	-4%
	Busy day	WB	01:31:17	01:21:36	-00:09:41	-11%
		EB	01:21:24	01:10:07	-00:11:17	-14%
11-2	AM	WB	00:37:36	00:38:00	00:00:24	1%
		EB	00:36:58	00:37:24	00:00:26	1%
	IP	WB	00:39:14	00:40:06	00:00:52	2%
		EB	00:36:49	00:37:12	00:00:23	1%
	PM	WB	00:38:47	00:39:37	00:00:50	2%
		EB	00:35:59	00:36:19	00:00:20	1%
	Busy day	WB	00:47:53	00:52:39	00:04:46	10%
		EB	00:38:50	00:41:02	00:02:12	6%

5.5.16 As shown above, in 2026 there are forecast journey time savings for those travelling the full length of the corridor from J13 of the M25 to J29 of the M5 and in reverse (route 2), especially in the busy period model. These are, however, of a smaller magnitude to the savings experienced along the main A303 section (route

11), suggesting that there are secondary impacts elsewhere along the corridor when traffic is no longer delayed on the Stonehenge section.

5.5.17 This is confirmed by considering route 11-2, which runs to the west of the Scheme, which is forecast to experience minor increases in journey time in the neutral month models. In the busy period model journey times increase by approximately 5 minutes westbound and 2 minutes eastbound. Overall however, there are still time savings, and these are larger in the busy period model.

5.5.18 Table 5-23 shows journey times forecast for the year 2041.

Table 5-23: A303 corridor journey times, 2041

2041						
Route	**Time Period**	**Direction**	**Without scheme (hh:mm:ss)**	**With scheme (hh:mm:ss)**	**Difference**	**% Difference**
2	AM	WB	02:48:31	02:45:05	-00:03:26	-2%
		EB	02:49:06	02:45:02	-00:04:04	-2%
	IP	WB	02:50:31	02:48:13	-00:02:18	-1%
		EB	02:42:19	02:39:05	-00:03:14	-2%
	PM	WB	02:59:29	02:57:03	-00:02:26	-1%
		EB	02:43:36	02:41:16	-00:02:20	-1%
	Busy day	WB	03:25:14	03:13:04	-00:12:10	-6%
		EB	03:10:12	02:59:53	-00:10:19	-5%
11	AM	WB	01:12:17	01:08:43	-00:03:34	-5%
		EB	01:13:59	01:09:09	-00:04:50	-7%
	IP	WB	01:14:17	01:11:37	-00:02:40	-4%
		EB	01:10:39	01:07:01	-00:03:38	-5%
	PM	WB	01:15:28	01:12:26	-00:03:02	-4%
		EB	01:08:46	01:05:46	-00:03:00	-4%
	Busy day	WB	01:44:50	01:31:00	-00:13:50	-13%
		EB	01:32:24	01:20:09	-00:12:15	-13%
11-2	AM	WB	00:40:04	00:40:47	00:00:43	2%
		EB	00:38:13	00:39:14	00:01:01	3%
	IP	WB	00:41:53	00:43:25	00:01:32	4%
		EB	00:37:59	00:38:38	00:00:39	2%
	PM	WB	00:40:58	00:42:40	00:01:42	4%
		EB	00:36:42	00:37:20	00:00:38	2%
	Busy day	WB	00:54:18	00:59:55	00:05:37	10%
		EB	00:43:30	00:49:31	00:06:01	14%

5.5.19 Along the whole A303 corridor (route 2) there are journey time improvements forecast in 2041 larger than those modelled in 2026. Similarly to the 2026 model, these savings are smaller than those experienced on the section of the A303 including the Scheme (route 11).

5.5.20 For the stretch of the A303 to the west of the Scheme (route 11-2), journey times are forecast to increase in all time periods. In particular, during the busy day an increase in journey time of about 6 minutes is forecast.

5.5.21 Further analysis of the locations of these differences in journey time in the neutral month forecasts has shown that there is an increase forecast of almost one minute on the westbound approach to Podimore roundabout in the interpeak and PM periods, with the Scheme in place. In the busy period there is an increase of almost four minutes forecast on the approach to Podimore in the westbound direction. In the eastbound direction there is an increase of almost two minutes on the Mere to Chicklade single carriageway section of the A303, an increase of almost one minute on the approach to Podimore and an increase of almost one minute on the Stockton Wood to Wylye single carriageway section of the A303.

5.5.22 It can therefore be seen that journey time improvements experienced around the Scheme (route 11-1) are partly eroded by an increase in delay forecast along other parts of the A303 corridor (route 11-2) which are not assumed to be improved for these forecasts. Overall there is still a net modelled journey time benefit along the A303 corridor however, especially during the busy days.

Other routes

5.5.23 Journey times along the M4/M5 corridor (route 1) are forecast to experience very minor improvements as a result of the Scheme in 2026. This is also the case in 2041.

5.5.24 The savings along the A31/A35 corridor (route 4) are even smaller in all years.

5.6 Core scenario: Capacity

5.6.1 The forecasts also show that the Scheme reduces the number of links near or over capacity. Figure 5-15 shows the volume over capacity in percentage for links with values above 85% near Stonehenge for the 2041 core model in the AM peak.

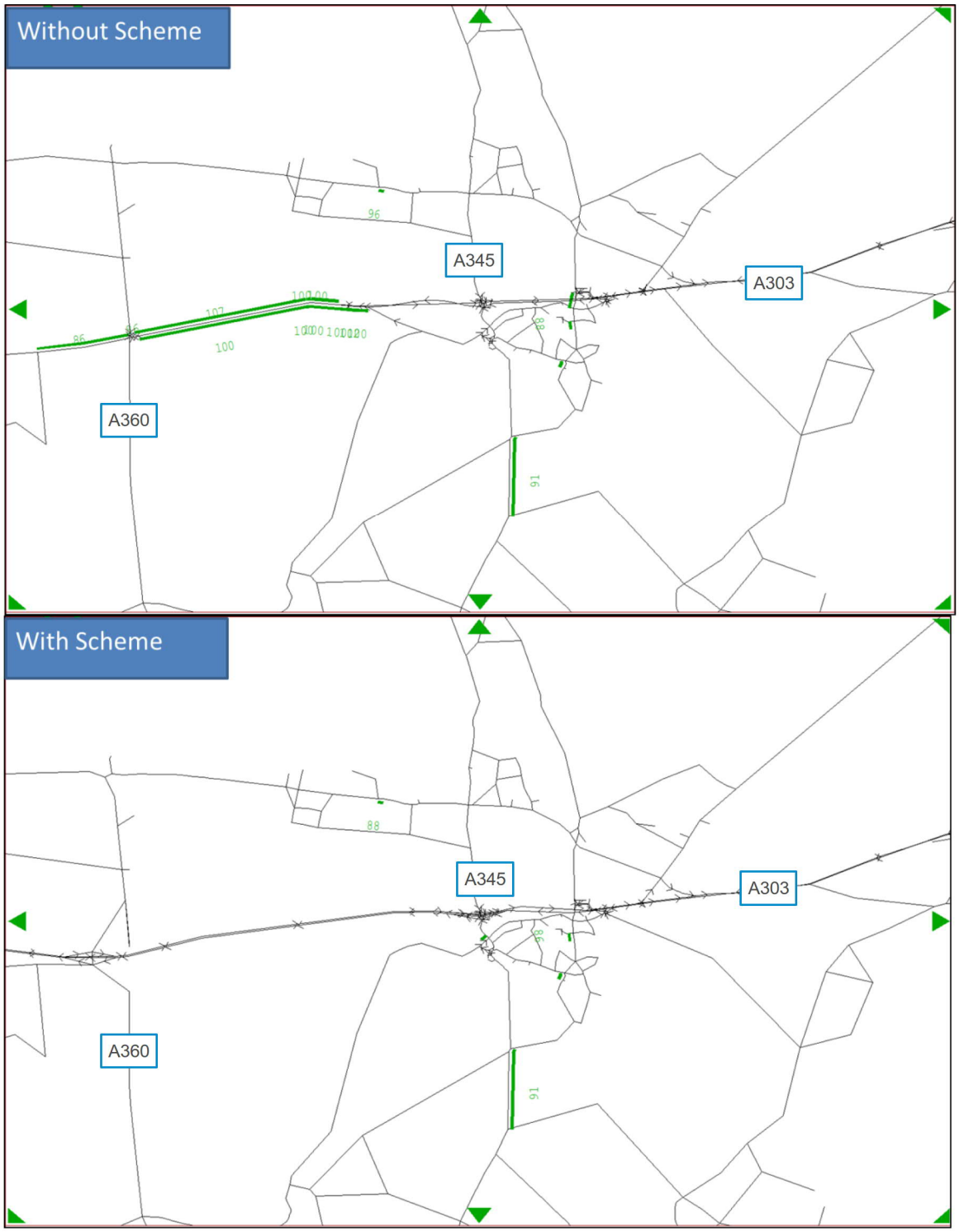


Figure 5-15: Volume over capacity in the 2041 core model AM peak

5.6.2 Table 5-24 shows the volume over capacity as a percentage across all time periods on the A303 mainline near Stonehenge.

Table 5-24: Volume over capacity on the A303 at Stonehenge

2041 Core Scenario			
Time Period	**Direction**	**Volume over capacity without Scheme**	**Volume over capacity with Scheme**
AM Peak	EB	107	50
	WB	100	41
Interpeak	EB	101	40
	WB	100	41
PM Peak	EB	101	41
	WB	100	45
Busy day	EB	122	56
	WB	128	54

5.7 Sensitivity testing

5.7.1 Appendix L and M shows the sensitivity test assignment and demand model convergence results. As explained in Section 5.2, the level of convergence is judged to be satisfactory.

High and low growth scenarios: Flows

5.7.2 Traffic flow diagrams showing the Annual Average Daily Traffic (AADT) for the sensitivity tests are included in Appendix N for:

a. all forecast years (2026, 2031, 2041, 2051);

b. without scheme and with scheme scenarios; and

c. low, high and alternative local growth scenarios.

5.7.3 Table 5-25 and Table 5-26 show AADT flows for the A303 for the 2026 low and high growth scenarios and a comparison to the core scenario.

Table 5-25: A303 AADT low and high growth scenarios without scheme 2026

2026 without scheme						
Section of A303	Direction	Core	Low		High	
		AADT	AADT	% difference from core	AADT	% difference from core
North of Wylye (A36 to B3083)	EB	11,700	11,100	-5%	12,200	4%
	WB	11,500	11,100	-3%	11,900	3%
East of Winterbourne Stoke (B3083 to Longbarrow)	EB	11,800	11,200	-5%	12,300	4%
	WB	12,000	11,500	-4%	12,400	3%
West of Amesbury (Longbarrow to Countess)	EB	14,300	13,800	-3%	14,900	4%
	WB	15,100	14,400	-5%	15,700	4%
East of Amesbury (Countess to Solstice Park)	EB	16,800	16,000	-5%	17,600	5%
	WB	15,100	14,300	-5%	15,700	4%
South of Bulford (Allington Track to Double Hedges)	EB	18,500	17,600	-5%	19,400	5%
	WB	19,400	18,500	-5%	20,300	5%
North of Cholderton (Double Hedges to A338)	EB	21,000	19,900	-5%	22,000	5%
	WB	19,300	18,300	-5%	20,100	4%

Table 5-26: A303 AADT low and high growth scenarios with scheme 2026

2026 with scheme						
Section of A303	Direction	Core	Low		High	
		AADT	AADT	% difference from core	AADT	% difference from core
North of Wylye (A36 to B3083)	EB	14,200	13,400	-6%	15,000	6%
	WB	14,600	13,900	-5%	15,300	5%
East of Winterbourne Stoke (B3083 to Longbarrow)	EB	14,200	13,400	-6%	15,000	6%
	WB	14,600	13,900	-5%	15,300	5%
West of Amesbury (Longbarrow to Countess)	EB	18,500	17,300	-6%	19,700	6%
	WB	18,700	17,700	-5%	19,800	6%
East of Amesbury (Countess to Solstice Park)	EB	19,300	18,100	-6%	20,500	6%
	WB	17,700	16,800	-5%	18,700	6%
South of Bulford (Allington Track to Double Hedges)	EB	20,500	19,400	-5%	21,600	5%
	WB	21,200	20,200	-5%	22,200	5%
North of Cholderton (Double Hedges to A338)	EB	23,000	21,700	-6%	24,300	6%
	WB	21,100	20,100	-5%	22,100	5%

5.7.4 Traffic flows in the high and low growth scenarios in 2026 are consistently 3% to 6% above or below the core flows, respectively.

5.7.5 Table 5-27 and Table 5-28 show AADT flows for the A303 for the 2041 low and high growth scenarios and a comparison to the core scenario.

Table 5-27: A303 AADT low and high growth scenarios without scheme 2041

2041 without scheme						
Section of A303	Direction	Core	Low		High	
		AADT	AADT	% difference from core	AADT	% difference from core
North of Wylye (A36 to B3083)	EB	13,400	13,000	-3%	13,800	3%
	WB	12,900	12,500	-3%	13,200	2%
East of Winterbourne Stoke (B3083 to Longbarrow)	EB	13,400	13,000	-3%	13,700	2%
	WB	13,300	12,900	-3%	13,600	2%
West of Amesbury (Longbarrow to Countess)	EB	16,000	15,600	-3%	15,800	-1%
	WB	16,100	15,900	-1%	15,900	-1%
East of Amesbury (Countess to Solstice Park)	EB	19,200	18,400	-4%	19,700	3%
	WB	17,100	16,200	-5%	17,700	4%
South of Bulford (Allington Track to Double Hedges)	EB	21,400	20,400	-5%	22,100	3%
	WB	21,900	20,700	-5%	23,000	5%
North of Cholderton (Double Hedges to A338)	EB	24,400	23,000	-6%	25,400	4%
	WB	21,700	20,500	-6%	22,800	5%

Table 5-28: A303 AADT low and high growth scenarios with scheme 2041

2041 with scheme						
Section of A303	Direction	Core	Low		High	
		AADT	AADT	% difference from core	AADT	% difference from core
North of Wylye (A36 to B3083)	EB	17,300	16,200	-6%	18,500	7%
	WB	17,800	16,600	-7%	18,900	6%
East of Winterbourne Stoke (B3083 to Longbarrow)	EB	17,300	16,200	-6%	18,500	7%
	WB	17,800	16,600	-7%	18,900	6%
West of Amesbury (Longbarrow to Countess)	EB	22,700	20,900	-8%	24,400	7%
	WB	22,800	20,900	-8%	24,500	7%
East of Amesbury (Countess to Solstice Park)	EB	23,600	21,800	-8%	25,300	7%
	WB	21,400	19,700	-8%	22,700	6%
South of Bulford (Allington Track to Double Hedges)	EB	24,600	22,800	-7%	26,300	7%
	WB	24,700	23,000	-7%	25,900	5%
North of Cholderton (Double Hedges to A338)	EB	27,400	25,400	-7%	29,200	7%
	WB	24,500	22,800	-7%	25,800	5%

5.7.6 Traffic flows in the high and low growth scenarios with the Scheme in place are consistently 5% to 8% above or below the core scenario. However, traffic flows in the without scheme scenario on the single carriageway section of the A303

between Countess and Longbarrow do not change appreciably from the core scenario and variations on adjacent sections of the A303 are also reduced. This illustrates the capacity constraint of the current infrastructure.

High and low growth scenarios: Journey times

5.7.7 Appendix O shows the full journey time results for the high and low growth scenarios.

5.7.8 Table 5-29 and Table 5-30 show journey times for the year 2041 for route 11-1, which is the section of the A303 to be upgraded, for the low and high growth scenarios respectively.

Table 5-29: A303 - A34 to A36 journey times, 2041 low

2041						
Route	Time Period	Direction	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference
11-1 A303: A34 to A36	AM	WB	00:31:13	00:27:40	-00:03:33	-11%
		EB	00:34:25	00:29:21	-00:05:04	-15%
	IP	WB	00:31:31	00:27:54	-00:03:37	-11%
		EB	00:31:46	00:28:03	-00:03:43	-12%
	PM	WB	00:32:58	00:29:00	-00:03:58	-12%
		EB	00:31:24	00:28:06	-00:03:18	-11%
	Busy Day	WB	00:47:37	00:30:23	-00:17:14	-36%
		EB	00:46:08	00:29:56	-00:16:12	-35%

Table 5-30: A303 - A34 to A36 journey times, 2041 high

2041						
Route	Time Period	Direction	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference
11-1 A303: A34 to A36	AM	WB	00:33:17	00:28:12	-00:05:05	-15%
		EB	00:37:06	00:30:34	-00:06:32	-18%
	IP	WB	00:33:36	00:28:30	-00:05:06	-15%
		EB	00:33:44	00:28:42	-00:05:02	-15%
	PM	WB	00:36:00	00:30:41	-00:05:19	-15%
		EB	00:32:58	00:28:50	-00:04:08	-13%
	Busy Day	WB	00:54:11	00:31:50	-00:22:21	-41%
		EB	00:52:09	00:31:14	-00:20:55	-40%

5.7.9 In the low growth 2041 forecasts the magnitude of change as a result of the Scheme is reduced, with journey time savings for route 11-1 of three to four minutes in the neutral months, compared to journey time savings of over 4 minutes in the core scenario (Table 5-19). In the busy day the time savings of 16

and 17 minutes are similarly less than 18 and 19 minutes forecast in the core scenario respectively eastbound and westbound.

5.7.10 The forecast journey time savings for the high growth scenario are similarly forecast to be about one minute greater than in the core scenario for the neutral month periods and two to three minutes greater during a busy day.

Alternative local growth

5.7.11 Table 5-31 shows AADT flows for the A303 for the 2041 alternative local growth scenario and a comparison to the core scenario.

Table 5-31: A303 AADT alternative local growth scenario with and without scheme 2041

		Core		Alternative local growth			
Section of A303	Direction	Without scheme	With scheme	Without scheme		With scheme	
		AADT	AADT	AADT	difference from core	AADT	difference from core
North of Wylye (A36 to B3083)	EB	13,400	17,300	13,400	0%	17,400	1%
	WB	12,900	17,800	12,900	0%	17,800	0%
East of Winterbourne Stoke (B3083 to Longbarrow)	EB	13,400	17,300	13,400	0%	17,400	1%
	WB	13,300	17,800	13,300	0%	17,800	0%
West of Amesbury (Longbarrow to Countess)	EB	16,000	22,700	16,000	0%	23,100	2%
	WB	16,100	22,800	16,100	0%	23,000	1%
East of Amesbury (Countess to Solstice Park)	EB	19,200	23,600	19,700	3%	24,100	2%
	WB	17,100	21,400	18,000	5%	22,300	4%
South of Bulford (Allington Track to Double Hedges)	EB	21,400	24,600	20,900	-2%	24,400	-1%
	WB	21,900	24,700	23,400	7%	26,300	6%
North of Cholderton (Double Hedges to A338)	EB	24,400	27,400	24,000	-2%	27,200	-1%
	WB	21,700	24,500	23,300	7%	26,100	7%

5.7.12 The increase in flow on the A303 due to the Scheme is consistent with the scale of increase in flow in the core scenario.

5.7.13 The westbound flows on the section of the A303 to the east of Countess roundabout are higher in the alternative growth scenario which is to be expected due to the location and scale of development assumed at Boscombe Down.

5.7.14 Appendix O includes the full journey time results for the alternative local growth scenario.

5.7.15 The journey time savings on the A303 due to the Scheme with the Boscombe Down development in place are very similar to the journey time savings in the core scenario.

5.7.16 Table 5-32 shows with scheme journey times for the year 2041 for route 11-1, which is the section of the A303 to be upgraded, for the core and alternative local growth scenario.

Table 5-32: A303 - A34 to A36 journey times, 2041 alternative scenario

2041 with scheme						
Route	**Time Period**	**Direction**	**Core growth (hh:mm:ss)**	**Alternative local growth (hh:mm:ss)**	**Difference**	**% Difference**
11-1 A303: A34 to A36	AM	WB	00:27:55	00:28:09	00:00:14	1%
		EB	00:29:55	00:29:57	00:00:02	0%
	IP	WB	00:28:12	00:28:19	00:00:07	0%
		EB	00:28:23	00:28:24	00:00:01	0%
	PM	WB	00:29:46	00:30:06	00:00:20	1%
		EB	00:28:26	00:28:31	00:00:05	0%
	Busy Day	WB	00:31:05	00:31:17	00:00:12	1%
		EB	00:30:38	00:30:41	00:00:03	0%

5.7.17 The comparison of core and alternative local growth scenario journey times with the Scheme in place show minimal changes. This shows that the Scheme operates efficiently, even with different assumptions regarding the level of local development.

Core growth sensitivity test - Revisions to the scheme design and to DfT forecasting advice

5.7.18 Traffic flow diagrams showing the Annual Average Daily Traffic (AADT) for the core growth scenario which incorporates the revisions to the scheme design and to the DfT forecasting advice sensitivity test are included in Appendix P for:

a. the forecast years 2026 and 2041; and

b. without scheme and with scheme scenarios.

5.7.19 Table 5-33 shows AADT flows for the A303 for the 2041 sensitivity test for the core growth scenario.

Table 5-33: A303 AADT core growth sensitivity test scenario with and without scheme 2041

		Core		Core sensitivity test			
Section of A303	Direction	Without scheme	With scheme	Without scheme		With scheme	
		AADT	AADT	AADT	% difference from core	AADT	% difference from core
North of Wylye (A36 to B3083)	EB	13,400	17,300	13,500	1%	17,400	0%
	WB	12,900	17,800	13,000	0%	17,700	-1%
East of Winterbourne Stoke (B3083 to Longbarrow)	EB	13,400	17,300	13,500	1%	17,400	0%
	WB	13,300	17,800	13,400	0%	17,700	-1%
West of Amesbury (Longbarrow to Countess)	EB	16,000	22,700	16,200	2%	22,200	-2%
	WB	16,100	22,800	16,300	1%	22,700	0%
East of Amesbury (Countess to Solstice Park)	EB	19,200	23,600	19,300	1%	22,900	-3%
	WB	17,100	21,400	17,200	1%	21,200	-1%
South of Bulford (Allington Track to Double Hedges)	EB	21,400	24,600	21,500	0%	24,400	-1%
	WB	21,900	24,700	21,900	0%	24,500	-1%
North of Cholderton (Double Hedges to A338)	EB	24,400	27,400	24,400	0%	27,200	-1%
	WB	21,700	24,500	21,700	0%	24,400	-1%

5.7.20 The differences in AADT flow on the A303 between the core and sensitivity test scenario are less than 3% in the with and without scheme scenarios.

5.7.21 Appendix Q includes the full journey time results for the core growth sensitivity test scenario.

5.7.22 Table 5-34 and Table 5-35 show journey times for the year 2041 for route 11-1, which is the section of the A303 to be upgraded, for the core growth scenario which incorporates the revisions to the scheme design and to the DfT forecasting advice, for the without and with scheme scenarios.

Table 5-34: A303 - A34 to A36 journey times, 2041 core growth sensitivity test scenario, without scheme

2041 without scheme						
Route	Time Period	Direction	Core growth (hh:mm:ss)	Core growth sensitivity test (hh:mm:ss)	Difference	% Difference
11-1 A303: A34 to A36	AM	WB	00:32:12	00:32:03	-00:00:09	0%
		EB	00:35:45	00:35:08	-00:00:37	-2%
	IP	WB	00:32:24	00:31:59	-00:00:25	-1%
		EB	00:32:39	00:32:16	-00:00:23	-1%
	PM	WB	00:34:30	00:34:11	-00:00:19	-1%
		EB	00:32:03	00:31:53	-00:00:10	-1%
	Busy Day	WB	00:50:32	00:52:09	00:01:37	3%
		EB	00:48:53	00:49:58	00:01:05	2%

Table 5-35: A303 - A34 to A36 journey times, 2041 core growth sensitivity test scenario, with scheme

2041 with scheme						
Route	Time Period	Direction	Core growth (hh:mm:ss)	Core growth sensitivity test (hh:mm:ss)	Difference	% Difference
11-1 A303: A34 to A36	AM	WB	00:27:55	00:27:52	-00:00:03	0%
		EB	00:29:55	00:29:46	-00:00:09	-1%
	IP	WB	00:28:12	00:28:08	-00:00:04	0%
		EB	00:28:23	00:28:21	-00:00:02	0%
	PM	WB	00:29:46	00:29:35	-00:00:11	-1%
		EB	00:28:26	00:28:25	-00:00:01	0%
	Busy Day	WB	00:31:05	00:31:16	00:00:11	1%
		EB	00:30:38	00:30:49	00:00:11	1%

5.7.23 The comparison of core and sensitivity test scenario journey times with the Scheme in place shows minimal changes.

5.7.24 In the neutral month forecasts without the Scheme there is a reduction in journey times of between 10 and 40 seconds in the core sensitivity test in comparison to the core scenario without the Scheme and a reduction of up to 10 seconds across the different modelled periods with the Scheme. In the busy period there is an increase in journey time of about one minute. The differences in all time periods are within 3% of the core scenario.

5.7.25 There are no material changes between the forecasts for the core scenario and the sensitivity test scenario which incorporates the revisions to the scheme design

and the DfT forecasting advice. On this basis the updates to the forecast input assumptions are shown to have a negligible impact on traffic forecasts.

6 Operational assessment

6.1 Introduction

6.1.1 This section sets out the forecast operational performance of the Scheme, focussing on the design year of 2041 with analysis of opening year 2026 where appropriate. All analysis in this section is the design year 2041 unless otherwise stated. The performance of the Scheme is explained for each section of carriageway working west to east along the A303 corridor. Where appropriate, reference is made to the operational performance in 'normal' conditions typical of neutral month operation, and 'busy' periods such as the summer months.

6.1.2 The section is structured as below:

a. 6.2 Winterbourne Stoke;

b. 6.3 Longbarrow interchange;

c. 6.4 Stonehenge tunnel;

d. 6.5 Countess roundabout;

e. 6.6 Solstice Park junction;

f. 6.7 A303 mainline by Double Hedges;

g. 6.8 A303 mainline;

h. 6.9 Rollestone Cross junction;

i. 6.10 A345/The Packway roundabout;

j. 6.11 Operational modelling summary; and

k. 6.12 Incident testing.

6.1.3 The results set out here are generated by the forecast VISSIM operational models, and cover a 'busy day' typical of a Friday summer period between 12:00 and 18:00, and neutral month AM, Inter-peak and PM peak periods. The time periods covered are defined in section 2.4.

6.1.4 Forecast year traffic flows in the operational model were produced by applying the absolute difference between cordons of the with scheme and base 'minus' average hour SATURN models for both mainline and local networks. The absolute difference in traffic flow was calculated for each OD movement, and added to the base VISSIM peak hour matrices.

6.1.5 A summary of the key findings and recommendations from the operational assessment of the Scheme on the A303 corridor is provided at the end of this section in Table 6-1.

6.2 Winterbourne Stoke

6.2.1 The Scheme would divert the existing A303 through Winterbourne Stoke on to the Winterbourne Bypass. Through traffic would be removed from the existing road and traffic use of the existing A303 through Winterbourne Stoke becomes more 'local' in nature as indicated in Figure 6-1.

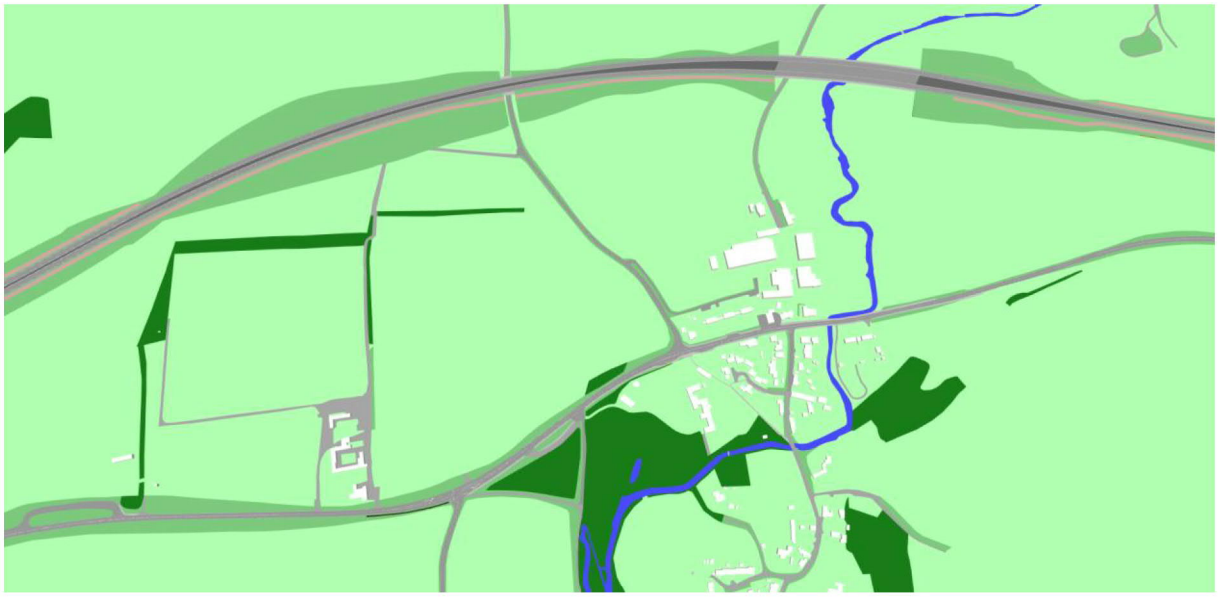


Figure 6-1: Design of scheme near Winterbourne Stoke

6.2.2 Figure 6-2 shows average speeds forecast through the Winterbourne Stoke area during the 2041 busy period and indicates there are no operational concerns with the downgraded existing A303 or B3083 under the Scheme.

6.2.3 The new A303 Winterbourne Stoke Bypass is part of the upgraded A303 and modelling indicates no operational issues with this section of scheme in any of the modelled periods.

Figure 6-2: Winterbourne Stoke average speeds (mph): Busy day

6.3 Longbarrow interchange

6.3.1 The Longbarrow junction arrangement is illustrated in Figure 6-3 and consists of a dumb-bell roundabout; two roundabouts joined by a two lane dual carriageway, separated by a central reservation. Both roundabouts feature two circulatory lanes.

6.3.2 A flare to two lanes is assumed on all approach arms to each of the dumbbell roundabouts.

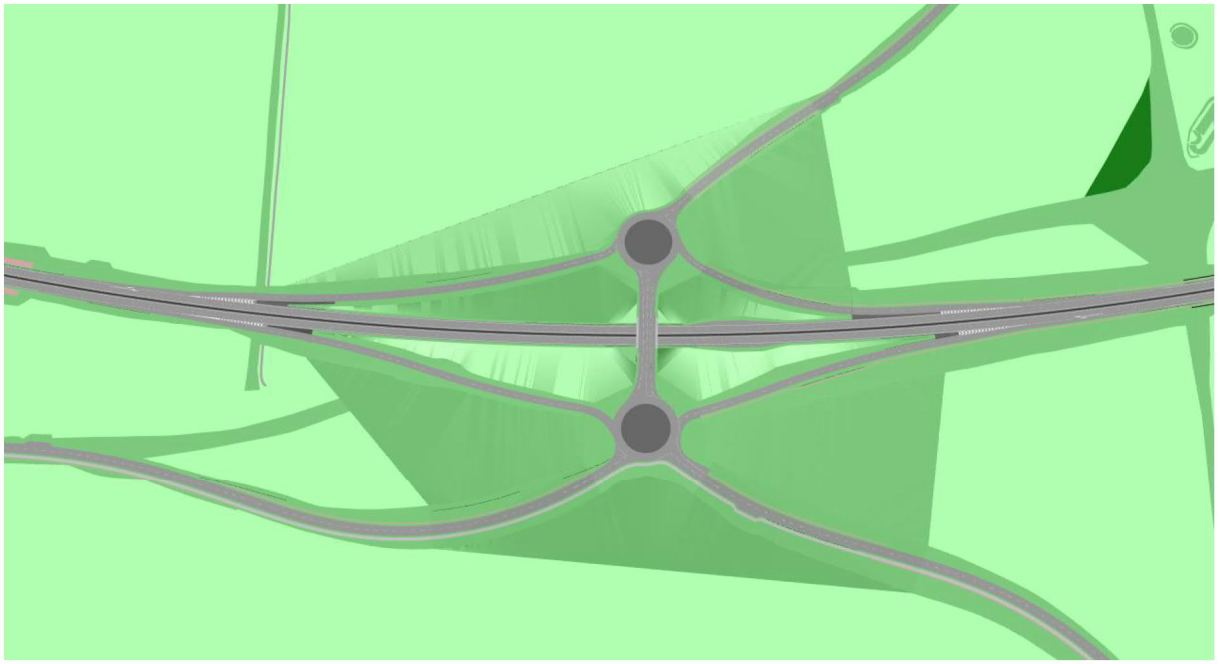


Figure 6-3: Design of Longbarrow interchange

6.3.3 In the 'busy day' peak and 'normal' AM peak models the forecast traffic flow indicated the critical interaction would be between southbound flows from the A360 with opposing traffic using the northern roundabout, leading to queues on the A360 southbound.

6.3.4 No notable queues are observed during the 'normal' IP or PM peak periods.

6.3.5 The northbound A360 approach to Longbarrow interchange is sensitive to the layout of lane markings and flare lengths. There are no notable queues in the model, provided the two lane flare is at least 25m in length and the traffic accessing the overbridge is able to use both lanes into the roundabout.

6.3.6 All other arms operate with no operational issues, including the A303 off-slips where no significant congestion is modelled.

6.3.7 Initial assumptions were for a short two lane flare on the A360 southbound approach to the northern roundabout. Figure 6-4 shows average speeds through Longbarrow interchange during the 2041 AM peak and 2041 'busy day' peak periods, showing the queues on the A360 southbound.

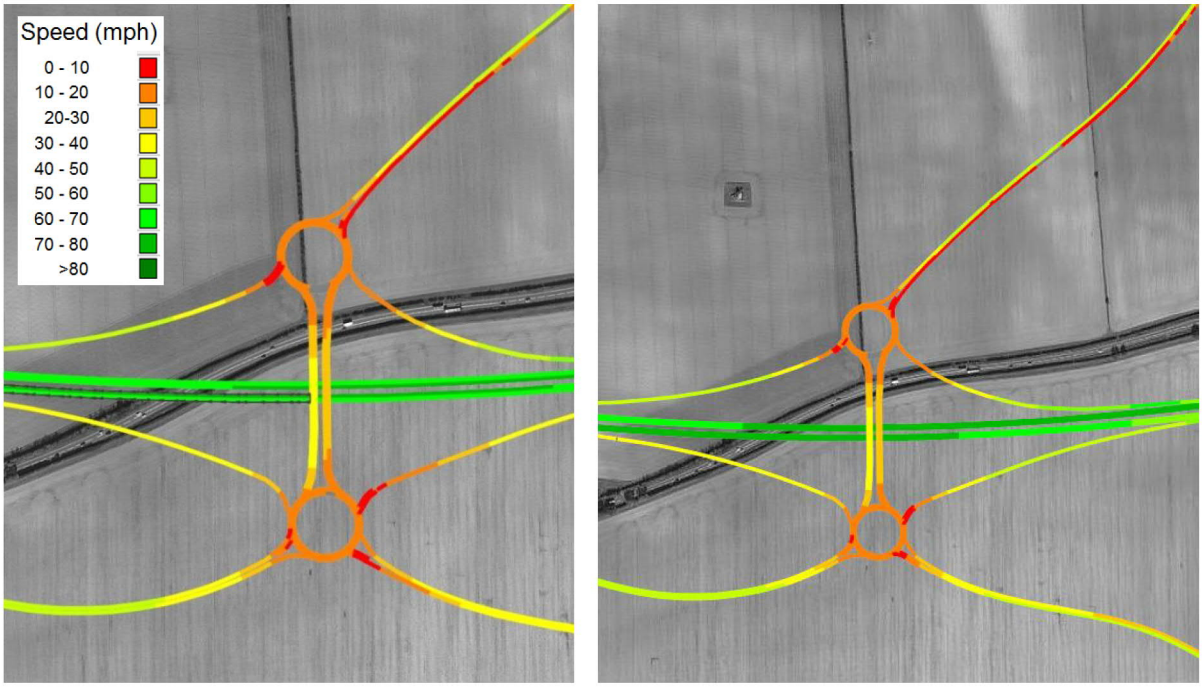


Figure 6-4: Longbarrow interchange average speeds (mph): AM (left), busy day (right)

6.3.8 Figure 6-5 compares journey times through Longbarrow interchange for each 'normal' AM, PM, inter-peak and average 'busy day' periods.

6.3.9 The graphs show the impact the congestion discussed has on the journey time when compared to the uncongested inter-peak model in the with scheme future year scenario. The AM and 'busy day' peak periods are forecast to have an average journey time approximately 1 minute greater than the uncongested inter-peak and PM periods in the southbound direction.

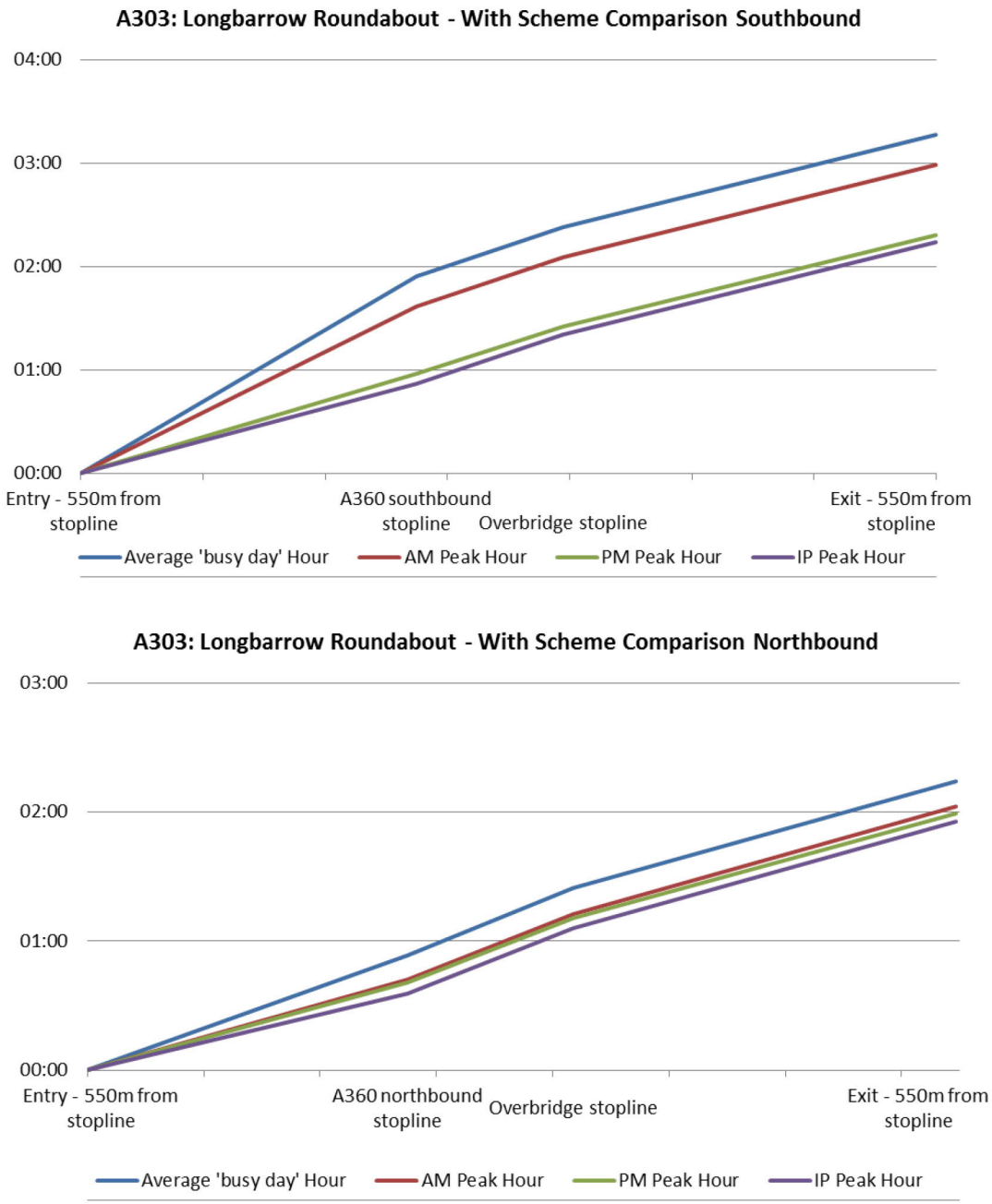


Figure 6-5: Journey times (mm:ss) at Longbarrow interchange

6.3.10 The Scheme was refined to provide additional capacity on the A360 southbound approach, with the provision of a dedicated left turn lane from the A360 to the eastbound on-slip. Figure 6-6 shows the average speeds through Longbarrow interchange with a dedicated left turn lane from A360 to the eastbound on-slip. As shown, this revision allows the design to operate without forecast congestion.

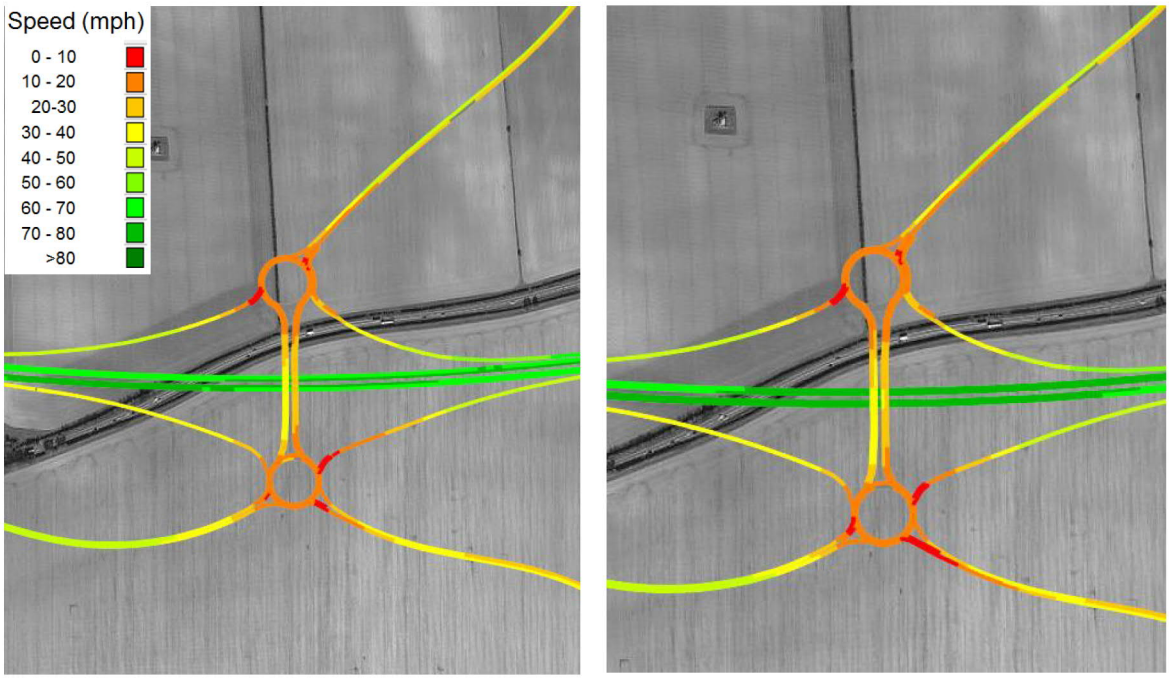


Figure 6-6: Sensitivity test – Longbarrow interchange average speeds (mph): AM (left), busy day (right)

6.4 Stonehenge tunnel

6.4.1 The Stonehenge tunnel is modelled with a 70mph speed limit under average speed camera control, with two lanes in each direction as indicated in Figure 6-7.

6.4.2 There are no modelled operational issues on the approach to, or within, the tunnel section in each of the 'busy day' or neutral AM, IP and PM modelled peak periods.

Figure 6-7: Design of Stonehenge tunnel

6.4.3 Figure 6-8 shows average speeds through the Stonehenge tunnel during the 2041 busy period and indicates there are no operational concerns.

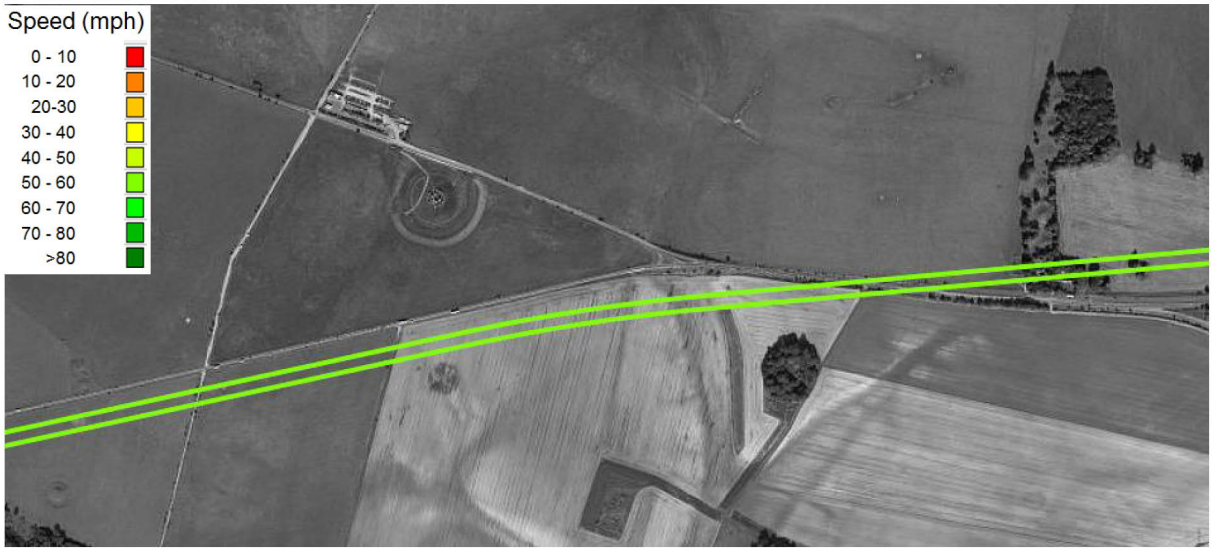


Figure 6-8: Stonehenge tunnel average speeds (mph): Busy day

6.5 Countess roundabout

6.5.1 Under the scheme proposals indicated in Figure 6-9, the mainline A303 is diverted onto a two lane dual carriageway overpass which removes east-west traffic from the roundabout itself. Whilst there is construction required for the ramps connecting the roundabout to the main carriageway, this is to retain connectivity, and the operational modelling accordingly represents no physical change to the highway layout at Countess roundabout itself.

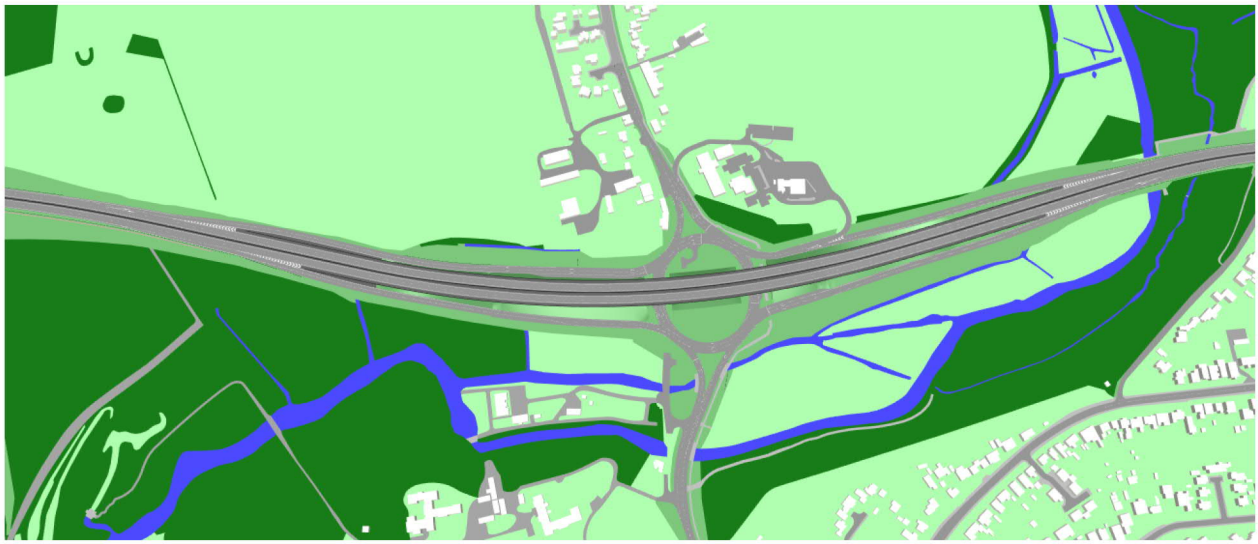


Figure 6-9: Design of Countess roundabout

6.5.2 The construction of the new carriageway removes the existing underpass for pedestrian movements and instead the Countess roundabout scheme design provides for non-motorised users. Given the need for pedestrian crossings for non-motorised users the signals are assumed to be retained.

6.5.3 The traffic signal staging and intergreens are unchanged from the existing operation with each approach arm having a red phase; the signal timings are optimised to accommodate the new traffic volume distributions present in the with scheme future year scenarios.

6.5.4 Figure 6-10 shows average speeds through the Countess roundabout during the 2041 'busy day' model and indicates there are no operational concerns.

Figure 6-10: Countess roundabout average speeds (mph): Busy day

6.5.5 Figure 6-11 compares the north / south journey times through Countess roundabout along the A345 for each 'normal' AM, PM, inter-peak and average 'busy day' periods in the with scheme future year scenario. These graphs show there is very little variation in journey time between each period and no issues in any peak.

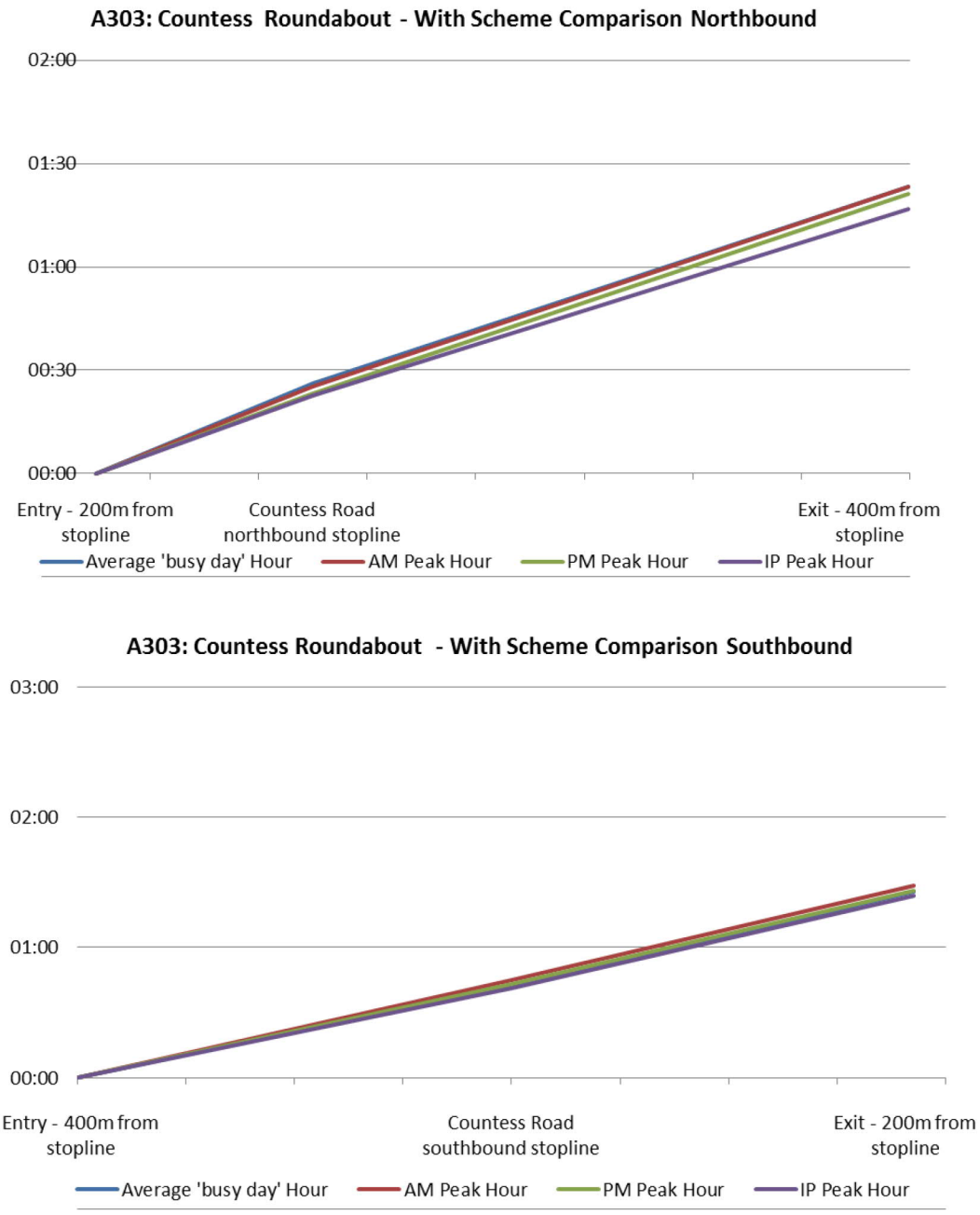


Figure 6-11: Journey times (mm:ss) at Countess roundabout

6.6 Solstice Park junction

6.6.1 Solstice Park consists of a 'northern' roundabout (north of the A303 mainline) with approaches from Porton Road, Salisbury Road and the A303 eastbound off-slip, and three 'southern' roundabouts (south of the A303 mainline) stretching from the A303 westbound off-slip/ Equinox Drive to London Road /Porton Road.

6.6.2 Under the scheme proposals, the highway network at Solstice Park is unchanged from the existing layout as indicated in Figure 6-12 below.

Figure 6-12: Existing Solstice Park junction arrangement

6.6.3 Under the current junction arrangements model forecasts indicate that the northern and southern London Road / Porton Road roundabouts would operate over capacity with or without the Scheme.

Solstice Park northern roundabout

6.6.4 The northern roundabout at Solstice Park would experience southbound queueing on Salisbury Road by 2041 during weekday peak periods. In the AM period the model shows queues approaching 1km, and in the PM period queue lengths exceed 300m. This poor operational performance would occur with or without the Scheme.

6.6.5 Figure 6-13 shows average speeds through the Solstice Park junction with the Scheme during the 2041 AM period and indicates the southbound queueing on Salisbury Road.

Figure 6-13: Solstice Park average speeds (mph): AM period

6.6.6 Figure 6-14 compares journey times through Solstice Park junction for each AM, PM, inter-peak and average 'busy day' periods in the with scheme future year scenario. The graphs show the impact the congestion discussed has on the journey time when compared to the uncongested inter-peak model.

6.6.7 The southbound journey time in the AM period is approximately two minutes greater, and the PM period approximately 1 minute 30 seconds greater, than the uncongested 'busy day' and inter-peak periods. The delay is resulting from the queues on Salisbury Road heading south into the northern roundabout.

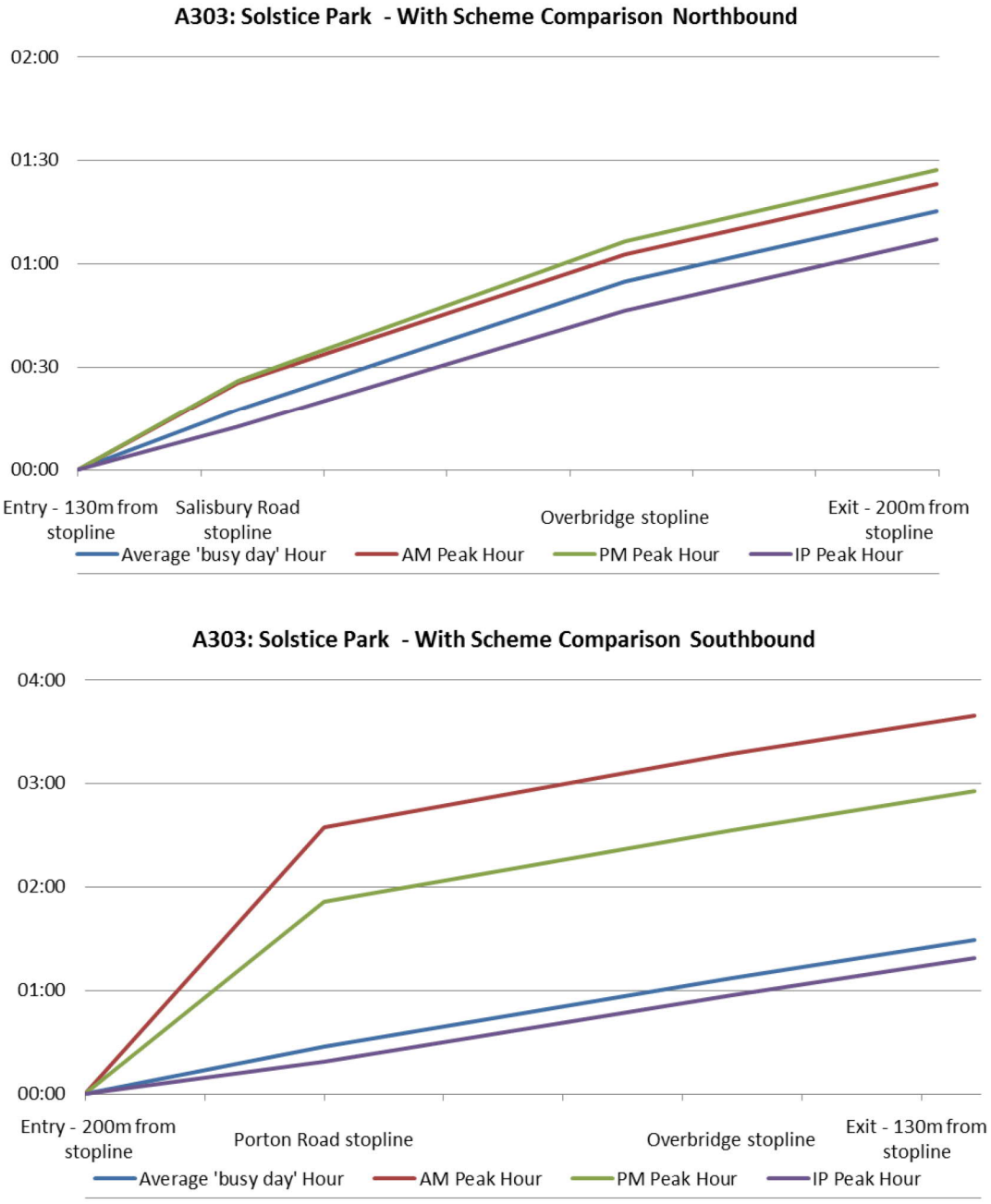


Figure 6-14: Journey times (mm:ss) at Solstice Park junction

Solstice Park southern roundabout (London Road / Porton Road / Solstice Park Avenue)

6.6.8 The Solstice Park south-western roundabout between London Road / Porton Road / Solstice Park Avenue is suggesting queueing on the westbound Solstice Park Avenue approach during the 2041 Do Something 'busy day' period, with queues extending back to the A303 westbound mainline.

6.6.9 On a busy day without the Scheme, queues form blocking back from Stonehenge. These are forecast, without the Scheme, to extend back past Solstice Park junction, by 2041. The Scheme removes this constraint. However the demand forecast to use Solstice Park junction is also forecast to exceed its current capacity by 2041 (with or without the Scheme). One consequence of this constraint is that on busy days queues might block back from the junction onto the westbound A303 carriageway.

6.6.10 Figure 6-15 shows average speeds through the Solstice Park junction during the 2041 busy day and indicates the westbound queueing.

Figure 6-15: Solstice Park average speeds (mph): Busy day

6.6.11 The average 'busy day' is delayed by approximately 3 minutes due to the congestion on Solstice Park Avenue extending onto the mainline (see the average journey time plot in section 6.8, Figure 6-19).

Solstice Park northern and southern roundabout upgrade/sensitivity tests

6.6.12 Highways England is the responsible authority for this junction and, as such, has an obligation to both review developments as they occur and, through the planning system, agree mitigation for proposed development plans as part of their responsibility to maintain the operation of the network to acceptable standards. Assuming that, through the standard development and planning processes, decisions are taken to augment the capacity of Solstice Park junction, a sensitivity test of potential improvements to the current layout, has been modelled.

6.6.13 To alleviate the southbound congestion in the AM and PM periods on Salisbury Road, the two lane entry flare was assumed to be extended to 25m and a two lane exit assumed on the exit to the overbridge, 40m in length. This allows two lanes to be used for the southbound movement around the roundabout.

6.6.14 Figure 6-16 shows the average speeds in the AM period with the potential network changes at the northern Solstice Park roundabout. The change does result in increased levels of congestion southbound on the A303 overbridge, indicated by the orange colouring; however queues do not impact on the A303 eastbound off-slip.

Figure 6-16: Sensitivity test - Solstice Park average speeds (mph): AM period

6.6.15 To alleviate the westbound congestion in the 'busy day' period on Solstice Park Avenue, a sensitivity test with two lanes running from the off-slip through to the roundabout junction with Porton Road in the westbound direction was run. This change allowed two lanes to be used for the ahead movement through the two Solstice Park roundabouts with Equinox Road and Meridian Way.

6.6.16 Figure 6-17 shows the average speeds in the 'busy day' model with the potential network amendments to Solstice Park Avenue, resolving the A303 mainline queuing issue.

Figure 6-17: Sensitivity test - Solstice Park average speeds (mph): Busy period

Solstice Park summary

6.6.17 Under the current junction arrangements model forecasts indicate that the 'northern' and southern (London Road / Porton Road) roundabouts would operate over capacity with or without the Scheme.

6.6.18 Highways England is the responsible authority for this junction and, as such, have a responsibility to maintain the operation of the network to acceptable standards. Assuming that, through the standard development and planning processes, decisions are taken to augment the capacity of Solstice Park junction, then Solstice Park is shown to operate within capacity.

6.6.19 The improvements assumed in the assessment of Solstice Park are:

e. Northern roundabout southbound approach from Salisbury Road entry flare extended to 25m, and a two lane exit assumed on the exit to the overbridge, 40m in length - and to be provided by 2026.

f. Southern roundabouts two lanes running from the off-slip through to the roundabout junction with Porton Road in the westbound direction - to be provided between 2026 and 2041.

6.7 A303 mainline by Double Hedges

6.7.1 The mainline A303 eastbound is on a climbing gradient up to the merge section with the A3028 Double Hedges.

6.7.2 Under the scheme proposals there is a design change to lengthen the merging section for safety reasons only, and hence this has not been represented in the forecast year 'with scheme' models.

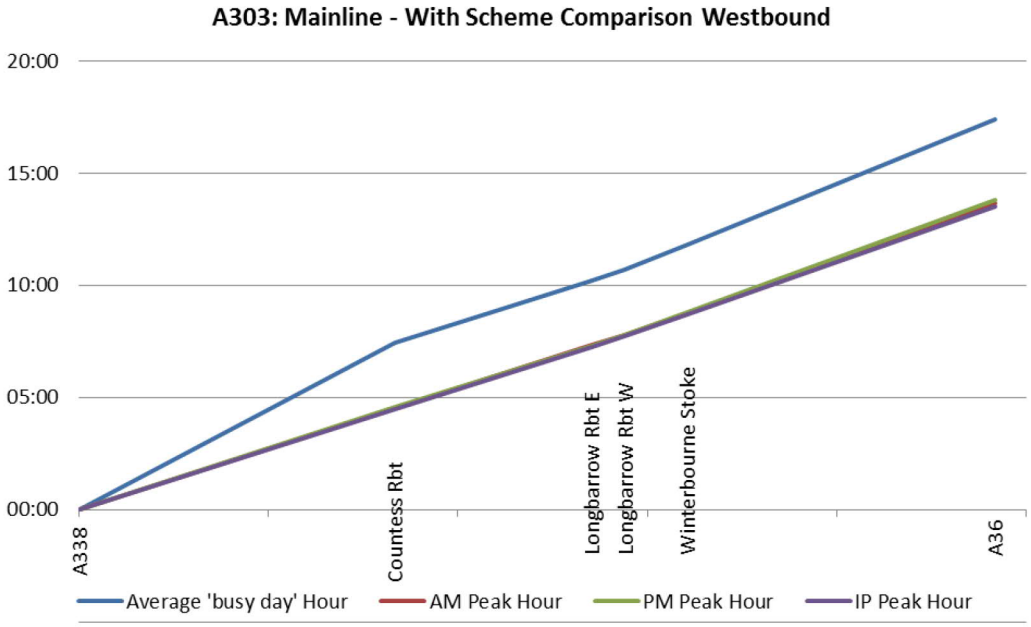
6.7.3 The 2041 Do Something 'busy period' model average speeds are shown in Figure 6-18, and show no issues with slow moving traffic due to the gradient.

Figure 6-18: Mainline A303 by Double Hedges average speeds (mph): Busy period

6.8 A303 mainline

6.8.1 Initial model runs indicated the westbound mainline average 'busy day' journeys are delayed by approximately 3 minutes due to the congestion on Solstice Park Avenue extending onto the mainline (see Section 6.6).

6.8.2 Figure 6-19 compares journey times eastbound and westbound on the A303 in the Do Something 2041 future year scenario. The journey time is recorded between the junctions with the A36 and A338 for each AM, PM, inter-peak and average 'busy day' periods.



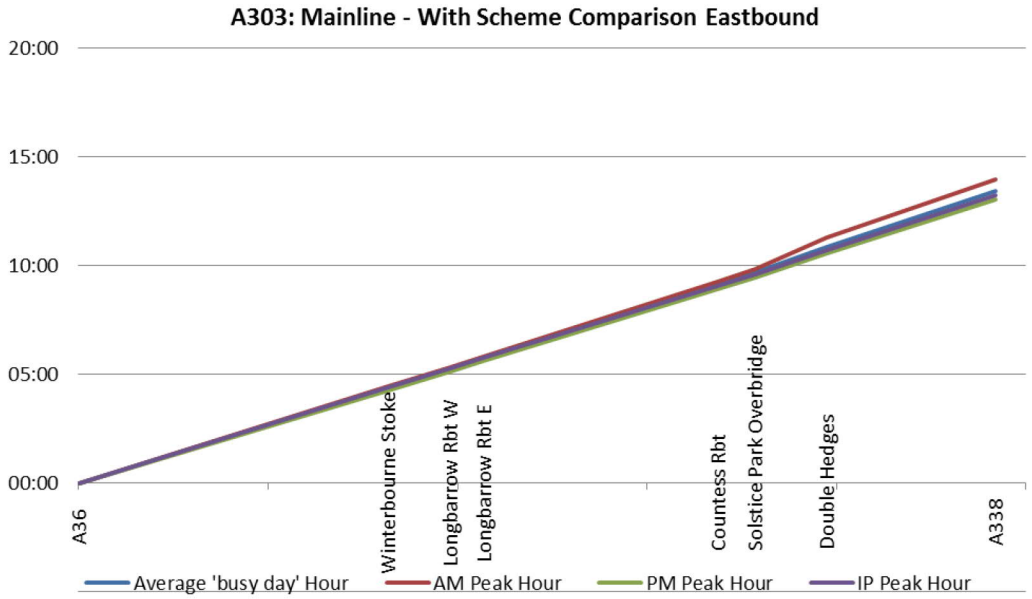


Figure 6-19: Journey times (mm:ss) for the A303 mainline

6.8.3 Solstice Park junction is forecast to exceed its current capacity by 2041 (with or without the Scheme) and an assumption has been made that Highways England, who are the responsible authority for this junction have maintained the operation of the network to an acceptable standard, and augmented the capacity of Solstice Park junction. Hence as outlined in Section 6.6 capacity improvements have been assumed at this junction.

6.8.4 Figure 6-20 compares journey times westbound on the A303 in the with scheme 2041 future year scenario with capacity improvements at Solstice Park.

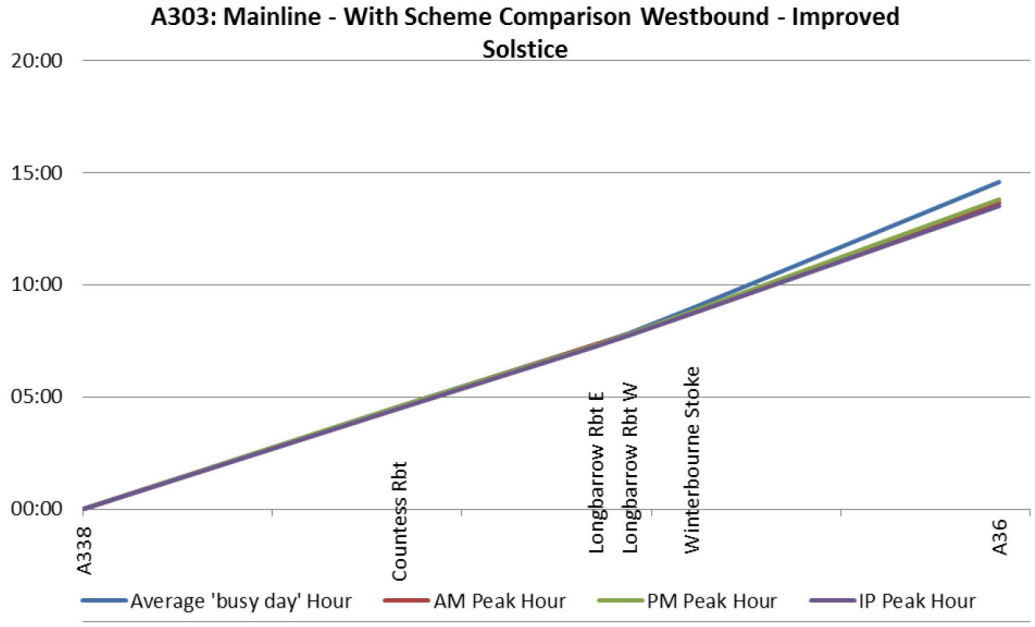


Figure 6-20: Journey times - A303 mainline – increased Solstice Park capacity

6.8.5 The westbound graph shows there is little difference in journey time between AM, PM, inter-peak and average 'busy day' with the Scheme, assuming no blocking back from Solstice Park junction.

6.8.6 The eastbound graph shows there is little difference in journey time between AM, PM, inter-peak and average 'busy day' with the Scheme.

6.9 Rollestone Cross junction

6.9.1 The scheme proposals which have been tested at the Rollestone Cross junction are indicated in Figure 6-21. The junction is re-aligned making The Packway and B3086 the unopposed route with two T-junctions; one for access to Rollestone Camp and the other to join with The Packway/London Road. The speed limit on the bend is reduced from national speed limit to 40mph.

Figure 6-21: Modelled Rollestone Cross junction design

6.9.2 The most recent scheme proposals at the Rollestone Cross junction were revised as indicated in Figure 6-22. This retains The Packway and B3086 as the unopposed route, but includes a single priority junction for access to Rollestone Camp and The Packway / London Road. This design change will not change the conclusions drawn from the forecast models.

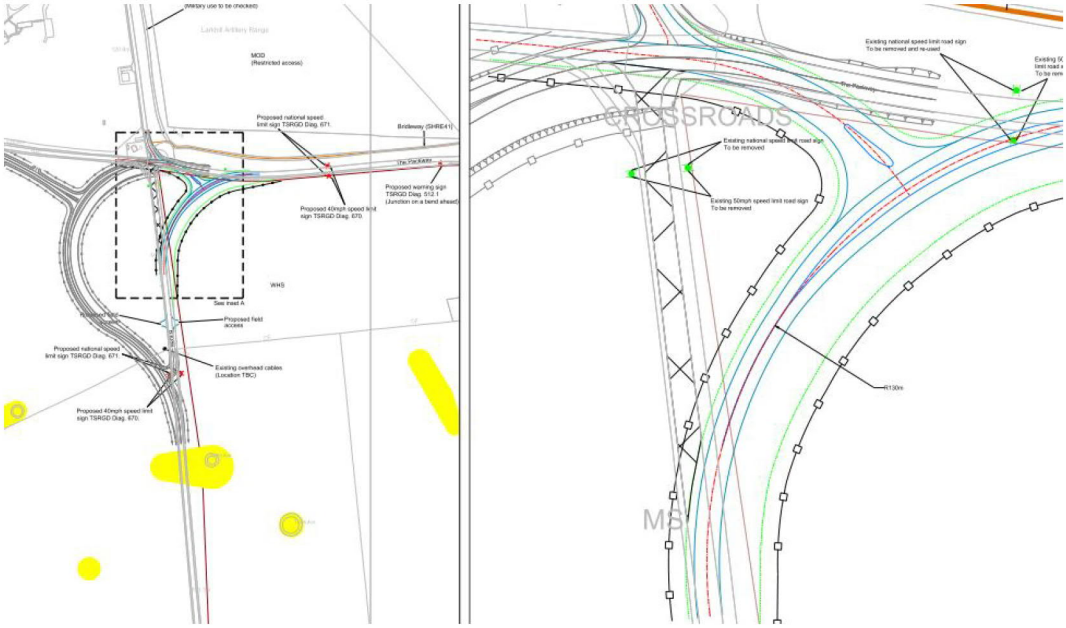


Figure 6-22: Rollestone Cross junction design.

6.9.3 There are no operational issues at Rollestone Cross junction in any of the modelled peak periods.

6.9.4 Figure 6-23 shows average modelled speeds through the Rollestone Cross junction during the 2041 AM period.

Figure 6-23: Rollestone Cross average speeds (mph): AM period

6.10 A345/The Packway roundabout

6.10.1 Under the scheme proposals, the highway network at The Packway roundabout is unchanged from the existing layout as indicated in Figure 6-24.

Figure 6-24: A345/The Packway roundabout

6.10.2 This junction is forecast to experience congestion in the 2041 AM 'with scheme' and 2041 AM 'without scheme' models. There is a consistent slow moving queue modelled northbound on Countess Road, and queues form and disperse on all other arms. Queues on the approaches to this roundabout cause queuing on side roads, including Fargo Road and Stonehenge Road, due to blocking back from the roundabout.

6.10.3 Figure 6-25 shows average speeds forecast through The Packway roundabout during the 2041 Do Something AM period.

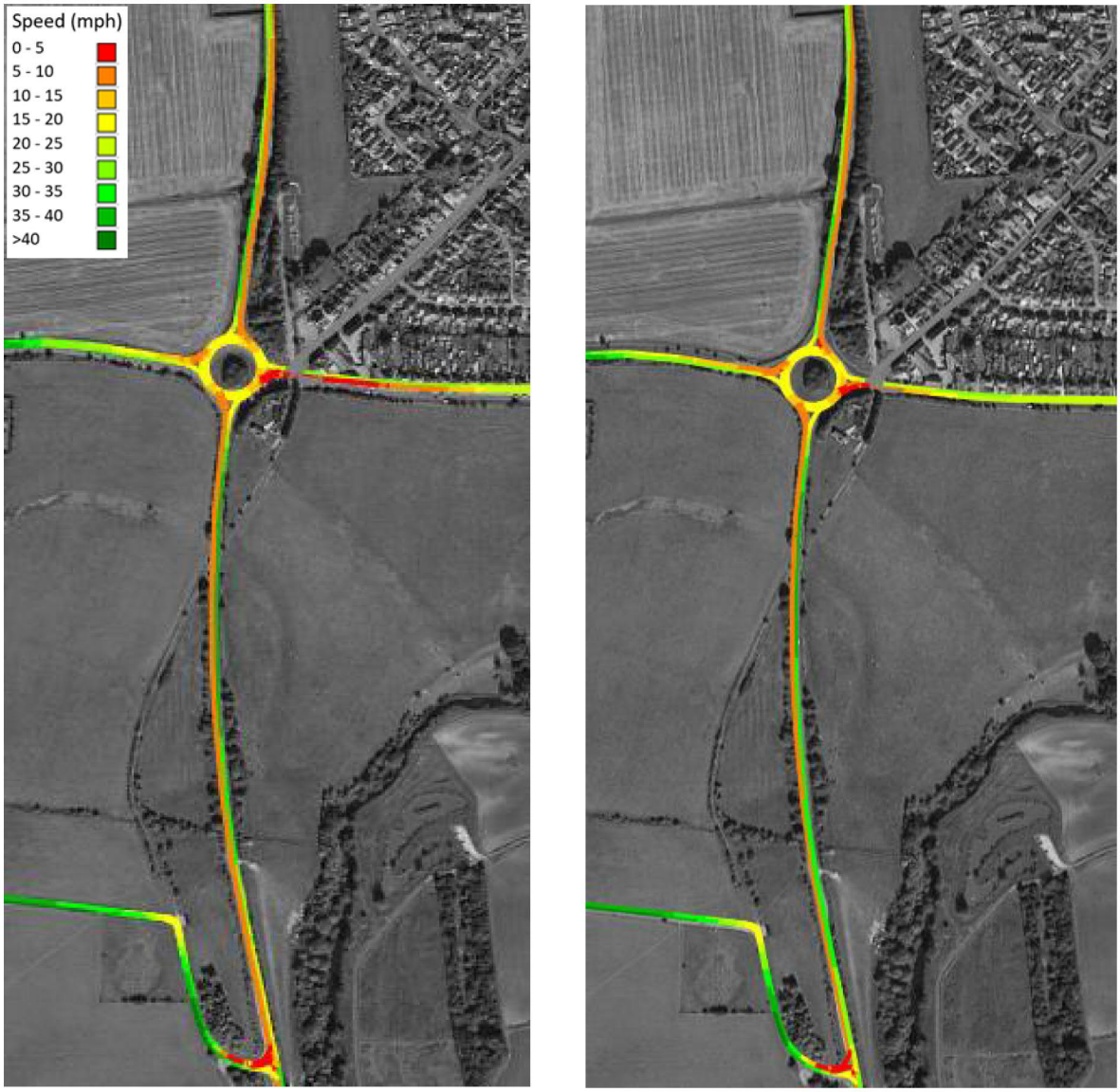


Figure 6-25: A345/The Packway average speeds (mph): AM period with scheme (left) and without scheme (right)

6.10.4 In the PM 2041 with scheme and PM without scheme there is some modelled congestion but to a lesser extent than in the AM period. The inter-peak and 'busy' day models have low levels of congestion on this approach with the Scheme.

6.10.5 Figure 6-26 compares journey times between The Packway and Countess Road in the Do Something future year scenario for each 'normal' AM, PM, inter-peak and average 'busy day' periods.

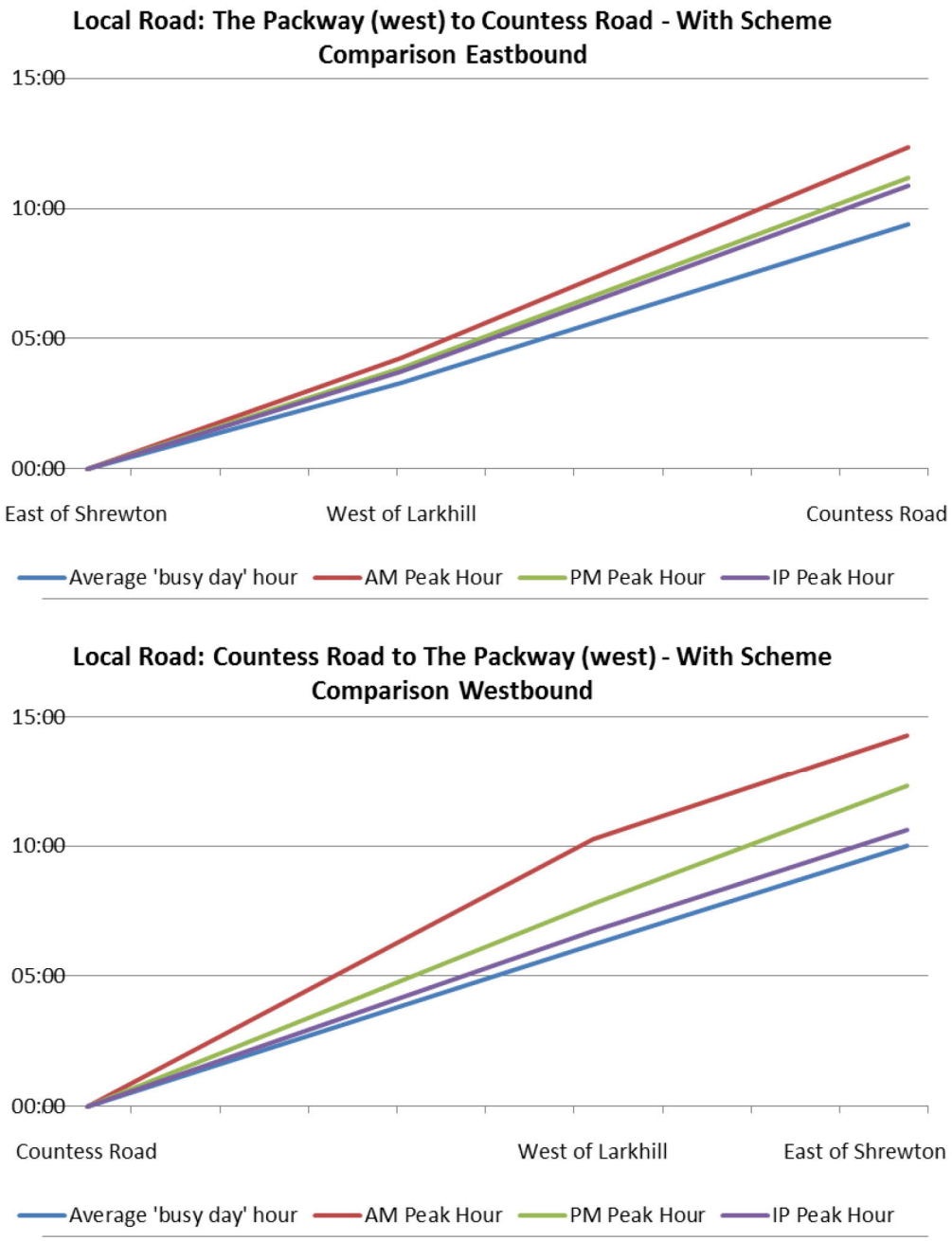


Figure 6-26: Journey times (mm:ss) in the local road network – With scheme

6.10.6 The westbound journey time in the AM period is forecast to be approximately 4 minutes greater, and the PM period approximately 2 minutes greater, than the uncongested 'busy day' and inter-peak periods. The delay is resulting from the queues on Countess Road into The Packway roundabout.

6.10.7 Figure 6-27 shows the journey time on Countess Road from just south of Fargo Road westbound on The Packway towards Shrewton. The graphs show that the journey time with the Scheme is no worse than without the Scheme in 2041.

6.10.8 Figure 6-28 shows the journey time on the approach to The Packway/A345 roundabout from Bulford. The graphs show that the journey time with the Scheme is no worse than without the Scheme in 2041.

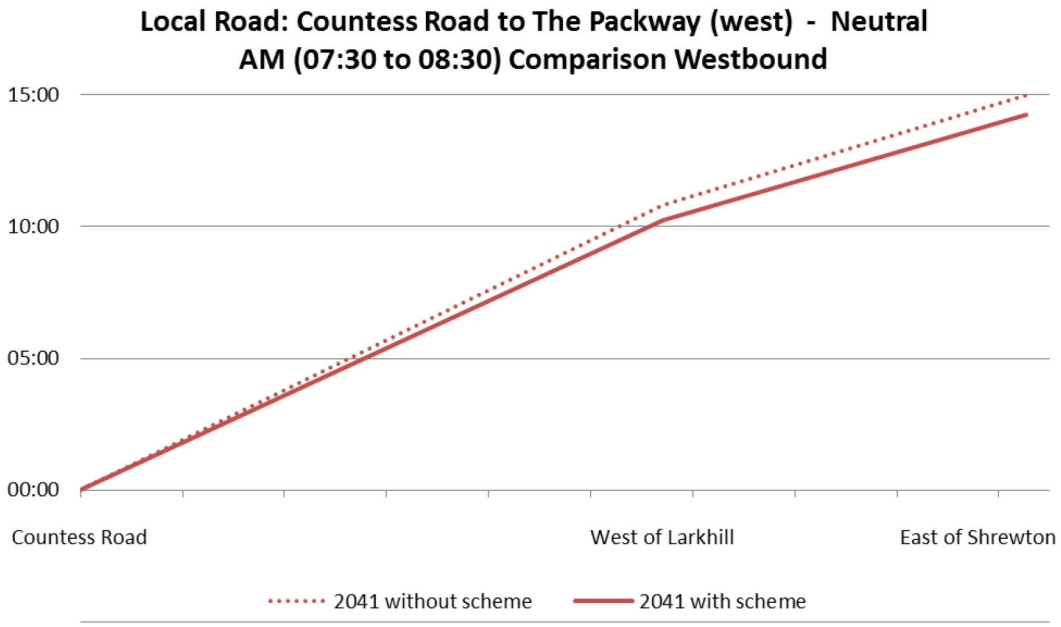


Figure 6-27: Journey time (mm:ss) comparison for with and without scheme in 2041 northbound on Countess Road in the AM peak model period

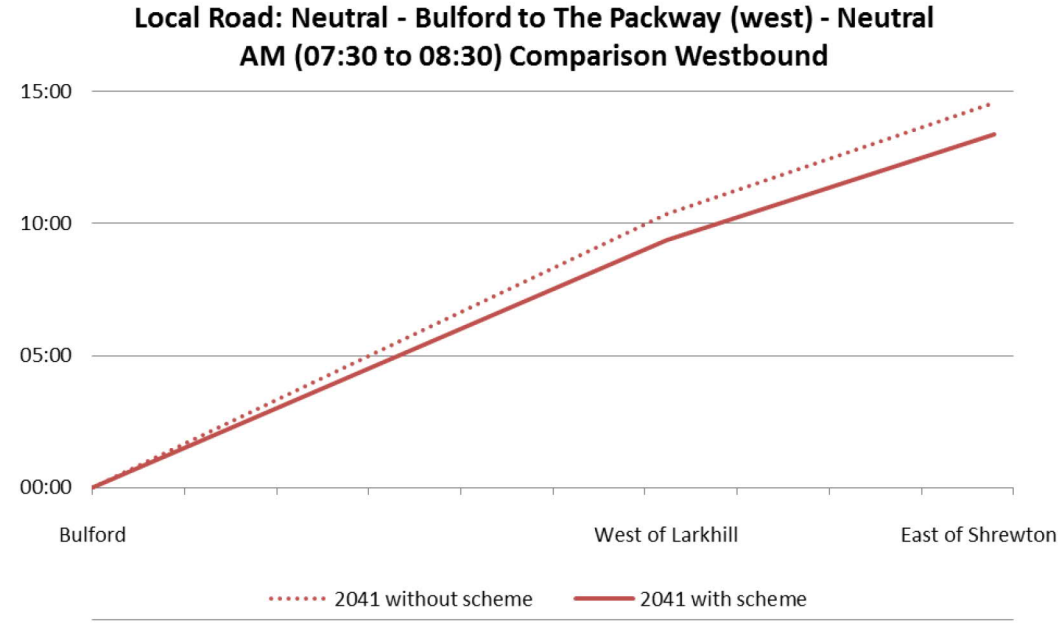


Figure 6-28: Journey time (mm:ss) comparison for with and without scheme in 2041 westbound from Bulford in the AM peak model period

6.10.9 Sensitivity tests suggest that improvements to The Packway/A345 roundabout could be made to alleviate the congestion. The provision of two lanes for the northbound movement reduced the level of queueing modelled on Countess Road; the flare on approach is 20m. Some congestion remained on the A345 southbound into the roundabout and westbound on Larkhill Road; the journey

time from the A345 north to west of Larkhill increases by 1 minute 44 seconds, indicating some redistribution of queues around the junction.

6.10.10 Figure 6-29 shows the average speeds in the AM period with the potential network changes at the A345/The Packway roundabout.

Figure 6-29: Sensitivity test – A345/The Packway roundabout average speeds (mph): AM period

6.11 Operational modelling summary

6.11.1 A summary of the key findings and design requirements from the operational assessment of the Scheme on the A303 corridor once sensitivity tests are taken into account, in normal and busy periods, is indicated in Table 6-1.

Table 6-1: Operational summary / design requirements – A303 network

	Design Requirement
Longbarrow north	**A360 southbound:** Dedicated left turn lane, an extended southbound flare to 40m, or signalisation required during AM peak/busy day operation. **A303 eastbound off slip: T**wo lane stop line, flare of 15m assumed **-** no operational issues. **A360 overbridge:** Two lane overbridge and stop line - no operational issues.
Longbarrow south	**A360 northbound:** Flare of at least 25m and provision of two marked lanes to the A360 overbridge required during AM peak/busy day operation. **A303 westbound off slip:** Two lane stop line, flare of 20m assumed - no operational issues. **Winterbourne Stoke** (existing A303): Two lane stop line, flare of 20m assumed - no operational issues.
Solstice Park northern roundabout	Capacity improvements provided through standard development and planning processes, by 2026, and not as part of the 'with scheme' proposals. For illustration a conceptual improvement tested was: **Salisbury Road:** Two lane stop line and flare of at least 25m required during AM and PM peak operation. **Porton Road overbridge exit:** Two lane exit required of approximately 40m. **Porton Road overbridge entry:** As existing. **A303 eastbound off-slip:** As existing.
Solstice Park southern roundabouts	Capacity improvements provided through standard development and planning processes, between 2026 and 2041, and not as part of the 'with scheme' proposals. For illustration a conceptual improvement tested was: **Salisbury Park Avenue westbound:** Two lanes maintained from A303. **All other arms:** As existing layout.

6.11.2 In the local network, The Packway / diversion route including the improved Rollestone junction, upgraded as part of the Scheme, the upgraded A3028 Durrington roundabout and the A3028 Bulford roundabouts are forecast to operate satisfactorily.

6.11.3 The A345 / The Packway roundabout is forecast to experience congestion in the 2041 AM peak period both with and without the Scheme.

6.12 Incident testing

6.12.1 Incident tests have been undertaken in both 'busy day' and 'normal' AM, PM and Inter-peak 2041 models to assess the impact of a single tunnel closure and how the remaining tunnel would operate under contraflow conditions.

6.12.2 The incident test has assumed:

a. The westbound tunnel is used for the contraflow;

b. The merging for single lane use begins 400m before the tunnel; and

c. The average speed camera control is implemented at 50mph through the contraflow tunnel, and is enforced 800m before the lane drop and continues 90m beyond the traffic management as per Traffic Signs Manual Chapter 8.

6.12.3 The 'normal' AM period model forecasts queuing in the eastbound direction on approach to the contraflow lane drop. The modelled queues extend up the on-slip from Longbarrow interchange, and beyond the Longbarrow off-slip on the mainline. The 'normal' AM period journey time eastbound along the corridor increases by approximately 17 minutes with the contraflow in place.

6.12.4 Figure 6-30 compares journey times eastbound on the A303 in a contraflow tunnel situation with the Do Something 2041 future year scenario.

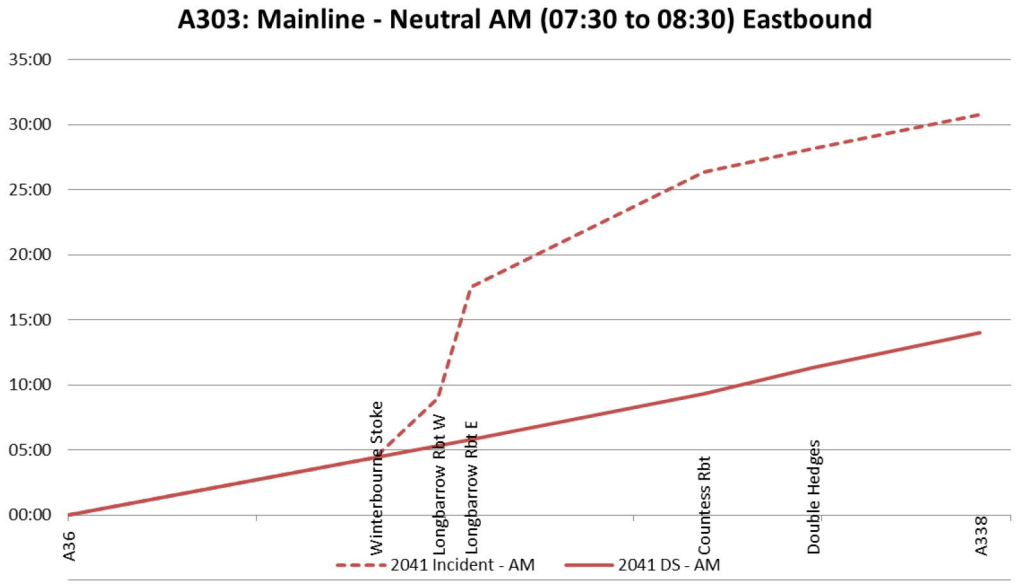


Figure 6-30: A303 journey times with scheme contraflow - 2041 eastbound – AM period

6.12.5 The 'normal' AM period model forecasts that in the westbound direction there is some periodic queue build up on the approach to the lane drop, however this disperses and does not extend beyond the on-slip from Countess roundabout. The traffic flow once in the contraflow tunnel is continuous but moving steadily.

6.12.6 Figure 6-31 compares journey times westbound on the A303 in a contraflow tunnel situation with the Do Something 2041 future year scenario.

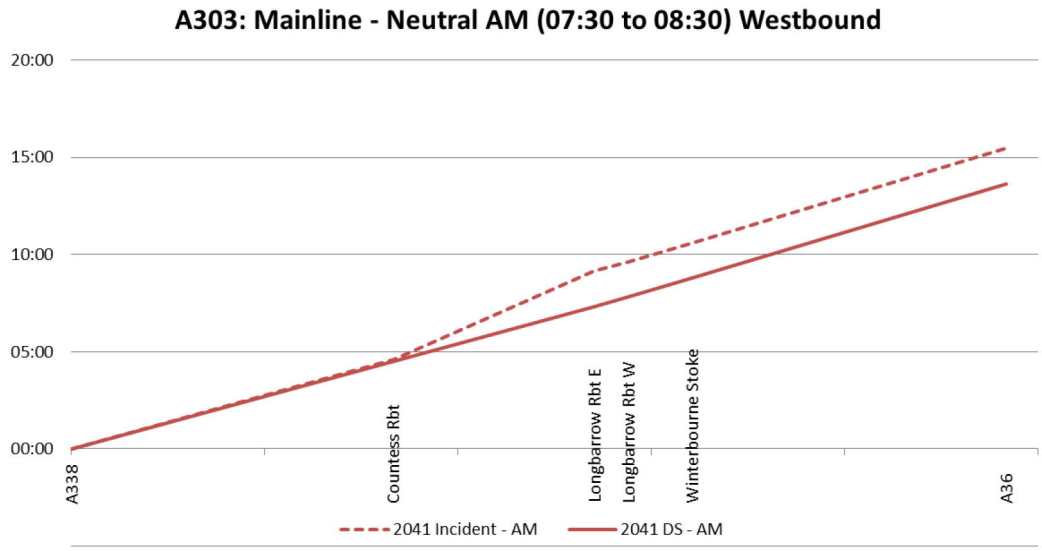


Figure 6-31: A303 journey times with scheme contraflow - 2041 westbound – AM period

6.12.7 The 'normal' inter-peak and PM period models show no issues with traffic flowing well on approach and through the contraflow tunnel. Journey times increase during these periods by approximately 2 minutes across both eastbound and westbound movements. Inter-peak and PM journey times are presented in Figure 6-32 to Figure 6-35.

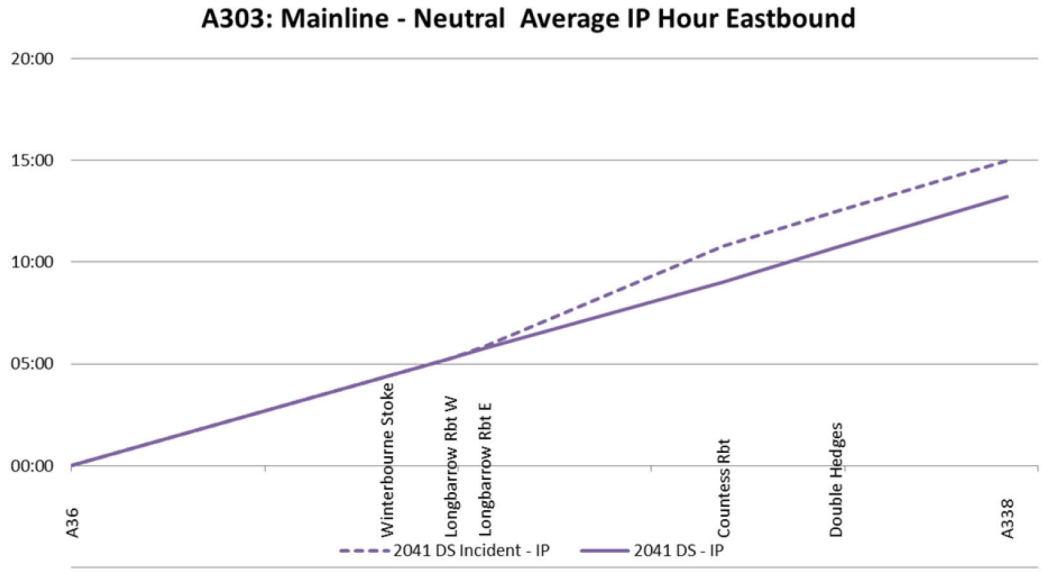


Figure 6-32: A303 journey times with scheme contraflow - 2041 eastbound – Inter-peak period

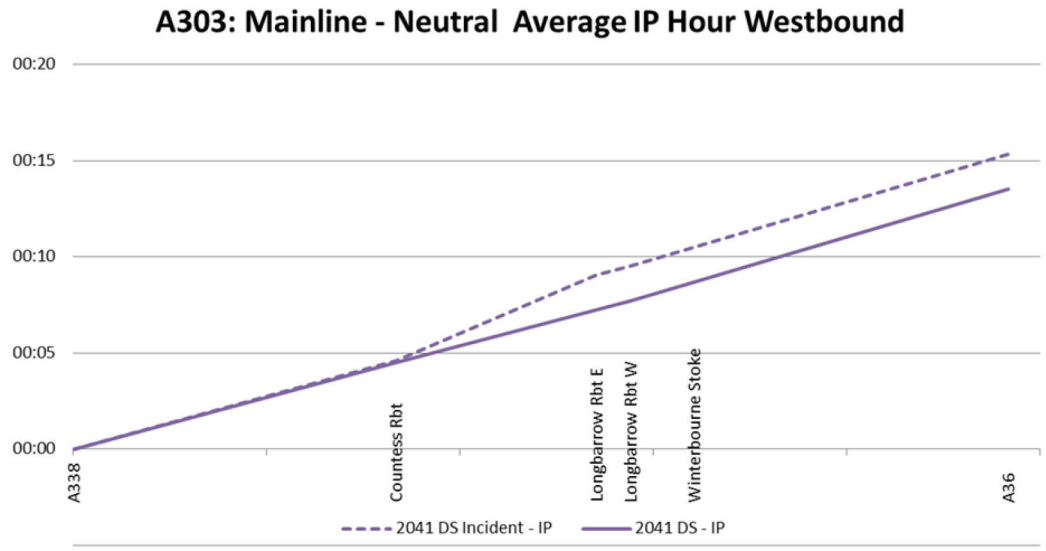


Figure 6-33: A303 journey times with scheme contraflow - 2041 westbound – Inter-peak period

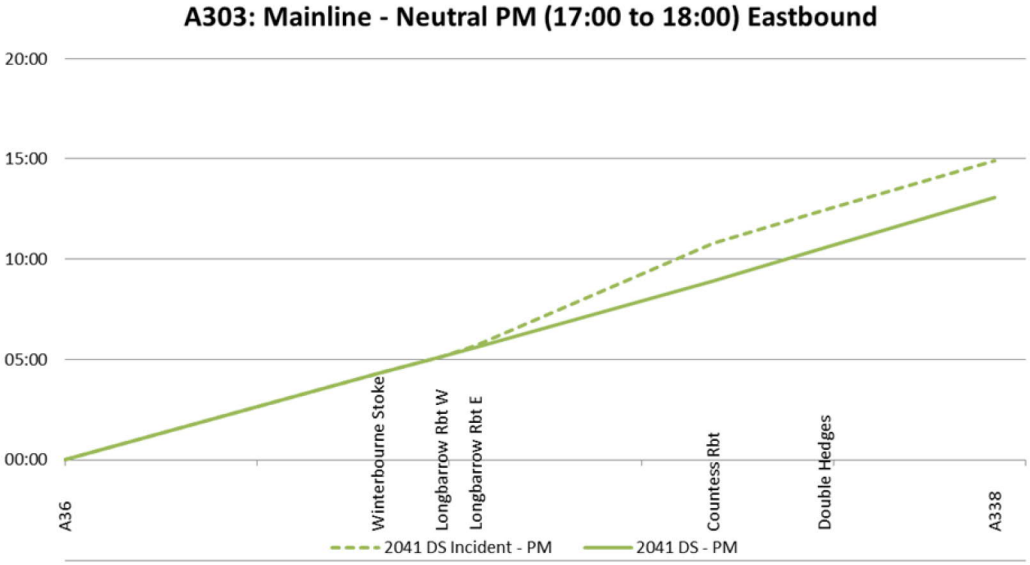


Figure 6-34: A303 journey times with scheme contraflow - 2041 eastbound – PM period

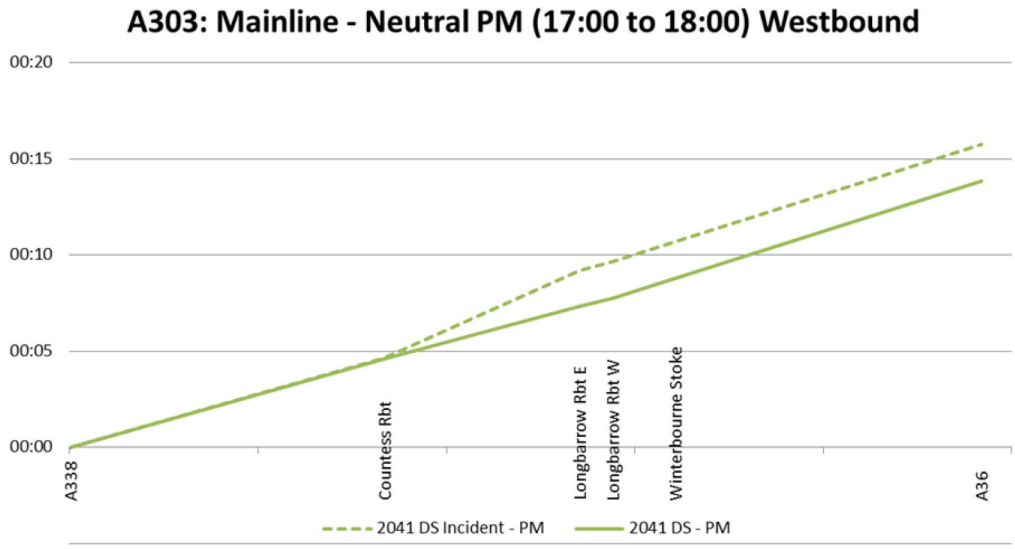


Figure 6-35: A303 journey times with scheme contraflow - 2041 westbound – PM period

6.12.8 The 'busy day' model shows high levels of queuing on approach to the contraflow tunnel in both eastbound and westbound directions. The queues are evident from the start of the model period, 12:00, and extend to the Solstice Park junction and beyond the Longbarrow interchange off-slip on the mainline; queues continue to build and surpass Solstice Park for the remaining duration of the model. Vehicles queue off the network to the west of the model, the model does not recover after the initial 12:00 queues. There is some queueing on the on-slips at both Longbarrow interchange and Countess roundabout. The traffic flow once in the contraflow tunnel is continuous but moving steadily. The journey time is significantly impacted upon by the closure in a 'busy day' period for both directions of travel.

6.12.9 Modelled tests indicate that contraflow operation would be likely to operate satisfactorily without causing delays, beyond those caused by speed limit changes. The contraflow operates satisfactorily in the interpeak and PM peak with typical weekdays. Mainline traffic flows would be lower at night time and similarly operation of a single bore tunnel should be satisfactory from an operational perspective.

6.12.10 Operational problems were modelled in the morning peak period of week days and on busy days (such as a summer Friday between 10-6pm). It is recommended that plans for tunnel maintenance should minimise planned single bore tunnel closure at these times to minimise disruption to traffic.

7 Construction and maintenance

7.1 Overview

7.1.1 This section presents the results of the modelling of the construction phase in both the strategic model and the operational model.

7.2 Strategic modelling results

7.2.1 Traffic flow diagrams showing the Annual Average Daily Traffic (AADT) and average hourly flow in the construction scenarios are included in Appendix R.

7.2.2 Figure 7-1 and Figure 7-2 show the change in forecast AADT flows in relation to the without scheme 2026 scenario for construction phases 1 and 2. Negative values indicate a decrease in AADT in the construction scenarios compared to the without scheme scenario.

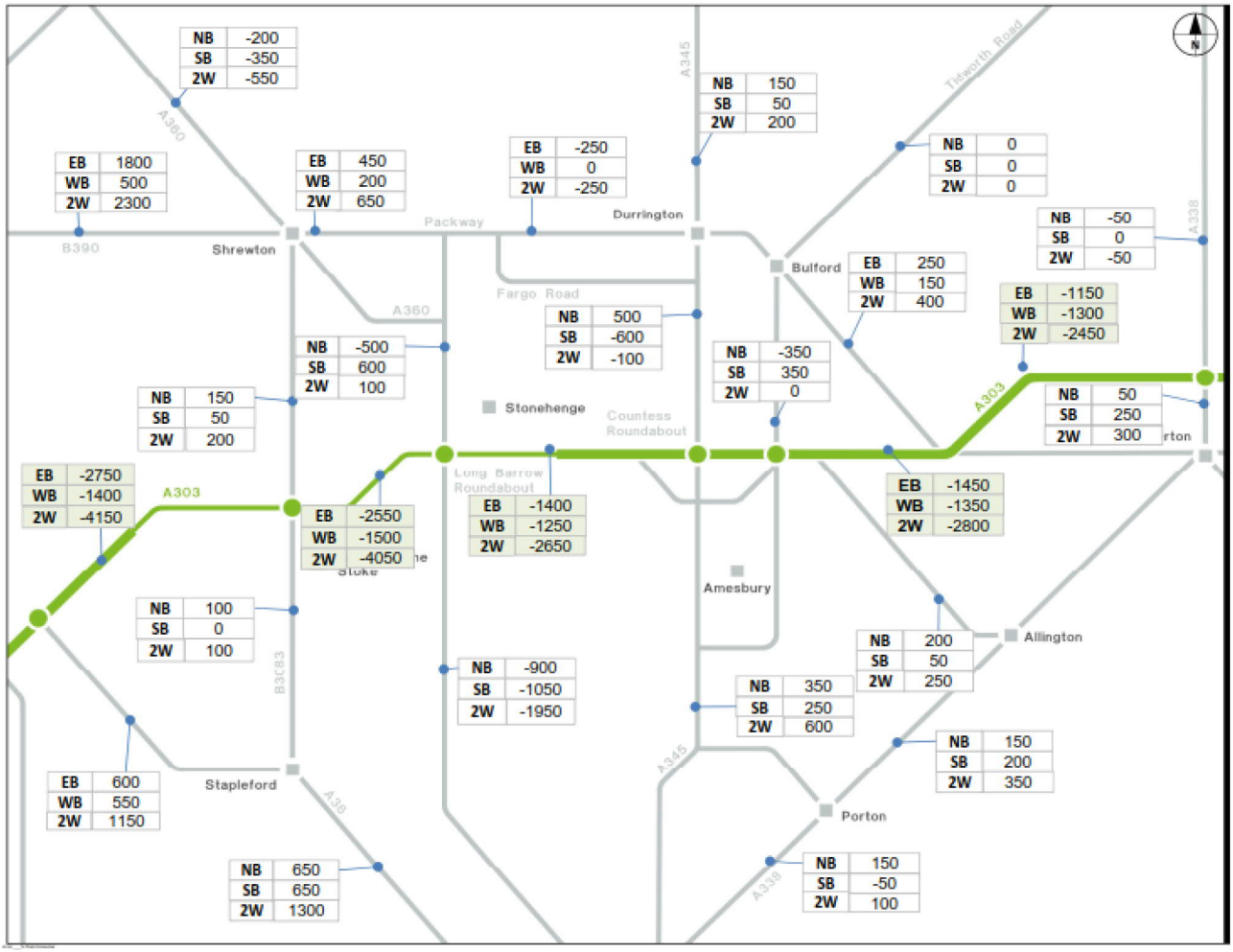


Figure 7-1: Difference between construction scenario phase 1 AADT & 2026 without scheme AADT

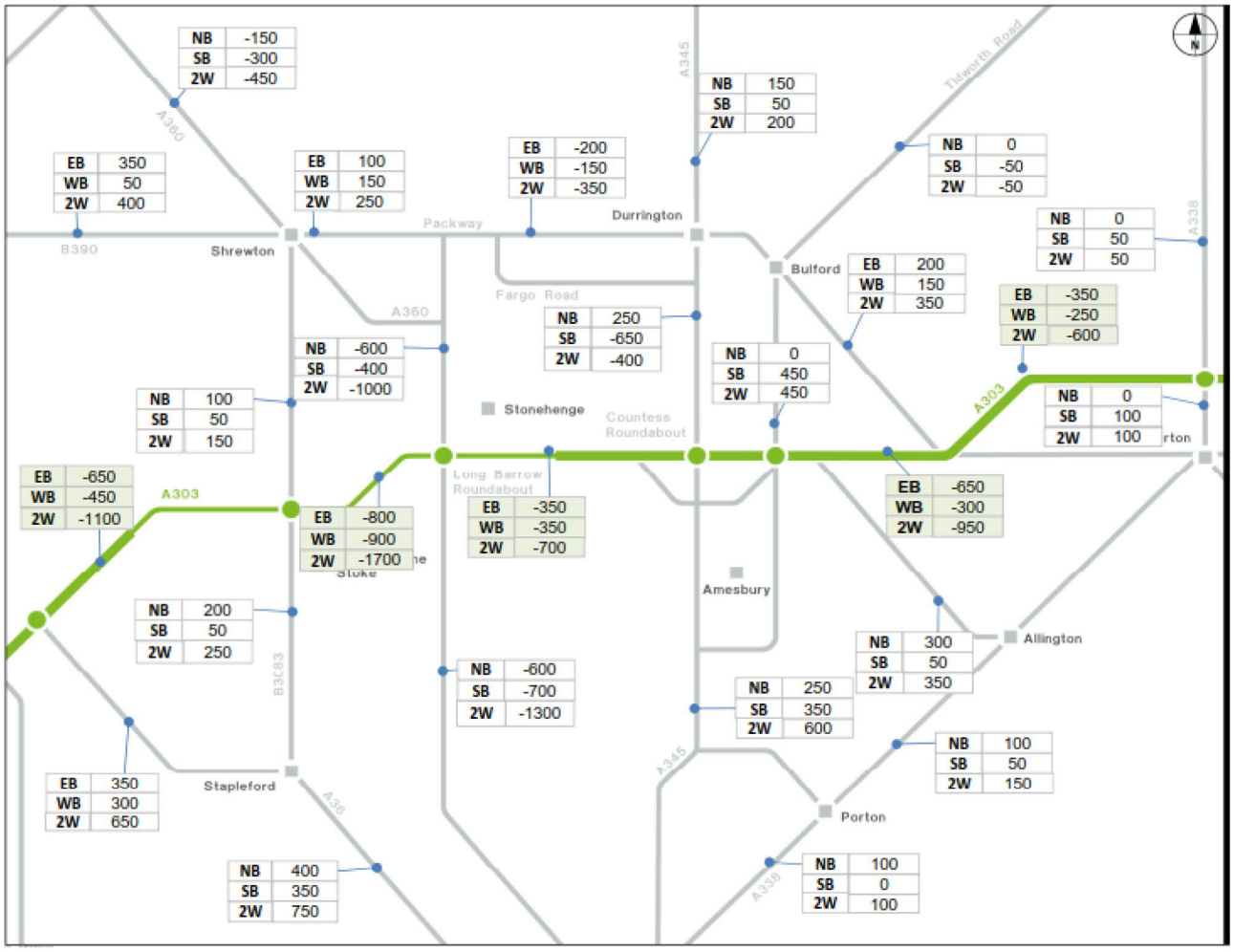


Figure 7-2: Difference between construction scenario phase 2 AADT & 2026 without scheme AADT

7.2.3 Figure 7-1 and Figure 7-2 show that during construction there is forecast to be a decrease in flows on the A303 mainline near the Scheme.

7.2.4 To the north of the A303 there is an increase in flow on the B390 through Shrewton as traffic re- routes from the A36/A303 as a result of increased journey times on the A303. To the south of the A303 there is forecast to be some re-routeing for areas to the north west of Salisbury to access the A303 west via the A36 rather than the A360, again due to the increase in journey time on the A303.

7.2.5 In phase 2 of construction the bypass at Winterbourne Stoke is in place, as well as the flyover at Countess, which means that the change in forecast traffic flows is smaller in magnitude than in phase 1.

7.2.6 To understand the wider re-routeing during the construction phase, analysis has been undertaken of flows through the north/south screenline which extends from the M4 at the north through to the A31 at the south (as previously shown in Figure 5-9). Table 7-1 shows the screenline flows for construction phase 1.

Table 7-1: 2026 screenline flows (two way, AADT) - Construction phase 1

	Name	2026 without scheme	2026 Construction phase 1	% difference
North of A303	M4	81,500	82,100	1%
	A4	11,300	11,400	1%
	A342	8,700	9,000	5%
	N of A303	3,800	3,800	-1%
	Packway	6,900	6,400	-6%
A303	A303	29,400	26,700	-9%
South of A303	S of A303	7,600	7,600	0%
	S of A303	3,000	3,000	0%
	Nettons	1,700	1,900	13%
	S of A303	18,300	19,100	4%
	A338	8,000	8,300	4%
	A36	19,300	19,400	0%
	A30	12,300	12,900	5%
	A31	70,100	70,000	0%
Total		281,800	281,700	0%

7.2.7 There is a forecast reduction in AADT on the A303 and The Packway of 3,200pcu in construction phase 1, due to the traffic management measures on the A303 and at Longbarrow and Countess roundabout. The screenline analysis shows that there is forecast to be a corresponding increase in traffic on alternative routes, generally these are modest increases dispersed over a wide area with no individual route experiencing more than a 5% or 200 PCU increase in daily traffic volume.

7.2.8 The journey times for all routes (as described in Section 5.5) for the construction scenarios are presented in Appendix S.

7.2.9 Table 7-2 shows journey times for route 11-1 in the without scheme scenario, phase 1 of the construction scenario and phase 2 of the construction scenario.

Table 7-2: A303 - A34 to A36 journey times, construction scenarios

Route	Time Period	Direction	Without scheme (hh:mm:ss)	Phase 1		Phase 2	
				(hh:mm:ss)	difference from without scheme	(hh:mm:ss)	difference from without scheme
11_1 A303: A34 to A36	AM	EB	00:30:42	00:34:31	00:03:49	00:31:15	00:00:33
		WB	00:33:22	00:36:02	00:02:40	00:33:34	00:00:12
	IP	EB	00:31:03	00:34:57	00:03:54	00:31:32	00:00:29
		WB	00:30:57	00:34:44	00:03:47	00:31:38	00:00:41
	PM	EB	00:32:12	00:35:49	00:03:37	00:32:30	00:00:18
		WB	00:30:54	00:34:46	00:03:52	00:31:38	00:00:44
	Busy Period	EB	00:43:24	00:45:27	00:02:03	00:43:32	00:00:08
		WB	00:42:33	00:44:48	00:02:15	00:43:41	00:01:08

7.2.10 There is a forecast increase in journey times of between two and four minutes in construction phase 1, due to the speed limits in place during the construction phase. In construction phase 2 the bypass at Winterbourne Stoke is in place, as well as the flyover at Countess, which results in forecast journey times that are mostly within a minute of the without scheme scenario.

7.2.11 Table 7-3 shows selected local journey times for the construction scenarios.

Table 7-3: Selected local journey times (6 – The Packway, 8 - A360, 9 – A345) during construction scenarios

Route	Time Period	Direction	Without scheme (hh:mm:ss)	Phase 1		Phase 2	
				(hh:mm:ss)	difference from without scheme	(hh:mm:ss)	difference from without scheme
6	AM	WB	00:26:14	00:27:02	00:00:48	00:26:35	00:00:21
		EB	00:26:21	00:27:23	00:01:02	00:26:40	00:00:19
	IP	WB	00:25:26	00:25:36	00:00:10	00:25:37	00:00:11
		EB	00:25:02	00:25:42	00:00:40	00:25:25	00:00:23
	PM	WB	00:26:45	00:27:03	00:00:18	00:26:51	00:00:06
		EB	00:25:36	00:26:26	00:00:50	00:25:56	00:00:20
	Busy Period	WB	00:27:48	00:27:03	-00:00:45	00:27:24	-00:00:24
		EB	00:27:37	00:26:41	-00:00:56	00:27:01	-00:00:36
8	AM	NB	00:37:32	00:38:16	00:00:44	00:38:10	00:00:38
		SB	00:38:06	00:38:16	00:00:10	00:38:50	00:00:44
	IP	NB	00:36:20	00:37:05	00:00:45	00:37:06	00:00:46
		SB	00:36:43	00:37:05	00:00:22	00:37:26	00:00:43
	PM	NB	00:37:32	00:38:08	00:00:36	00:38:08	00:00:36
		SB	00:37:52	00:38:08	00:00:16	00:38:35	00:00:43
	Busy Period	NB	00:36:49	00:37:31	00:00:42	00:37:33	00:00:44
		SB	00:37:01	00:37:31	00:00:30	00:37:43	00:00:42
9	AM	NB	00:27:54	00:27:47	-00:00:07	00:27:30	-00:00:24
		SB	00:30:53	00:30:57	00:00:04	00:30:36	-00:00:17
	IP	NB	00:27:25	00:27:04	-00:00:21	00:27:25	00:00:00
		SB	00:28:11	00:28:10	-00:00:01	00:28:27	00:00:16
	PM	NB	00:29:52	00:30:00	00:00:08	00:30:02	00:00:10
		SB	00:29:15	00:29:16	00:00:01	00:29:17	00:00:02
	Busy Period	NB	00:27:37	00:27:13	-00:00:24	00:27:43	00:00:06
		SB	00:29:18	00:28:36	-00:00:42	00:29:25	00:00:07

7.2.12 Table 7-3 shows that during phase 1 of construction there are increases in journey times of up to a minute in the neutral time periods on The Packway and the A360 in comparison to the 2026 without scheme model. On busy days the roadworks act to relocate queues further from Stonehenge. The implication is that the journey time savings drivers can gain by diverting onto The Packway to avoid queueing is likely to reduce. The forecasts indicate therefore a modest reduction in flows and journey times along The Packway (route 6) on busy days.

7.2.13 Phase 2 of construction in general leads to an increase in journey times of 30 seconds to one minute on the A360 (route 8), in comparison to the without scheme 2026 model. There are limited changes on the other local routes.

7.3 Operational modelling results

7.3.1 Journey times were extracted along the A303 between the A36 and A338 for each construction phase and time period: AM, PM and 'busy day'. The journey times in both directions on the A303 were compared to the 2026 without scheme journey time for each construction phase.

7.3.2 The journey time changes predicted by the operational models were compared to those predicted by the SATURN model. The operational modelling results show the same general trends as the SATURN results.

7.3.3 The AM and PM operational models indicate similar levels of delay from the 2026 without scheme network in both eastbound and westbound directions on the A303. The re-routing of traffic forecast by the SATURN model results in some sections of the network having no delay when compared to the 2026 without scheme journey times.

7.3.4 The operational model also indicates the Phase 2 construction scenario will result in less delay than Phase 1 throughout the A303 corridor in all time periods: AM, PM and 'busy day'.

7.3.5 The AM and 'busy day' operational models show the re-routing forecast by the SATURN models results in long queues southbound into Longbarrow roundabout on the A360 in the different construction phases; this is due to an increase in traffic using the A360.

7.3.6 Figure 7-3 shows the levels of queueing suggested southbound into Longbarrow roundabout in the AM period.

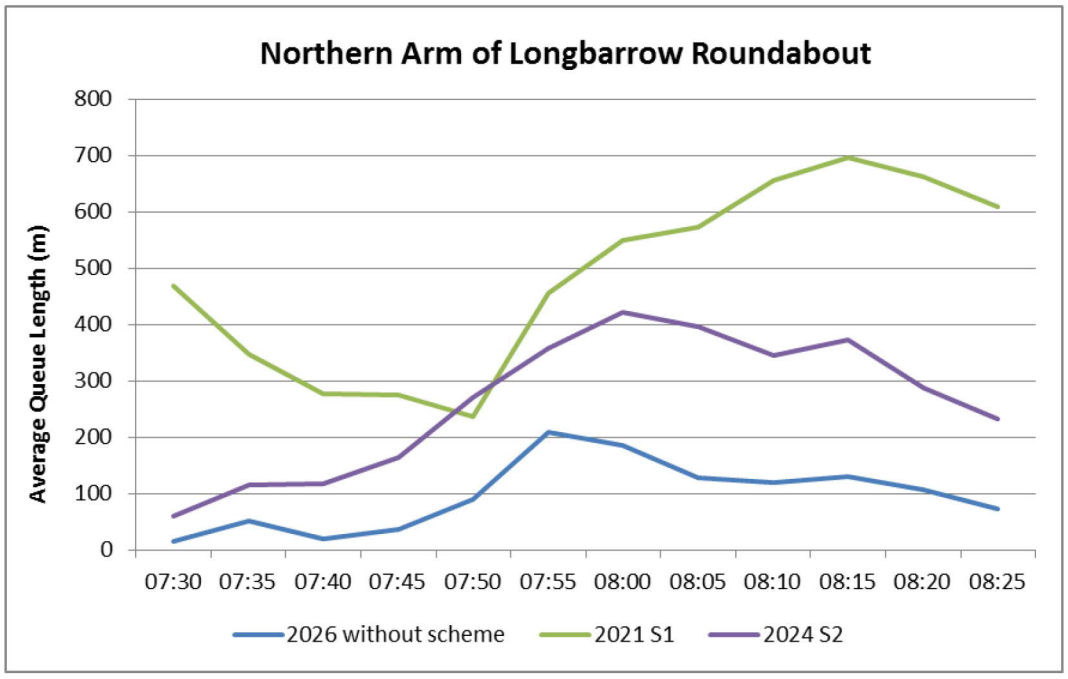


Figure 7-3: Average queue length (m) on A360 southbound into Longbarrow roundabout in the AM period (07:30-08:30)

7.3.7 The AM and 'busy day' models show an increase in queue length on the western arm of Longbarrow roundabout in construction phase 2. The model indicates this

is not a stationary queue but a long slow moving shock wave queue. Time savings along the rest of the network in this phase make up for the additional delay here so there is no overall increase in journey time between the A36 and A338.

7.3.8 In both AM and PM operational models the signals have been adjusted to minimise queueing and journey time increases through Countess roundabout. This will need to be monitored and optimised for the final traffic management scheme.

8 Summary

8.1 Summary of forecast assumptions

8.1.1 Highways England is progressing the development of the A303 Amesbury to Berwick Down scheme, one of the most significant schemes in the first period of the Road Investment Strategy.

8.1.2 Transport modelling is required to provide an evidence base for the Scheme. The evidence base needs to be able to assess the impacts of the Scheme in normal traffic conditions and in the busy periods where significant congestion is currently observed. A strategic model and A303 and local road microsimulation operational models have been developed.

8.1.3 The strategic model has been developed by augmenting information derived from Highways England's South West Regional Traffic Model (SWRTM) Design Freeze 3.0 and the PCF Stage 2 options model. Local demand data, local traffic counts and network refinements pertinent to the Scheme being taken forward at Stage 3 have been introduced. Given the specific issues on the A303 caused by holiday traffic, a busy time period model has also been developed to cover the summer Friday, Saturday and Sunday times during July and August. The refined model is known as the 'A303 Stonehenge SWRTM (DCO)' model.

'A303 Stonehenge SWRTM (DCO)' model

8.1.4 Forecasts have been developed for 2026 (which has been taken as the opening year of the Scheme), 2031, 2041 and 2051.

8.1.5 The reference demand was developed using a combination of an uncertainty log and national growth forecasts published within the National Trip End Model (NTEM) and generated by the Trip End Model Program (TEMPro). The developments identified in the uncertainty log were allocated to the specific zones in the modelled area.

8.1.6 The reference demand additionally includes trips from the Army Basing Programme (ABP) for Salisbury Plain as the Single Living Accommodation (SLA) developments on existing MoD land are not represented in the standard TEMPro forecasting process.

8.1.7 The variable demand model (VDM) then applies changes in travel generalised cost to forecast changes in travel behaviour. The responses modelled are macro time period choice, mode choice and destination choice.

8.1.8 To develop the without scheme networks, the uncertainty log is consulted to identify which schemes are likely to be in place in each forecast year.

8.1.9 To examine the impact of different growth assumptions and different development assumptions the 'A303 Stonehenge SWRTM (DCO)' model has been subjected to three sensitivity tests. The first two are common WebTAG tests, referred to as high and low growth. These modify the reference case demand in each year by a standard factor. The purpose of these tests is to demonstrate whether the Scheme is resilient to lower or higher overall demand. The high growth test is also used to examine whether the infrastructure is resilient to dealing with greater volumes of traffic.

8.1.10 The third sensitivity test has examined the impact of the Boscombe Down development, primarily to examine whether this development will have an adverse impact on the performance of the Scheme in terms of journey times on the A303.

8.1.11 In addition to exploring the performance of the network in the forecast years the 'A303 Stonehenge SWRTM (DCO)' model has been used to consider how the construction period will affect traffic. The construction phases have been represented by modifying the network to represent the traffic management and adding construction traffic, including site workers to the demand.

Operational modelling

8.1.12 The forecast traffic growth has been applied using detailed operational microsimulation models to test the performance of the Scheme in its assumed opening (2026) and design year (2041) and assess any considerations for subsequent detailed design of the Scheme.

8.2 Summary of forecast results

'A303 Stonehenge SWRTM (DCO)' model

8.2.1 Model flows are shown to be stable and robust in the Area of Detailed Modelling. There are some areas of instability in the wider model area which may need further investigation in the economic assessment as this would use outputs from the whole model area.

8.2.2 In the core scenario travel demand is generally forecast to increase by a little less than 1% pa, with higher local growth to 2026 reflecting increased demand from the British Army Rebasing in Larkhill, Durrington and Bulford. Without the Scheme traffic flow on the section of the A303 past Stonehenge is not forecast to increase due to capacity constraints and growth forecast on adjacent sections is of a more modest scale.

8.2.3 The Scheme would remove this capacity constraint with demand forecast in 2041 to increase from 30,000 AADT (two way) to 45,000 AADT. The main source of this increase is from diversion from other roads, in particular, The Packway.

8.2.4 On typical weekdays the Scheme is forecast to reduce travel times along the A303 by three or four minutes in 2026. By 2041 some congestion is forecast along this section of the A303 on typical neutral weekdays and the time savings of the Scheme are forecast to increase to between four and six minutes. The induced traffic along the A303 corridor is forecast to result in some additional congestion at single carriageway sections further to the west, partly offsetting these timesaving for long distance journeys.

8.2.5 During busy days the forecasts indicate that the substantial delay for traffic along the A303 would increase without the Scheme. The Scheme provides the capacity to address this congestion with average busy day time savings forecast to increase from 14 minutes in 2026 to 19 minutes in 2041. By alleviating queueing on the A303 the Scheme would remove the busy day delays that cause traffic to 'rat run' using local roads adjacent to the Scheme.

Operational modelling

8.2.6 Operational modelling forecast satisfactory operation of the Scheme in the design year.

8.2.7 There are no forecast operational issues on the A303 mainline at Winterbourne Stoke, through the tunnel, or at Double Hedges. In the busy period in 2041 there is forecast congestion on the A303 westbound on the approach to Solstice Park junction, both with and without the Scheme. This is due to blocking back from Solstice Park junction, which is forecast to exceed capacity by 2041. The mainline operates satisfactorily assuming capacity improvements are provided at Solstice Park junction through standard development and planning processes (not part of the 'with scheme' proposals).

8.2.8 The operational modelling at Countess roundabout assumes no changes to the existing layout at Countess and is forecast to operate satisfactorily with the Scheme. At Longbarrow the following assumptions about the design of the junction have been made:

a. A360 southbound: Either a dedicated left turn lane, an extended southbound flare of 40m, or signalisation;

b. A303 eastbound off-slip: Two lane stop line, flare of 15m;

c. A360 overbridge: Two lane overbridge and at the stop line;

d. A360 northbound: Flare of at least 25m and provision of two marked lanes to the A360 overbridge;

e. A303 westbound off-slip: Two lane stop line, flare of 20m; and

f. Winterbourne Stoke (existing A303): Two lane stop line, flare of 20m.

8.2.9 As a result, the junction at Longbarrow is forecast to operate without congestion.

8.2.10 In the local network, The Packway diversion route including the improved Rollestone junction, upgraded as part of the Scheme, the upgraded A3028 Durrington roundabout and the A3028 Bulford roundabouts are forecast to operate satisfactorily. The A345 / The Packway roundabout is forecast to experience congestion in the 2041 AM peak period both with and without the Scheme.

8.3 Recommendations

8.3.1 This report demonstrates that the 'A303 Stonehenge SWRTM (DCO)' model and the complementary operational models provide the appropriate evidence base for PCF Stage 3 and Stage 4 as the forecasts are taken from models which have been developed in accordance with best practice and industry guidance and which are shown to be stable and consistent.

8.3.2 It is recommended that the strategic and operational models developed be taken forward for appraisal of the A303 Amesbury to Berwick Down scheme.

8.3.3 Whilst the models have demonstrated reasonable forecast results and their development has followed appropriate guidance, it is recommended that the

subsequent use of model outputs is undertaken in close coordination with the traffic model team and Highways England to ensure data are used in an appropriate manner.

Abbreviations List

AADT	Annual Average Daily Traffic
AAWT	Annual Average Weekday Traffic
ABP	Army Basing Programme
AoDM	Area of Detailed Modelling
CIP	Complex Infrastructure Projects
ComMA	Combined Modelling and Appraisal Report
CSR	Client Scheme Requirements
DCO	Development Consent Order
DfT	Department for Transport
DIADEM	Dynamic Integrated Assignment and Demand Modelling
DMRB	Design Manual for Roads and Bridges
ES	Environmental Statement
GIS	Geographic Information Systems
HEIDI	Highways England Integrated DIADEM Interface
HGV	Heavy Goods Vehicle
IAN	Interim Advice Note
km	Kilometre
km/h	Kilometres per Hour
LGV	Light Goods Vehicle
MoD	Ministry of Defence
MSOA	(Census) Middle Super Output Area
NSIP	Nationally Significant Infrastructure Project
NTEM	National Trip End Model
NTM	National Transport Model
OD	Origin-Destination
OGV1	Ordinary Goods Vehicle type 1 (2 and 3 axle rigid vehicles)
OGV2	Ordinary Goods Vehicle type 2 (4 axle rigid, 3+ axle articulated vehicles)

PCF	Project Control Framework
PINS	Planning Inspectorate
PRA	Preferred Route Announcement
RIP	Road Investment Programme
RIS	Road Investment Strategy
RTM	Regional Traffic Model
SFA	Service Families Accommodation
SLA	Single Living Accommodation
SMP	Smart Motorway Programme
SRN	Strategic Road Network
SWRTM	South West Regional Traffic Model
TEMPro	Trip End Model Presentation Program
TEN-T	Trans-European Network-Transport
TFR	Traffic Forecasting Report
TPG	Highways England's Transport Planning Group
VDM	Variable Demand Model(ling)
WebTAG	Web-based Transport Analysis Guidance
WHS	World Heritage Site

Appendices

Appendix A Uncertainty log

A.1 Demand uncertainty log

ID	Application reference	Number of Dwellings	Employment SQM	Certainty (application reference)	X	Y	Parish	2026 Build Out	2031 Build Out
7	14/06691/FUL		4074	Near Certain	416821	141894	Amesbury CP	100%	100%
8	15/02530/OUT	515	18000	Near Certain	415852	139870	Amesbury CP	100%	100%
9	S/2012/0497	460	1000	Near Certain	416203	140508	Amesbury CP	100%	100%
10	13/06181/OUT	143	-	Near Certain	416692	139940	Amesbury CP	100%	100%
13	15/04006/FUL	227	-	Near Certain	417496	143683	Bulford CP	100%	100%
19	17/06370/FUL	94	-	Near Certain	414581	144496	Durrington CP	100%	100%
20	17/03959/FUL	196	-	Near Certain	414229	144421	Durrington CP	100%	100%
27	16/12217/OUT	130	600	Reasonably Foreseeable	380512	132229	Mere CP	100%	100%
28	14/06624/FUL		8700	Near Certain	380184	132254	Zeals CP	100%	100%
29	14/06780/OUT	134	-	Near Certain	381693	131744	Mere CP	100%	100%
30	17/00085/REM	74	-	Near Certain	381766	131708	Mere CP	100%	100%
35	16/02151/FUL		25017	Near Certain	422023	138194	Allington Idmiston	50%	100%
42	15/12526/REM		17200	Near Certain	420727	136784	Idmiston	100%	100%
50	K/59795/O	360	-	Near Certain	423640	147547	Tidworth	100%	100%
56	E/2012/0361/OUT	100	-	Near Certain	423389	149180	Tidworth	100%	100%
58	E/2012/1447/REM	289	-	Near Certain	423599	149704	Tidworth	100%	100%
63	15/02770/FUL	246	-	Near Certain	425965	150372	Ludgershall	100%	100%
64	16/10907/OUT	269	3000	Reasonably Foreseeable	426895	150345	Ludgershall	100%	100%
121	17/03219/REM	168	-	Near Certain	419210	168239	Savernake	100%	100%
123	16/11539/FUL		2295	Near Certain	418249	168797	Marlborough	100%	100%
126	14/01649/FUL	94		Near Certain	419439	168638	Marlborough	100%	100%
143	17/01124/OUT		51990	Near Certain	385221	143993	Corsley	50%	100%
145	14/09146/OUT		4650	Hypothetical	384148	148064	Chapmanslade	100%	100%
148	16/10502/OUT	135	-	More than Likely	389478	144442	Warminster	100%	100%
150	15/01800/OUT	1200	60000	More than Likely	385732	145398	Warminster	50%	100%
151	15/02079/FUL		2229	Near Certain	386729	145821	Warminster	100%	100%
156	17/05360/FUL	239		More than Likely	386319	145307	Warminster	100%	100%
157	17/05947/FUL		1855	Near Certain	386717	146033	Warminster	100%	100%
159	14/06562/FUL	203	-	Near Certain	385624	144465	Warminster	100%	100%
166	17/01463/FUL	232	-	More than Likely	385288	144674	Warminster	100%	100%
172	14/03118/OUT		45250	Near Certain	386396	153201	Heywood	50%	100%
175	15/12551/OUT	300	16.7	Near Certain	386132	151531	Dilton Marsh	100%	100%
182	13/03568/OUT	220	-	Near Certain	387470	152194	Westbury	100%	100%
199	13/01243/OUT	230	-	Near Certain	402901	162807	Bishops Cannings	100%	100%
201	E/2012/0954/FUL		2868	Near Certain	402406	163327	Bishops Cannings	100%	100%
205	13/00715/FUL	50	-	Near Certain	401140	159956	Roundway	100%	100%

ID	Application reference	Number of Dwellings	Employment SQM	Certainty (application reference)	X	Y	Parish	2026 Build Out	2031 Build Out
209	16/12285/OUT	50	1650	Near Certain	401329	160170	Roundway	100%	100%
215	15/01388/OUT	123	-	Near Certain	400803	161696	Roundway	100%	100%
216	16/04371/FUL	55	1275	Near Certain	399700	161776	Devizes	100%	100%
221	16/11230/FUL	66	1786	Near Certain	401746	162346	Roundway	100%	100%
228	16/04468/OUT	250	-	More than Likely	388158	158077	Steeple Ashton	100%	100%
250	14/12175/FUL		2823	Near Certain	415933	129153	Salisbury	100%	100%
253	16/10838/FUL	51		Near Certain	41353,	30278	Salisbury	100%	100%
254	16/12244/FUL	56		Near Certain	413320	130392	Salisbury	100%	100%
255	15/09465/FUL	71	387	Near Certain	413354	130372	Salisbury	100%	100%
258	17/01881/FUL		918	Near Certain	413696	130385	Salisbury	100%	100%
259	S/2012/1282	60	-	Near Certain	413258	130675	Salisbury	100%	100%
263	13/01494/FUL		2500	Near Certain	414317	130144	Salisbury	100%	100%
283	W/13/00643/FUL	138	-	Near Certain	383397	160826	Bradford on Avon	100%	100%
294	14/06561/FUL	99	-	Near Certain	416925	121674	Downton	100%	100%
303	17/04001/OUT	50	80	Reasonably Foreseeable	419159	127145	Alderbury	100%	100%
313	14/04756/FUL		6030	Near Certain	416001	132205	Laverstock	100%	100%
314	14/06858/FUL		1683	Near Certain	415207	132610	Laverstock	100%	100%
315	15/04004/OUT	480	3942	Reasonably Foreseeable	415135	133103	Laverstock	100%	100%
334	13/05269/FUL		2315	Near Certain	384783	169432	Box	100%	100%
335	13/05724/FUL	88	12000	Near Certain	384723	169675	Box	50%	100%
340	14/11354/OUT	180	-	Near Certain	384672	169178	Box	100%	100%
349	13/05188/OUT	150	1394	Near Certain	385784	170596	Corsham	100%	100%
351	N/12/00718/FUL		2080	Near Certain	386655	170280	Corsham	100%	100%
352	N/12/00836/OUT	100	2129	Near Certain	385217	170423	Corsham	100%	100%
361	14/05686/OUT	64	-	Near Certain	386543	169298	Corsham	100%	100%
362	15/10519/OUT	170	-	Near Certain	385316	170011	Corsham	100%	100%
363	16/07938/FUL		24943	Near Certain	384902	168753	Corsham	50%	100%
365	17/08760/FUL		27976	More than Likely	384902	168753	Corsham	50%	100%
367	17/08554/OUT	120	-	More than Likely	391116	171111	Lacock	100%	100%
368	N/13/00308/OUT		50000	Near Certain	390698	171161	Lacock	50%	100%
376	15/10457/OUT	53	-	Near Certain	396318	171124	Calne Without	100%	100%
378	14/08305/FUL	125	-	Near Certain	400076	169445	Calne Without	100%	100%
379	15/10682/FUL	56	-	Near Certain	400238	169399	Calne Without	100%	100%
380	16/04124/FUL	154	-	More than Likely	399770	170076	Calne Without	100%	100%
382	N/12/04038/FUL	125	-	Near Certain	400114	169429	Calne Without	100%	100%
384	17/00679/OUT	165	190	Near Certain	400920	171164	Calne Without	100%	100%
385	15/05254/REM	124	-	More than Likely	400716	171369	Calne Without	100%	100%
388	N/12/02137/FUL		4233	Near Certain	400469	172769	Calne	100%	100%

ID	Application reference	Number of Dwellings	Employment SQM	Certainty (application reference)	X	Y	Parish	2026 Build Out	2031 Build Out
400	17/03417/OUT		92900	More than Likely	391887	179184	Kingston St Michael	50%	100%
412	14/10461/OUT	450	-	Near Certain	391531	163397	Melksham & Melksham without	100%	100%
427	17/01096/REM	100	-	Near Certain	391732	164324	Melksham Without	100%	100%
429	14/11295/REM	261	-	More than Likely	389611	164901	Melksham Without	100%	100%
437	W/12/00906/REM	118	-	Near Certain	372100	164200	Melksham Without	100%	100%
438	16/09699/FUL		1462.3	Near Certain	390326	161258	Melksham Without	100%	100%
440	16/01123/OUT	235	14000	Near Certain	390797	162608	Melksham Without	100%	100%
441	16/00497/OUT	150	-	Near Certain	390278	162507	Melksham Without	100%	100%
474	17/08188/OUT	81	-	More than Likely	411763	187150	Purton	100%	100%
481	14/10200/REM	422	-	Near Certain	411,25	18708	Purton	100%	100%
486	N/13/01615/REM	218	-	Near Certain	411276	186964	Purton	100%	100%
491	15/08666/FUL	109	-	Near Certain	409652	193787	Cricklade	100%	100%
494	13/07132/OUT	70	-	Near Certain	409775	193004	Cricklade	100%	100%
496	16/02609/OUT	75		More than Likely	403453	195604	Ashton Keyes, Leigh	50%	100%
503	16/03001/WCM		62500	Near Certain	406814	194464	Ashton Keyes, Leigh	50%	100%
532	16/11603/OUT	59	-	More than Likely	393676	186566	St Paul Malmesbury without	100%	100%
534	15/05015/REM	180	20000	More than Likely	393226	188444	St Paul Malmesbury without	100%	100%
536	13/04122/REM		3000	Near Certain	394337	186478	St Paul Malmesbury without	100%	100%
542	17/04983/FUL		10000	Near Certain	392909	188449	Malmesbury	50%	100%
547	14/04281/FUL		10379	Near Certain	392912	188463	Malmesbury	50%	100%
557	14/05997/FUL		1585	Near Certain	415664	131569	Salisbury	100%	100%
558	14/06650/OUT	60	-	Reasonably Foreseeable	414028	131866	Salisbury	100%	100%
567	16/05957/FUL		34000	Near Certain	411336	131452	Salisbury	50%	100%
575	N/12/04072/REM	63	-	More than Likely	394460	178803	Sutton Benger	100%	100%
579	N/12/00560/OUT	750	12710	Near certain	391884	175052	Langley Burrell Without	50%	100%
580	14/10828/FUL		25527	Near Certain	392723	174580	Langley Burrell Without	50%	100%
581	15/12351/OUT	700	45000	More than Likely	393212	174161	Langley Burrell Without	100%	100%
587	16/03515/OUT	400	13655	Near Certain	392410	174273	Chippenham	50%	100%
592	14/12118/OUT	1000	13400	Near Certain	391271	171767	Chippenham	50%	100%
596	15/12363/OUT	1500	92000	More than Likely	393555	173317	Chippenham	50%	100%
597	16/04269/FUL		1741	More than Likely	392190	173910	Chippenham	100%	100%
601	17/05828/FUL	140	341	More than Likely	392274	173706	Chippenham	100%	100%

ID	Application reference	Number of Dwellings	Employment SQM	Certainty (application reference)	X	Y	Parish	2026 Build Out	2031 Build Out
606	N/12/04160/FUL	95	-	Near Certain	391241	172337	Chippenham	100%	100%
609	19/09277/OUT	72	-	Reasonably Foreseeable	390762	171974	Chippenham	100%	100%
610	17/06409/PNCOU	77	-	Reasonably Foreseeable	389877	171881	Chippenham	100%	100%
612	N/13/01018/FUL		2765	Near certain	389767	172015	Chippenham	100%	100%
613	N/13/01747/FUL	450	23300	Reasonably Foreseeable	390326	171682	Chippenham	100%	100%
616	17/03547/WCM		100900	Near certain	405113	184052	Wootton Bassett	100%	100%
619	13/03592/FUL		1375	Near Certain	407633	182428	Wootton Bassett	100%	100%
627	15/10486/FUL	92	-	Near certain	407952	181869	Wootton Bassett	100%	100%
630	N/12/00551/FUL	100	-	Near Certain	407898	182875	Wootton Bassett	100%	100%
633	N/12/03421/FUL		2020	Near Certain	407115	181787	Wootton Bassett	100%	100%
635	N/12/03941/FUL	129	-	Near certain	407270	182888	Wootton Bassett	100%	100%
639	17/03269/OUT	140	-	Reasonably Foreseeable	382375	155024	Southwick	100%	100%
642	15/04736/OUT	2500	150000	More than Likely	386848	156305	North Bradley	50%	100%
644	W/12/01121/FUL		2232	Near Certain	386226	155275	North Bradley	100%	100%
647	17/05497/PNCOU	104	-	Near certain	386029	155758	North Bradley	100%	100%
648	16/00672/OUT	210	-	More than Likely	386395	159367	Hilperton	100%	100%
663	14/01797/FUL	64	-	Near Certain	386522	158252	Trowbridge	100%	100%
670	16/05154/FUL	50	-	Near certain	386281	156879	Trowbridge	100%	100%
676	17/07693/OUT	54	6900	Near Certain	385501	157676	Trowbridge	100%	100%
677	17/09961/OUT	267	800	More than Likely	386968	157240	Trowbridge	100%	100%
678	W/12/01393/REM	79	-	Near certain	387165	157661	Trowbridge	100%	100%
680	W/12/02299/FUL		55000	Hypothetical	385194	158018	Trowbridge	100%	100%
682	17/05669/FUL	82	-	More than Likely	385394	156341	Trowbridge	100%	100%
687	14/07689/OUT	60	3000	Near Certain	383584	160994	Bradford on Avon	100%	100%
688	14/05846/FUL	82	-	Near Certain	425882	150946	Ludgershall	100%	100%
689	17/07548/FUL	88	-	More than Likely	386265	152213	Westbury	100%	100%
690	14/06522/FUL	181	-	Near Certain	426495	150482	Ludgershall	100%	100%
693	17/03292/OUT	235	2600	More than Likely	401785	179310	Lyneham and Bradenstoke	100%	100%
694	14/09262/OUT	300	-	Near Certain	387740	152188	Trowbridge	100%	100%
695	S/2011/0517	450	30000	Near Certain	410588	131855	Wilton	50%	100%
709	17/10167/FUL		800	More than Likely	414432	128967	Salisbury	100%	100%
713	17/11623/OUT	80	-	More than Likely	381509	171328	Colerne	100%	100%
713	In adopted 'Wiltshire Core Strategy' document Appendix A.		84000	Reasonably Foreseeable	403030	163086	Devizes	50%	100%
714	In adopted 'Wiltshire Core	393	-	Reasonably Foreseeable	426525	150739	Ludgershall	100%	100%

ID	Application reference	Number of Dwellings	Employment SQM	Certainty (application reference)	X	Y	Parish	2026 Build Out	2031 Build Out
	Strategy' document Appendix A.								
715	In adopted 'Wiltshire Core Strategy' document Appendix A.	500	-	Near Certain	415334	132166	Salisbury	100%	100%
716	In adopted 'Wiltshire Core Strategy' document Appendix A.		40000	Reasonably Foreseeable	411369	131434	Salisbury	50%	100%
717			1,500 jobs	Reasonably Foreseeable	417797	140490	Salisbury	100%	100%
719	14/00726/OUTS	320	-	Near Certain	438758	117165	Nursling and Rownhams	100%	100%
720	14/01090/FULLS	275	-	Near Certain	437385	119469	Romsey	100%	100%
722	14/00061/OUTN	85	-	Near Certain	435432	147144	Andover	100%	100%
723	15/01763/FULLS	326	-	More Than Likely	437767	115877	Nursling and Rownhams	100%	100%
724	16/02432/OUTS	300	-	More Than Likely	438431	119481	North Baddesley	100%	100%
725	12/02497/OUTN	350	-	Near Certain	436654	147158	Andover	100%	100%
727	TVN.09258	1119	-	Near Certain	438370	147729	Andover	100%	100%
728	TVN.09275	1300	-	Near Certain	438745	145805	Andover	100%	100%
729	10/00242/OUTN	232	-	Near Certain	439315	146916	Andover	100%	100%
730	14/00774/OUTN	180	-	Near Certain	438800	146140	Andover	100%	100%
731	08/00475/OUTS	160	3650	Near Certain	436694	122920	Romsey	100%	100%
732	11/02859/FULLS	-6	42820	Near Certain	437315	114837	Nursling and Rownhams	100%	100%
733	07/02872/OUTS		59118	Near Certain	437679	115775	Nursling and Rownhams	50%	100%
734	16/01344/OUTN		45300	Near Certain	438719	146706	Andover	50%	100%
735	16/03120/FULLN	520	0	Near Certain	439295	145719	Andover	50%	100%
736	14/02995/FULLN	0	31,522	Near Certain	433436	145861	Andover	50%	100%
737	COM 6	400	0	Reasonably Foreseeable	438733	146662	Andover	100%	100%
738	COM3	1300	0	Reasonably Foreseeable	436610	120278	Romsey	50%	100%
739	COM5	50	0	Reasonably Foreseeable	443977	117436	North Stoneham	100%	100%
740	TVS.07553/1		1,478	Near Certain	440627	118418	Chilworth	100%	100%
741	12/02366/FULLN		3,767	Near Certain	439293	146130	Andover	100%	100%
742	15/00449/FULLS		1,423	Near Certain	436350	130576	Romsey	100%	100%
743	15/02627/FULLS		1,540	Near Certain	435138	122537	Romsey	100%	100%
800	18/00397/FUL	160		More than Likely	414581	144496	Durrington CP	100%	100%
318 Option A	13/00673/OUT	673	-	Near Certain	414831	134219	Laverstock	100%	100%
329 A	13/04870/OUT	292	-	Near Certain	410475	131680	Wilton	100%	100%

A.2 Supply uncertainty log

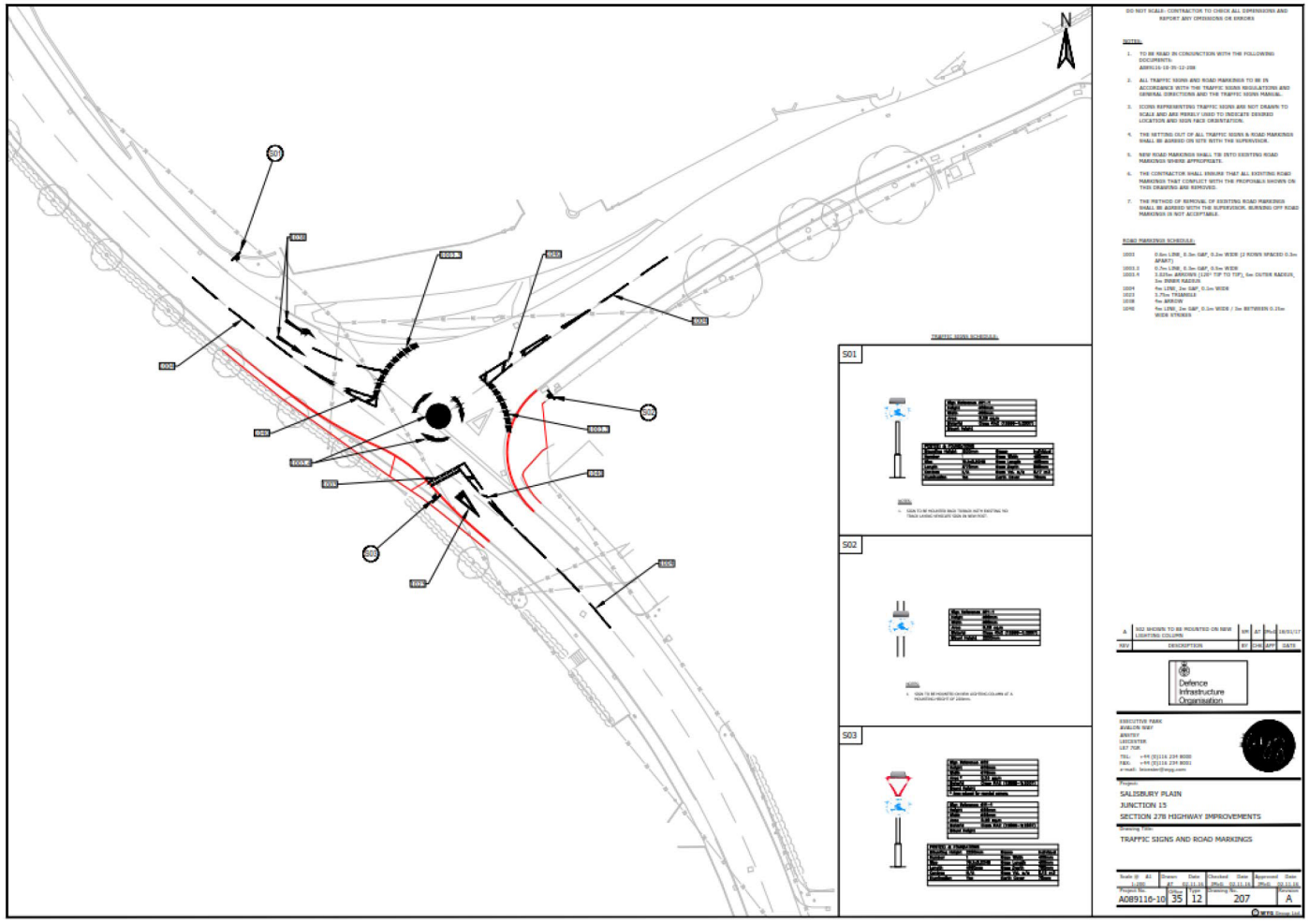
Application			Location		Included in Core Scenario?
Applicant for 'other development' and brief description	**Certainty**	**Opening Year**	**Location**	**Area**	
RIS1 Schemes, to be delivered in RIS period 1					
A30 Temple to Higher Carblake: The A30 Temple to Higher Carblake scheme will dual the last section of single carriageway on the A30 between the M5 at Exeter and the Carland Cross junction with the A39 north of Truro (approximately 2.8 miles or 4.5 kilometres)	Completed	2017	Cornwall		Include
M3 Junctions 2-4a Smart Motorway Programme (SMP): J2 (M25 interchange) to J4a (A327 Farnborough): upgrading the M3 to Smart Motorway including hard shoulder running.	Near Certain	2018	Surrey	Rushmoor	Include
M49 Avonmouth Junction: New junction on the M49 to provide strategic access to Severnside and Avonmouth; this will support the Enterprise Zone and local growth in the Bristol area.	More than likely	2020	Bristol	Bristol	Include
A31 Ringwood: Widening to three lanes and junction improvements providing more capacity for local traffic; adjustments to nearby road network to provide improvements for pedestrians and address safety	More than likely	2020	Hampshire	New Forest	Include
A34 Oxford Junctions: Improvements at Peartree and Botley interchanges	More than likely	2021	Oxfordshire		Include
M27 Junction 4-11 Smart Motorway Programme (SMP): J4 (M3 interchange) to J11 (Fareham): upgrading to Smart Motorway, linking with the Smart Motorway scheme on the M3.	More than likely	2022	Hampshire	Fareham	Include
M3 Junctions 9-14 Smart Motorway Programme (SMP): J 9 (Winchester/A34 interchange) to J14 (M27 interchange): upgrading to Smart Motorway, linking with the Smart Motorway scheme on the M27	More than likely	2022	Hampshire	Southampton	Include
M271 and A35 Redbridge Roundabout upgrade - An upgrade to the Redbridge Roundabout. Improvements will include a dedicated left turn lane for traffic leaving the M271 to access Southampton Docks and the city centre.	Near Certain	2022	Hampshire	Southampton	Include
M4 junctions 3-12: smart motorway - Provision of an additional running lane in both directions. The extra lane will continue through junctions 4,5,6,7,8/9 and 11. To enable provision of a smart motorway, it will be necessary to replace or widen bridges where there is currently no hard shoulder.	Near Certain	2022	Berkshire	Heathrow to Reading	Include
A30 Chiverton to Carland Cross: Upgrading the A30 to dual carriageway north of Truro, linking existing dual carriageways around Bodmin with the Redruth bypass; coupled with the Temple to Higher Carblake scheme with will improve the A30 to Expressway standard between Camborne and the M5	More than likely	2023	Cornwall		Include
M27 Junctions 5-8 (Southampton Junctions): J5 (Southampton Airport) to J8 (A3024): widening and signalisation of slip roads and access routes to junction 8, and replacement of rail bridges in Southampton (on local road network) to reduce pressure on the motorway	More than likely	2023	Hampshire	Southampton	Include
A358 Taunton to Southfields - Widening the existing carriageway from West Hatch Lane to Southfields Roundabout.	More than likely	2023	Somerset	Taunton	Include
M3 Junction 9 (A34) Improvements: A comprehensive package of improvements, to include new links and widening and remodelling of junction 9 to allow more free flowing connections and reduce congestion	More than likely	2024	Hampshire	Winchester	Include

Application			Location		Included in Core Scenario?
Applicant for 'other development' and brief description	**Certainty**	**Opening Year**	**Location**	**Area**	
A303 Amesbury to Berwick Down - Construction of a twin-bored tunnel of at least 1.8 miles as the road passes Stonehenge, coupled with a dual carriageway bypass for Winterbourne Stoke to link the existing dual carriageway section around Amesbury with the dual carriageway at Berwick Down.	Near Certain	2026	Wiltshire	Amesbury	With Scheme
A303 Sparkford - Ilchester dualling - Dualling of a single carriageway section of the A303, linking together the Sparkford and Ilchester bypasses.	Near Certain	2028	Somerset	Sparkford	Include
Local Authority Schemes					
A380 South Devon Highway (Kingskerswell By-pass) - 5.5km dual carriageway, providing a bypass for Kingskerswell.	Completed	2015	Devon	Newton Abbot	Include
Dunyeat's Roundabout and Queen Anne Drive junctions - Improvements to Dunyeat's roundabout and Queen Anne Drive junctions on the A349 to reduce congestion and improve journey times on major commuter route, including improvements for pedestrians and cyclists.	Completed	2016	Dorset	Bournemouth	Include
A34 Milton Interchange improvement - Increased capacity at this roundabout junction by adding a 'hamburger lane' dedicated left turn lanes and widening. A34 is within SRN.	Completed	2016	Oxfordshire	Milton	Include
A34 Chilton Interchange improvement - Adding two north facing slip roads to connect the A34 with the A4185 Newbury Road and Hagbourne Hill. A34 is within SRN.	Completed	2016	Oxfordshire	Chilton	Include
M5 J24 Huntworth Roundabout - Improvement to roundabout required to mitigate impact of several developments.	Completed	2016	Somerset	Bridgwater	Include
M5 J30/31 - A379 Bridge Road widening Exeter - Local highway scheme to widen A379.	Completed	2017	Devon	Exeter	Include
A349 Major improvement - Major improvement works to A349 (Gravel Hill), stabilising and strengthening embankments, increasing capacity for motor vehicles and delivering improvements to sustainable transport options.	Completed	2017	Dorset	Poole	Include
A40 Elmbridge Court Roundabout - Hamburger' - through about junction, widen approach lanes and signalise.	Completed	2017	Gloucestershire	Gloucester	Include
M5 J24 HPC Park & Ride - 700 space park & ride site to serve HPC construction only.	Completed	2017	Somerset	Bridgwater	Include
Northern Inner Distribution Road (NIDR) - New road connecting Priory Bridge Road to Staplegrove Road.	Completed	2017	Somerset	Taunton	Include
M4 J17 partial signalisation - Partial MOVA signalisation of junction. Required to mitigate effects of housing and business growth in Chippenham. Also to improve safety by preventing queues on off-slip backing onto main line.	Completed	2017	Wiltshire	Chippenham	Include
M4 J16 improvement - Upgrading capacity and changing the gyratory layout at J16 (Swindon). Third party scheme required to accommodate the nearby extension of Swindon at Wichelstowe.	Near Certain	2018	Wiltshire	Swindon	Include
A38 M5 J16 to Aztec West - Widening southbound to 5 lanes.	Near Certain	2018	South Gloucestershire	South Gloucestershire	Include
M5 J23 Signalisation - Signalisation of 3 arms to mitigate the impact of Hinkley Point C construction. Third party funded scheme.	Near Certain	2018	Somerset	Bridgwater	Include
M5 J23 HPC Park & Ride - 1300 space park & ride site to serve HPC construction only.	Near Certain	2018	Somerset	Bridgwater	Include
Staplegrove - Access link off Staplegrove Road to east of Cross Keys / Silk Mills Roundabout.	More than likely	2018	Somerset	Taunton	Include

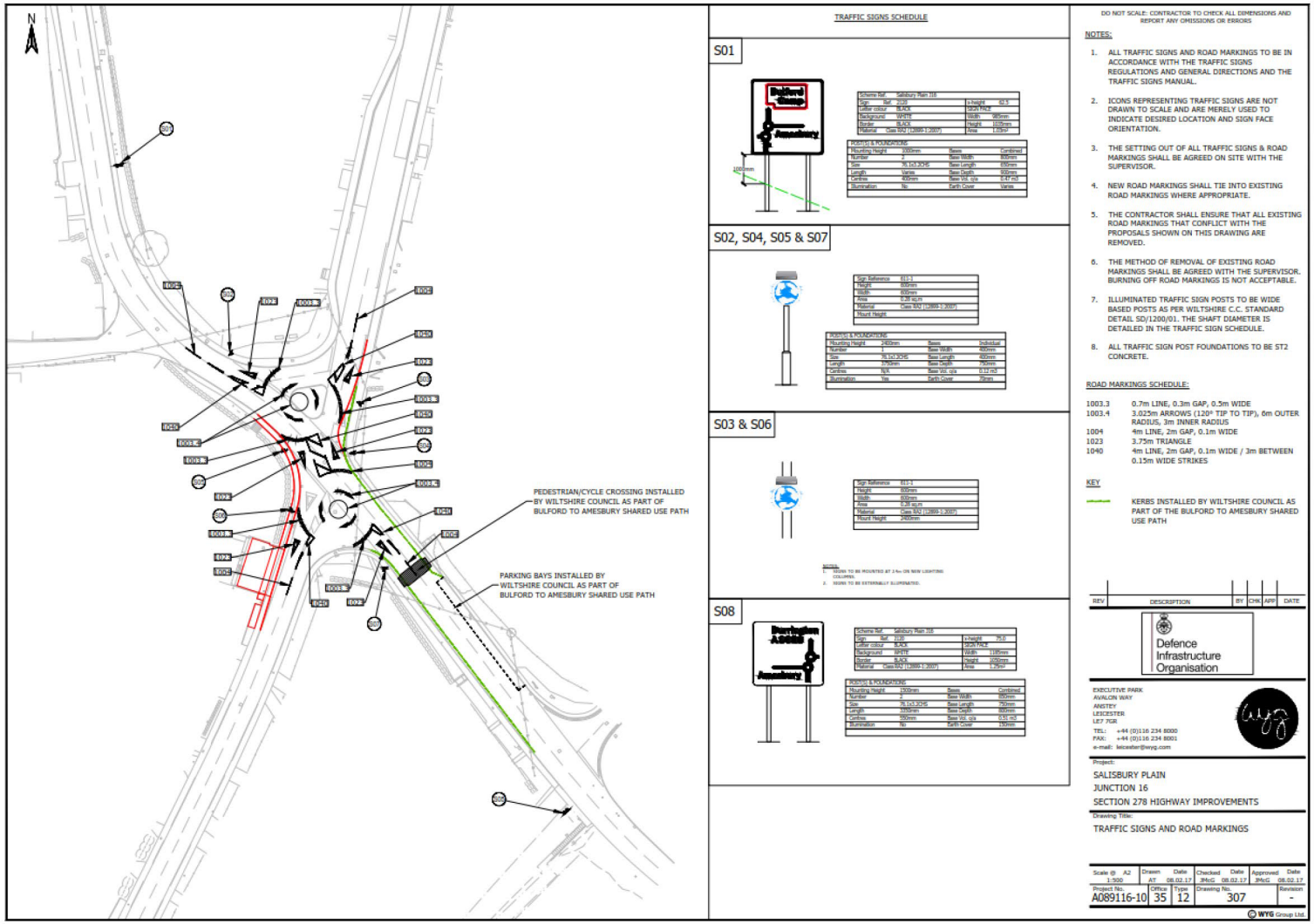
Application			Location		Included in Core Scenario?
Applicant for 'other development' and brief description	**Certainty**	**Opening Year**	**Location**	**Area**	
A350 Chippenham improvements - The A350 southbound from M4 J17 bypasses Chippenham to the west and heads south to Melksham, Trowbridge and eventually to Poole in Dorset. Wilts C has delivered a £2m package of improvements to the Chippenham bypass section, including the golf course and Bumpers Farm roundabouts and dualling sections of road immediately to the north of both junctions.	Near Certain	2018	Wiltshire	Chippenham	Include
A419 White Hart junction improvement - Remodelling and upgrading of gyratory below A419. Required to accommodate new Eastern Villages urban extension east of A419.	Near Certain	2019	Wiltshire	Swindon	Include
M5 J25 - Major junction improvement with new arm and access to a proposed strategic employment site to the south east of the junction. Proposed and designed by Somerset CC with funding from developer, local growth fund and potentially Highways England HGF.	More than likely	2019/20	Somerset	Taunton	Include
Blackwater junction - Widening the A338 from Blackwater south to Cooper Dean junction with A3060. A new junction is to be built at Wessex Fields just north of Bournemouth Hospital linking the A338 with development land north of the hospital.	Near Certain	2020	Dorset	Bournemouth	Include
M4 J15 improvement - Upgrading capacity and changing the gyratory layout at J15 (Swindon East). Third party scheme required to accommodate the nearby extension of Swindon at Commonhead. Additional lane on gyratory, additional lane on A419 southbound approach and dedicated lane onto eastbound M4 slip.	More than likely	2020	Wiltshire	Swindon	Include
A38 Deep Lane Junction east of Plymouth - Improved junction capacity with associated park & ride scheme. Required to provide additional junction capacity to enable development of Sherford new town, 5,500 new homes, jobs, schools etc.	More than likely	2021	Devon	Plymouth	Include
M5 J23 Dunball roundabout improvements - Improvement to Dunball roundabout junction with A38 as requirement for Huntspill Energy Park development. Third party scheme.	More than likely	Unknown	Somerset	Bridgwater	Include
Other Area of Detailed Modelling Schemes					
Army Re-basing works, Larkhill: Re-modelling of existing priority junction between The Packway and Tombs Road to create a roundabout. Access to Tombs Road from The Packway prohibited. Part of the Army re-basing works, to facilitate access to development north of the Packway.	Completed	2017	Wiltshire	Larkhill	Include
Bulford Junction Changes - Traffic signage and road marking amendments to accommodate the A303 High Loads diversion route. These will be implemented at the mini-roundabouts located on the A3028 at the Salisbury Road and Orchard End junctions.	Near Certain	2020	Wiltshire	Bulford	Include
Other Wider Area or Buffer Network Schemes					
M4 / M48 River Severn Crossing tolls: Removal of the westbound tolls on the M4/M48 River Severn crossings	Near Certain	2019	Wales / Bristol	Wales / Bristol	Include

Appendix B Supply uncertainty log scheme plans: Area of Detailed Modelling

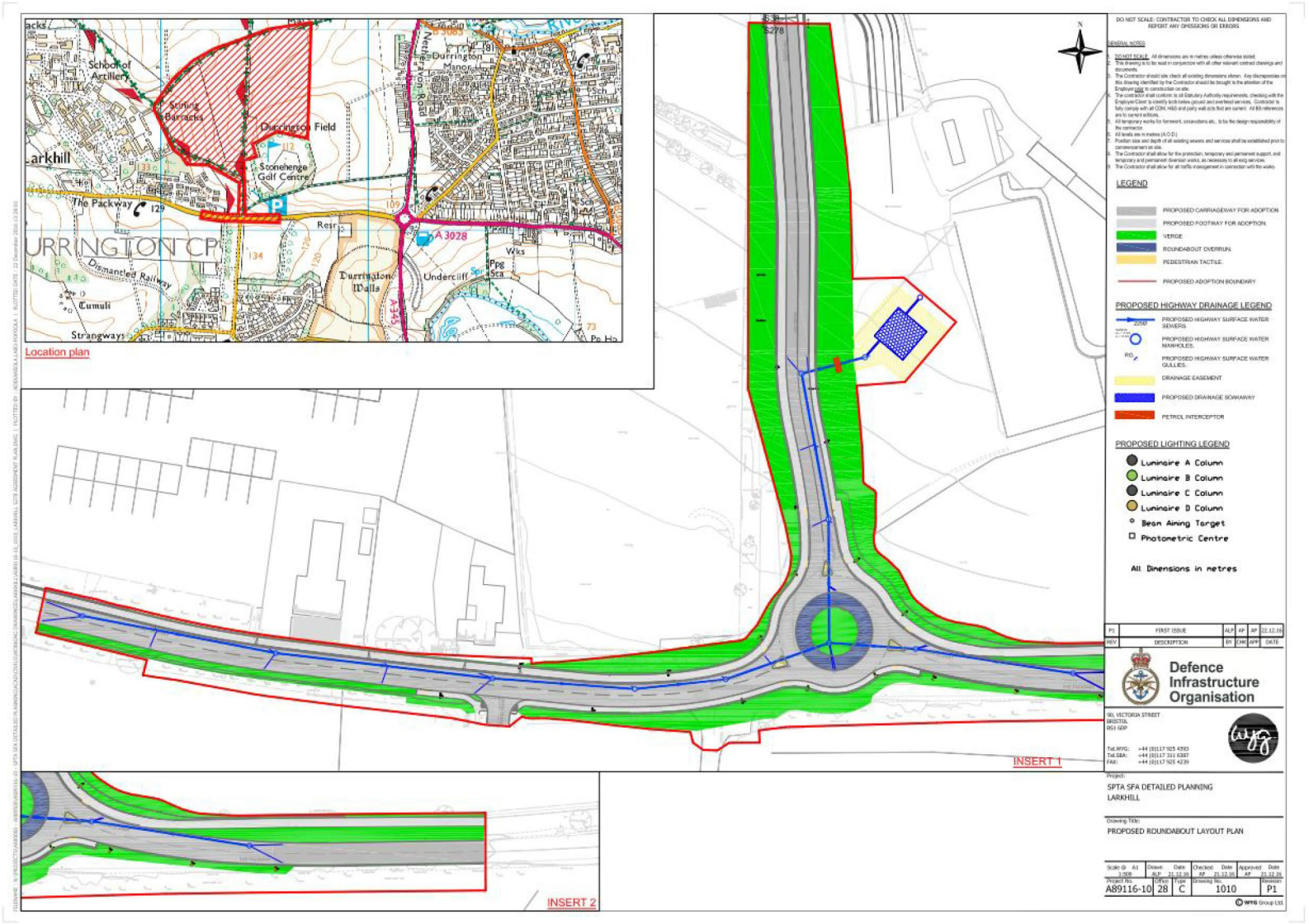
B.1 Junction improvement in Bulford (A3028 High Street / Orchard End):



B.2 Junction improvement in Bulford (A3028 High Street / Salisbury Road):



B.3 New roundabout on The Packway:



Appendix C Planning data: Comparison of TEMPro growth at MSOA level and planning data growth (after constraint to TEMPro at district level)

C.1 2026 Planning Data

	TEMPro Default		Planning Data (Constrained to TEMPro)		Difference	
Name	HHs	Jobs	HHs	Jobs	HHs	Jobs
Wiltshire	220,652	260,783	220,652	260,783	0	0
Test Valley	58,031	70,364	58,031	70,364	0	0
Wiltshire 001	3,180	2,791	3,140	2,732	-40	-59
Wiltshire 002	3,424	5,611	3,368	5,770	-56	159
Wiltshire 003	2,563	2,192	3,108	2,147	545	-45
Wiltshire 004	2,591	2,395	2,453	2,360	-138	-35
Wiltshire 005	2,664	2,324	2,580	2,338	-84	14
Wiltshire 006	3,432	2,580	3,415	2,530	-17	-50
Wiltshire 007	4,868	8,995	4,935	9,953	67	958
Wiltshire 008	3,063	4,300	2,962	4,221	-101	-79
Wiltshire 009	4,258	4,936	4,187	4,933	-71	-3
Wiltshire 010	4,587	4,479	4,258	4,379	-329	-100
Wiltshire 011	4,952	7,855	4,596	7,675	-356	-180
Wiltshire 012	3,925	3,807	3,715	3,745	-210	-62
Wiltshire 013	2,998	3,780	4,062	4,623	1,064	843
Wiltshire 014	3,299	1,277	3,062	1,248	-237	-29
Wiltshire 015	4,545	4,293	4,497	4,420	-48	127
Wiltshire 016	3,642	1,746	3,381	1,713	-261	-33
Wiltshire 017	3,328	4,546	3,599	4,538	271	-8
Wiltshire 018	6,309	10,421	6,191	10,326	-118	-95
Wiltshire 019	3,915	5,313	3,908	5,296	-7	-17
Wiltshire 020	3,489	1,095	3,238	1,070	-251	-25
Wiltshire 021	4,450	5,889	4,130	5,767	-320	-122
Wiltshire 022	3,750	4,154	4,677	4,328	927	174
Wiltshire 023	2,822	2,321	2,671	2,266	-151	-55
Wiltshire 024	3,404	3,208	3,222	3,146	-182	-62
Wiltshire 025	5,185	6,200	4,929	6,110	-256	-90
Wiltshire 026	3,553	5,457	3,526	5,384	-27	-73
Wiltshire 027	4,913	3,450	4,773	3,426	-140	-24
Wiltshire 028	3,764	3,288	3,563	3,243	-201	-45
Wiltshire 029	3,266	2,678	3,092	2,632	-174	-46
Wiltshire 030	3,555	1,965	3,510	1,924	-45	-41
Wiltshire 031	3,205	11,034	3,305	10,914	100	-120
Wiltshire 032	3,722	2,472	3,456	2,413	-266	-59
Wiltshire 033	2,449	954	2,274	938	-175	-16
Wiltshire 034	3,298	4,555	3,432	4,512	134	-43
Wiltshire 035	3,472	2,530	3,223	2,480	-249	-50
Wiltshire 036	2,818	1,691	2,616	1,681	-202	-10
Wiltshire 037	2,868	4,900	3,336	4,888	468	-12
Wiltshire 038	2,679	2,761	2,535	2,719	-144	-42

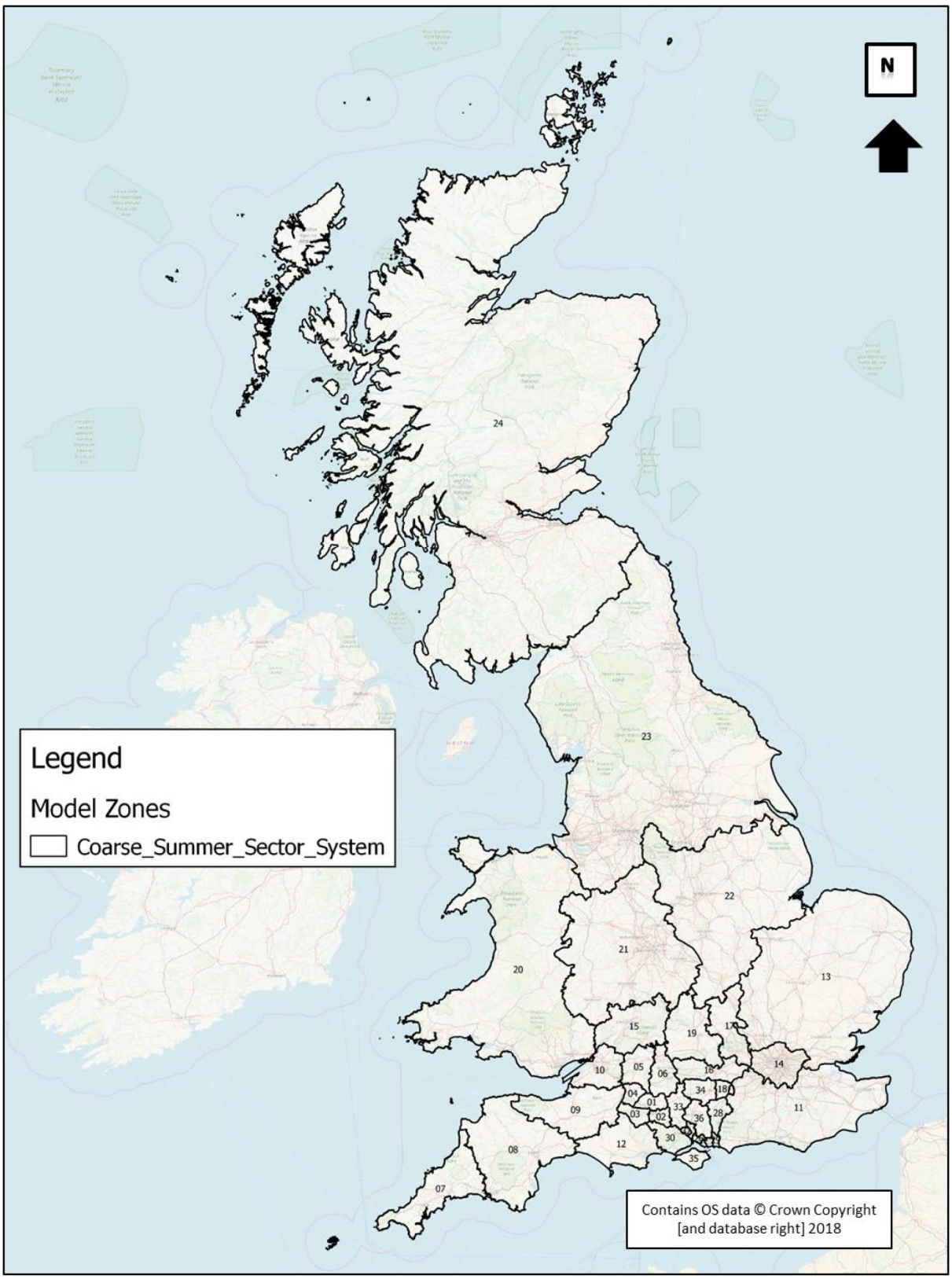
	TEMPro Default		Planning Data (Constrained to TEMPro)		Difference	
Name	HHs	Jobs	HHs	Jobs	HHs	Jobs
Wiltshire 039	3,295	3,692	3,358	3,606	63	-86
Wiltshire 040	6,439	4,683	6,585	4,571	146	-112
Wiltshire 041	5,153	11,252	6,056	11,049	903	-203
Wiltshire 042	2,635	3,745	2,581	3,669	-54	-76
Wiltshire 043	2,833	1,324	3,304	1,478	471	154
Wiltshire 044	3,221	3,838	2,990	3,752	-231	-86
Wiltshire 045	3,111	7,639	3,141	7,529	30	-110
Wiltshire 046	2,706	1,450	2,840	1,429	134	-21
Wiltshire 047	3,070	4,830	2,905	4,738	-165	-92
Wiltshire 048	4,903	6,917	5,670	7,102	767	185
Wiltshire 049	2,978	6,318	2,819	6,480	-159	162
Wiltshire 050	3,285	3,291	3,317	3,347	32	56
Wiltshire 051	2,690	1,396	2,997	1,780	307	384
Wiltshire 052	2,885	861	2,678	850	-207	-11
Wiltshire 053	2,897	1,688	2,689	1,655	-208	-33
Wiltshire 054	4,847	4,241	4,880	4,169	33	-72
Wiltshire 055	3,540	6,959	3,473	6,903	-67	-56
Wiltshire 056	3,224	9,060	3,044	9,045	-180	-15
Wiltshire 057	3,031	7,470	3,542	7,230	511	-240
Wiltshire 058	2,814	5,806	2,612	5,695	-202	-111
Wiltshire 059	2,794	1,814	2,594	1,785	-200	-29
Wiltshire 060	3,584	2,310	3,392	2,268	-192	-42
Wiltshire 061	2,957	2,462	2,799	2,442	-158	-20
Wiltshire 062	3,555	3,494	3,464	3,422	-91	-72
Test Valley 001	3,483	1,665	3,279	1,651	-204	-14
Test Valley 002	3,454	1,606	3,517	1,594	63	-12
Test Valley 003	4,853	9,865	7,441	9,782	2,588	-83
Test Valley 004	3,977	5,736	3,648	5,688	-329	-48
Test Valley 005	4,984	8,646	4,571	8,579	-413	-67
Test Valley 006	4,016	4,597	3,684	4,557	-332	-40
Test Valley 007	3,484	4,857	3,191	4,819	-293	-38
Test Valley 008	2,640	2,865	2,418	2,843	-222	-22
Test Valley 009	3,977	3,979	3,642	3,947	-335	-32
Test Valley 010	4,652	2,530	4,266	2,510	-386	-20
Test Valley 011	3,518	5,537	3,227	5,489	-291	-48
Test Valley 012	5,314	3,314	5,200	3,287	-114	-27
Test Valley 013	3,199	5,215	3,365	5,250	166	35
Test Valley 014	3,438	1,367	3,153	1,355	-285	-12
Test Valley 015	3,042	8,585	3,429	9,012	387	427

C.2 2031 Planning Data

	TEMPro Default		Planning Data (Constrained to TEMPro)		Difference	
Name	HHs	Jobs	HHs	Jobs	HHs	Jobs
Wiltshire	228,671	263,993	228,671	263,993	0	0
Test Valley	60,842	71,229	60,842	71,229	0	0
Wiltshire 001	3,303	2,826	3,216	2,977	-87	151
Wiltshire 002	3,556	5,681	3,369	5,782	-187	101
Wiltshire 003	2,662	2,220	3,109	2,068	447	-152
Wiltshire 004	2,668	2,423	2,453	2,295	-215	-128
Wiltshire 005	2,742	2,352	2,581	2,259	-161	-93
Wiltshire 006	3,570	2,613	3,416	2,443	-154	-170
Wiltshire 007	5,012	9,104	4,936	9,628	-76	524
Wiltshire 008	3,153	4,351	2,963	5,167	-190	816
Wiltshire 009	4,429	5,000	5,338	5,463	909	463
Wiltshire 010	4,771	4,535	4,259	4,209	-512	-326
Wiltshire 011	5,151	7,954	4,598	7,369	-553	-585
Wiltshire 012	4,041	3,850	3,716	3,635	-325	-215
Wiltshire 013	3,087	3,822	5,562	6,340	2,475	2,518
Wiltshire 014	3,431	1,293	3,063	1,199	-368	-94
Wiltshire 015	4,728	4,349	4,498	4,262	-230	-87
Wiltshire 016	3,788	1,769	3,382	1,655	-406	-114
Wiltshire 017	3,426	4,600	3,688	5,050	262	450
Wiltshire 018	6,563	10,553	7,193	10,805	630	252
Wiltshire 019	4,066	5,380	3,909	5,131	-157	-249
Wiltshire 020	3,629	1,108	3,239	1,028	-390	-80
Wiltshire 021	4,629	5,964	4,131	5,555	-498	-409
Wiltshire 022	3,900	4,206	4,678	4,166	778	-40
Wiltshire 023	2,905	2,348	2,671	2,174	-234	-174
Wiltshire 024	3,505	3,245	3,223	3,038	-282	-207
Wiltshire 025	5,393	6,278	4,930	5,890	-463	-388
Wiltshire 026	3,696	5,526	3,527	5,169	-169	-357
Wiltshire 027	5,103	3,493	4,774	3,300	-329	-193
Wiltshire 028	3,875	3,326	3,563	3,160	-312	-166
Wiltshire 029	3,363	2,709	3,092	2,551	-271	-158
Wiltshire 030	3,698	1,990	3,511	1,852	-187	-138
Wiltshire 031	3,334	11,171	3,305	10,507	-29	-664
Wiltshire 032	3,872	2,504	3,457	2,314	-415	-190
Wiltshire 033	2,548	967	2,274	909	-274	-58
Wiltshire 034	3,396	4,605	3,433	4,376	37	-229
Wiltshire 035	3,612	2,561	3,224	2,393	-388	-168
Wiltshire 036	2,931	1,716	2,616	1,652	-315	-64
Wiltshire 037	2,953	4,958	5,836	7,701	2,883	2,743
Wiltshire 038	2,758	2,794	2,536	2,640	-222	-154

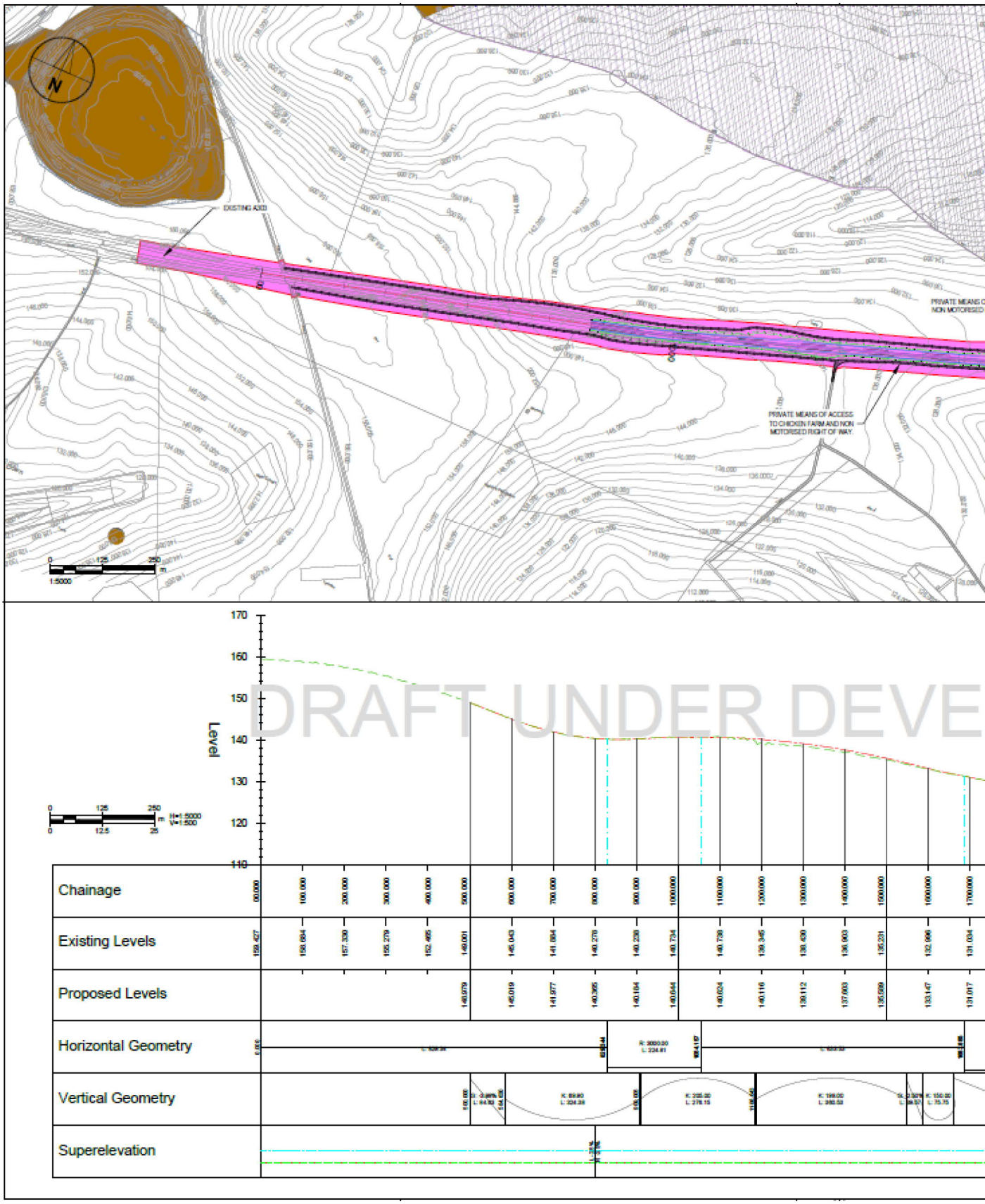
Wiltshire 039	3,427	3,739	3,359	3,461	-68	-278
Wiltshire 040	6,698	4,742	6,587	4,853	-111	111
Wiltshire 041	5,351	11,393	6,058	10,687	707	-706
Wiltshire 042	2,741	3,792	2,581	3,537	-160	-255
Wiltshire 043	2,947	1,341	4,504	2,937	1,557	1,596
Wiltshire 044	3,350	3,887	2,990	3,605	-360	-282
Wiltshire 045	3,203	7,728	3,141	7,326	-62	-402
Wiltshire 046	2,810	1,468	2,841	1,390	31	-78
Wiltshire 047	3,161	4,887	2,906	4,579	-255	-308
Wiltshire 048	5,100	7,004	5,671	6,873	571	-131
Wiltshire 049	3,066	6,394	2,819	6,684	-247	290
Wiltshire 050	3,382	3,330	3,318	3,235	-64	-95
Wiltshire 051	2,799	1,414	2,998	1,726	199	312
Wiltshire 052	3,001	873	2,679	1,501	-322	628
Wiltshire 053	3,014	1,711	2,690	1,596	-324	-115
Wiltshire 054	4,990	4,289	5,331	4,560	341	271
Wiltshire 055	3,682	7,045	3,474	6,634	-208	-411
Wiltshire 056	3,353	9,174	3,044	8,735	-309	-439
Wiltshire 057	3,120	7,560	3,543	6,848	423	-712
Wiltshire 058	2,927	5,881	2,613	5,498	-314	-383
Wiltshire 059	2,907	1,838	2,595	1,722	-312	-116
Wiltshire 060	3,690	2,336	3,393	2,196	-297	-140
Wiltshire 061	3,045	2,489	2,800	2,398	-245	-91
Wiltshire 062	3,660	3,534	3,465	3,300	-195	-234
Test Valley 001	3,652	1,685	3,417	1,625	-235	-60
Test Valley 002	3,621	1,626	3,654	1,573	33	-53
Test Valley 003	5,089	9,986	8,154	10,552	3,065	566
Test Valley 004	4,171	5,806	3,805	5,601	-366	-205
Test Valley 005	5,226	8,752	4,768	8,460	-458	-292
Test Valley 006	4,211	4,654	3,842	4,485	-369	-169
Test Valley 007	3,656	4,918	3,331	4,751	-325	-167
Test Valley 008	2,770	2,900	2,524	2,802	-246	-98
Test Valley 009	4,173	4,028	3,802	3,890	-371	-138
Test Valley 010	4,877	2,561	4,450	2,474	-427	-87
Test Valley 011	3,689	5,605	3,366	5,401	-323	-204
Test Valley 012	5,555	3,353	5,397	3,236	-158	-117
Test Valley 013	3,357	5,280	3,494	5,185	137	-95
Test Valley 014	3,605	1,384	3,289	1,333	-316	-51
Test Valley 015	3,190	8,691	3,550	9,861	360	1,170

Appendix D Busy period sector system

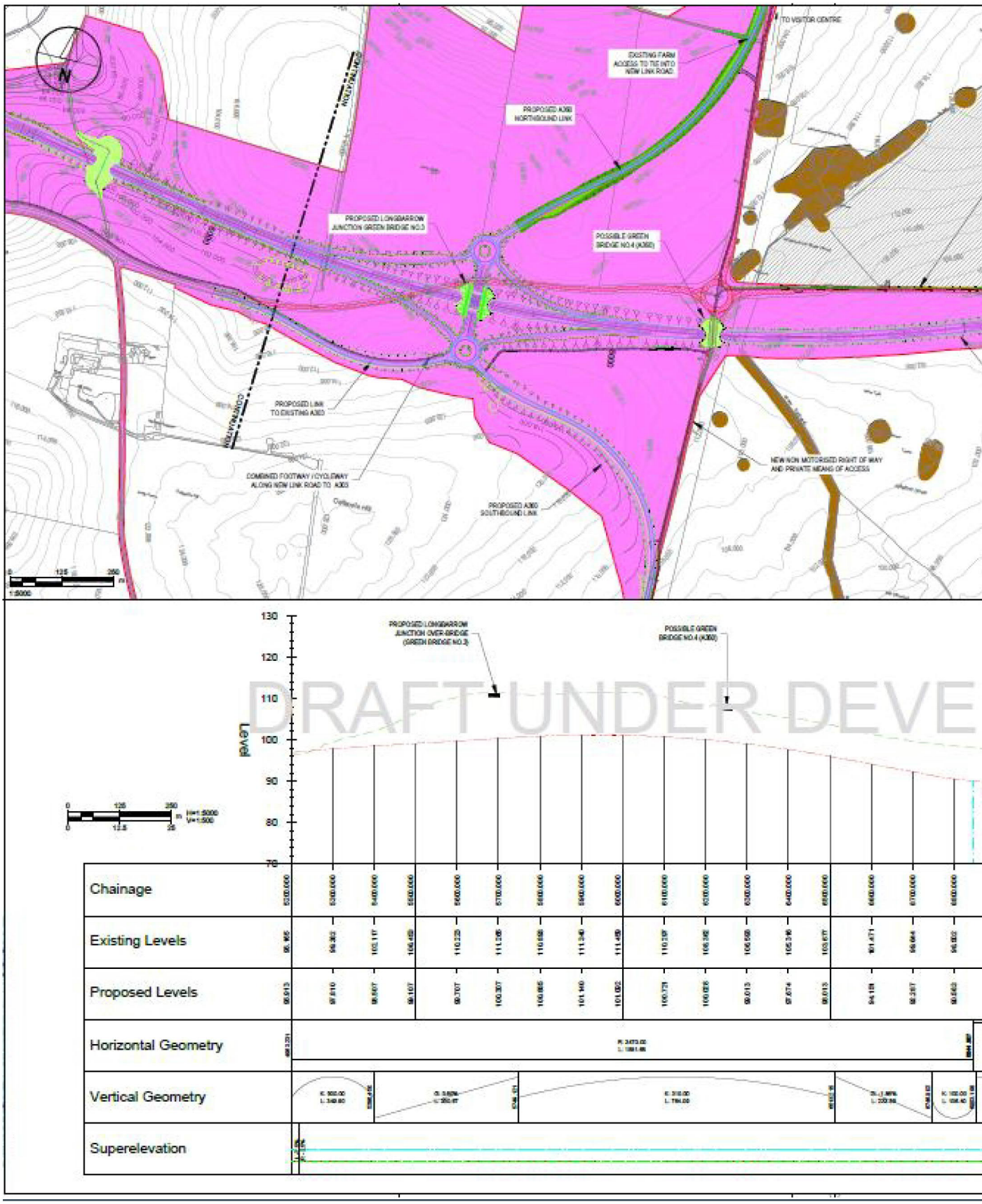


Appendix E Scheme plans

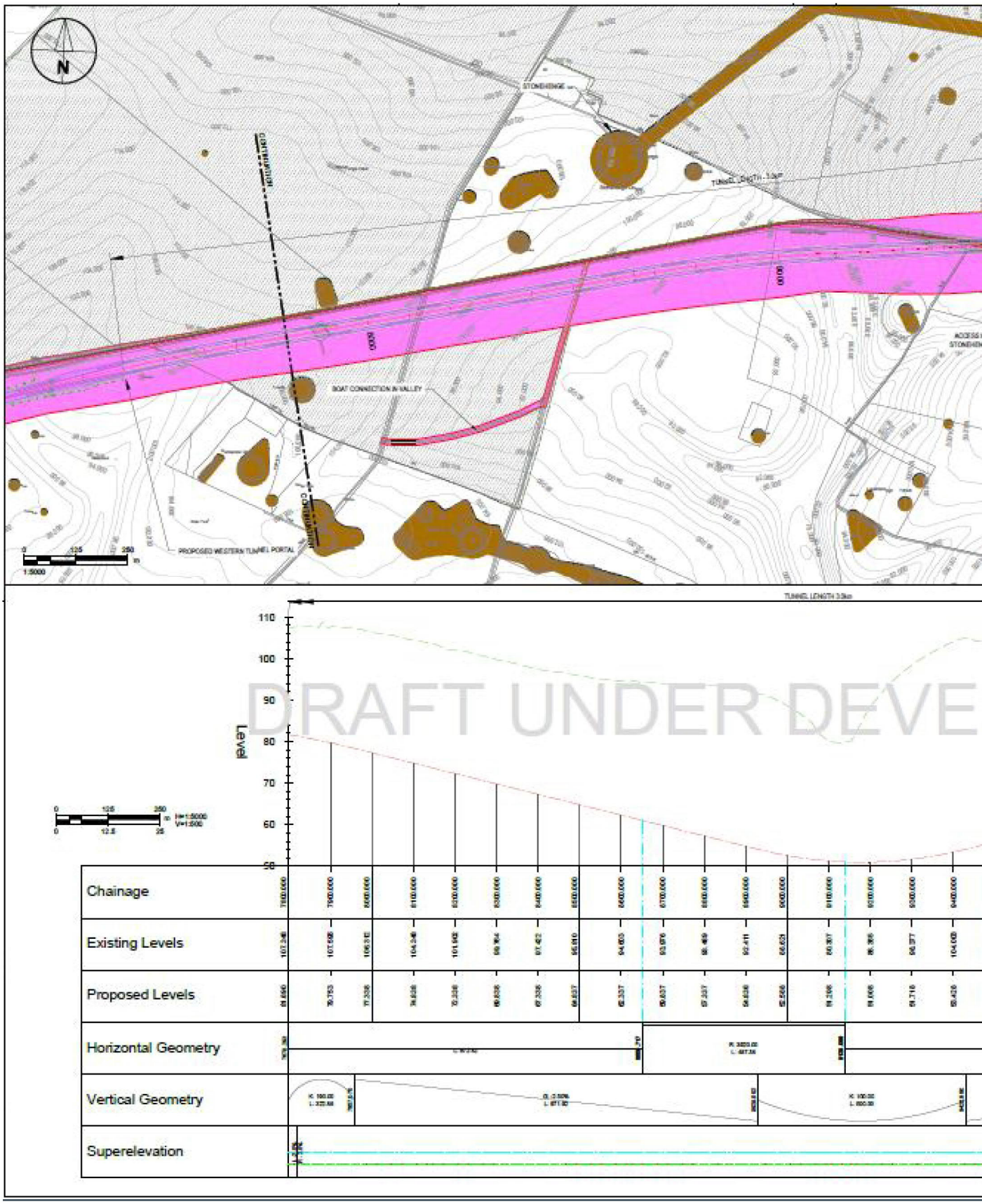
E.1 A303 mainline design drawings (west to east):

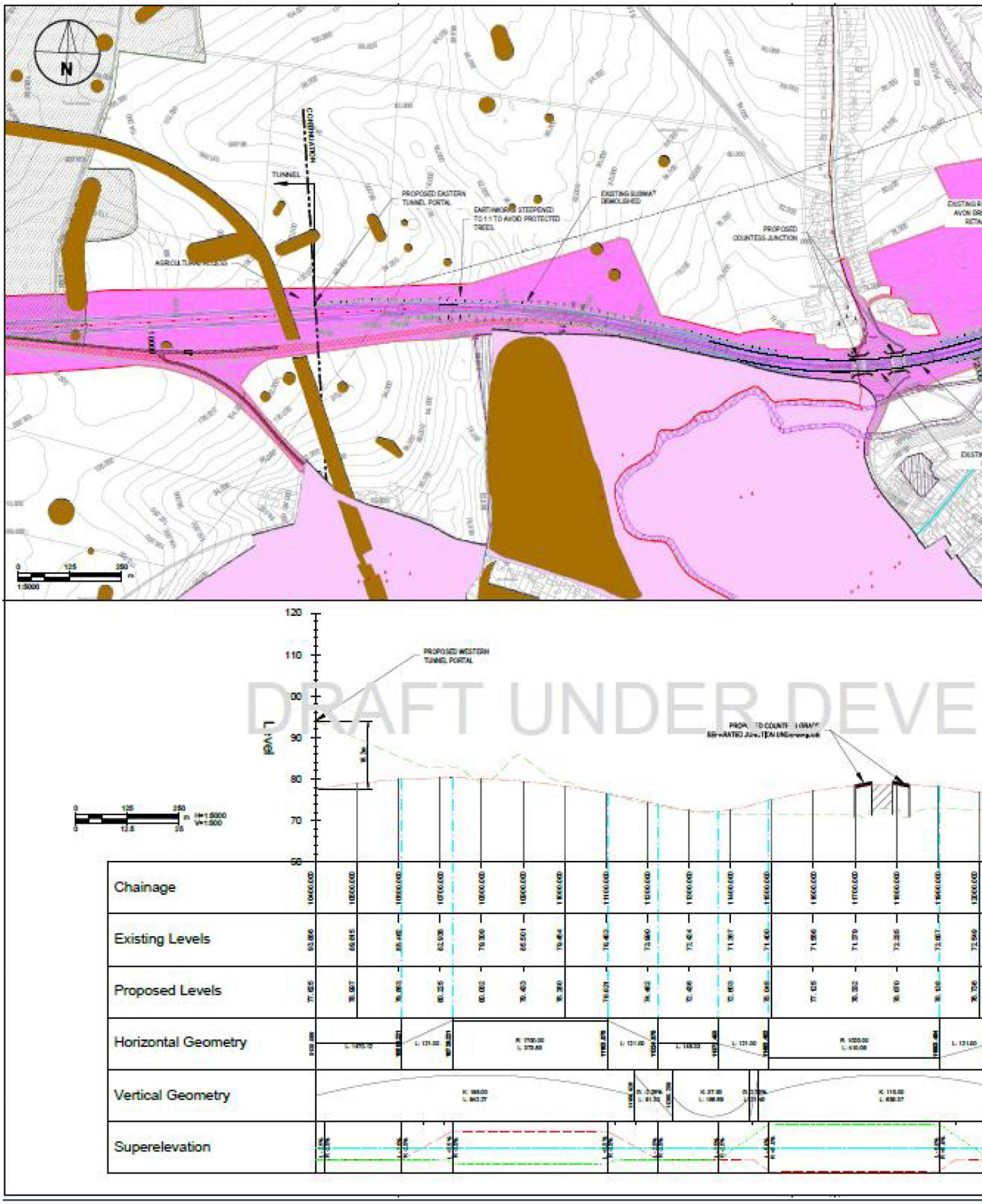


Document reference HE551506-AMW-HGN-SW_ML_M00_Z-SK-CH-5001-P07.1

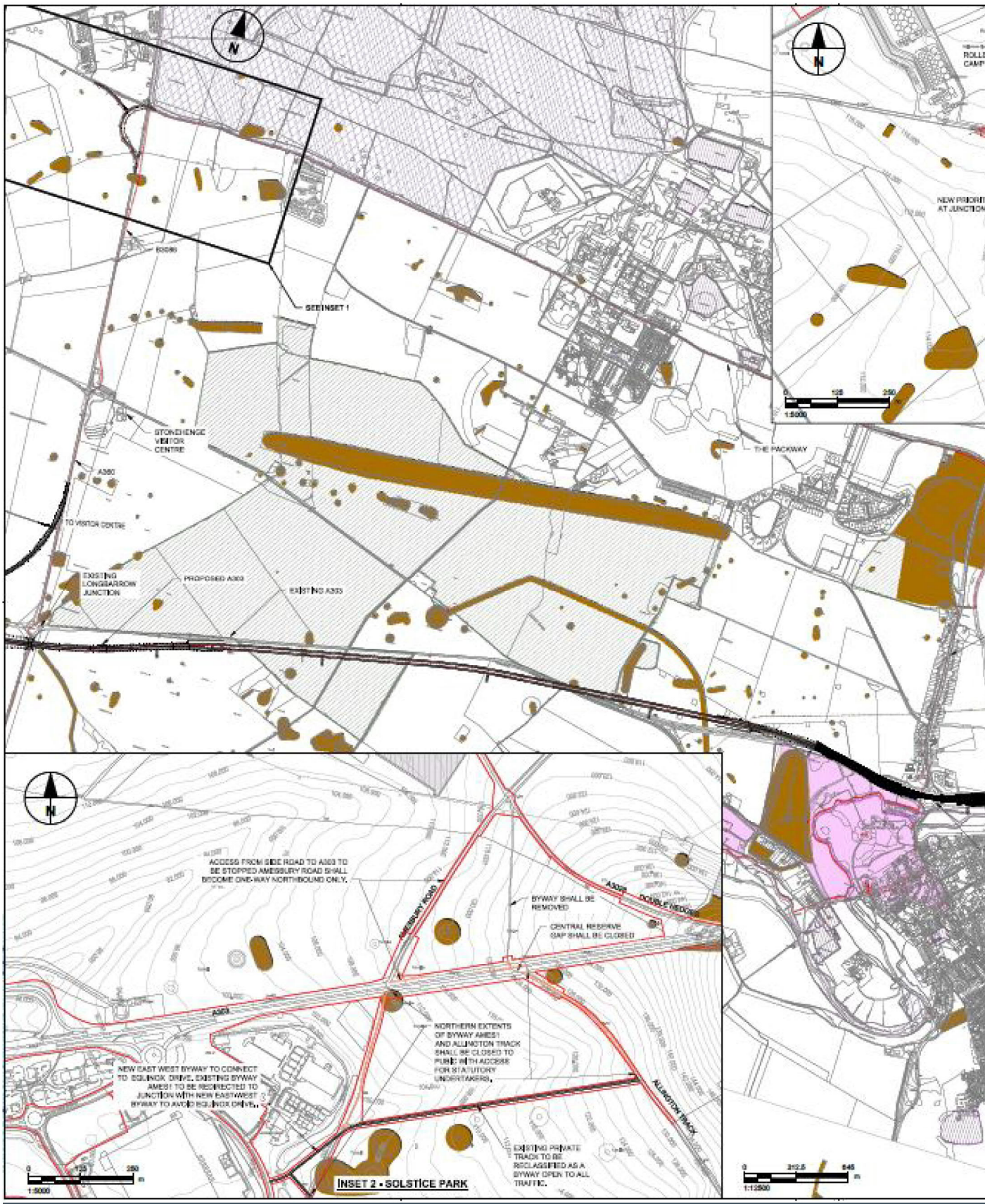


Document reference HE551506-AMW-HGN-SW_ML_M00_Z-SK-CH-5003-P07.1





Document reference HE551506-AMW-HGN-SW_ML_M00_Z-SK-CH-5005-P07.1



Document reference HE551506-AMW-HGN-SW_ML_M00_Z-SK-CH-5006-P01.1

Appendix F Scheme assumptions for DCO construction traffic management modelling

Project:	**A303 Amesbury to Berwick Down scheme**				
Title:	**Technical Note 022: Scheme assumptions for DCO Construction Traffic Management modelling**				
Doc ID:					
Date:	**14/05/18**	Version:	**P01**	Status:	**S03**

Revision	Date	Prepared by	Reviewed by	Approved by
P01	21/05/2018	Chloe Bates	Traffic, Solutions, Buildability	
P02	01/06/2018	Chloe Bates	Ken Marshall, Mike Sarling, Jeremy Damrel, Nik Bowyer	
P03	07/06/2018	Roger Dickinson	Craig Bell, Ken Marshall	Ken Marshall

1 Introduction

Background

1.1 Highways England is currently progressing development of the A303 Amesbury to Berwick Down scheme. The Scheme is being delivered through the Complex Infrastructure Programme (CIP), part of Highways England's Major Projects directorate.

1.2 The Scheme is being developed in accordance with Highways England's Project Control Framework (PCF), which aligns stages of work with key decision points in the standard lifecycle of a major project. The Scheme has successfully passed through PCF Stage 0 (Strategy, Shaping and Prioritisation), Stage 1 (Option Identification) and Stage 2 (Preferred Route Announcement). The Scheme is currently in the middle of PCF Stage 3 (DCO design) which represents the beginning of the Development phase of works.

1.3 AmW (AECOM, mace, WSP) has been appointed as Highways England's Technical Partner to develop the DCO design for the Scheme, manage and lead on the Development Consent Order (DCO) application for the Scheme.

Context

1.4 As the Scheme progresses through the Development phase of works (PCF Stage 3) and towards DCO, the traffic management measures during construction need to be defined to assist in determining a robust assessment of the Scheme construction period.

1.5 Whilst construction information will be provided by the Buildability team, outputs are required from the traffic models (both strategic and operational) to inform both environmental and economic appraisal of the construction works and to understand the operation of the A303 mainline, its junctions and the local road network during the

construction period.

Technical Note structure

1.6 This Technical Note sets out the assumptions made for the traffic management measures during the construction phase(s).

1.7 Following the review of construction programme P10, two main phases of the construction programme have been identified. These correspond to:

- Phase 1 (5th July 2021 to 28th November 2023) when Winterbourne Stoke bypass, Longbarrow interchange and Countess roundabout flyover are under construction; and
- Phase 2 (December 2023 to 27th January 2027) when the construction of the tunnel is the primary construction activity. The Winterbourne Stoke bypass, Longbarrow interchange and Countess roundabout flyover constructed in the prior phase and are now operational.

1.8 The traffic management assumptions outlined in Section 2 and Section 3 have been selected on the basis of the individual elements of traffic management which are in place for the longest period during the construction phase and likely severity of impact. There will be short term variations within these two phases, which will not be assessed using the traffic models.

1.9 Following this introductory section, the remainder of this report is structured as follows:

- Section 2, which sets out the traffic management assumptions (in terms of road layouts and speeds) during the first phase of construction (2021-2023);
- Section 3, which sets out assumptions for the second phase of construction (2024-2026);
- Section 4, which provides a brief overview of how the stages will be coded in the strategic traffic model developed for PCF Stage 3; and
- Section 5, which provides details on the number of HGVs accessing the network at Longbarrow during construction.

2 Phase 1 (2021 – 2023) assumptions

Introduction

2.1 This section of the Technical Note sets out to define the input assumptions relating to traffic management during Phase 1. This phase is expected to run through 2021-2023 (29 months) when the Winterbourne Stoke bypass, Longbarrow interchange and Countess roundabout flyover are under construction.

2.2 The following scheme elements are expected to have been completed prior to this phase of works:

- Rollestone Cross junction;
- Closure of Stonehenge Road;
- Stopping-up of Allington Track and A303 junction, and realignment of Allington Track to Equinox Drive (Solstice Park); and
- Alterations to minor at-grade accesses east of Solstice Park (Amesbury Road

and A3028 Double Hedges).

2.3 As part of the A303 construction works, the following section outlines the proposed TM works and what will be modelled. Drawings are included within Appendix A. This construction phase comprises:

Western Tie In

- Stage 3 of the TM will be modelled, as this represents the TM in place for the longest period during Phase 1.
- **Stage 3 TM (18 weeks) November 2021 to April 2022** - Traffic to run two-way on the **eastbound** carriageway from the new temporary crossover approximately 120 metres west of chainage zero to the second crossover required for the tie in back to the existing road through Winterbourne Stoke whilst the westbound carriageway is constructed.

  The eastbound speed limit reduces from 70mph to 50mph to 30mph ahead of the temporary crossover. Between the two crossovers, the speed limit will be 30mph until after the road ties back into the existing carriageway through Winterbourne Stoke when the speed limit will be reduced to 40mph due to the close proximity of the existing 40mph speed limit on the entry to Winterbourne Stoke.

  Upon leaving Winterbourne Stoke the existing 40mph speed limit will be extended to the crossover, where the westbound speed limit will drop to 30mph ahead of the crossover onto new carriageway at around chainage 1800. Between the two crossovers, the speed limit will be 30mph until traffic passes through the temporary crossover to the west of chainage zero, where it can then be released back to existing (national) speed limit.

New Longbarrow Interchange

- Northern roundabout construction is completed and used for the A303 mainline movement as a single lane in each direction with no adjoining arms (no opposing flow).
- A303 traffic will use the existing A303 through Winterbourne Stoke and then use a temporary bridge over the new alignment to the new northern Longbarrow roundabout. The existing 40mph speed limit east of Winterbourne Stoke will be extended in both directions to the point where the new temporary road/bridge is constructed where a 30mph speed limit will be introduced. Passing through the roundabout with no opposing flow, traffic then uses a temporary road to join onto the existing Longbarrow roundabout. There will be a 30mph speed limit through this section, in both directions from the temporary bridge to include the existing Longbarrow roundabout where it can then return to the existing speed limit.

Existing Longbarrow Roundabout

- Western (eastbound entry) arm of the existing roundabout is re-aligned to the north with the lane allocation being the same as the existing western arm.
- Southern (northbound arm) arm of the existing roundabout is re-aligned to use a temporary bridge over the new A303 mainline with 30mph speed limit to cross the temporary bridge.
- Eastern (westbound entry) and northern (southbound entry) arms remain unchanged. Westbound entry is currently signed as the nearside lane being for ahead and left, the middle lane for ahead only and the offside lane for right

turn only.

- A303 mainline traffic will use the roundabout as currently with no changes to its capacity or lane allocation. The roundabout speed limit will reduce from 40mph to 30mph. The A303 eastbound and westbound exit arms will see traffic merge from two lanes to one as per the existing situation.

Countess Roundabout

- Eastbound from Stonehenge Cottages to Countess roundabout, a single lane is in operation with a temporary left-in left-out access to a construction site with a 200 metre merge/diverge section for construction traffic following this.
- The eastbound entry to Countess roundabout has a one lane approach from the point after the construction site entry / exit flaring to two lanes at the stop line with a flare of 100 metres. It is assumed that there will be two lanes eastbound through the roundabout.
- The eastbound exit slip drops to one lane after the services access.
- In the westbound direction, a single lane approach to the roundabout to allow for ramp works is assumed, flaring to two lanes at the stop line. A flare length of 60 metres is assumed.
- Continuing westbound, a two lane exit for the A303 is assumed for a distance of 205 metres before returning to a single lane for 300 metres before returning to two lanes until the point of the existing lane drop to single lane on the A303.
- Signal timings for the strategic model are assumed to be the same as in the 2017 base year. The detailed operational model will see signal timings optimised to improve operational efficiency.
- There will be no changes to the A345 northbound and southbound arms.

2.4 The speed limits assumed are:

- 30mph **eastbound** from the new temporary crossover to the west of chainage zero to after the crossover to tie back into the existing road through Winterbourne Stoke.
- 40mph from the crossover to the west of Winterbourne Stoke and through Winterbourne Stoke to the point where the A303 leaves the existing alignment to cross over to the new Longbarrow junction via the temporary road / bridge.
- 30mph through Longbarrow construction (due to speed restriction required on temporary bridge) from before the tie-in with the A303 on the western side of the junction through to the exit on the eastern side of the existing Longbarrow roundabout.
- Unrestricted (national) speed limit between Longbarrow and Stonehenge Cottages.
- 40mph from Stonehenge Cottages to the end of the traffic management (eastbound) after Avon Bridge, except 30mph through Countess roundabout between the two ramps.
- 40mph **westbound** from start of TM (existing crossover to the west of Solstice Park – chainage 12,800) to Countess roundabout.
- 30mph through Countess roundabout between the two ramps in construction.

- Return to existing national speed limit between the end of Countess TM (chainage 10,800) and existing Longbarrow roundabout.
- 30mph between the entry to the existing Longbarrow and the tie in to the A303 east of Winterbourne Stoke.
- 40mph from when the road returns to the existing A303 alignment to the east of Winterbourne Stoke and through Winterbourne Stoke to the crossover onto the new carriageway.
- 30mph from the crossover onto the new road to the temporary crossover to the west of chainage zero where the road returns to the original alignment and the speed limit can increase back to the national speed limit.

3 Phase 2 (2024 – 2026) assumptions

3.1 This phase is expected to approximately run from 2024 to the end of 2026 (36 months). The construction of the tunnel is the primary construction activity during this phase of works. The Winterbourne Stoke bypass, Longbarrow interchange and Countess roundabout flyover are assumed to have been constructed in the prior phase and are now operational.

3.2 The following assumptions are made through this construction phase, outlined below from west to east.

Winterbourne Stoke Bypass

- Existing dual carriageway extended towards Parsonage Down.
- Crossover from dual carriageway operation to use of the southern carriageway to occur at chainage 3,000.
- Speed limit to be 70mph from chainage 0 to chainage 1800. Then reduces to 50mph before the crossover at chainage 3,000, which would have a speed limit of 30mph.
- From this point eastwards, the new eastbound carriageway is open to construction traffic only (used in both directions).
- The westbound carriageway is open to general traffic operating as contraflow, with one lane in each direction to the new Longbarrow interchange. Speed limit for both directions of 50mph.

New Longbarrow Interchange

- Both northern and southern roundabouts completed with a single lane in each direction used throughout, including along the new permanent overbridge between the two roundabouts.
- Eastbound A303 traffic accesses the interchange at the southern roundabout making a tight left turn onto the overbridge to the northern roundabout. This flow is unopposed through the junction.
- Westbound A303 traffic accesses the interchange at the northern roundabout, via the temporary road from the existing Longbarrow roundabout, then passing over the overbridge and around the southern roundabout to join onto the new A303 Winterbourne Stoke westbound carriageway. This flow is opposed only by local trips coming from Winterbourne Stoke along the existing A303.

- The existing A303 from Winterbourne Stoke remains open to local traffic and joins onto the southern roundabout as in the final scheme with no flaring. The existing 40mph speed limit east of Winterbourne Stoke will be extended east to 100 metres before the new southern Longbarrow roundabout where a 30mph speed limit will be in place.
- The A360 is not connected to the interchange along the new alignment to allow for unobstructed A303 flow through the new interchange. Instead, A360 traffic continues on the existing alignment, interacting with A303 traffic at the existing Longbarrow roundabout.

Existing Longbarrow Roundabout

- Remains the same as in Phase 1.

Countess Roundabout

- Flyover in place with two lanes running eastbound and one lane running westbound.
- A single lane westbound approach to the roundabout flaring to 2 lanes at the stop line with a flare length of 28 metres.
- All other approaches and circulatory carriageway are the same as in the final scheme.
- Signal timings for the strategic model are assumed to be the same as in the 2026 opening year scheme coding.

3.3 The following speed limits are assumed:

- National speed limit reduced to 50mph then 30mph ahead of the new crossover to the west of Parsonage Down;
- 50mph in both directions along the Winterbourne Stoke bypass;
- The 40mph speed limit through Winterbourne Stoke is extended to the new Longbarrow interchange;
- 30mph through the new Longbarrow interchange and existing Longbarrow roundabout;
- Unrestricted (national) speed limit from the eastern side of existing Longbarrow roundabout to Stonehenge Cottages. Southern arm has a 30mph speed limit from a point south of the temporary bridge;
- 40mph from Stonehenge Cottages to the eastbound off slip to Countess roundabout;
- 70mph limit eastbound from the western end of the new Countess roundabout flyover. The speed-limit on the eastbound off slip to Countess roundabout is assumed to have a 40mph limit;
- 50mph from the existing crossover to the west of Solstice Park westbound over the flyover and 40mph around Countess roundabout; and
- 60mph limit westbound from the lane-gain at the western side of Countess roundabout to Stonehenge Cottages.

4 Scheme coding in the traffic models

A303 Stonehenge SWRTM (DCO) – Strategic Model

4.1 Coding of the Scheme in the strategic model will use standardised values (e.g. saturation flows, speed flow curves) that are consistent with those used in the base year, 'Do Minimum' and 'Do Something' models. These will follow the Highways England Regional Traffic Model (RTM) coding guidelines.

4.2 Distances will be a combination of distances taken from the Scheme and base year coding.

5 HGV Demand assumptions

HGV Movements to/from site

HGV Deliveries to Concrete Batching Plant, Longbarrow

5.1 A construction compound is to be based at Longbarrow which will contain a "remote" concrete batching plant. The concrete will be transported from this plant to the various construction sites along the route.

5.2 Information provided by the Buildability team indicates 40,000 HGV deliveries to supply raw material for the concrete batching plant for non-tunnel construction. 70% of the deliveries are assumed to be in the construction period from July 2021 to the end of 2023 (**Phase 1**) which is assumed to be 126 weeks with deliveries arriving 5.5 days a week (Monday-Saturday) in a 12 hour window (7am-7pm). Hence:

40,000 * 70% = 28,000

28,000 / 126 = 222 *HGVs per week*

222 / 5.5 = 40 *HGVs per day*

40 / 12 = 3.6 *HGVs per hour*

So there are approximately 3.6 HGVs per hour arriving and leaving the Longbarrow compound due to the delivery of materials for use in concrete production for the period between July 2021 and the end of 2023

5.3 Information provided by the Buildability team indicates 40,000 HGV deliveries to supply raw material for the concrete batching plant for non-tunnel construction. 30% of the deliveries are assumed to be in the construction period from January 2024 to the end of 2026 (**Phase 2**) which is assumed to be 156 weeks with deliveries arriving 5.5 days a week (Monday-Saturday) in a 12 hour window (7am-7pm). Hence:

40,000 * 30% = 12,000

12,000 / 156 = 77 *HGVs per week*

77 / 5.5 = 14 *HGVs per day*

14 / 12 = 1.2 *HGVs per hour*

So there are approximately 1.2 HGVs per hour arriving and leaving the Longbarrow compound due to the delivery of materials for use in concrete production for the period between January 2024 and the end of 2026.

Information provided by the Buildability team indicates 19,500 (18,000 concrete + 1,500 grout) HGV deliveries to supply raw materials for the concrete batching plant for the tunnel construction in Phase 1 for 44 weeks, from February 2023 to the end of

November 2023. Assuming the production of concrete takes place 6 days a week, for 12 hours a day during this period we have:

Phase 1

19,500 / 44 = 443 *HGVs per week*

443 / 6 = 74 *HGVs per day*

74 / 12 = 6 *HGVs per hour*

So there are approximately 6 HGVs per hour arriving and leaving the Longbarrow compound due to production of concrete for use in the tunnel construction, during Phase 1.

5.4 Information provided by the Buildability team indicates 23,800 (22,300 concrete + 1,500 grout) HGV deliveries to supply raw materials for the concrete batching plant for the tunnel construction in Phase 2 for 86 weeks, from December 2023 to the end of July 2025.

5.5 Assuming the production of concrete takes place 6 days a week, for 12 hours a day during this period we have:

Phase 2

22,800 / 86 = 265 *HGVs per week*

265 / 6 = 44 *HGVs per day*

44 / 12 = 4 *HGVs per hour*

So there are approximately 4 HGVs per hour arriving and leaving the Longbarrow compound due to production of concrete for use in the tunnel construction, during Phase 2.

Additional HGV delivery assumptions:

- The following numbers are the number of deliveries so vehicle movements will be twice these values.
- Structural Steel: Currently assumed 60 deliveries during Phase 1. Assume 0.2 deliveries per day.
- Approximately 74,000 tonnes of rebar. Approximately 3,700 loads. Split between phase 1 and phase 2 the same as the civils concrete i.e. 70% & 30%. Phase 1 - 3.5 deliveries per day. Phase 2 - 1.5 deliveries per day.
- Type 1 and backfill to structures amounting to approximately 23,000 tonne. Approximately 1,150 loads. Approximately 70% phase 1 and 30% phase 2. Phase 1 - 1 delivery per day. Phase 2 - 0.5 deliveries per day.
- Hardcore for haul roads and working platforms: approximately 12,000 tonne / 600 loads. Vast majority 85% phase 1. Phase 1 - 0.7 deliveries per day. Phase 2 - 0.1 deliveries per day.
- Timber: At the commencement of each zone of work around 5 deliveries per week would be expected (assume an average of 1 a day), after which would reduce to 1 delivery per week. Phase 1 assume 1 delivery per day.
- Pre-cast concrete components: 760 tonnes. Equating to approximately 50 loads. The locations for kerbing are spread along the length of the works, but say 65% phase 1 35% phase 2. Phase 1 assume 0.05 deliveries per day.

Phase 2 assume 0.02 deliveries per day.

- Road surfacing, approximately 190,400 tonnes, 9,520 loads. Split between phase 1 and phase 2 approximately 50% each. 6 deliveries per day.
- Drainage stone and RE-MEDI8 filter material 24,000 tonnes, 1200 loads. Split between phase 1 and 2 approximately 60% / 40%. Phase 1 assume 1 delivery per day. Phase 2 assume 0.6 deliveries per day.
- Lime/cement for drying wet chalk approximately 7,000 tonne in 30 tonne loads, = 233 spread between phase 1 and 2 of 40 % / 60%. Phase 1 assume 0.12 deliveries per day, Phase 2 assume 0.18 deliveries per day

Other large loads:

- TBM 6 abnormal loads plus approximately 40/50 40' containers all phase 1.
- Geotextiles/miscellaneous approximately 4 per week phase 1 and 2/3 phase 2.

Delivery Type	Phase 1 2021-2023		Phase 2 2024-2026	
	Daily	Av. Hour	Daily	Av. Hour
Concrete: non-tunnel	40	3.6	14	1.2
Concrete: tunnel	74	6	44	4
Structural Steel	0.2			
Rebar	3.5		1.5	
Type 1 and backfill structures	1.0		0.5	
Hardcore	0.7		0.1	
Timber	1.0			
Pre-cast concrete	0.05		0.02	
Road surfacing	6		6	
Drainage Stone & RE-MEDI8	1.0		0.6	
Lime/cement	0.12		0.18	
Total	**128**	**10.6**	**67**	**5.6**
Suggested Robust Assumption for Traffic Assessment (30% increase Phase 1 and Phase 2)		**14**		**7**

5.6 Deliveries of the above materials would be made in a 12 hour period between 7am and 7pm.

5.7 Deliveries are assumed to route along the following main corridors, based on the percentage distribution identified:

- A36 (north) – 55%;
- A36 (south) – 15%;
- A303, west of A36 junction – 15%; and
- A303, east of scheme – 15%.

5.8 This distribution assumes that 85% of deliveries will approach / leave the construction site on the A303 west of the construction site.

5.9 HGV trips will be added to the traffic model by selecting appropriate model zones further than 10km outside the Area of Detailed Model (AoDM).

5.10 Assumed 80% of all deliveries are assumed to go to Longbarrow, the other 20% going to the Countess compound.

Site HGV movements on Public Highway

Longbarrow Compound to Eastern Portal Construction Site

- Approximately 58,000m³ to eastern construction sites (chainage 10,400 +) in 8m³ agitator trucks = 7,250. All in phase 2. **8 per day**.
- In addition to the above will be miscellaneous equipment etc. say average of 4 per day.

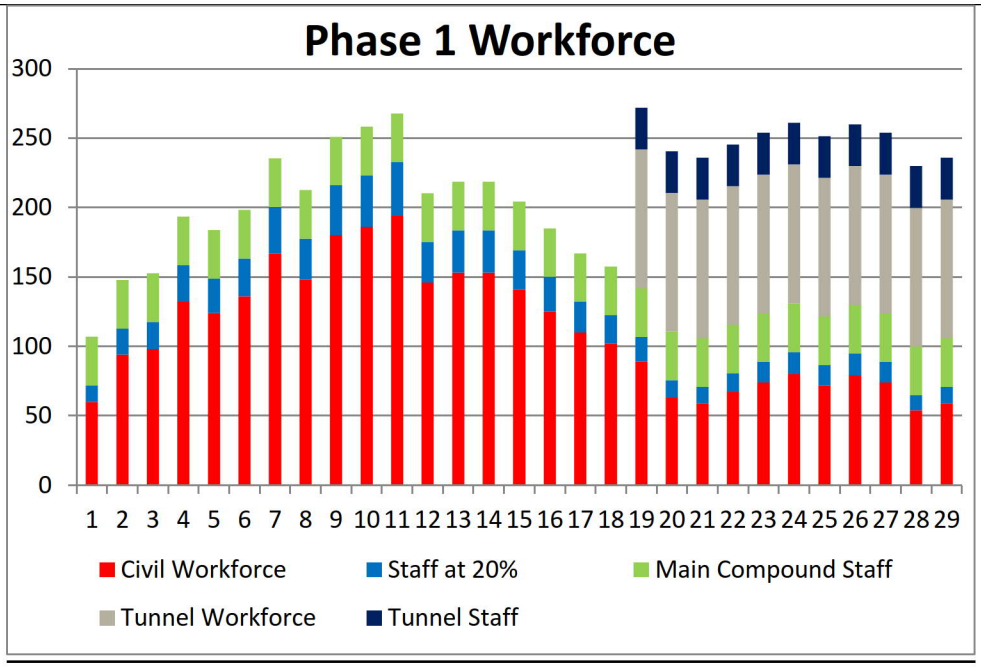
Eastern Cutting Excavated Material Movement

- 125,000m³ of excavated material will need to be transported from the eastern site to the western site compound via the existing A303.
- 15,620 HGVs in total based upon approximately 200,000m³ total excavation from the eastern portal. 75,000m³ (optimistic) into the ramps at Countess. No fill going back into the portal to make up levels (see western tunnel approach).
- Assume over 30 weeks 15,620/30 = 520 per week, 520 / 5.5 = 95 per day, 95/12 = 8 per hour.
- Assume that transfer will occur between 07:00 and 19:00 means **8 HGVs per hour each way.** Phase 1.

6 Worker Demand

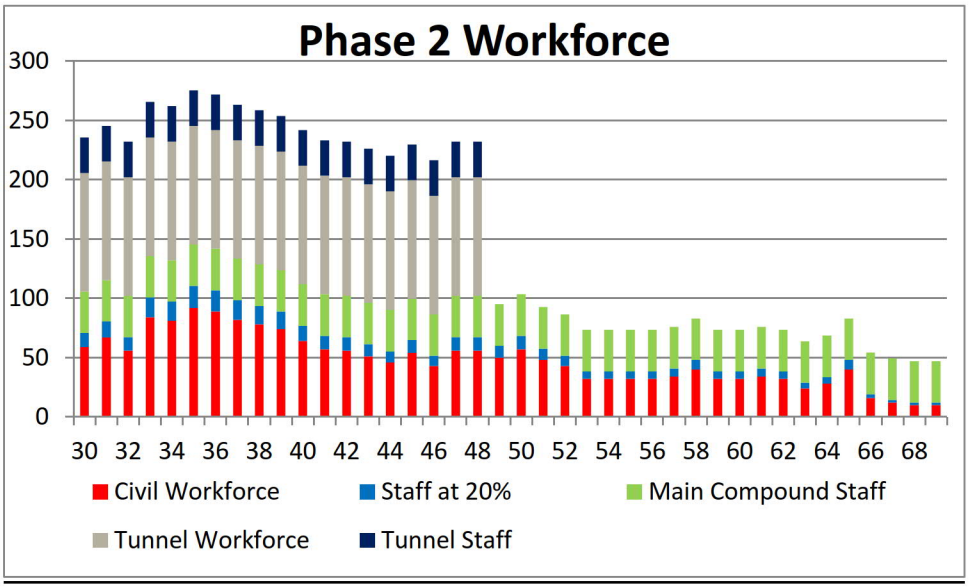
6.1 Figures below show the forecast profile of workforce for Phase 1 and Phase 2. Input assumptions have been provided by the Buildability and tunnels team, with the profile based on programme P10.

Phase 1 – 2021 to end 2023



- Average across Phase 1 – 218 staff.
- Maximum monthly workforce Phase 1 – 268 staff.
- Assume for purpose of traffic assessment 280 staff.

Phase 2 – 2024 to end 2026



- Average across Phase 2 – 154 staff.
- Average Phase 2 months 30-48 – 244 staff.
- Maximum monthly workforce Phase 2 – 275.
- Assume for purpose of traffic assessment 300 staff (Includes allowance for tunnel M&E workforce).

6.2	Shift work is assumed with civils work being carried out between 7am and 7pm meaning workers would arrive and leave outside of peak hours.
6.3	During the construction of the tunnel workers are assumed to work in two 12 hour shifts 7am-7pm and 7pm-7am. This would mean there would be workers leaving the site between the AM peak (7-8am) and arriving at site in the PM peak (6-7pm).
6.4	Assume the workforce is split over the two site compounds at Longbarrow and Countess. Assume all tunnel workers will use the site at Longbarrow and that 70% of civils workers will arrive at Longbarrow, 30% at Countess.
6.5	Assume travel plans are in place for the workforce so with the combination of car sharing, mini-buses and single occupancy vehicles, we assume an average vehicle occupancy of 3.
6.6	Within the strategic model, worker demand will be added to the 'car commuter' user-class (user-class 2) and retain standard commuter values of time.
6.7	Workforce trips will be distributed across model zones within a 10km radius of Longbarrow based on the number of dwellings within each zone.

Appendix G Impact of known errors

Army Rebasing Programme sensitivity test

G.1.1.1 During review of the 'A303 Stonehenge SWRTM (DCO)' model demand, it was discovered that trips associated with the Army Rebasing Programme were inputted as the transpose of what they should be (i.e. arrivals have been applied as departures and vice versa). A sensitivity test was therefore undertaken to determine the scale of the incorrect application of trips associated with the Army Rebasing Programme.

G.1.1.2 Table A-8-1 shows the corrected application of the Army Rebasing Programme demand, as applied in the sensitivity test. Table A-8-2 shows how these trips were applied in the 'A303 Stonehenge SWRTM (DCO)' model. Table A-8-3 summarises the scale of the error for each zone affected.

Table A-8-1: Correct application of Army Rebasing Programme demand (sensitivity test demand)

	AM Peak		Inter-peak		PM Peak	
Zone	Arrivals	Departures	Arrivals	Departures	Arrivals	Departures
22610	103	6	20	14	16	98
22443	119	7	23	16	19	113
22605	24	1	5	3	4	23
22591	15	13	3	3	7	12
20962	4	4	1	1	2	3
22590	23	19	5	5	10	18
22599	47	8	8	6	5	35
22597	5	1	1	1	1	4
22419	16	1	3	2	2	12

Table A-8-2: Application of Army Rebasing Programme demand in 'A303 Stonehenge SWRTM (DCO)' model

	AM Peak		Inter-peak		PM Peak	
Zone	Arrivals	Departures	Arrivals	Departures	Arrivals	Departures
22610	6	103	14	20	98	16
22443	7	119	16	23	113	19
22605	1	24	3	5	23	4
22591	13	15	3	3	12	7
20962	4	4	1	1	3	2
22590	19	23	5	5	18	10
22599	8	47	6	8	35	5
22597	1	5	1	1	4	1
22419	1	16	2	3	12	2

Table A-8-3: Difference between sensitivity test demand and 'A303 Stonehenge SWRTM (DCO)' model demand

	AM Peak		Inter-peak		PM Peak	
Zone	Arrivals	Departures	Arrivals	Departures	Arrivals	Departures
22610	-96	96	-5	5	82	-82
22443	-111	111	-6	6	94	-94
22605	-22	22	-1	1	19	-19
22591	-3	3	0	0	5	-5
20962	-1	1	0	0	1	-1
22590	-4	4	-1	1	8	-8
22599	-39	39	-3	3	30	-30
22597	-4	4	0	0	3	-3
22419	-15	15	-1	1	10	-10

G.1.1.3 The sensitivity test was undertaken on the 2026 Do Something scenario, as all development associated with the Army Rebasing Programme is expected to be complete by 2026. The magnitude of the error will be consistent in all future years as the trip production and attraction of the Army Rebasing Programme developments is fixed in all future years.

G.1.1.4 The sensitivity test consisted of removing the trips detailed in Table A-8-2 from the 2026 demand matrices and replacing with the trips detailed in Table A-8-1. The actual flow difference (2026 with scheme sensitivity test – 2026 with scheme 'A303 Stonehenge SWRTM (DCO)' model) is shown the following figures.

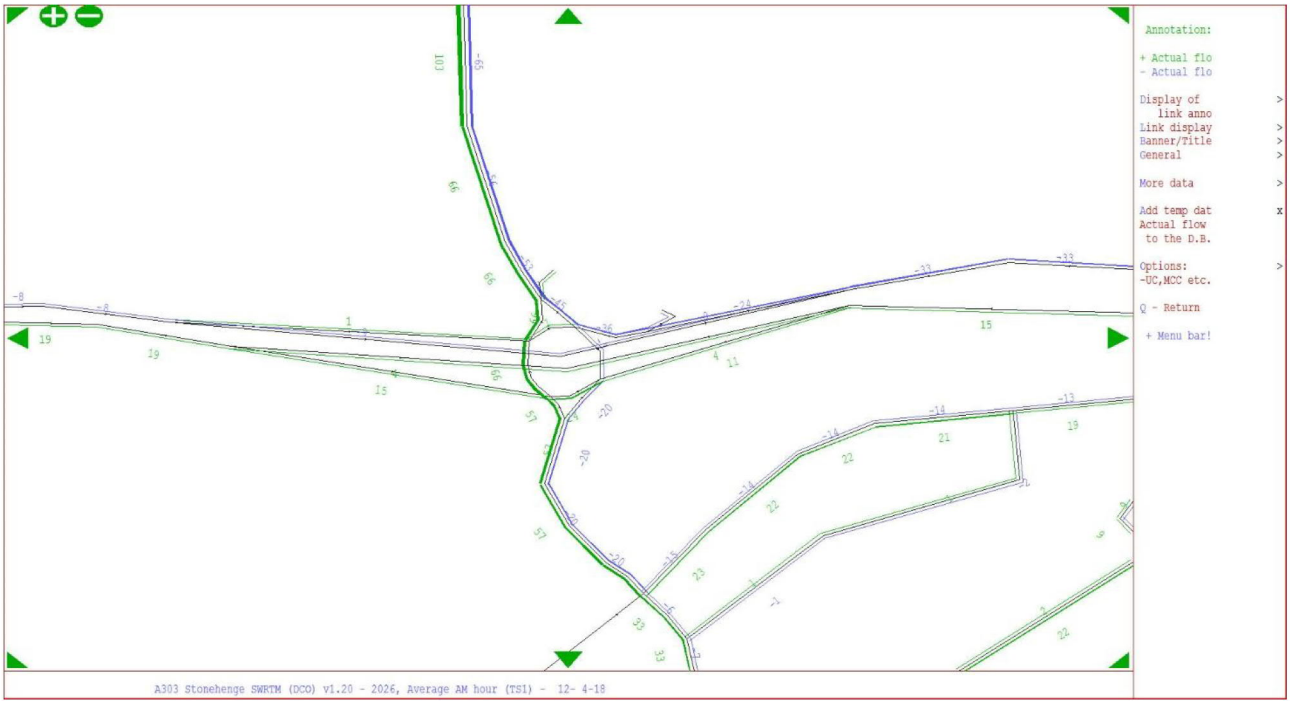


Figure A-8-1: Army Rebasing Programme sensitivity test – 2026 AM Countess roundabout

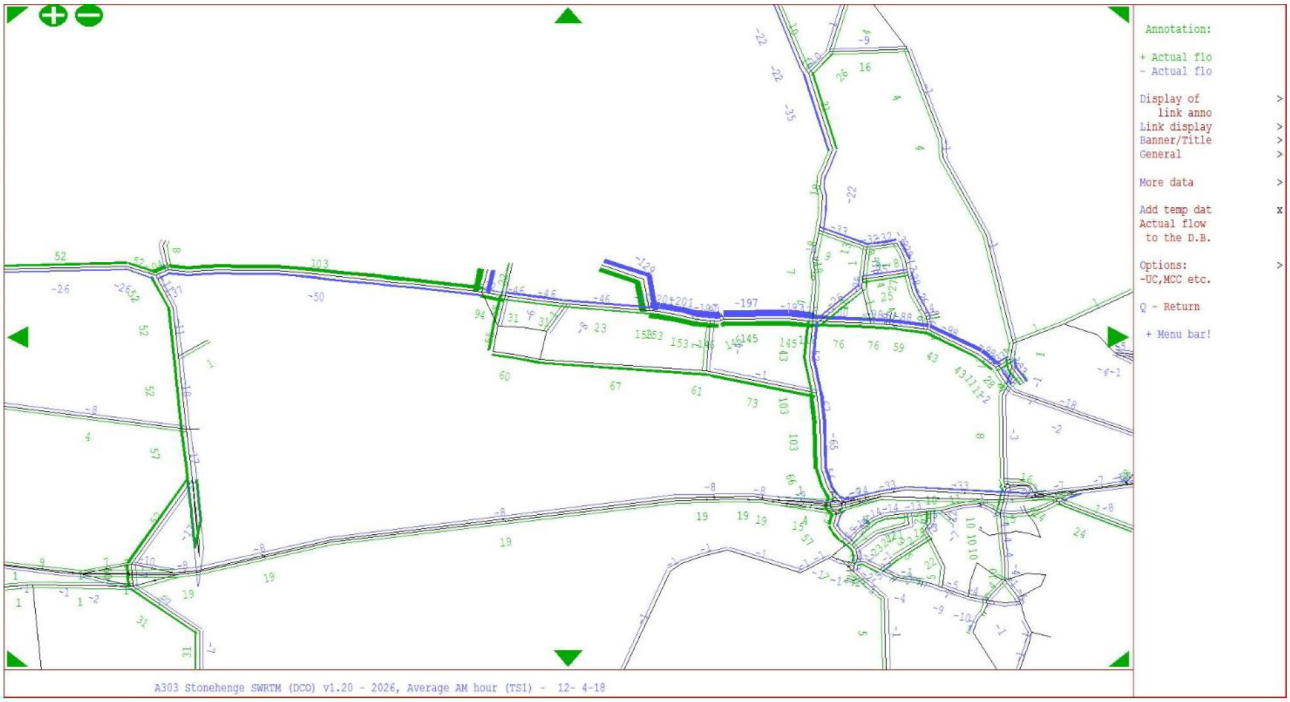


Figure A-8-2: Army Rebasing Programme sensitivity test – 2026 AM Larkhill

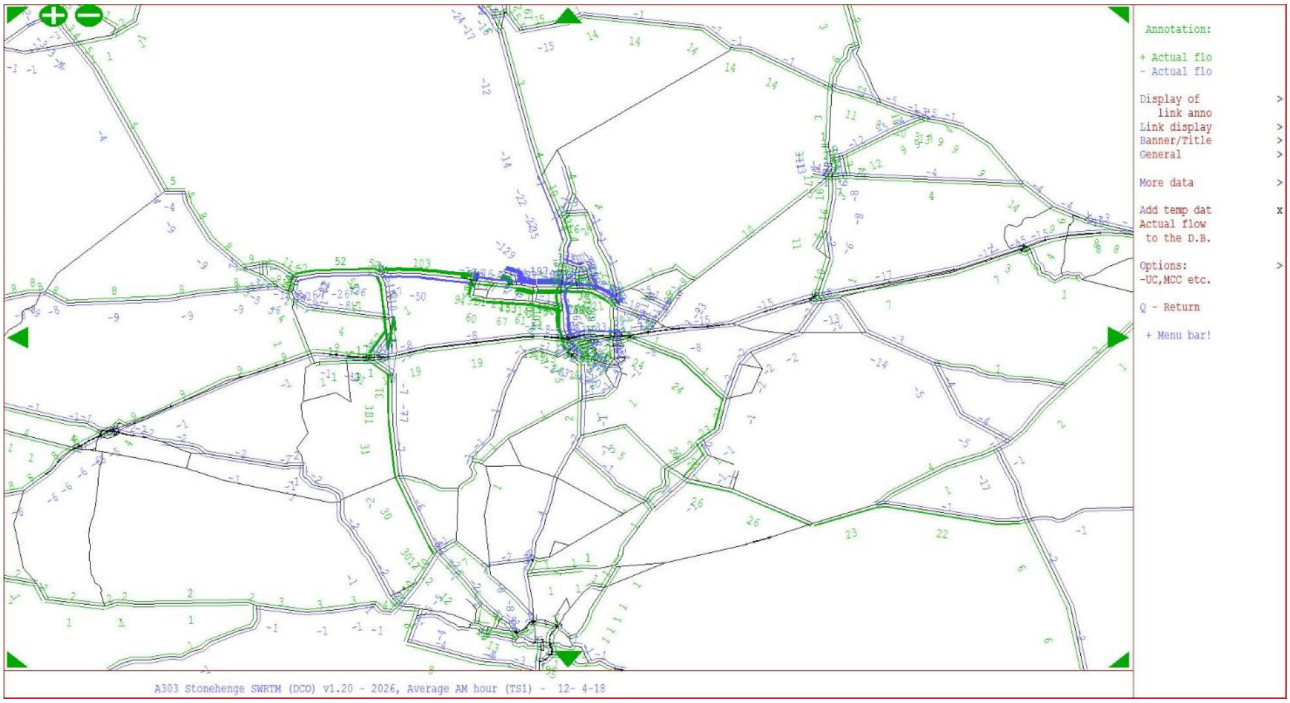


Figure A-8-3: Army Rebasing Programme sensitivity test – 2026 AM AoDM

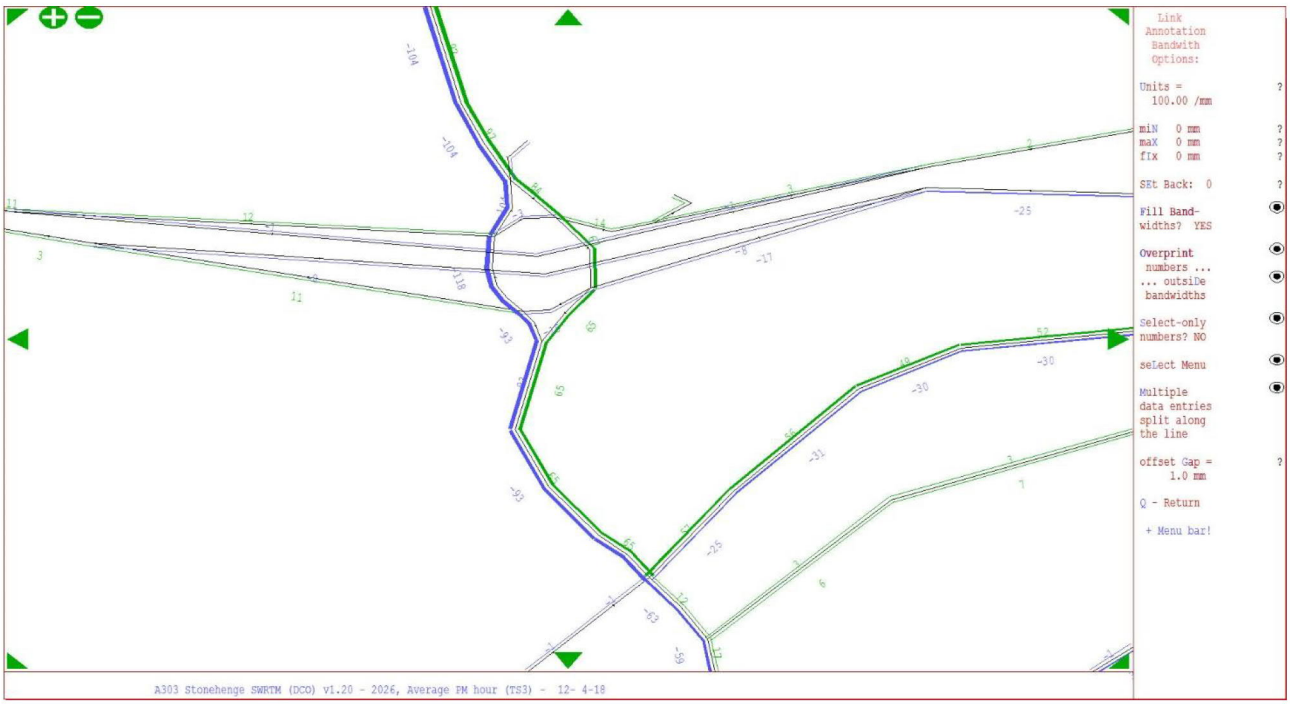


Figure A-8-4: Army Rebasing Programme sensitivity test – 2026 PM Countess roundabout

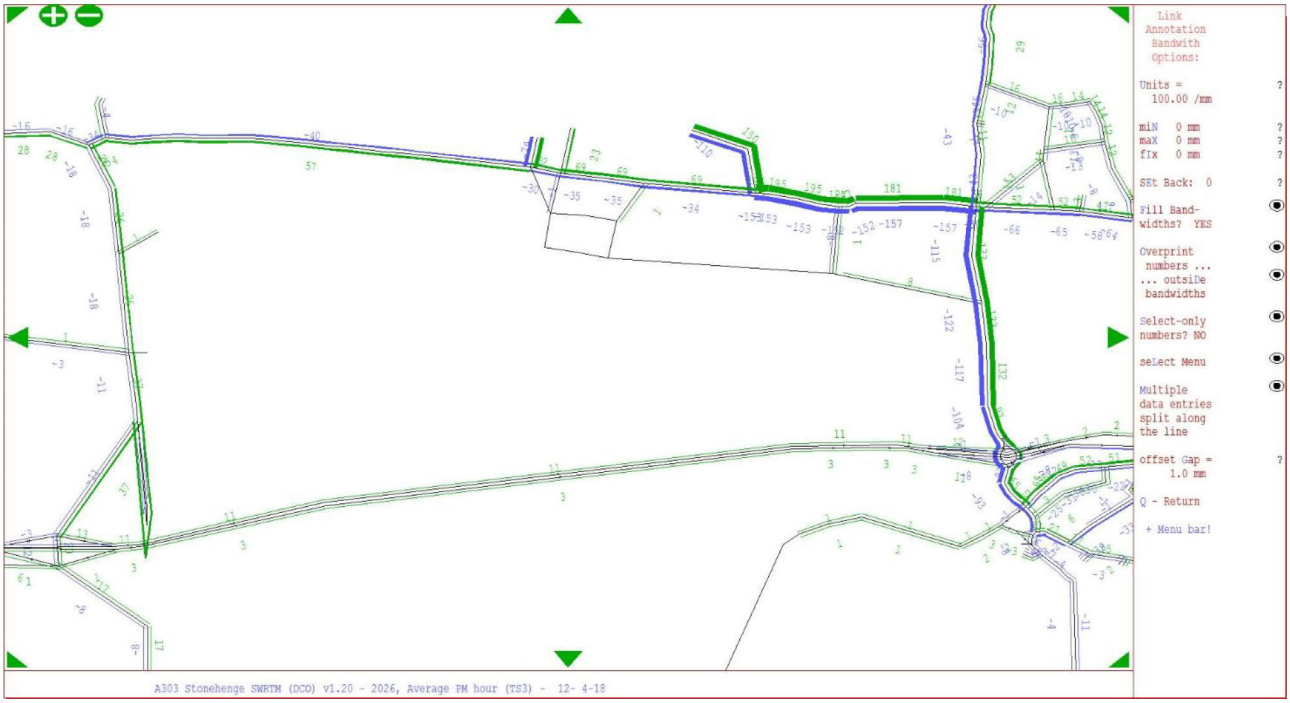


Figure A-8-5: Army Rebasing Programme sensitivity test – 2026 PM Larkhill

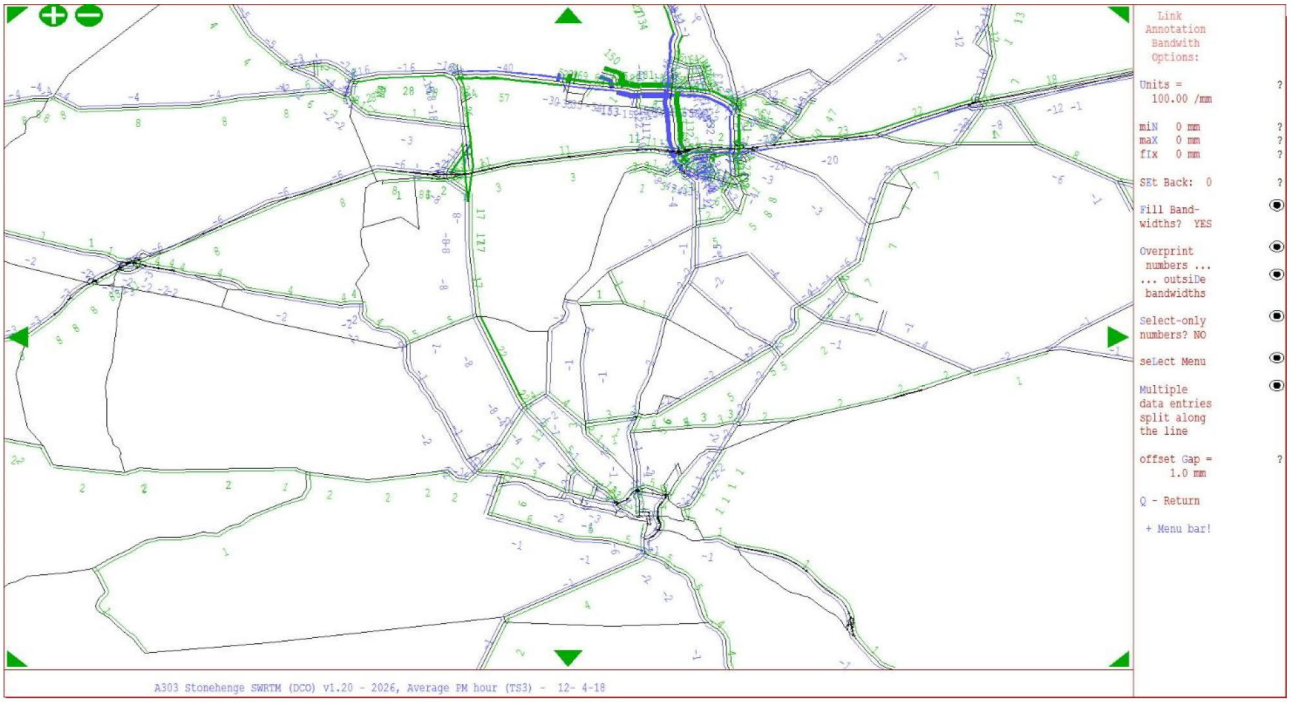


Figure A-8-6: Army Rebasing Programme sensitivity test – 2026 PM AoDM

G.1.1.5 Flow differences in the region of 150 to 200pcu are seen on the eastern section of The Packway in individual time periods, with flow differences in the region of 100pcu seen on Countess Road between Countess roundabout and The Packway. Over the day the changes are tidal, as would be expected and the net change on AADT is small.

G.1.1.6 The plots show that the changes in flows are limited to the study area and mostly within the areas of Larkhill and Durrington. There are some relatively large changes in flow at Countess roundabout although the larger impact looks more limited to south-north movements rather than affecting A303 particularly.

G.1.1.7 In conclusion, the sensitivity test flow differences on the A303 are minor and are unlikely to have a material impact on the A303 corridor. Two-way flows are similar and therefore will not have a material impact on the environmental assessment (which is based on two-way all day traffic flows).

Busy period matrix build correction

G.1.1.8 During the development of the busy day matrices the methodology was refined in order to apply accurate sector growth factors. An error had occurred in the development of the growth factors meaning that certain sector growth factors were incorrect. The models developed using the unrefined method had already been issued to the environment team.

G.1.1.9 The difference between the matrices once assigned is small as the error occurred on sectors away from the Area of Detailed Modelling. On the A303 mainline past Stonehenge the following differences in flow were noted.

Table A-8-4: Difference in flow between unrefined and refined matrix build at A303 Amesbury to Berwick Down

Scenario	Eastbound			Westbound		
	Flow in Unrefined Matrix Model	Flow in Refined Matrix Model	Difference in Flow	Flow in Unrefined Matrix Model	Flow in Refined Matrix Model	Difference in Flow
2026 without scheme	875	879	-4	943	950	-7
2026 with scheme	1,184	1,185	-1	1,764	1,774	-10
2041 without scheme	914	900	14	957	950	7
2041 with scheme	2,347	2,310	37	2,188	2,222	-34

A negative difference in flow equates to more flow in the refined matrix.
A positive difference in flow equates to less flow in the refined matrix.

G.1.1.10 The following screenshots show the magnitude of the error in the Area of Detailed Modelling against the correct matrix build. In all the following screenshots a green bandwidth indicates more flow in the refined methodology; a blue bandwidth indicates more flow in the unrefined methodology.

Figure A-8-7: Difference in flow between unrefined and refined matrix build – 2026 without scheme busy day

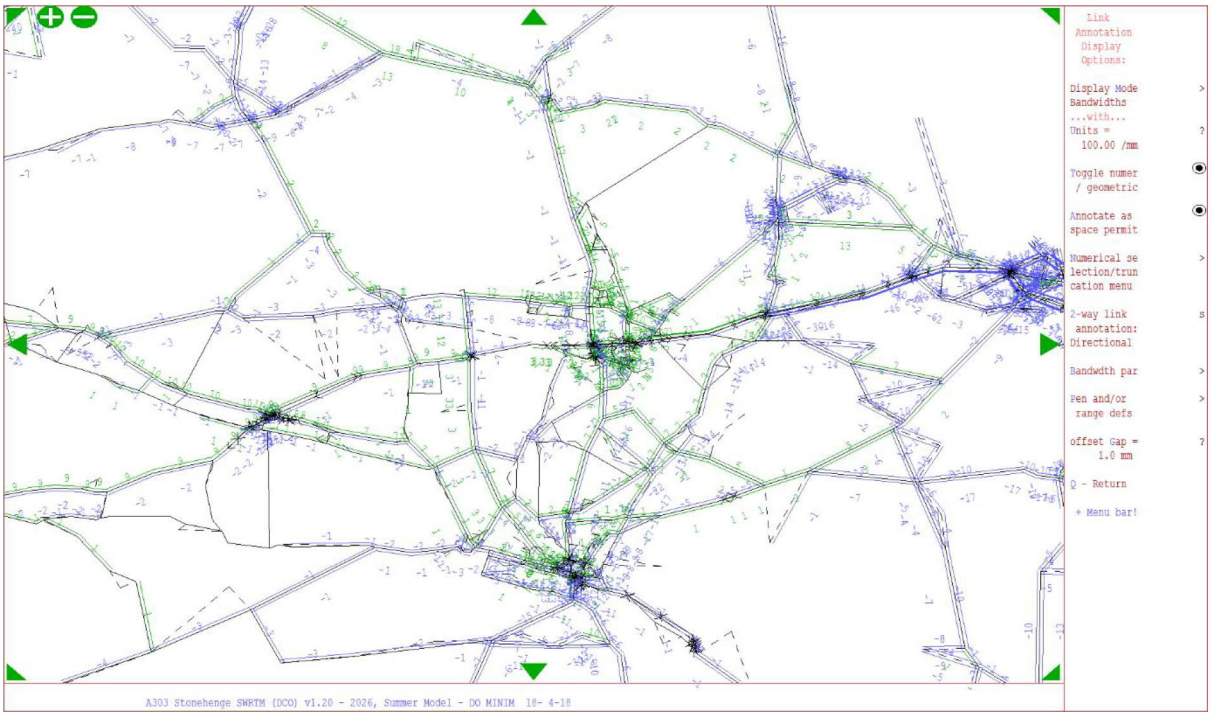


Figure A-8-8: Difference in flow between unrefined and refined matrix build – 2026 with scheme busy day

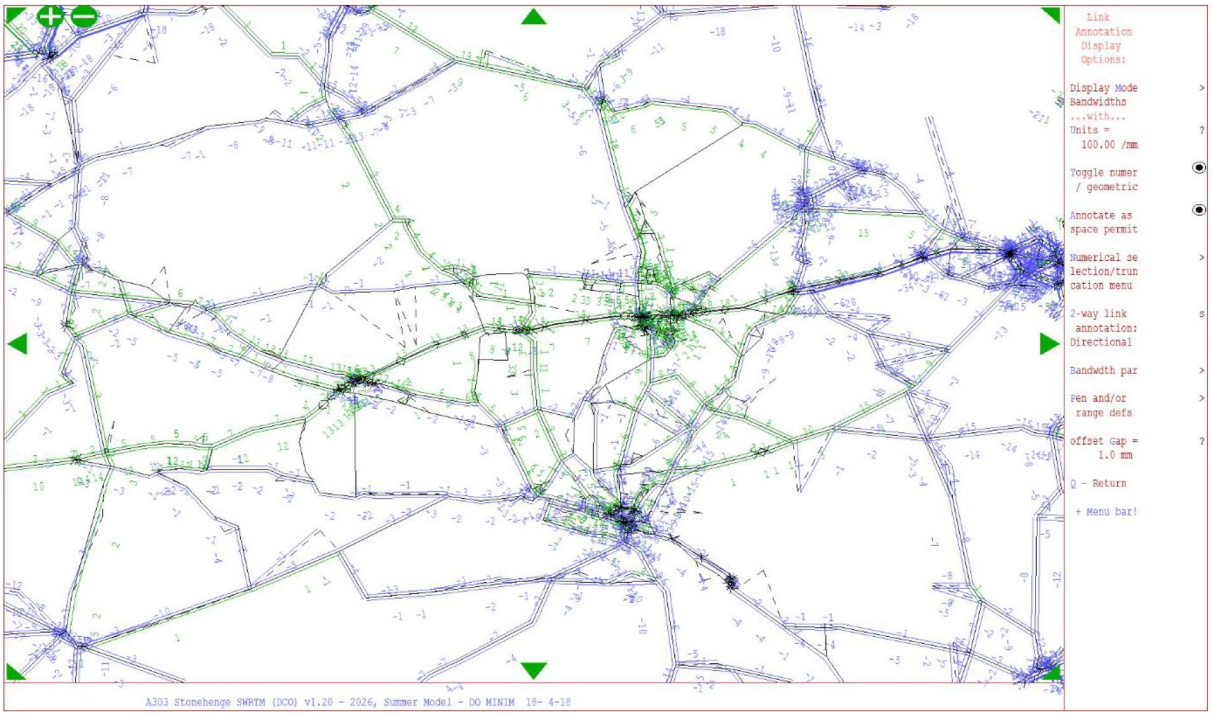


Figure A-8-9: Difference in flow between unrefined and refined matrix build – 2041 without scheme busy day

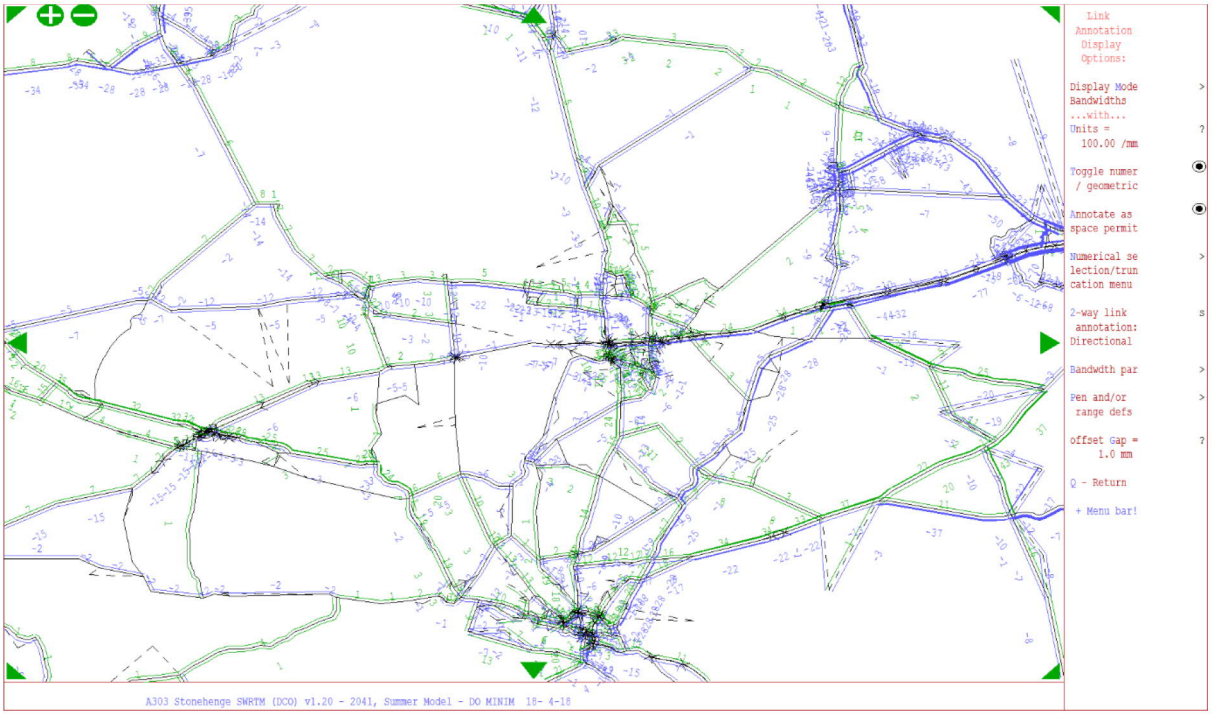
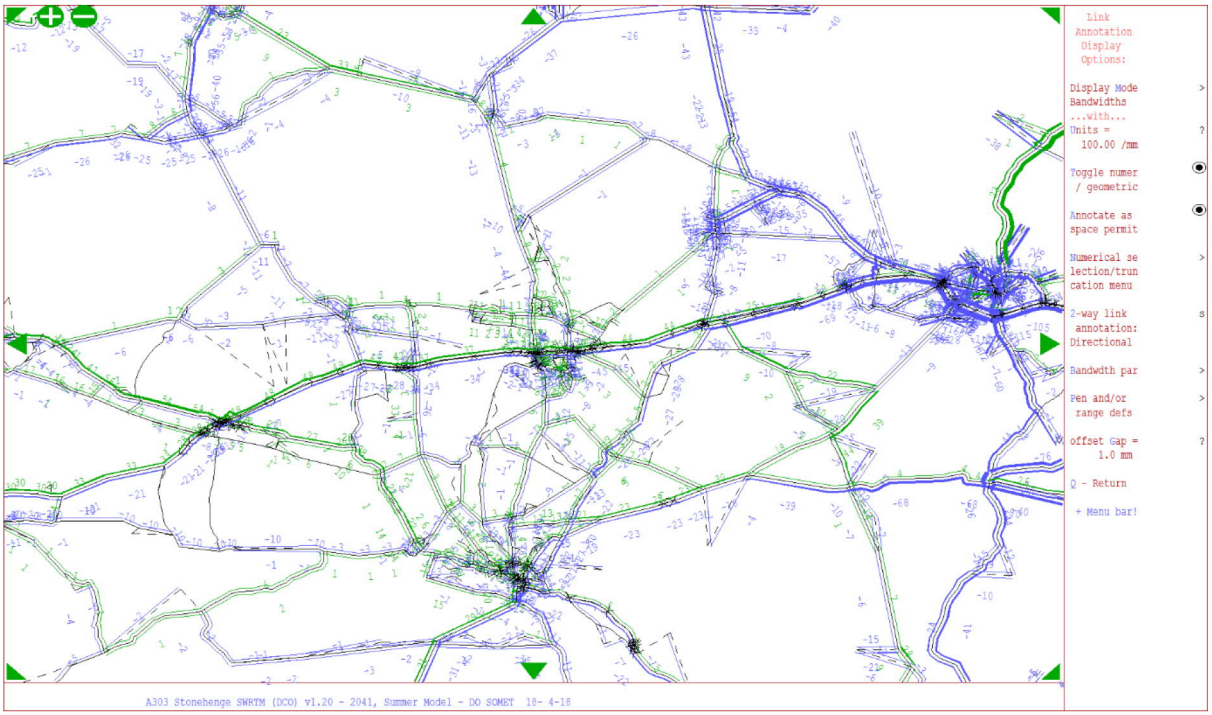


Figure A-8-10: Difference in flow between unrefined and refined matrix build – 2041 with scheme busy day



G.1.1.11 Table A-8-5 shows the differences in journey time on Route 11-1 (A34 to A36 Wylye) between the forecasts with the unrefined and refined matrices. The differences in journey time between the two forecasts are small.

Table A-8-5: Impact of sectoring error on journey time route 11-1

Matrix	Westbound			Eastbound		
	DM	DS	%	DM	DS	%
2026 Unrefined Matrix	00:43:32	00:28:59	-33.4%	00:42:20	00:29:02	-31.4%
2026 Refined Matrix	00:43:23	00:28:58	-33.2%	00:42:33	00:29:02	-31.8%
2041 Unrefined Matrix	00:51:19	00:31:47	-38.1%	00:48:37	00:30:35	-37.1%
2041 Refined Matrix	00:50:32	00:31:24	-37.9%	00:48:52	00:30:36	-37.4%

G.1.1.12 As the environment team analyse a smaller study area than the economics team, given the tight deadline requirements and proportion of the overall environment analysis which the time segment accounted for, it was decided that it would be disproportionate for the environment team to rerun their analysis upon the corrected models.

Appendix H Assignment model convergence – Core scenario

H.1 Do Minimum - Core

2026 Do Minimum Core (DMC)											
AM Peak			Interpeak			PM Peak			Busy period		
Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap
31	98.8	0.005	20	98.7	0.001	54	98.7	0.006	18	98.6	0.007
32	98.9	0.006	21	98.9	0.001	55	98.5	0.003	19	98.7	0.004
33	98.6	0.006	22	99.1	0.001	56	98.6	0.003	20	98.8	0.004
34	98.7	0.003	23	99.2	0.001	57	99.1	0.007	21	98.6	0.003

2031 Do Minimum Core (DMC)											
AM Peak			Interpeak			PM Peak			Busy period		
Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap
36	98.6	0.004	21	99	0.001	97	96.6	0.008	15	98.7	0.005
37	98.9	0.004	22	99	0.001	98	98	0.007	16	98.9	0.006
38	98.7	0.004	23	98.8	0.001	99	98.3	0.007	17	98.8	0.006
39	98.8	0.005	24	99.3	0.001	100	98.4	0.005	18	98.6	0.004

2041 Do Minimum Core (DMC)											
AM Peak			Interpeak			PM Peak			Busy period		
Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap
56	98.5	0.009	35	99	0.002	37	98.6	0.007	19	98.6	0.007
57	98.6	0.009	36	98.6	0.003	38	98.8	0.006	20	98.6	0.008
58	98.6	0.009	37	99.1	0.003	39	98.7	0.006	21	99.3	0.008
59	98.6	0.007	38	98.7	0.002	40	99	0.005	22	99.4	0.006

2051 Do Minimum Core (DMC)											
AM Peak			Interpeak			PM Peak			Busy period		
Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap
43	98.6	0.007	23	98.8	0.003	43	98.6	0.006	45	99	0.014
44	98.7	0.007	24	98.6	0.004	44	98.9	0.005	46	98.8	0.008
45	98.6	0.007	25	99	0.004	45	99.4	0.005	47	98.7	0.008
46	99.2	0.005	26	98.6	0.003	46	98.8	0.005	48	98.9	0.018

H.2 Do Something- Core

2026 Do Something Core (DSC)											
AM Peak			Interpeak			PM Peak			Busy period		
Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap
29	98.9	0.004	19	98.6	0.001	46	98.5	0.004	17	98.7	0.003
30	98.9	0.006	20	99	0.002	47	98.8	0.005	18	99.1	0.004
31	98.7	0.006	21	99	0.002	48	99	0.005	19	98.7	0.004
32	98.7	0.003	22	99.1	0.001	49	98.7	0.003	20	99	0.002

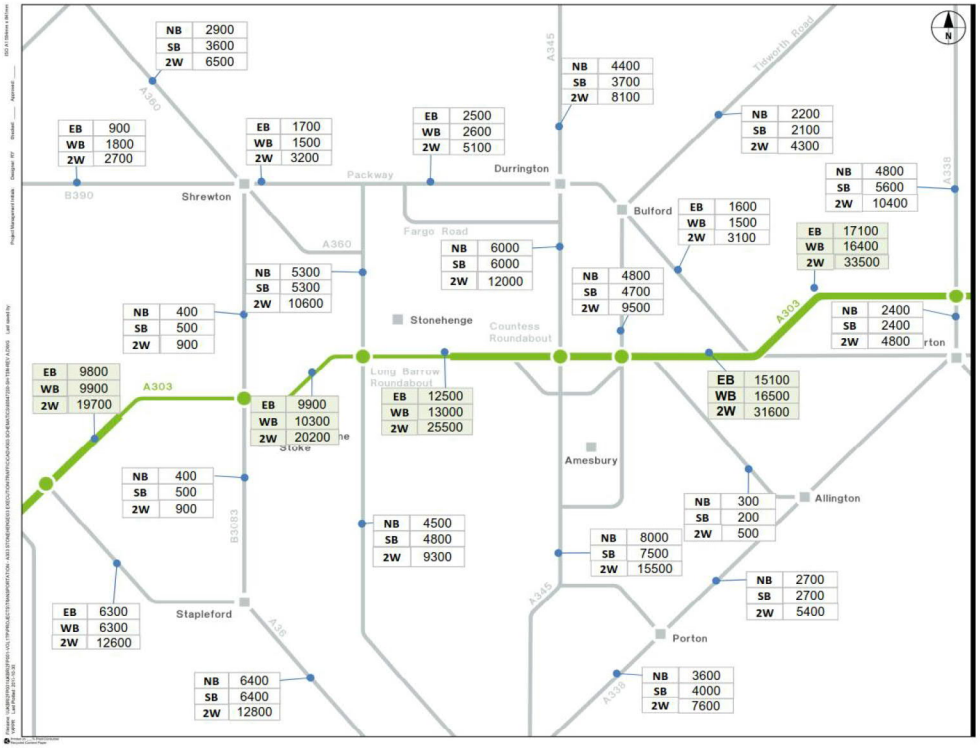
2031 Do Something Core (DSC)											
AM Peak			Interpeak			PM Peak			Busy period		
Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap
35	98.6	0.004	18	98.7	0.002	86	98.8	0.005	16	98.7	0.006
36	99	0.005	19	98.6	0.002	87	98.7	0.004	17	98.9	0.006
37	98.9	0.005	20	98.7	0.002	88	98.7	0.004	18	98.6	0.006
38	98.6	0.006	21	98.8	0.002	89	98.9	0.004	19	98.7	0.004

2041 Do Something Core (DSC)											
AM Peak			Interpeak			PM Peak			Busy period		
Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap
62	98.6	0.007	35	99.3	0.002	31	98.7	0.006	16	98.8	0.007
63	98.9	0.006	36	98.9	0.003	32	98.6	0.006	17	98.9	0.007
64	98.6	0.006	37	99.5	0.003	33	98.6	0.006	18	99.1	0.007
65	99.1	0.006	38	98.9	0.002	34	98.9	0.005	19	99.3	0.009

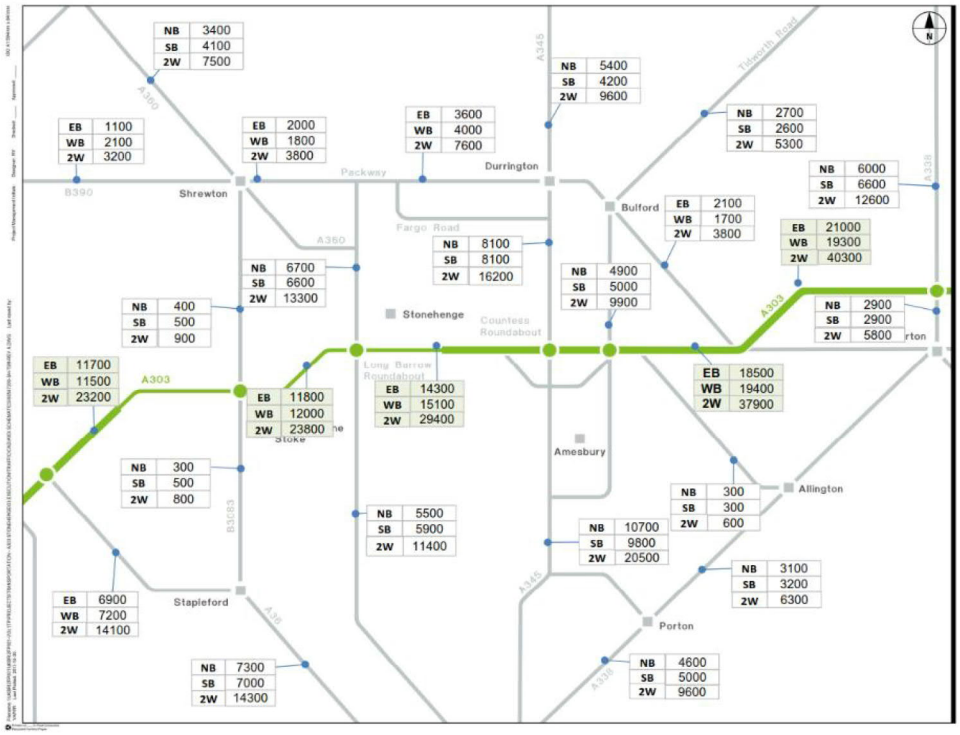
2051 Do Something Core (DSC)											
AM Peak			Interpeak			PM Peak			Busy period		
Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap
65	99.1	0.008	25	98.6	0.003	41	98.8	0.006	35	99.2	0.012
66	99.3	0.006	26	98.8	0.004	42	98.6	0.007	36	99	0.006
67	98.8	0.006	27	98.8	0.004	43	98.8	0.007	37	99.4	0.006
68	98.9	0.006	28	98.7	0.003	44	99	0.008	38	98.9	0.009

Appendix I AADT flow diagrams – Core scenario

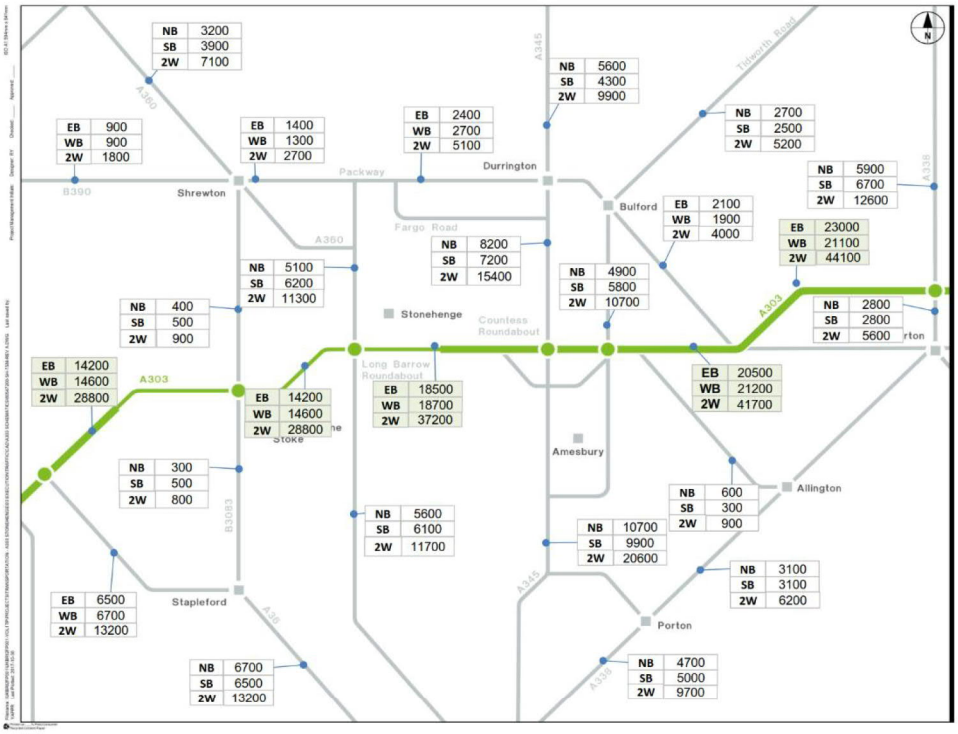
I.1 Annual Average Daily Traffic, Base 2017 (Vehicles)



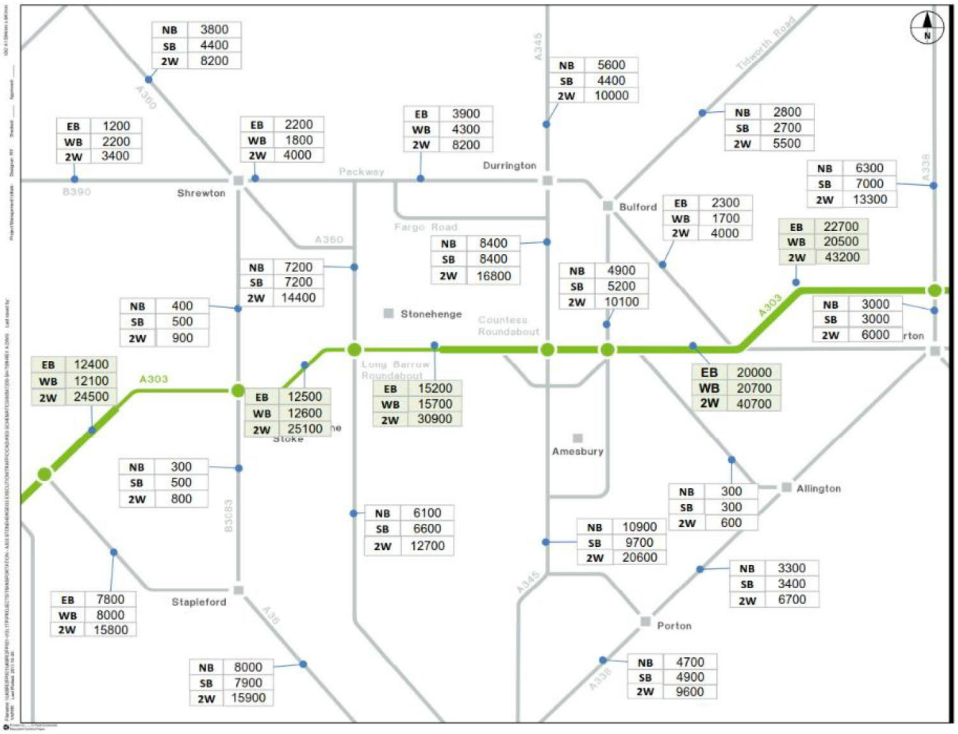
I.2 Annual Average Daily Traffic, Without Scheme 2026 (Vehicles)



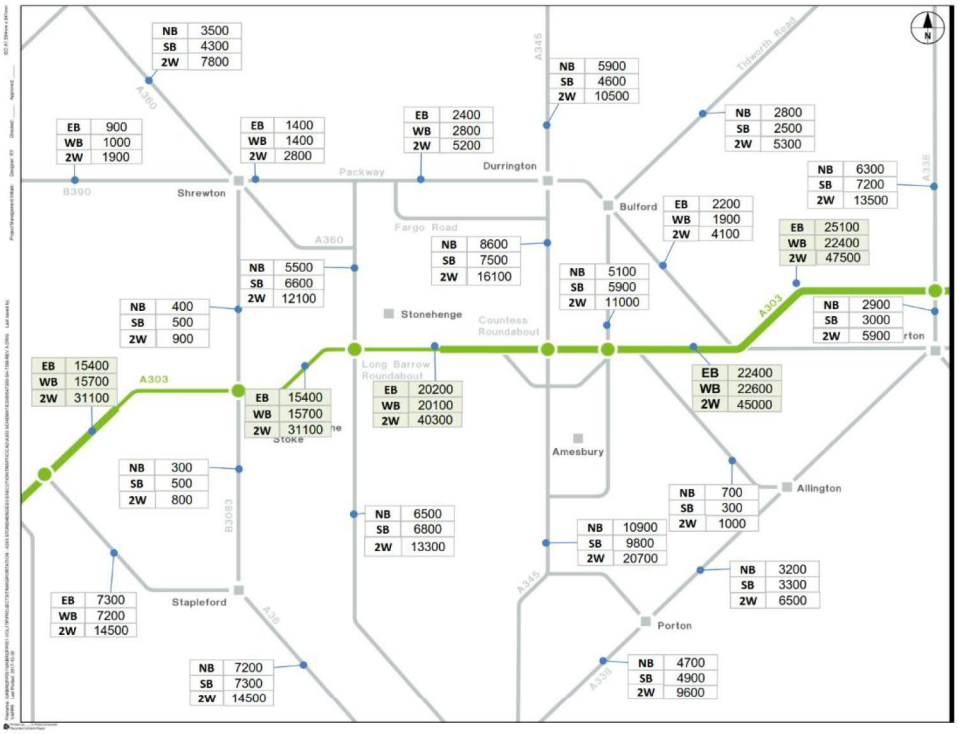
I.3 Annual Average Daily Traffic, With Scheme 2026 (Vehicles)



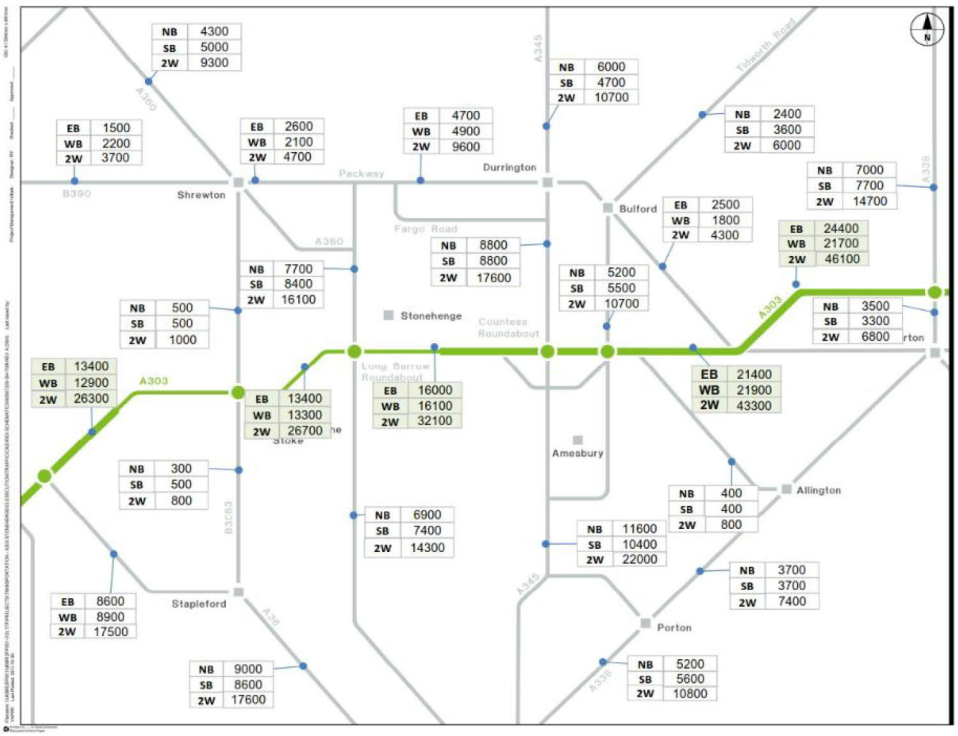
I.4 Annual Average Daily Traffic, Without Scheme 2031 (Vehicles)



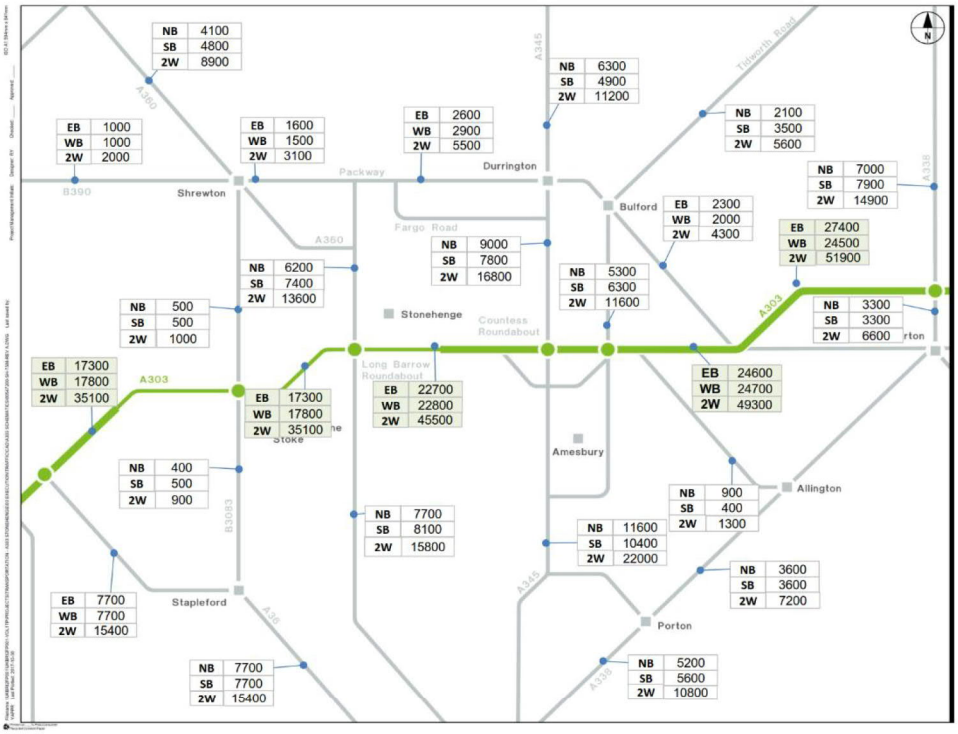
I.5 Annual Average Daily Traffic, With Scheme 2031 (Vehicles)



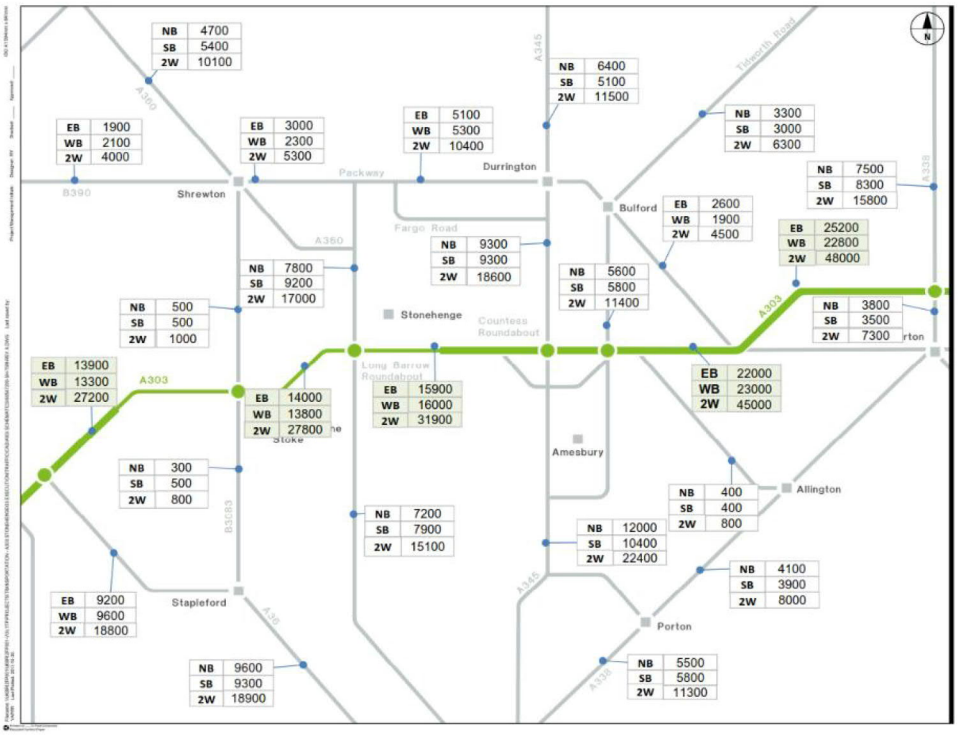
I.6 Annual Average Daily Traffic, Without Scheme 2041 (Vehicles)



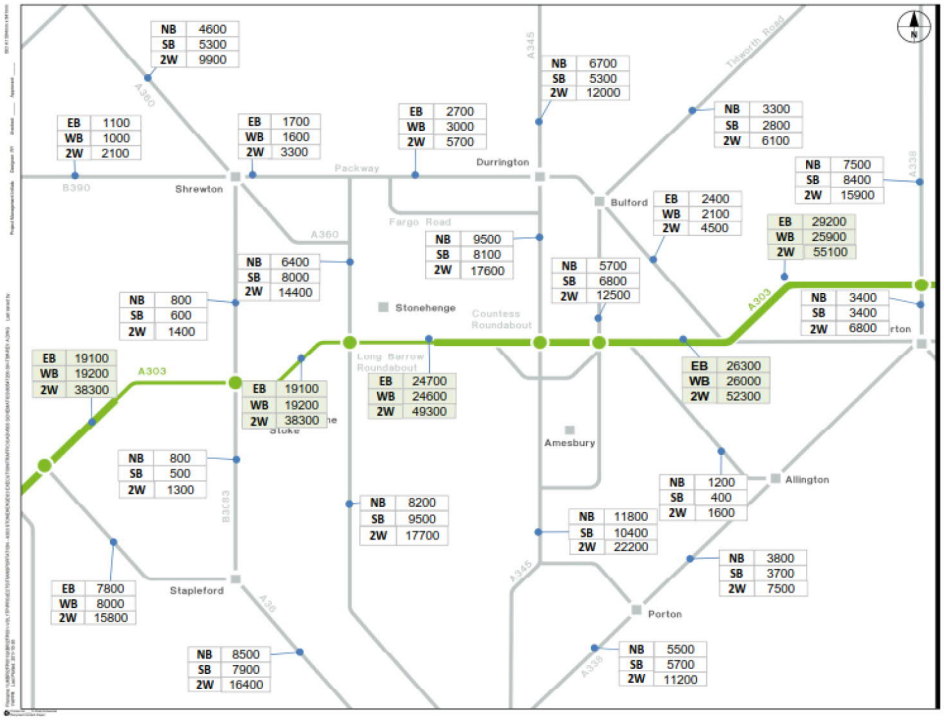
I.7 Annual Average Daily Traffic, With Scheme 2041 (Vehicles)



I.8 Annual Average Daily Traffic, Without Scheme 2051 (Vehicles)

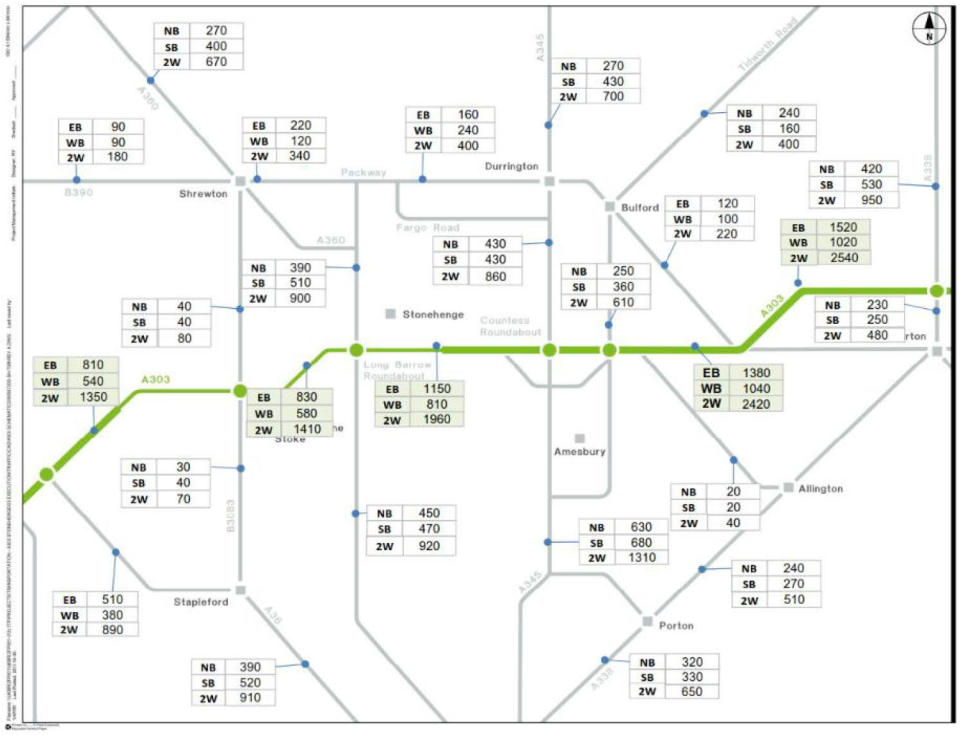


I.9 Annual Average Daily Traffic, With Scheme 2051 (Vehicles)

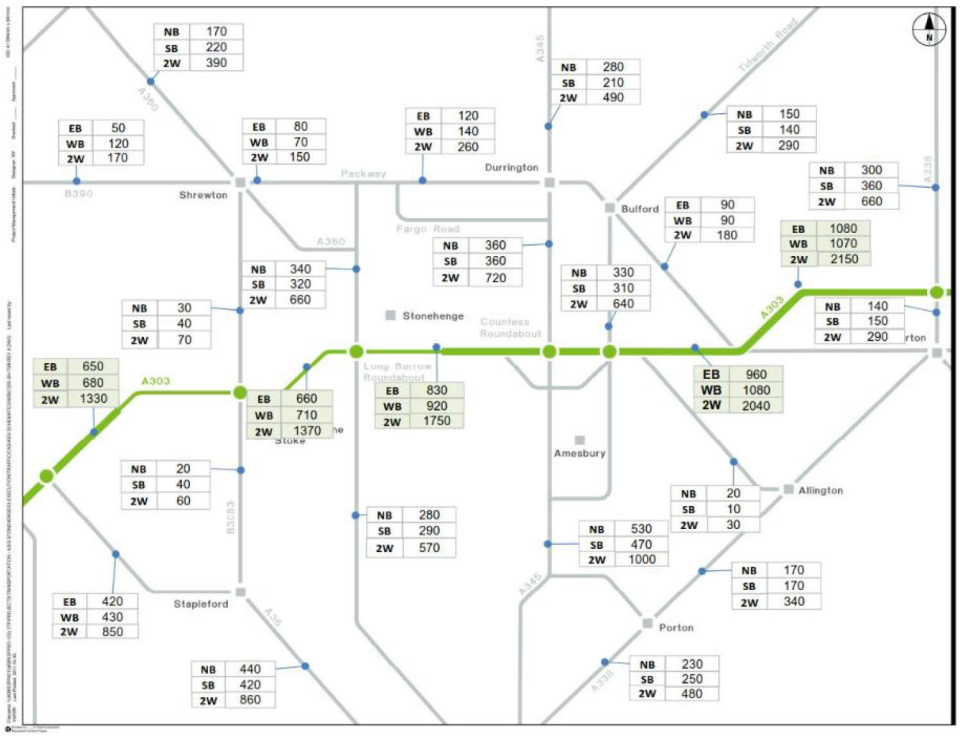


Appendix J Hourly flow diagrams – Core scenario

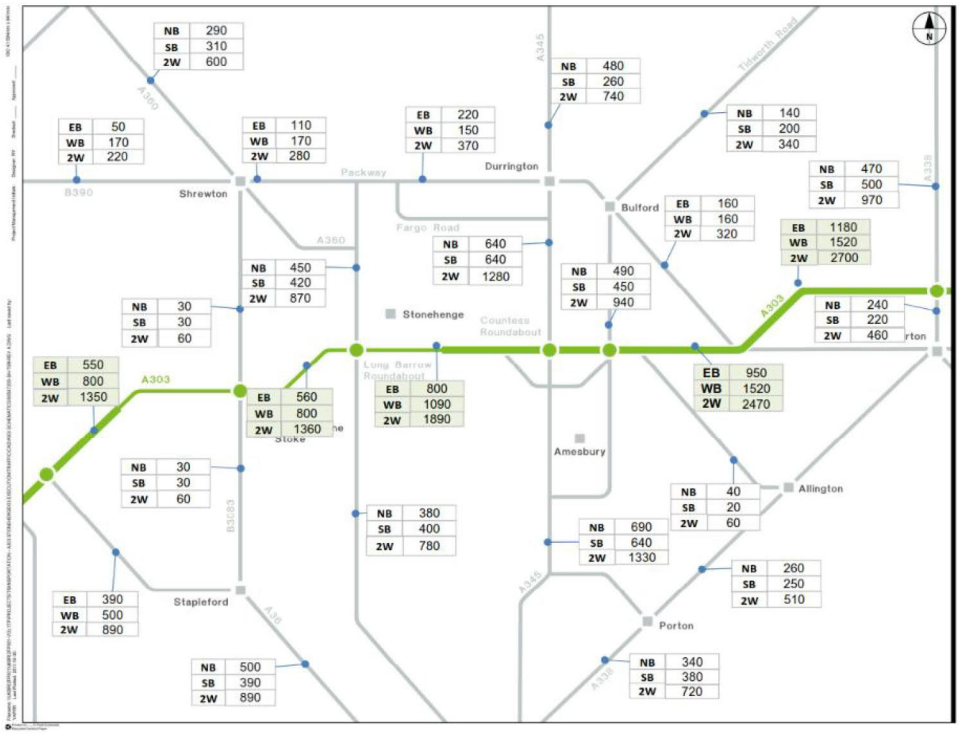
J.1 AM Peak Flows, Base 2017 (Vehicles)



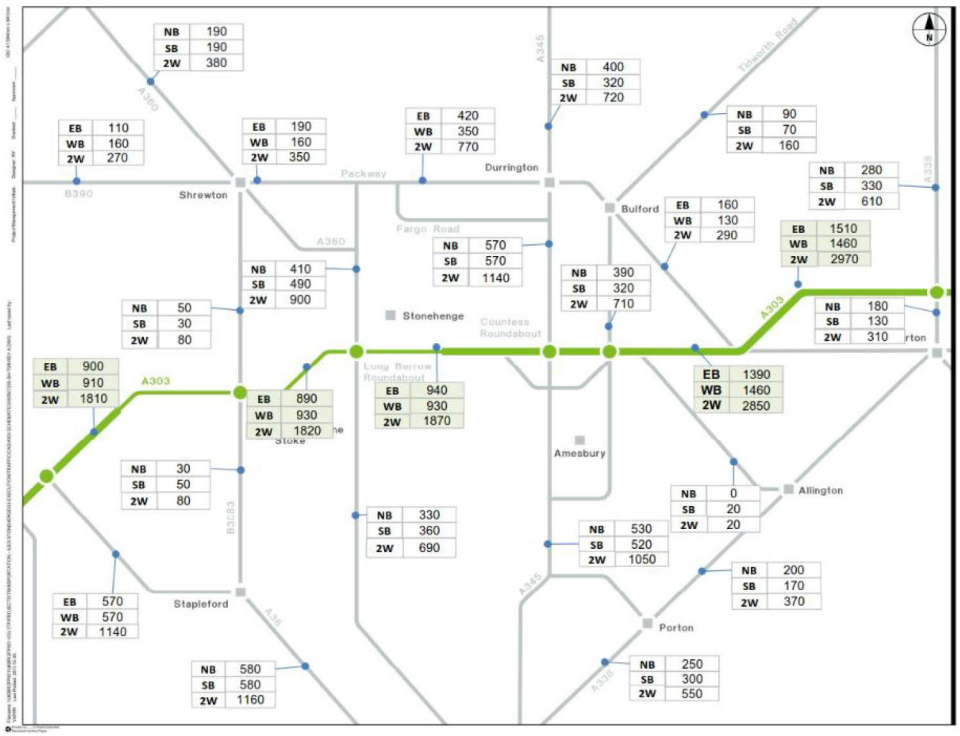
J.2 Interpeak Flows, Base 2017 (Vehicles)



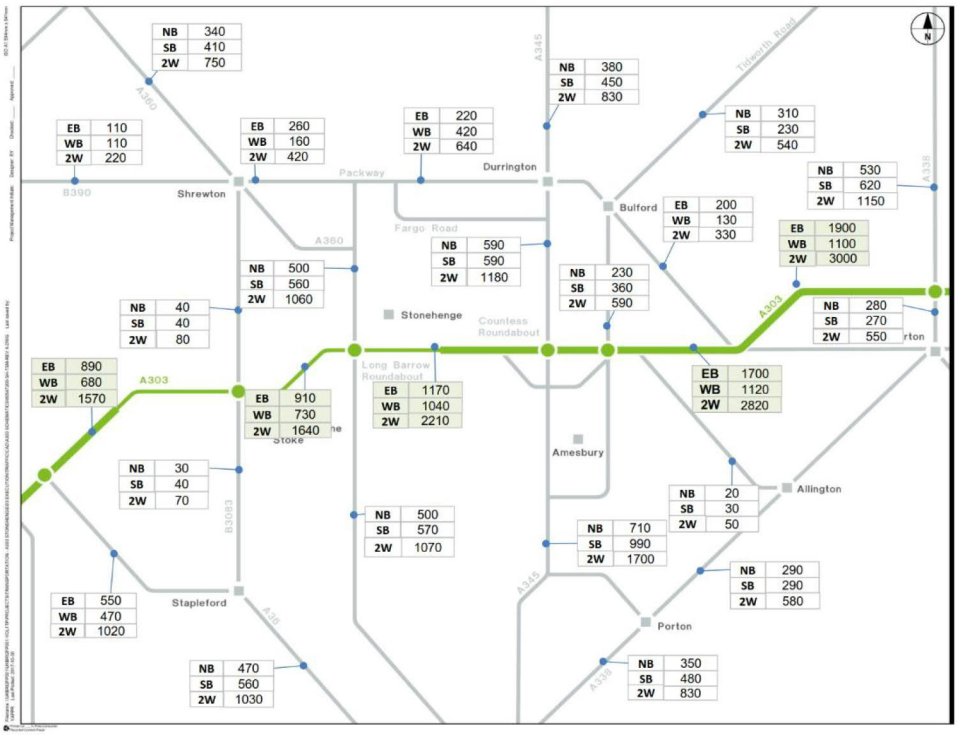
J.3 PM Peak Flows, Base 2017 (Vehicles)



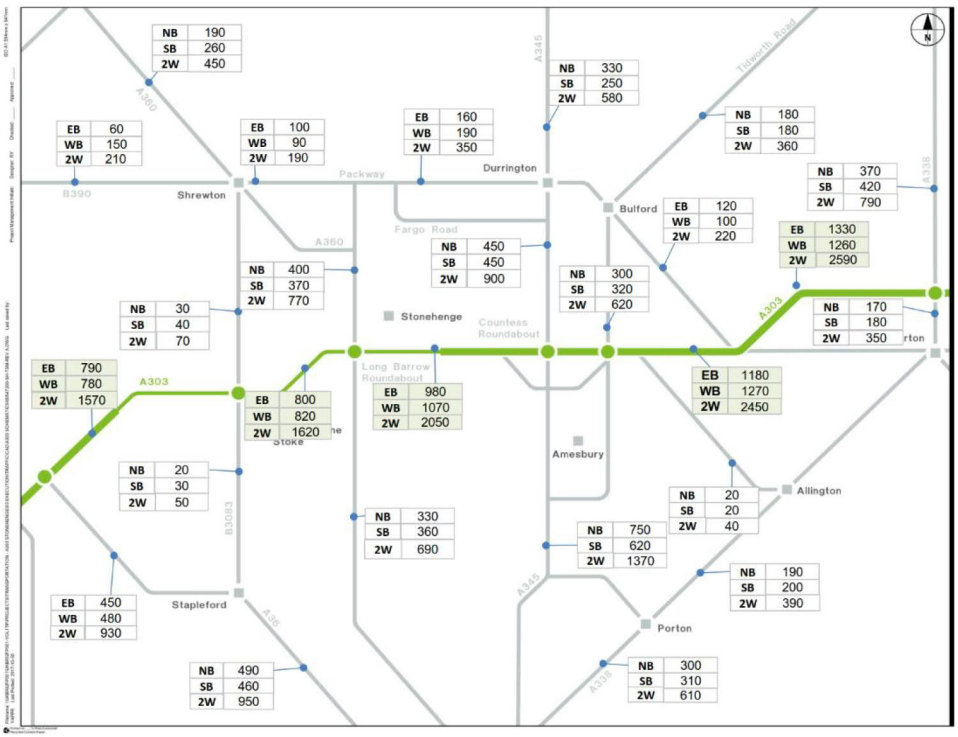
J.4 Busy Period Flows, Base 2017 (Vehicles)



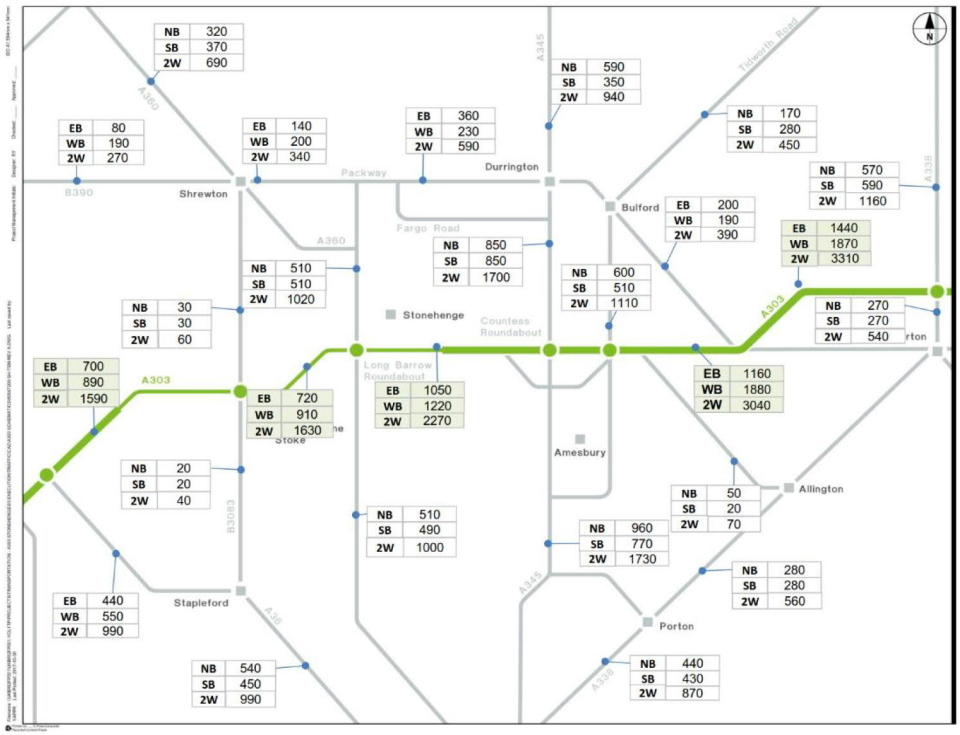
J.5 AM Peak Flows, Without Scheme 2026 (Vehicles)



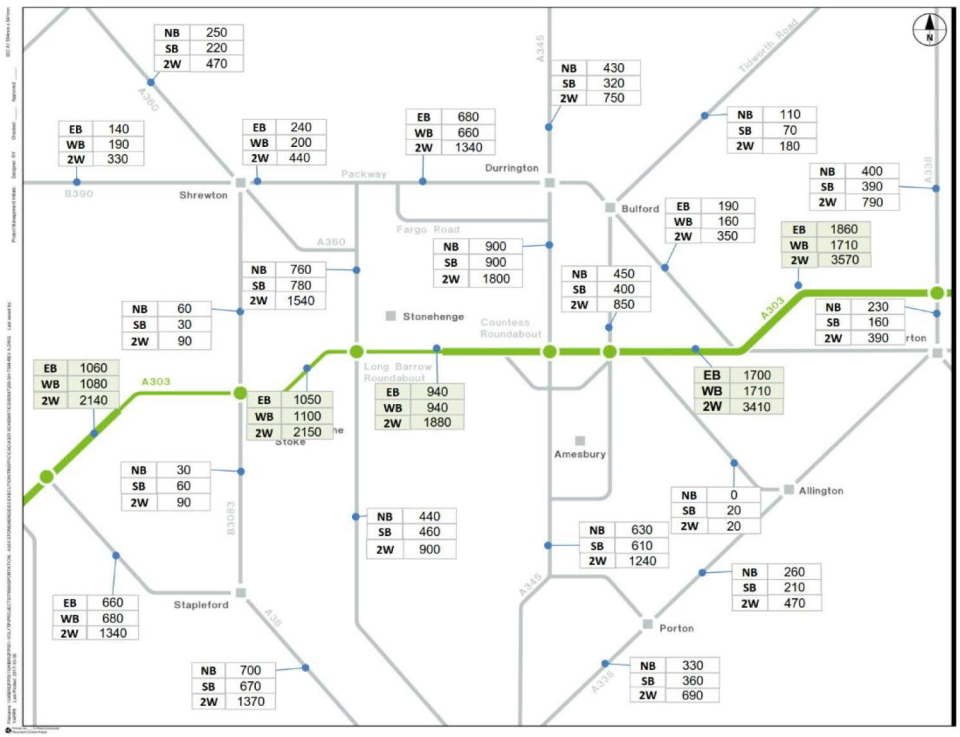
J.6 Interpeak Flows, Without Scheme 2026 (Vehicles)



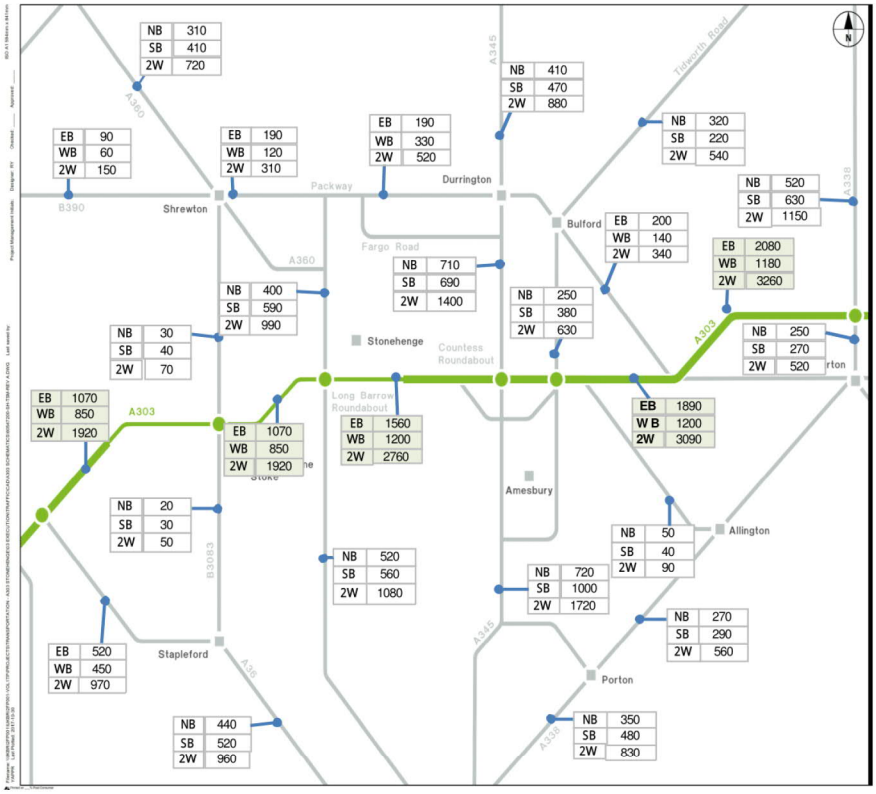
J.7 PM Peak Flows, Without Scheme 2026 (Vehicles)



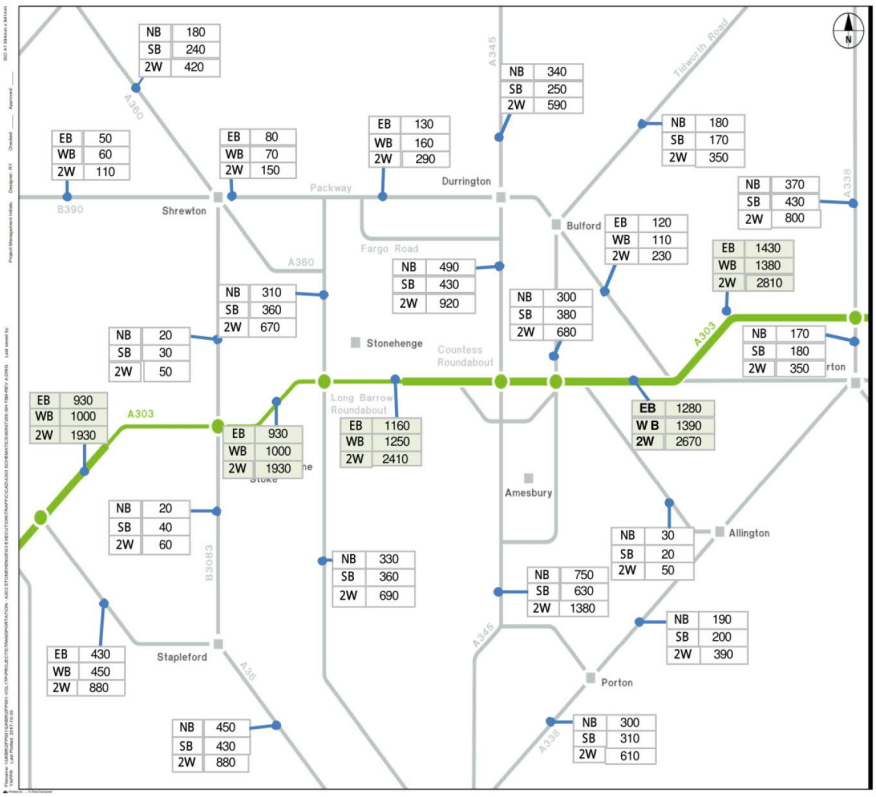
J.8 Busy Period Flows, Without Scheme 2026 (Vehicles)



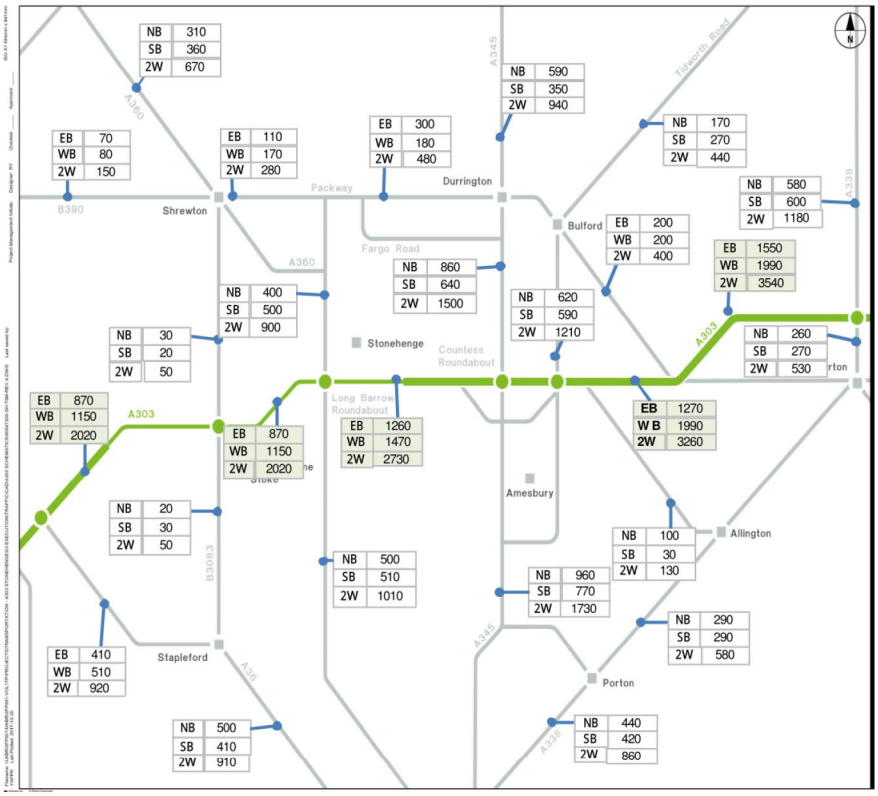
J.9 AM Peak Flows, With Scheme 2026 (Vehicles)



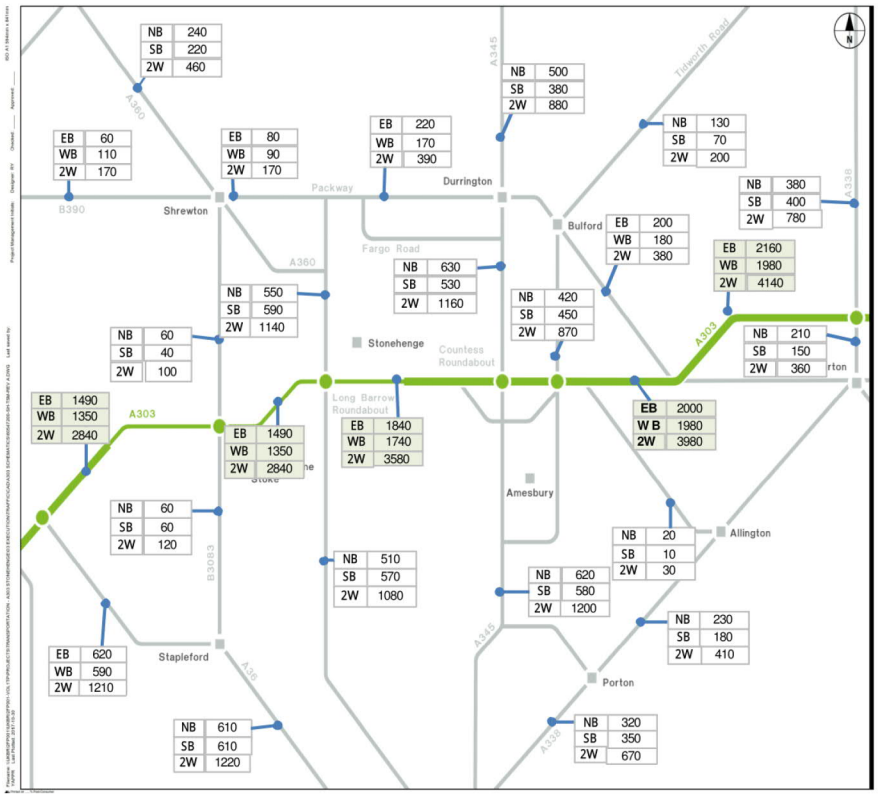
J.10 Interpeak Flows, With Scheme 2026 (Vehicles)



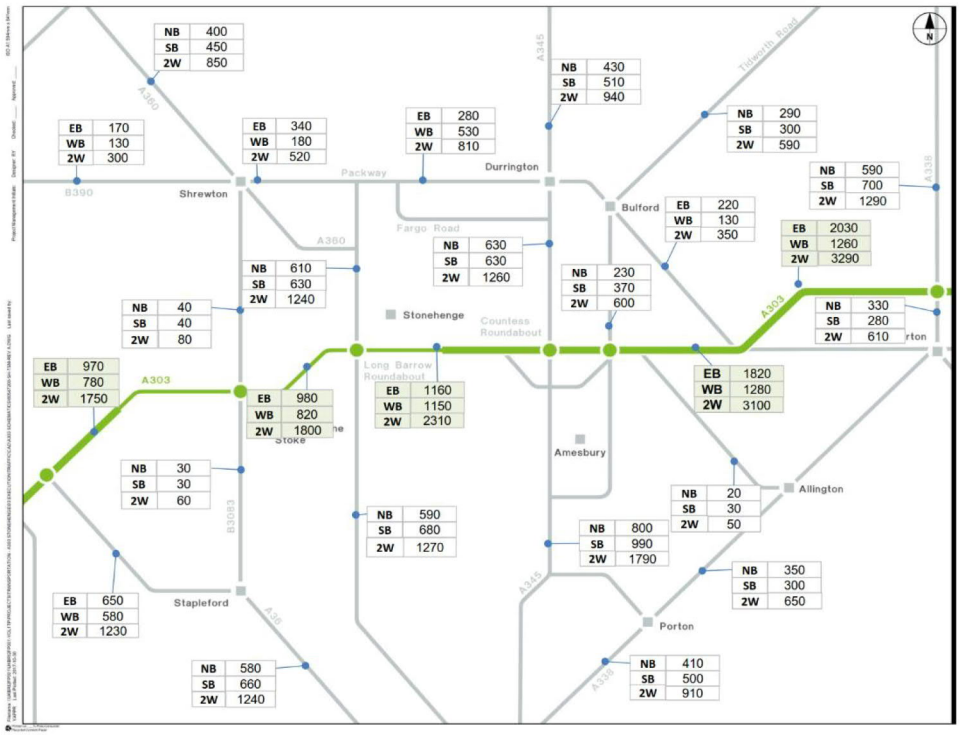
J.11 PM Peak Flows, With Scheme 2026 (Vehicles)



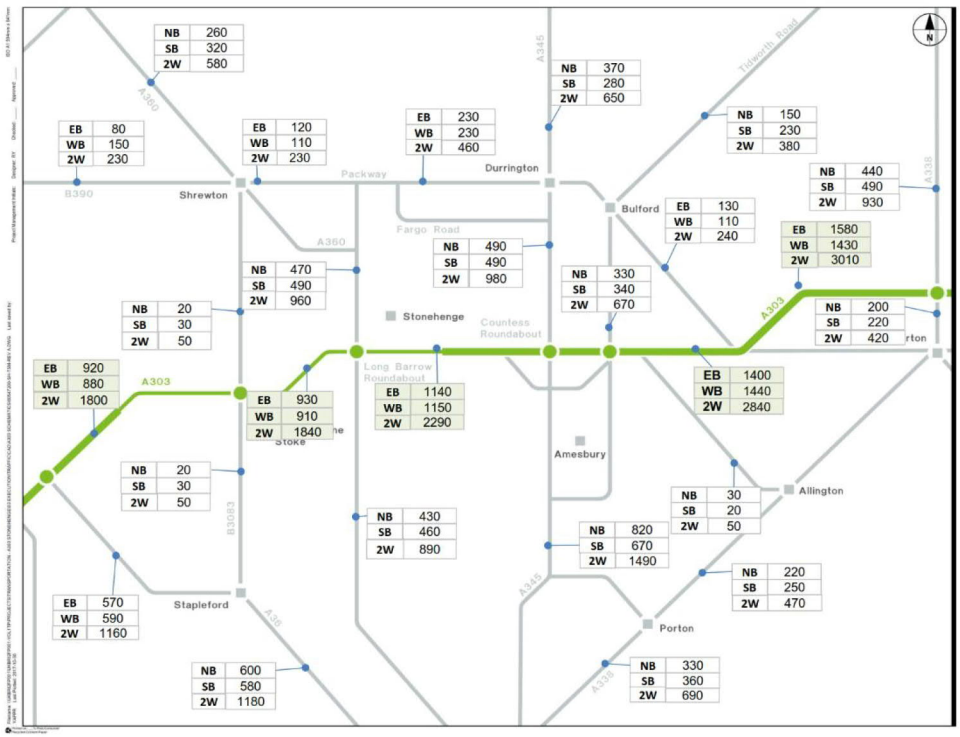
J.12 Busy Period Flows, With Scheme 2026 (Vehicles)



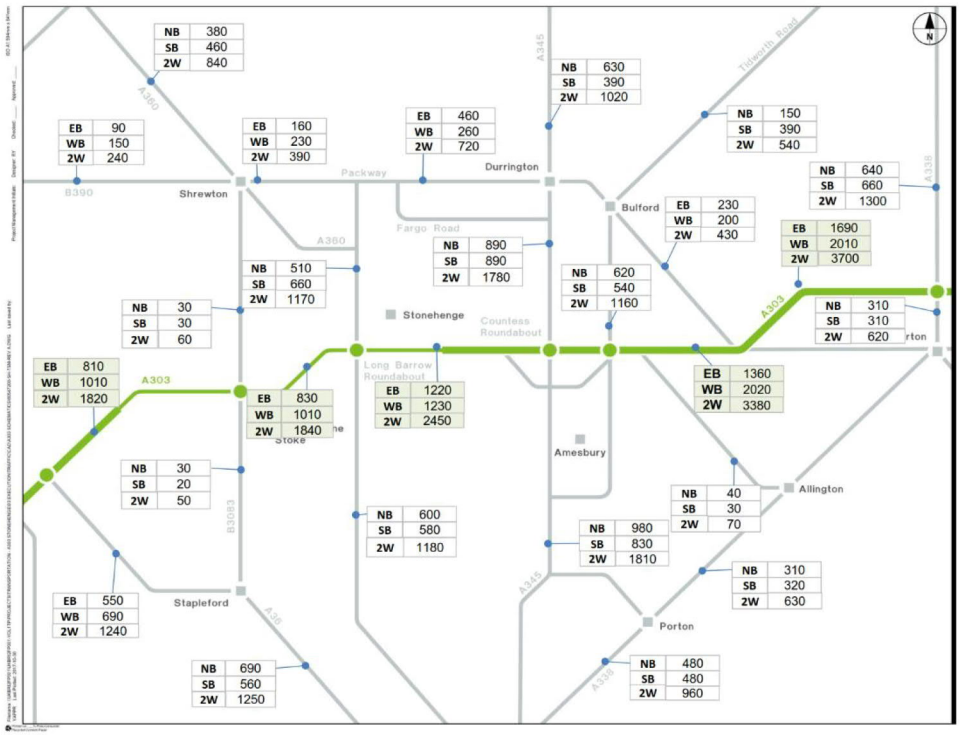
J.13 AM Peak Flows, Without Scheme 2041 (Vehicles)



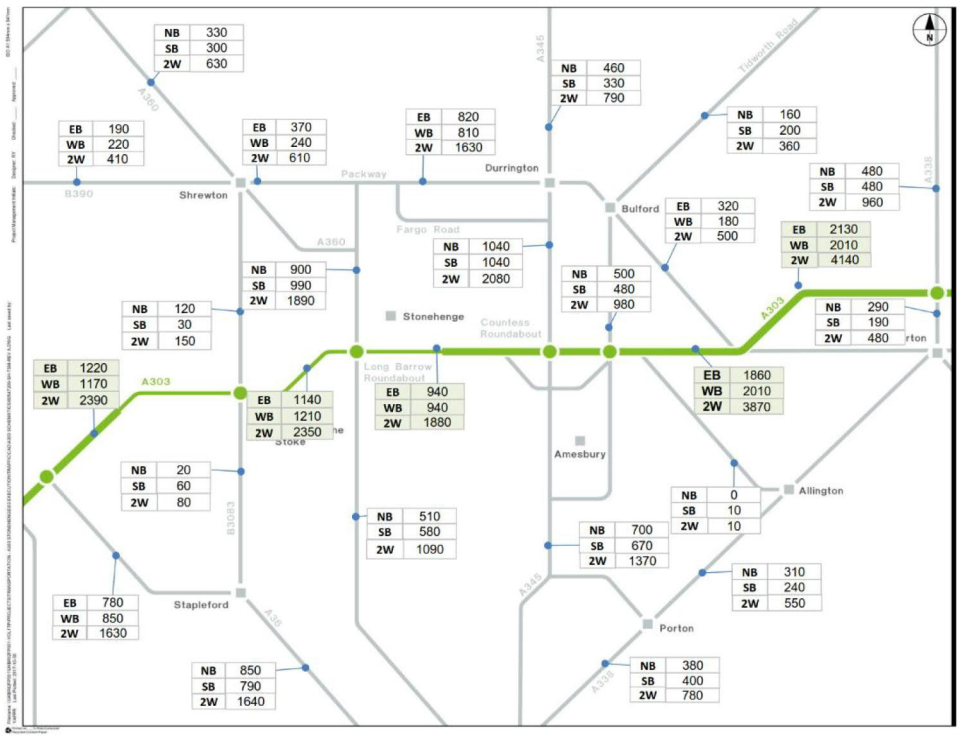
J.14 Interpeak Flows, Without Scheme 2041 (Vehicles)



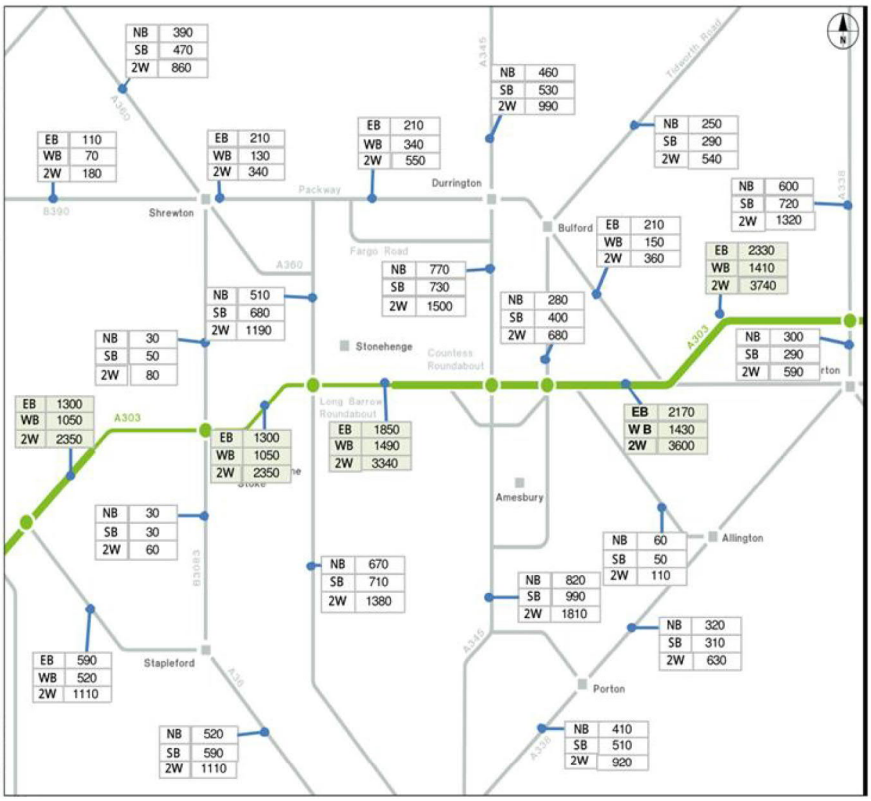
J.15 PM Peak Flows, Without Scheme 2041 (Vehicles)



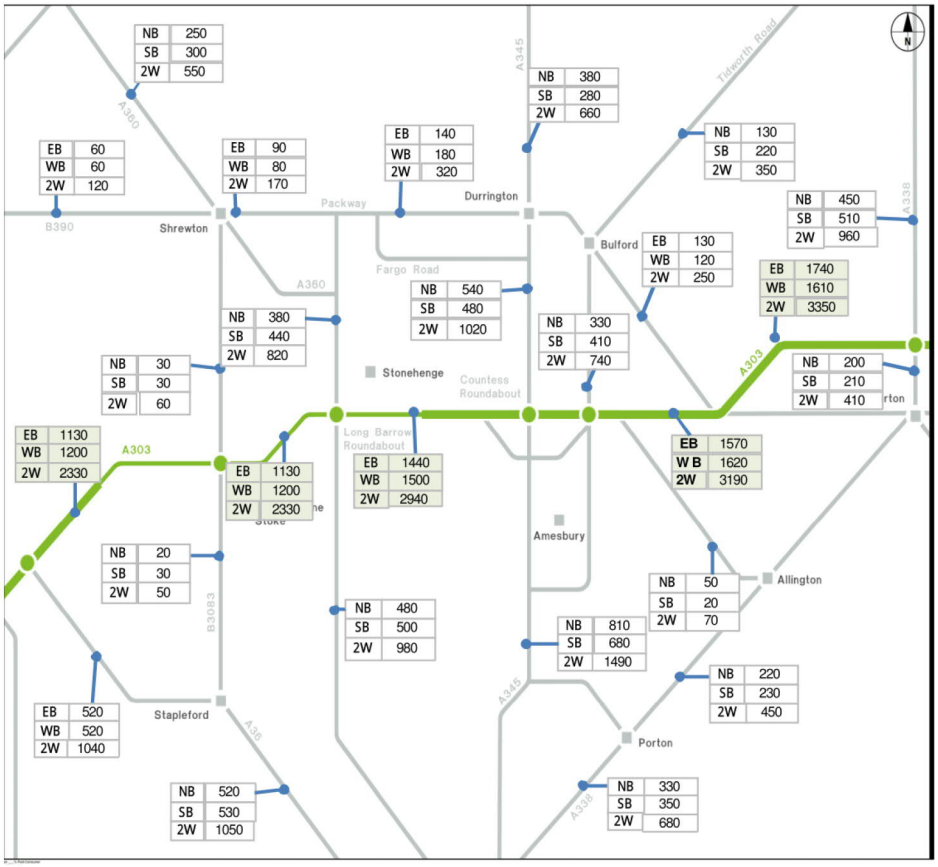
J.16 Busy Period Flows, Without Scheme 2041 (Vehicles)



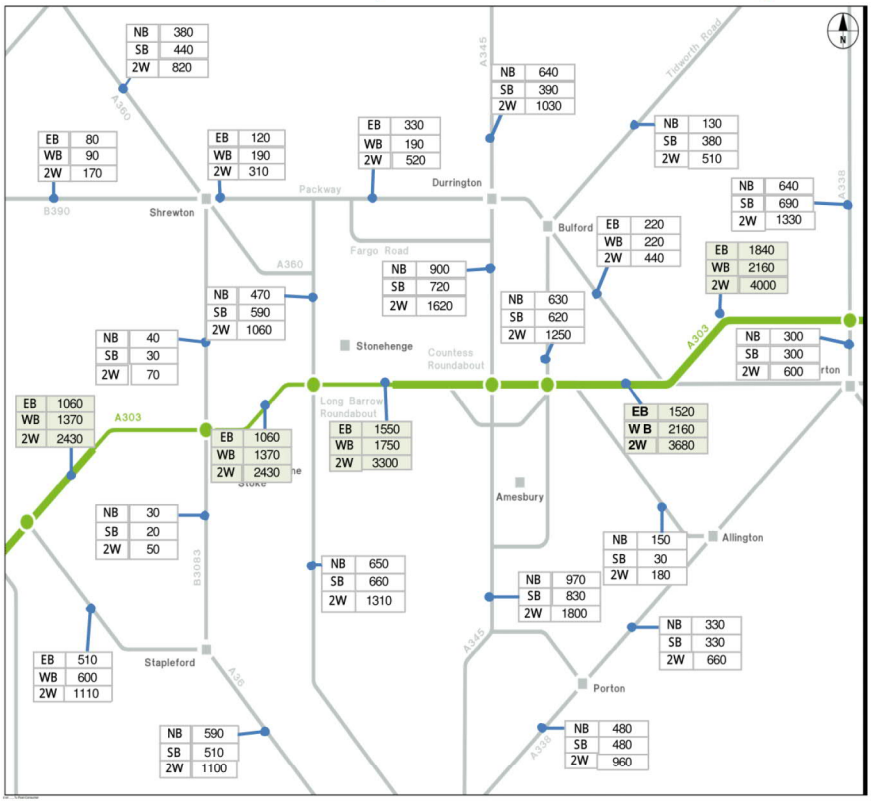
J.17 AM Peak Flows, With Scheme 2041 (Vehicles)



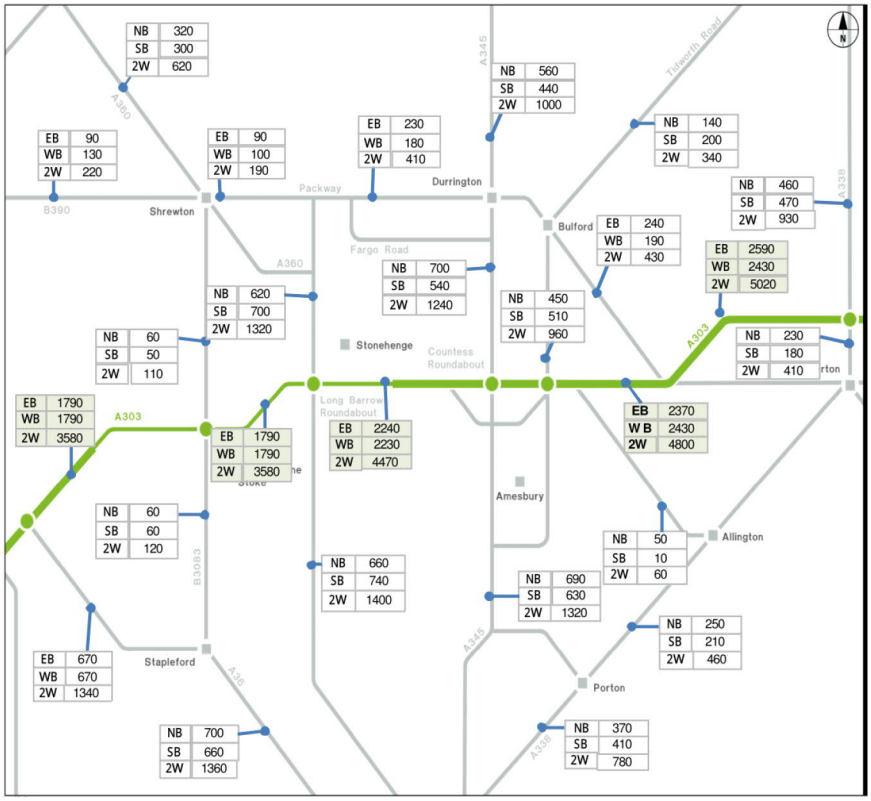
J.18 Interpeak Flows, With Scheme 2041 (Vehicles)



J.19 PM Peak Flows, With Scheme 2041 (Vehicles)



J.20 Busy Period Flows, With Scheme 2041 (Vehicles)



Appendix K Journey times – Core scenario

K.1 Core 2026

Route	Direction	Distance (Km)	AM				IP				PM				Busy Period			
			Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference
1	WB	270.5	02:45:08	02:45:07	-00:00:01	0%	02:44:40	02:44:33	-00:00:07	0%	03:01:34	03:01:26	-00:00:08	0%	02:53:51	02:53:10	-00:00:41	0%
	EB	282.4	02:53:35	02:53:19	-00:00:16	0%	02:44:05	02:43:53	-00:00:12	0%	02:53:39	02:53:19	-00:00:20	0%	02:53:29	02:52:23	-00:01:06	-1%
2	WB	239.1	02:39:18	02:36:31	-00:02:47	-2%	02:40:42	02:38:28	-00:02:14	-1%	02:48:57	02:46:40	-00:02:17	-1%	03:04:29	02:55:58	-00:08:31	-5%
	EB	238.7	02:39:33	02:35:54	-00:03:39	-2%	02:35:20	02:32:59	-00:02:21	-2%	02:37:48	02:35:34	-00:02:14	-1%	02:52:51	02:42:52	-00:09:59	-6%
3	WB	242.8	03:22:50	03:22:52	00:00:02	0%	03:20:31	03:20:34	00:00:03	0%	03:31:27	03:31:29	00:00:02	0%	03:27:07	03:27:31	00:00:24	0%
	EB	242.7	03:22:35	03:22:42	00:00:07	0%	03:17:07	03:17:19	00:00:12	0%	03:25:35	03:25:45	00:00:10	0%	03:20:45	03:21:09	00:00:24	0%
4	WB	256.2	03:08:25	03:08:25	00:00:00	0%	03:06:05	03:06:05	00:00:00	0%	03:16:30	03:16:33	00:00:03	0%	03:16:29	03:17:04	00:00:35	0%
	EB	256.0	03:10:53	03:10:51	-00:00:02	0%	03:00:11	03:00:12	00:00:01	0%	03:03:32	03:03:35	00:00:03	0%	03:13:47	03:13:11	-00:00:36	0%
5	WB	40.2	00:32:25	00:32:40	00:00:15	1%	00:32:29	00:32:42	00:00:13	1%	00:32:49	00:33:11	00:00:22	1%	00:33:01	00:33:14	00:00:13	1%
	EB	40.2	00:33:26	00:33:38	00:00:12	1%	00:32:27	00:32:33	00:00:06	0%	00:32:18	00:32:25	00:00:07	0%	00:33:17	00:33:36	00:00:19	1%
6	WB	26.5	00:26:14	00:26:08	-00:00:06	0%	00:25:26	00:25:17	-00:00:09	-1%	00:26:45	00:26:25	-00:00:20	-1%	00:27:48	00:25:43	-00:02:05	-7%
	EB	26.5	00:26:21	00:26:11	-00:00:10	-1%	00:25:02	00:25:15	00:00:13	1%	00:25:36	00:25:47	00:00:11	1%	00:27:37	00:25:22	-00:02:15	-8%
7	WB	41.1	00:34:50	00:34:51	00:00:01	0%	00:34:44	00:34:43	-00:00:01	0%	00:35:13	00:35:14	00:00:01	0%	00:34:58	00:34:55	-00:00:03	0%
	EB	41.2	00:36:43	00:36:35	-00:00:08	0%	00:35:12	00:35:10	-00:00:02	0%	00:35:39	00:35:37	-00:00:02	0%	00:35:38	00:35:32	-00:00:06	0%
8	NB	38.6	00:37:32	00:37:57	00:00:25	1%	00:36:20	00:36:47	00:00:27	1%	00:37:32	00:37:56	00:00:24	1%	00:36:49	00:37:22	00:00:33	1%
	SB	38.6	00:38:06	00:38:40	00:00:34	1%	00:36:43	00:37:09	00:00:26	1%	00:37:52	00:38:26	00:00:34	1%	00:37:01	00:37:39	00:00:38	2%
9	NB	25.7	00:27:54	00:27:35	-00:00:19	-1%	00:27:25	00:27:23	-00:00:02	0%	00:29:52	00:29:53	00:00:01	0%	00:27:37	00:27:09	-00:00:28	-2%
	SB	25.7	00:30:53	00:30:33	-00:00:20	-1%	00:28:11	00:28:17	00:00:06	0%	00:29:15	00:29:22	00:00:07	0%	00:29:18	00:28:31	-00:00:47	-3%
10	NB	23.6	00:24:26	00:24:24	-00:00:02	0%	00:23:38	00:23:39	00:00:01	0%	00:24:37	00:24:40	00:00:03	0%	00:23:44	00:23:38	-00:00:06	0%
	SB	23.6	00:25:46	00:25:46	00:00:00	0%	00:24:22	00:24:24	00:00:02	0%	00:25:07	00:25:09	00:00:02	0%	00:24:15	00:24:12	-00:00:03	0%
11	WB	108.3	01:08:19	01:05:25	-00:02:54	-4%	01:10:18	01:07:46	-00:02:32	-4%	01:11:00	01:08:16	-00:02:44	-4%	01:31:17	01:21:36	-00:09:41	-11%
	EB	108.5	01:10:21	01:06:22	-00:03:59	-6%	01:07:46	01:04:56	-00:02:50	-4%	01:06:53	01:04:10	-00:02:43	-4%	01:21:24	01:10:07	-00:11:17	-14%
11_1	WB	48.9	00:30:42	00:27:25	-00:03:17	-11%	00:31:03	00:27:40	-00:03:23	-11%	00:32:12	00:28:39	-00:03:33	-11%	00:43:24	00:28:56	-00:14:28	-33%
	EB	49.1	00:33:22	00:28:57	-00:04:25	-13%	00:30:57	00:27:44	-00:03:13	-10%	00:30:54	00:27:51	-00:03:03	-10%	00:42:33	00:29:04	-00:13:29	-32%
11_2	WB	59.4	00:37:36	00:38:00	00:00:24	1%	00:39:14	00:40:06	00:00:52	2%	00:38:47	00:39:37	00:00:50	2%	00:47:53	00:52:39	00:04:46	10%
	EB	59.4	00:36:58	00:37:24	00:00:26	1%	00:36:49	00:37:12	00:00:23	1%	00:35:59	00:36:19	00:00:20	1%	00:38:50	00:41:02	00:02:12	6%
12	WB	107.4	01:41:46	01:41:44	-00:00:02	0%	01:40:55	01:40:51	-00:00:04	0%	01:43:22	01:43:14	-00:00:08	0%	01:46:45	01:46:24	-00:00:21	0%
	EB	107.3	01:43:28	01:43:23	-00:00:05	0%	01:40:12	01:40:12	00:00:00	0%	01:44:22	01:44:19	-00:00:03	0%	01:41:53	01:41:37	-00:00:16	0%

K.2 Core 2031

Route	Direction	Distance (Km)	AM				IP				PM				Busy Period			
			Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference
1	WB	270.5	02:47:12	02:47:10	-00:00:02	0%	02:46:12	02:46:05	-00:00:07	0%	03:04:25	03:04:01	-00:00:24	0%	03:00:29	02:59:34	-00:00:55	-1%
	EB	282.4	02:57:21	02:56:59	-00:00:22	0%	02:46:51	02:46:41	-00:00:10	0%	02:57:06	02:56:28	-00:00:38	0%	02:59:57	02:58:30	-00:01:27	-1%
2	WB	239.1	02:42:52	02:39:48	-00:03:04	-2%	02:43:54	02:41:33	-00:02:21	-1%	02:52:19	02:50:06	-00:02:13	-1%	03:13:18	03:02:15	-00:11:03	-6%
	EB	238.7	02:42:51	02:38:53	-00:03:58	-2%	02:37:36	02:35:04	-00:02:32	-2%	02:39:43	02:37:41	-00:02:02	-1%	02:58:23	02:48:30	-00:09:53	-6%
3	WB	242.8	03:26:02	03:26:02	00:00:00	0%	03:22:45	03:22:50	00:00:05	0%	03:34:42	03:34:50	00:00:08	0%	03:30:40	03:31:04	00:00:24	0%
	EB	242.7	03:25:32	03:25:34	00:00:02	0%	03:18:52	03:19:02	00:00:10	0%	03:27:24	03:27:38	00:00:14	0%	03:23:38	03:23:59	00:00:21	0%
4	WB	256.2	03:12:15	03:12:22	00:00:07	0%	03:10:05	03:10:06	00:00:01	0%	03:22:35	03:22:39	00:00:04	0%	03:22:53	03:23:30	00:00:37	0%
	EB	256.0	03:14:51	03:14:47	-00:00:04	0%	03:03:00	03:02:58	-00:00:02	0%	03:07:34	03:07:42	00:00:08	0%	03:19:14	03:18:58	-00:00:16	0%
5	WB	40.2	00:32:56	00:33:13	00:00:17	1%	00:32:51	00:33:05	00:00:14	1%	00:33:24	00:33:44	00:00:20	1%	00:33:34	00:33:45	00:00:11	1%
	EB	40.2	00:33:49	00:34:05	00:00:16	1%	00:32:54	00:33:00	00:00:06	0%	00:32:47	00:32:58	00:00:11	1%	00:33:54	00:34:12	00:00:18	1%
6	WB	26.5	00:26:40	00:26:26	-00:00:14	-1%	00:25:40	00:25:23	-00:00:17	-1%	00:27:09	00:26:36	-00:00:33	-2%	00:28:25	00:25:52	-00:02:33	-9%
	EB	26.5	00:26:33	00:26:15	-00:00:18	-1%	00:25:06	00:25:19	00:00:13	1%	00:25:45	00:25:54	00:00:09	1%	00:28:23	00:25:28	-00:02:55	-10%
7	WB	41.1	00:34:59	00:35:00	00:00:01	0%	00:34:50	00:34:50	00:00:00	0%	00:35:21	00:35:20	-00:00:01	0%	00:35:08	00:35:04	-00:00:04	0%
	EB	41.2	00:36:56	00:36:46	-00:00:10	0%	00:35:25	00:35:23	-00:00:02	0%	00:35:54	00:35:50	-00:00:04	0%	00:35:57	00:35:49	-00:00:08	0%
8	NB	38.6	00:38:06	00:38:32	00:00:26	1%	00:36:37	00:37:02	00:00:25	1%	00:37:39	00:38:09	00:00:30	1%	00:37:10	00:37:45	00:00:35	2%
	SB	38.6	00:38:14	00:38:47	00:00:33	1%	00:37:03	00:37:31	00:00:28	1%	00:38:22	00:38:53	00:00:31	1%	00:37:29	00:38:01	00:00:32	1%
9	NB	25.7	00:28:22	00:28:03	-00:00:19	-1%	00:27:33	00:27:30	-00:00:03	0%	00:29:56	00:29:52	-00:00:04	0%	00:27:52	00:27:21	-00:00:31	-2%
	SB	25.7	00:30:37	00:30:16	-00:00:21	-1%	00:28:24	00:28:17	-00:00:07	0%	00:29:44	00:29:35	-00:00:09	-1%	00:30:05	00:28:36	-00:01:29	-5%
10	NB	23.6	00:24:40	00:24:38	-00:00:02	0%	00:23:42	00:23:42	00:00:00	0%	00:24:38	00:24:41	00:00:03	0%	00:23:52	00:23:46	-00:00:06	0%
	SB	23.6	00:25:48	00:25:48	00:00:00	0%	00:24:27	00:24:29	00:00:02	0%	00:25:17	00:25:21	00:00:04	0%	00:24:17	00:24:15	-00:00:02	0%
11	WB	108.3	01:10:01	01:06:52	-00:03:09	-4%	01:11:40	01:09:04	-00:02:36	-4%	01:12:38	01:09:46	-00:02:52	-4%	01:37:36	01:25:06	-00:12:30	-13%
	EB	108.5	01:11:48	01:07:22	-00:04:26	-6%	01:08:44	01:05:42	-00:03:02	-4%	01:07:31	01:04:49	-00:02:42	-4%	01:24:36	01:13:15	-00:11:21	-13%
11_1	WB	48.9	00:31:03	00:27:33	-00:03:30	-11%	00:31:27	00:27:53	-00:03:34	-11%	00:33:05	00:29:09	-00:03:56	-12%	00:46:49	00:30:13	-00:16:36	-35%
	EB	49.1	00:34:28	00:29:26	-00:05:02	-15%	00:31:28	00:27:58	-00:03:30	-11%	00:31:16	00:28:05	-00:03:11	-10%	00:44:54	00:29:41	-00:15:13	-34%
11_2	WB	59.4	00:38:58	00:39:19	00:00:21	1%	00:40:12	00:41:11	00:00:59	2%	00:39:33	00:40:37	00:01:04	3%	00:50:47	00:54:53	00:04:06	8%
	EB	59.4	00:37:19	00:37:56	00:00:37	2%	00:37:15	00:37:43	00:00:28	1%	00:36:14	00:36:44	00:00:30	1%	00:39:41	00:43:34	00:03:53	10%
12	WB	107.4	01:43:01	01:42:55	-00:00:06	0%	01:41:31	01:41:27	-00:00:04	0%	01:44:38	01:44:28	-00:00:10	0%	01:48:04	01:47:35	-00:00:29	0%
	EB	107.3	01:44:44	01:44:30	-00:00:14	0%	01:40:58	01:40:54	-00:00:04	0%	01:45:04	01:44:59	-00:00:05	0%	01:43:12	01:42:45	-00:00:27	0%

K.3 Core 2041

Route	Direction	Distance (Km)	AM				IP				PM				Busy Period			
			Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference
1	WB	270.5	02:51:43	02:51:34	-00:00:09	0%	02:51:16	02:51:00	-00:00:16	0%	03:13:13	03:12:52	-00:00:21	0%	03:14:08	03:12:21	-00:01:47	-1%
	EB	282.4	03:04:42	03:04:10	-00:00:32	0%	02:52:44	02:52:32	-00:00:12	0%	03:03:11	03:02:32	-00:00:39	0%	03:15:47	03:12:56	-00:02:51	-1%
2	WB	239.1	02:48:31	02:45:05	-00:03:26	-2%	02:50:31	02:48:13	-00:02:18	-1%	02:59:29	02:57:03	-00:02:26	-1%	03:25:14	03:13:04	-00:12:10	-6%
	EB	238.7	02:49:06	02:45:02	-00:04:04	-2%	02:42:19	02:39:05	-00:03:14	-2%	02:43:36	02:41:16	-00:02:20	-1%	03:10:12	02:59:53	-00:10:19	-5%
3	WB	242.8	03:31:20	03:31:21	00:00:01	0%	03:28:41	03:28:49	00:00:08	0%	03:41:49	03:42:17	00:00:28	0%	03:38:07	03:40:29	00:02:22	1%
	EB	242.7	03:31:27	03:31:18	-00:00:09	0%	03:22:42	03:22:42	00:00:00	0%	03:31:19	03:31:29	00:00:10	0%	03:29:03	03:30:08	00:01:05	1%
4	WB	256.2	03:20:36	03:20:22	-00:00:14	0%	03:17:51	03:17:52	00:00:01	0%	03:31:09	03:30:59	-00:00:10	0%	03:36:02	03:35:56	-00:00:06	0%
	EB	256.0	03:22:15	03:22:18	00:00:03	0%	03:09:01	03:08:51	-00:00:10	0%	03:14:12	03:14:12	00:00:00	0%	03:28:01	03:28:39	00:00:38	0%
5	WB	40.2	00:33:20	00:33:38	00:00:18	1%	00:33:24	00:33:42	00:00:18	1%	00:34:16	00:34:31	00:00:15	1%	00:34:25	00:35:07	00:00:42	2%
	EB	40.2	00:34:19	00:34:53	00:00:34	2%	00:33:24	00:33:33	00:00:09	0%	00:33:15	00:33:29	00:00:14	1%	00:34:35	00:34:57	00:00:22	1%
6	WB	26.5	00:27:21	00:26:41	-00:00:40	-2%	00:25:57	00:25:32	-00:00:25	-2%	00:27:54	00:27:02	-00:00:52	-3%	00:29:40	00:26:19	-00:03:21	-11%
	EB	26.5	00:27:09	00:26:24	-00:00:45	-3%	00:25:17	00:25:24	00:00:07	0%	00:25:54	00:26:00	00:00:06	0%	00:29:31	00:25:36	-00:03:55	-13%
7	WB	41.1	00:35:10	00:35:09	-00:00:01	0%	00:34:58	00:34:57	-00:00:01	0%	00:35:40	00:35:38	-00:00:02	0%	00:35:27	00:35:20	-00:00:07	0%
	EB	41.2	00:37:25	00:37:05	-00:00:20	-1%	00:35:42	00:35:39	-00:00:03	0%	00:36:12	00:36:07	-00:00:05	0%	00:36:31	00:36:16	-00:00:15	-1%
8	NB	38.6	00:38:30	00:39:00	00:00:30	1%	00:37:09	00:37:36	00:00:27	1%	00:38:21	00:39:00	00:00:39	2%	00:37:41	00:38:15	00:00:34	2%
	SB	38.6	00:39:10	00:39:50	00:00:40	2%	00:37:39	00:38:09	00:00:30	1%	00:38:59	00:39:36	00:00:37	2%	00:38:18	00:38:51	00:00:33	1%
9	NB	25.7	00:28:49	00:28:31	-00:00:18	-1%	00:28:08	00:28:04	-00:00:04	0%	00:30:59	00:30:51	-00:00:08	0%	00:28:33	00:27:50	-00:00:43	-3%
	SB	25.7	00:32:03	00:31:29	-00:00:34	-2%	00:29:13	00:29:08	-00:00:05	0%	00:30:36	00:30:24	-00:00:12	-1%	00:31:18	00:29:30	-00:01:48	-6%
10	NB	23.6	00:24:55	00:24:54	-00:00:01	0%	00:23:57	00:23:58	00:00:01	0%	00:25:07	00:25:12	00:00:05	0%	00:24:10	00:24:04	-00:00:06	0%
	SB	23.6	00:26:34	00:26:40	00:00:06	0%	00:24:48	00:24:49	00:00:01	0%	00:25:40	00:25:45	00:00:05	0%	00:24:38	00:24:33	-00:00:05	0%
11	WB	108.3	01:12:17	01:08:43	-00:03:34	-5%	01:14:17	01:11:37	-00:02:40	-4%	01:15:28	01:12:26	-00:03:02	-4%	01:44:50	01:31:00	-00:13:50	-13%
	EB	108.5	01:13:59	01:09:09	-00:04:50	-7%	01:10:39	01:07:01	-00:03:38	-5%	01:08:46	01:05:46	-00:03:00	-4%	01:32:24	01:20:09	-00:12:15	-13%
11_1	WB	48.9	00:32:12	00:27:55	-00:04:17	-13%	00:32:24	00:28:12	-00:04:12	-13%	00:34:30	00:29:46	-00:04:44	-14%	00:50:32	00:31:05	-00:19:27	-38%
	EB	49.1	00:35:45	00:29:55	-00:05:50	-16%	00:32:39	00:28:23	-00:04:16	-13%	00:32:03	00:28:26	-00:03:37	-11%	00:48:53	00:30:38	-00:18:15	-37%
11_2	WB	59.4	00:40:04	00:40:47	00:00:43	2%	00:41:53	00:43:25	00:01:32	4%	00:40:58	00:42:40	00:01:42	4%	00:54:18	00:59:55	00:05:37	10%
	EB	59.4	00:38:13	00:39:14	00:01:01	3%	00:37:59	00:38:38	00:00:39	2%	00:36:42	00:37:20	00:00:38	2%	00:43:30	00:49:31	00:06:01	14%
12	WB	107.4	01:44:54	01:44:45	-00:00:09	0%	01:43:50	01:43:43	-00:00:07	0%	01:47:05	01:47:02	-00:00:03	0%	01:51:15	01:52:22	00:01:07	1%
	EB	107.3	01:47:04	01:46:34	-00:00:30	0%	01:42:26	01:42:14	-00:00:12	0%	01:46:24	01:46:13	-00:00:11	0%	01:45:38	01:45:07	-00:00:31	0%

K.4 Core 2051

Route	Direction	Distance (Km)	AM				IP				PM				Busy Period			
			Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference
1	WB	270.5	02:56:49	02:56:35	-00:00:14	0%	02:56:39	02:56:13	-00:00:26	0%	03:21:19	03:21:10	-00:00:09	0%	03:27:19	03:24:58	-00:02:21	-1%
	EB	282.4	03:11:16	03:10:32	-00:00:44	0%	02:58:29	02:58:16	-00:00:13	0%	03:08:46	03:08:24	-00:00:22	0%	03:28:37	03:25:40	-00:02:57	-1%
2	WB	239.1	02:53:30	02:49:51	-00:03:39	-2%	02:56:01	02:53:34	-00:02:27	-1%	03:05:41	03:02:47	-00:02:54	-2%	03:33:48	03:22:07	-00:11:41	-5%
	EB	238.7	02:54:42	02:50:35	-00:04:07	-2%	02:46:33	02:42:55	-00:03:38	-2%	02:47:23	02:44:21	-00:03:02	-2%	03:23:21	03:09:03	-00:14:18	-7%
3	WB	242.8	03:37:49	03:37:50	00:00:01	0%	03:33:24	03:33:40	00:00:16	0%	03:50:06	03:49:59	-00:00:07	0%	03:46:06	03:49:01	00:02:55	1%
	EB	242.7	03:37:03	03:36:57	-00:00:06	0%	03:26:22	03:26:28	00:00:06	0%	03:35:12	03:35:17	00:00:05	0%	03:35:06	03:36:01	00:00:55	0%
4	WB	256.2	03:27:31	03:27:49	00:00:18	0%	03:25:02	03:25:10	00:00:08	0%	03:36:29	03:36:10	-00:00:19	0%	03:44:54	03:45:57	00:01:03	0%
	EB	256.0	03:29:25	03:29:25	00:00:00	0%	03:14:31	03:14:26	-00:00:05	0%	03:17:47	03:17:30	-00:00:17	0%	03:37:22	03:37:46	00:00:24	0%
5	WB	40.2	00:33:41	00:34:09	00:00:28	1%	00:33:54	00:34:16	00:00:22	1%	00:34:40	00:35:01	00:00:21	1%	00:35:03	00:35:50	00:00:47	2%
	EB	40.2	00:34:51	00:35:23	00:00:32	2%	00:33:42	00:33:59	00:00:17	1%	00:33:36	00:33:48	00:00:12	1%	00:35:09	00:35:31	00:00:22	1%
6	WB	26.5	00:28:01	00:26:57	-00:01:04	-4%	00:26:12	00:25:44	-00:00:28	-2%	00:28:09	00:27:32	-00:00:37	-2%	00:32:47	00:27:05	-00:05:42	-17%
	EB	26.5	00:27:42	00:26:33	-00:01:09	-4%	00:25:30	00:25:28	-00:00:02	0%	00:26:00	00:26:07	00:00:07	0%	00:30:41	00:25:45	-00:04:56	-16%
7	WB	41.1	00:35:17	00:35:14	-00:00:03	0%	00:35:08	00:35:06	-00:00:02	0%	00:36:00	00:35:55	-00:00:05	0%	00:35:42	00:35:32	-00:00:10	0%
	EB	41.2	00:38:05	00:37:25	-00:00:40	-2%	00:35:51	00:35:46	-00:00:05	0%	00:36:24	00:36:14	-00:00:10	0%	00:37:04	00:36:44	-00:00:20	-1%
8	NB	38.6	00:38:53	00:39:24	00:00:31	1%	00:37:32	00:38:04	00:00:32	1%	00:38:44	00:39:24	00:00:40	2%	00:38:11	00:38:48	00:00:37	2%
	SB	38.6	00:39:53	00:40:37	00:00:44	2%	00:38:12	00:38:43	00:00:31	1%	00:39:21	00:40:09	00:00:48	2%	00:39:03	00:39:35	00:00:32	1%
9	NB	25.7	00:29:08	00:28:44	-00:00:24	-1%	00:28:22	00:28:16	-00:00:06	0%	00:31:26	00:31:05	-00:00:21	-1%	00:29:01	00:28:10	-00:00:51	-3%
	SB	25.7	00:32:21	00:31:28	-00:00:53	-3%	00:29:33	00:29:22	-00:00:11	-1%	00:30:46	00:30:43	-00:00:03	0%	00:31:56	00:30:06	-00:01:50	-6%
10	NB	23.6	00:25:16	00:25:11	-00:00:05	0%	00:24:11	00:24:13	00:00:02	0%	00:25:28	00:25:34	00:00:06	0%	00:24:27	00:24:15	-00:00:12	-1%
	SB	23.6	00:27:12	00:26:59	-00:00:13	-1%	00:25:00	00:25:00	00:00:00	0%	00:26:08	00:26:10	00:00:02	0%	00:24:51	00:24:42	-00:00:09	-1%
11	WB	108.3	01:14:22	01:10:29	-00:03:53	-5%	01:16:43	01:13:36	-00:03:07	-4%	01:18:03	01:14:40	-00:03:23	-4%	01:49:18	01:36:16	-00:13:02	-12%
	EB	108.5	01:15:44	01:10:45	-00:04:59	-7%	01:12:34	01:08:28	-00:04:06	-6%	01:10:06	01:06:45	-00:03:21	-5%	01:41:34	01:25:00	-00:16:34	-16%
11_1	WB	48.9	00:33:04	00:28:15	-00:04:49	-15%	00:33:34	00:28:30	-00:05:04	-15%	00:35:50	00:30:32	-00:05:18	-15%	00:52:46	00:31:48	-00:20:58	-40%
	EB	49.1	00:36:44	00:30:27	-00:06:17	-17%	00:33:43	00:28:44	-00:04:59	-15%	00:32:52	00:28:46	-00:04:06	-12%	00:51:13	00:31:14	-00:19:59	-39%
11_2	WB	59.4	00:41:18	00:42:13	00:00:55	2%	00:43:08	00:45:05	00:01:57	5%	00:42:12	00:44:07	00:01:55	5%	00:56:31	01:04:28	00:07:57	14%
	EB	59.4	00:38:59	00:40:18	00:01:19	3%	00:38:50	00:39:43	00:00:53	2%	00:37:13	00:37:59	00:00:46	2%	00:50:20	00:53:45	00:03:25	7%
12	WB	107.4	01:46:47	01:46:31	-00:00:16	0%	01:45:27	01:45:21	-00:00:06	0%	01:49:11	01:48:58	-00:00:13	0%	01:55:14	01:56:56	00:01:42	1%
	EB	107.3	01:48:59	01:48:25	-00:00:34	-1%	01:43:48	01:43:40	-00:00:08	0%	01:47:37	01:47:35	-00:00:02	0%	01:47:50	01:46:36	-00:01:14	-1%

Appendix L Assignment model convergence – High, low and alternative growth scenarios

L.1 Without scheme – Low Growth

2026 Without scheme Low											
AM Peak			Interpeak			PM Peak			Busy Period		
Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap
35	98.7	0.004	15	98.9	0.002	73	99.4	0.002	13	98.6	0.004
36	98.8	0.005	16	99	0.002	74	99	0.003	14	98.6	0.004
37	99	0.005	17	99.1	0.002	75	99.3	0.003	15	98.7	0.004
38	98.8	0.004	18	99.3	0.001	76	98.7	0.006	16	99.2	0.002

2031 Without scheme Low											
AM Peak			Interpeak			PM Peak			Busy Period		
Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap
36	99.3	0.005	27	99	0.005	48	98.9	0.005	13	98.7	0.005
37	98.9	0.006	28	99.4	0.001	49	98.9	0.004	14	98.8	0.004
38	98.9	0.006	29	98.9	0.001	50	98.6	0.004	15	98.8	0.004
39	98.8	0.003	30	99.3	0.004	51	99.1	0.004	16	99.3	0.004

2041 Without scheme Low											
AM Peak			Interpeak			PM Peak			Busy Period		
Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap
38	98.9	0.004	20	98.9	0.004	39	99	0.004	19	98.9	0.004
39	98.9	0.005	21	98.8	0.001	40	98.7	0.006	20	98.5	0.007
40	99	0.005	22	98.8	0.001	41	99.2	0.006	21	98.9	0.007
41	98.7	0.007	23	99.3	0.004	42	98.7	0.004	22	98.8	0.004

2051 Without scheme Low											
AM Peak			Interpeak			PM Peak			Busy Period		
Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap
28	98.6	0.005	20	98.7	0.003	33	98.9	0.005	20	98.7	0.005
29	98.6	0.007	21	98.6	0.003	34	99.1	0.003	21	99.1	0.011
30	98.8	0.007	22	98.9	0.003	35	98.8	0.003	22	98.9	0.011
31	98.6	0.007	23	99	0.003	36	99.1	0.004	23	98.8	0.008

L.2 With scheme - Low Growth

2026 With scheme Low											
AM Peak			Interpeak			PM Peak			Busy Period		
Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap
31	98.7	0.005	17	98.6	0.002	47	98.9	0.003	12	98.6	0.004
32	98.5	0.004	18	99.1	0.002	48	98.8	0.002	13	98.7	0.004
33	98.9	0.004	19	99.2	0.002	49	98.7	0.002	14	98.7	0.004
34	98.6	0.006	20	99.4	0.001	50	99.3	0.003	15	99.1	0.003

2031 With scheme Low											
AM Peak			Interpeak			PM Peak			Busy Period		
Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap
38	98.9	0.005	18	98.6	0.001	48	98.9	0.003	14	98.5	0.005
39	99.2	0.006	19	98.7	0.002	49	98.7	0.006	15	98.6	0.004
40	98.7	0.006	20	99	0.002	50	99.3	0.006	16	98.9	0.004
41	98.6	0.003	21	98.8	0.001	51	98.8	0.006	17	98.9	0.004

2041 With scheme Low											
AM Peak			Interpeak			PM Peak			Busy Period		
Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap
35	98.7	0.007	20	98.8	0.002	31	99.2	0.006	20	98.7	0.007
36	98.9	0.004	21	98.8	0.002	32	99	0.004	21	99.2	0.005
37	99	0.004	22	98.7	0.002	33	98.7	0.004	22	99.1	0.005
38	98.9	0.005	23	98.8	0.002	34	99.2	0.005	23	99.4	0.005

2051 With scheme Low											
AM Peak			Interpeak			PM Peak			Busy Period		
Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap
29	98.7	0.006	20	98.8	0.004	32	99	0.004	22	99.2	0.007
30	98.7	0.004	21	98.8	0.004	33	99	0.004	23	99.2	0.005
31	98.6	0.004	22	98.9	0.004	34	99	0.004	24	99	0.005
32	98.8	0.006	23	99.2	0.003	35	99.1	0.004	25	99.1	0.005

L.3 Without scheme - High Growth

2026 Without scheme High											
AM Peak			Interpeak			PM Peak			Busy Period		
Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap
59	98.7	0.004	24	99	0.001	35	99	0.004	18	98.7	0.002
60	99.2	0.003	25	98.7	0.001	36	98.6	0.004	19	98.6	0.003
61	99	0.003	26	98.8	0.001	37	99	0.004	20	99.2	0.003
62	99.3	0.003	27	98.9	0.001	38	99	0.005	21	98.8	0.002

2031 Without scheme High											
AM Peak			Interpeak			PM Peak			Busy Period		
Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap
70	98.5	0.007	46	99.5	0.001	37	98.5	0.006	15	98.9	0.006
71	99	0.007	47	99	0.001	38	98.9	0.006	16	99.1	0.006
72	98.7	0.007	48	99.6	0.001	39	98.8	0.006	17	99.1	0.006
73	98.7	0.007	49	99.6	0.001	40	98.9	0.004	18	99.2	0.006

2041 Without scheme High											
AM Peak			Interpeak			PM Peak			Busy Period		
Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap
68	98.8	0.008	28	98.9	0.003	83	98.7	0.005	47	98.9	0.012
69	98.8	0.007	29	98.6	0.004	84	98.8	0.005	48	98.9	0.007
70	98.7	0.007	30	99	0.004	85	99	0.005	49	99.1	0.007
71	99	0.008	31	98.6	0.003	86	98.8	0.005	50	99.2	0.006

2051 Without scheme High											
AM Peak			Interpeak			PM Peak			Busy Period		
Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap
97	97.7	0.006	34	98.8	0.003	45	98.5	0.006	45	98.8	0.016
98	98	0.009	35	99	0.004	46	98.5	0.006	46	98.7	0.006
99	98.3	0.009	36	99	0.004	47	98.6	0.006	47	98.7	0.006
100	97.7	0.007	37	98.9	0.008	48	98.8	0.009	48	99	0.013

L.4 With scheme - High Growth

2026 With scheme High											
AM Peak			Interpeak			PM Peak			Busy Period		
Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap
57	99	0.004	22	98.8	0.002	31	98.7	0.004	21	98.7	0.004
58	98.8	0.006	23	98.6	0.001	32	98.7	0.005	22	99.3	0.004
59	99	0.006	24	98.6	0.001	33	99	0.005	23	99.1	0.004
60	98.6	0.004	25	98.9	0.002	34	98.8	0.005	24	99	0.003

2031 With scheme High											
AM Peak			Interpeak			PM Peak			Busy Period		
Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap
40	98.8	0.005	26	98.9	0.002	31	98.9	0.005	16	98.7	0.006
41	98.8	0.005	27	99.1	0.002	32	98.7	0.006	17	99	0.005
42	99	0.005	28	98.9	0.002	33	98.7	0.006	18	99.3	0.005
43	98.8	0.006	29	99.3	0.002	34	98.6	0.004	19	98.7	0.007

2041 With scheme High											
AM Peak			Interpeak			PM Peak			Busy Period		
Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap
91	98.8	0.005	90	99	0.004	64	98.7	0.006	49	99	0.01
92	98.9	0.004	91	99	0.002	65	98.7	0.006	50	98.7	0.013
93	98.9	0.004	92	98.8	0.002	66	98.8	0.006	51	99.1	0.013
94	98.9	0.012	93	99.3	0.004	67	98.6	0.008	52	99	0.01

2051 With scheme High											
AM Peak			Interpeak			PM Peak			Busy Period		
Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap
97	97.6	0.009	30	98.7	0.005	54	98.6	0.007	49	99	0.011
98	97.6	0.008	31	98.6	0.004	55	99	0.006	50	99.1	0.008
99	97.8	0.008	32	98.7	0.004	56	98.9	0.006	51	99.1	0.008
100	98.1	0.008	33	98.8	0.003	57	98.9	0.005	52	98.9	0.007

L.5 Do Minimum - Alternative local growth

2026 Alternative Growth											
AM Peak			Interpeak			PM Peak			Busy Period		
Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap
32	98.9	0.005	17	98.6	0.002	53	98.6	0.003	6	93.5	0.017
33	98.9	0.006	18	98.7	0.002	54	98.8	0.004	7	95.1	0.015
34	99	0.006	19	98.8	0.002	55	98.9	0.004	8	94.2	0.015
35	98.8	0.005	20	99.1	0.001	56	98.6	0.003	9	95.3	0.018

2031 Alternative Growth											
AM Peak			Interpeak			PM Peak			Busy Period		
Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap
33	98.7	0.004	21	98.5	0.002	49	98.7	0.004	16	98.7	0.006
34	98.6	0.006	22	98.7	0.002	50	98.7	0.005	17	98.6	0.004
35	98.6	0.006	23	98.9	0.002	51	99	0.005	18	98.6	0.004
36	98.8	0.008	24	99	0.001	52	98.7	0.003	19	98.8	0.004

2041 Alternative Growth											
AM Peak			Interpeak			PM Peak			Busy Period		
Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap
45	98.6	0.005	43	99.2	0.002	33	98.5	0.007	17	98.9	0.008
46	98.7	0.006	44	98.9	0.002	34	98.6	0.006	18	98.8	0.006
47	98.6	0.006	45	99.2	0.002	35	98.7	0.006	19	98.9	0.006
48	98.7	0.009	46	98.9	0.002	36	98.8	0.006	20	98.6	0.019

2051 Alternative Growth											
AM Peak			Interpeak			PM Peak			Busy Period		
Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap
54	98.5	0.006	25	99.1	0.005	40	98.7	0.006	53	99.3	0.008
55	98.8	0.008	26	98.8	0.003	41	98.7	0.005	54	99	0.007
56	98.8	0.008	27	98.5	0.003	42	98.6	0.005	55	99	0.007
57	98.6	0.006	28	99.3	0.002	43	98.9	0.005	56	99.5	0.007

L.6 Do Something – Alternative local growth

2026 Alternative Growth											
AM Peak			Interpeak			PM Peak			Busy Period		
Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap
26	98.5	0.005	20	98.8	0.002	69	99	0.002	20	99.3	0.002
27	98.6	0.006	21	98.8	0.001	70	98.6	0.003	21	98.9	0.002
28	98.7	0.006	22	99.1	0.001	71	99.3	0.003	22	99.3	0.002
29	98.6	0.003	23	99	0.001	72	99.1	0.002	23	98.9	0.002

2031 Alternative Growth											
AM Peak			Interpeak			PM Peak			Busy Period		
Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap
36	98.7	0.006	22	99	0.001	59	98.6	0.005	22	99	0.004
37	98.7	0.006	23	98.9	0.001	60	98.6	0.005	23	98.8	0.003
38	99.1	0.006	24	99	0.001	61	98.7	0.005	24	99	0.003
39	98.6	0.007	25	99.3	0.001	62	98.7	0.005	25	99	0.005

2041 Alternative Growth											
AM Peak			Interpeak			PM Peak			Busy Period		
Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap
55	98.8	0.007	96	99.3	0.002	32	98.5	0.008	16	98.8	0.007
56	99	0.004	97	99.4	0.002	33	98.6	0.006	17	98.7	0.007
57	98.5	0.004	98	98.7	0.002	34	98.5	0.006	18	98.9	0.007
58	99.1	0.003	99	99.4	0.002	35	98.9	0.005	19	99.1	0.006

2051 Alternative Growth											
AM Peak			Interpeak			PM Peak			Busy Period		
Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap	Loop	%Flow	%Gap
53	98.6	0.009	25	98.8	0.005	36	98.7	0.006	39	98.7	0.009
54	98.9	0.009	26	98.9	0.003	37	98.6	0.008	40	98.6	0.01
55	98.6	0.009	27	98.8	0.003	38	99.1	0.008	41	99.2	0.01
56	98.6	0.006	28	99	0.004	39	98.6	0.005	42	98.7	0.011

Appendix M Demand model convergence – High, low and alternative growth scenarios

M.1 Demand Model convergence - Low Growth

	Model	Loops	Full Model GAP	Sub-Area GAP	Full Model Converged ?	Sub-Area Converged ?
Without scheme	2026	7	0.05%	0.20%	Yes	Yes
	2031	9	0.03%	0.15%	Yes	Yes
	2041	8	0.05%	0.20%	Yes	Yes
	2051	8	0.05%	0.19%	Yes	Yes
With scheme	2026	7	0.05%	0.20%	Yes	Yes
	2031	9	0.03%	0.14%	Yes	Yes
	2041	8	0.05%	0.20%	Yes	Yes
	2051	8	0.05%	0.17%	Yes	Yes

M.2 Demand Model convergence - High Growth

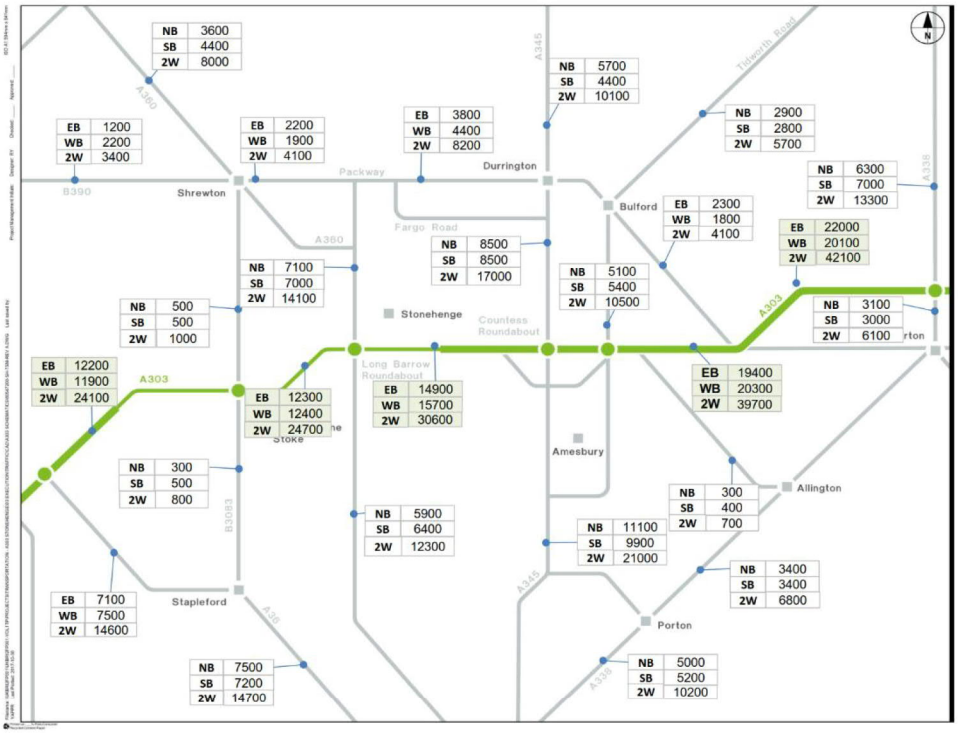
	Model	Loops	Full Model GAP	Sub-Area GAP	Full Model Converged ?	Sub-Area Converged ?
Without scheme	2026	20	0.03%	0.23%	Yes	No
	2031	20	0.03%	0.26%	Yes	No
	2041	20	0.03%	0.22%	Yes	No
	2051	20	0.03%	0.28%	Yes	No
With scheme	2026	20	0.03%	0.27%	Yes	No
	2031	20	0.03%	0.26%	Yes	No
	2041	20	0.03%	0.24%	Yes	No
	2051	20	0.03%	0.26%	Yes	No

M.3 Demand Model convergence - Alternative local growth

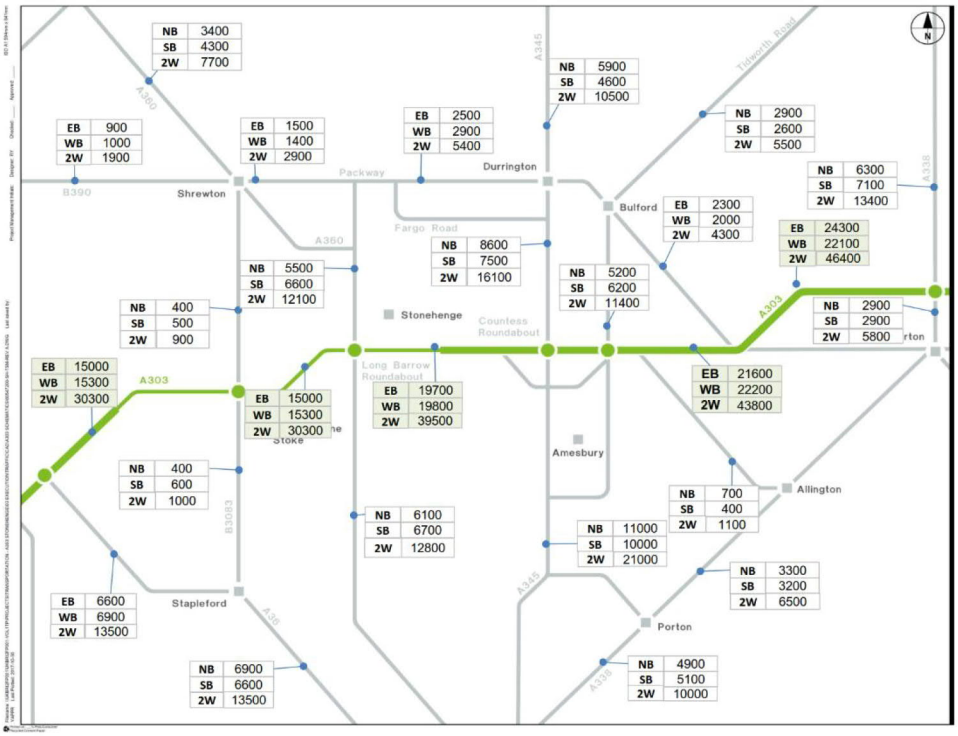
	Model	Loops	Full Model GAP	Sub-Area GAP	Full Model Converged ?	Sub-Area Converged ?
Without scheme	2026	10	0.02%	0.17%	Yes	Yes
	2031	16	0.03%	0.20%	Yes	Yes
	2041	20	0.02%	0.19%	Yes	Yes
	2051	20	0.02%	0.23%	Yes	No
With scheme	2026	10	0.02%	0.15%	Yes	Yes
	2031	12	0.02%	0.17%	Yes	Yes
	2041	19	0.02%	0.19%	Yes	Yes
	2051	16	0.02%	0.19%	Yes	Yes

Appendix N AADT flow diagrams – High, low and alternative growth scenarios

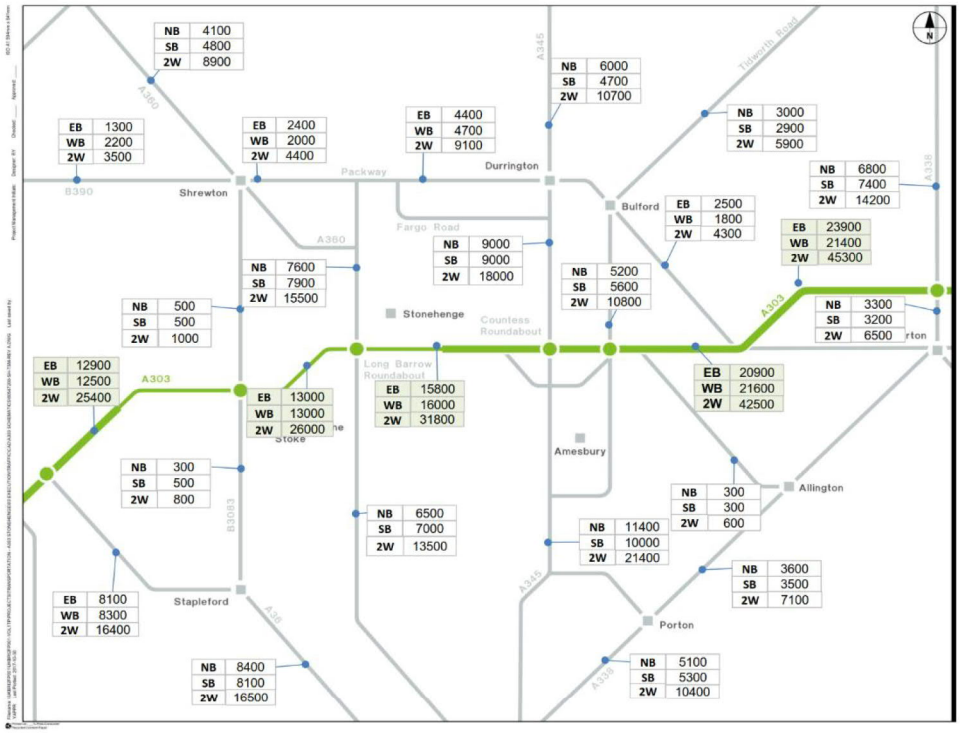
N.1 Average Annual Daily Traffic - High Growth - Without Scheme – 2026



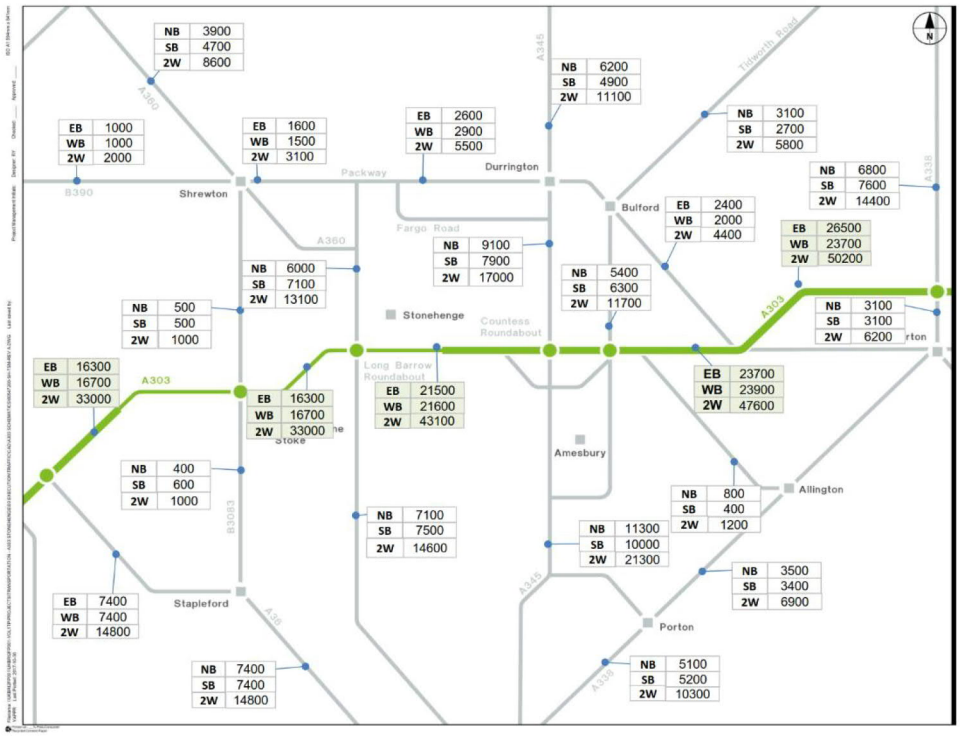
N.2 Average Annual Daily Traffic - High Growth - With Scheme – 2026



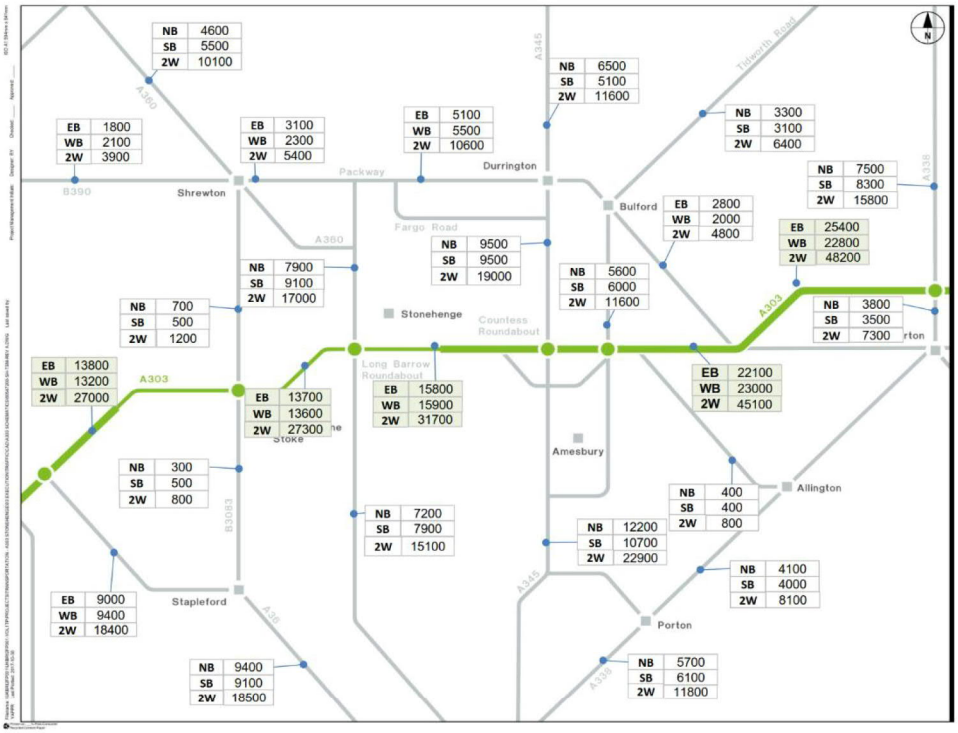
N.3 Average Annual Daily Traffic - High Growth - Without Scheme – 2031



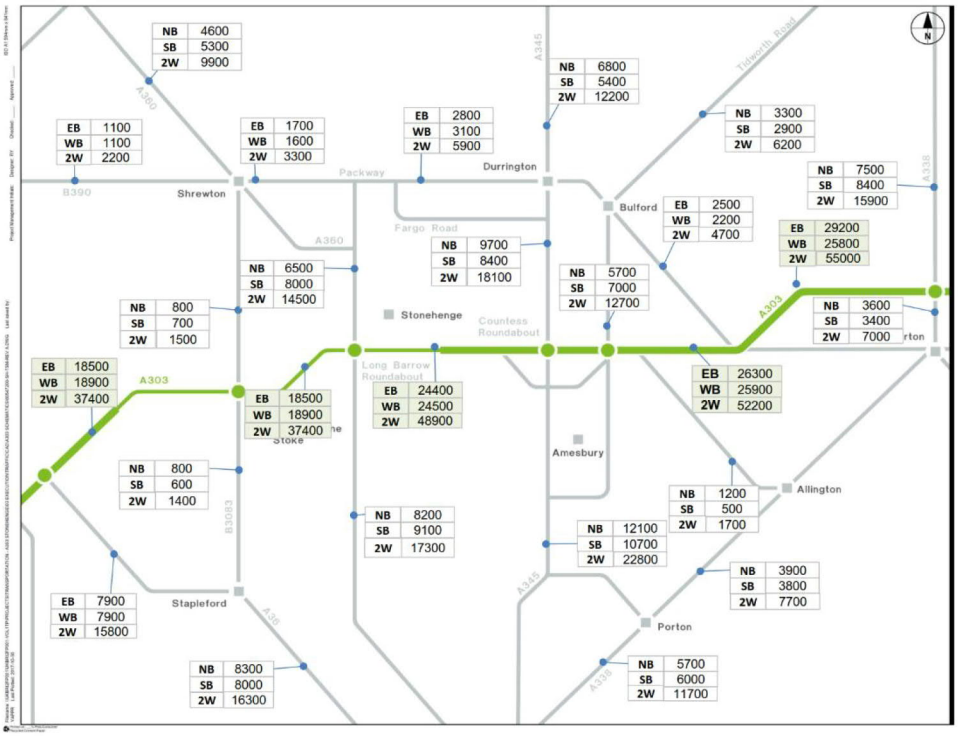
N.4 Average Annual Daily Traffic - High Growth - With Scheme – 2031



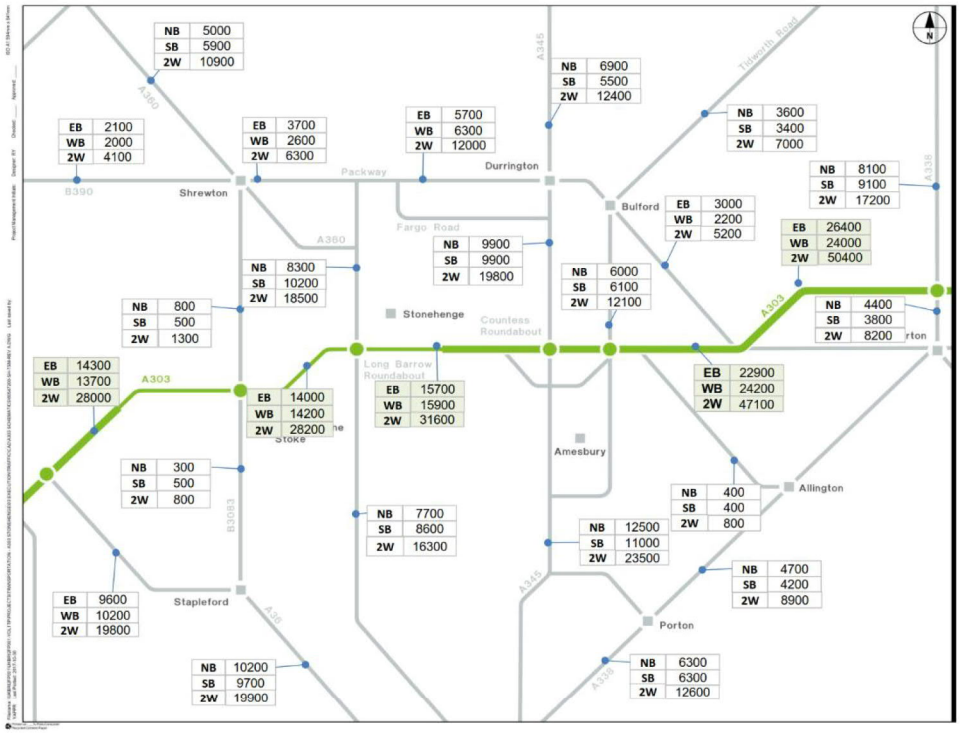
N.5 Average Annual Daily Traffic - High Growth - Without Scheme – 2041



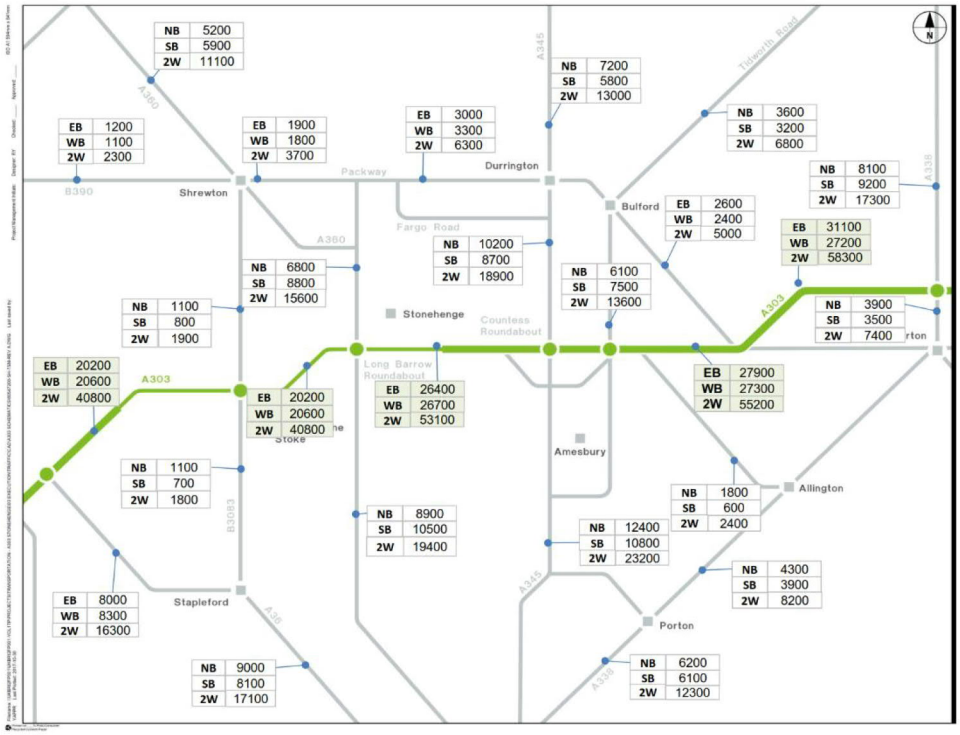
N.6 Average Annual Daily Traffic - High Growth - With Scheme – 2041



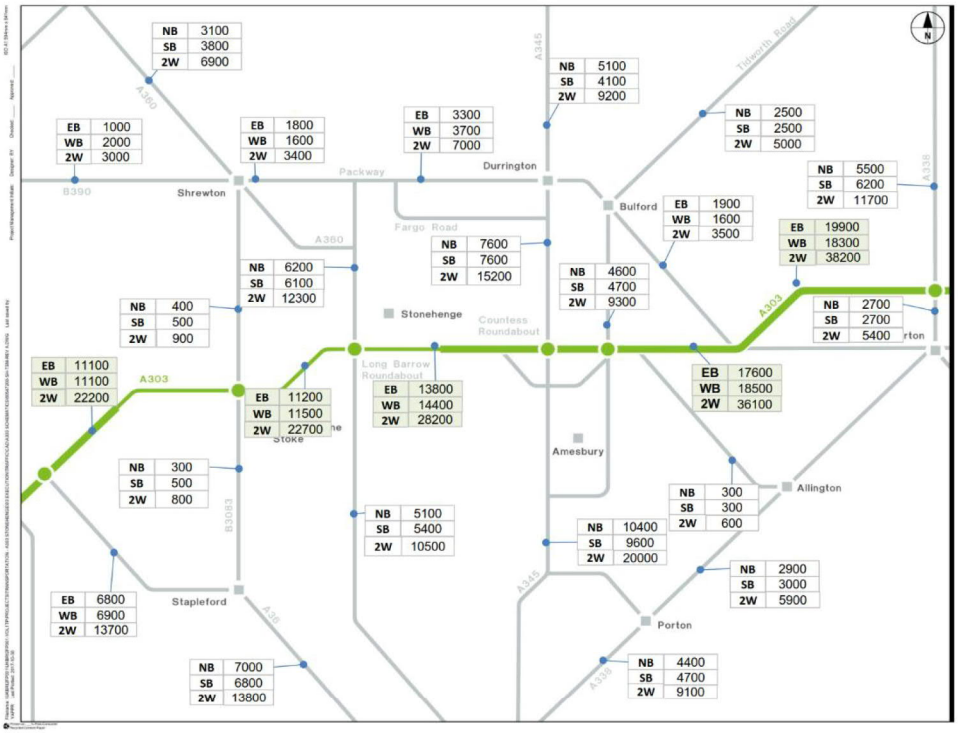
N.7 Average Annual Daily Traffic - High Growth - Without Scheme – 2051



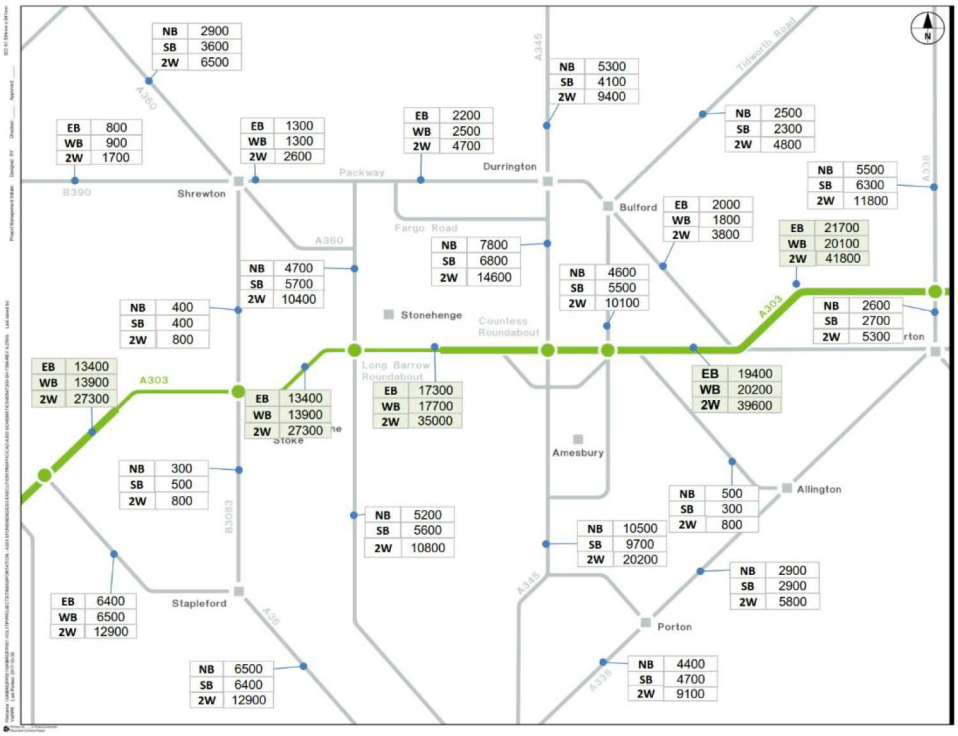
N.8 Average Annual Daily Traffic - High Growth - With Scheme – 2051



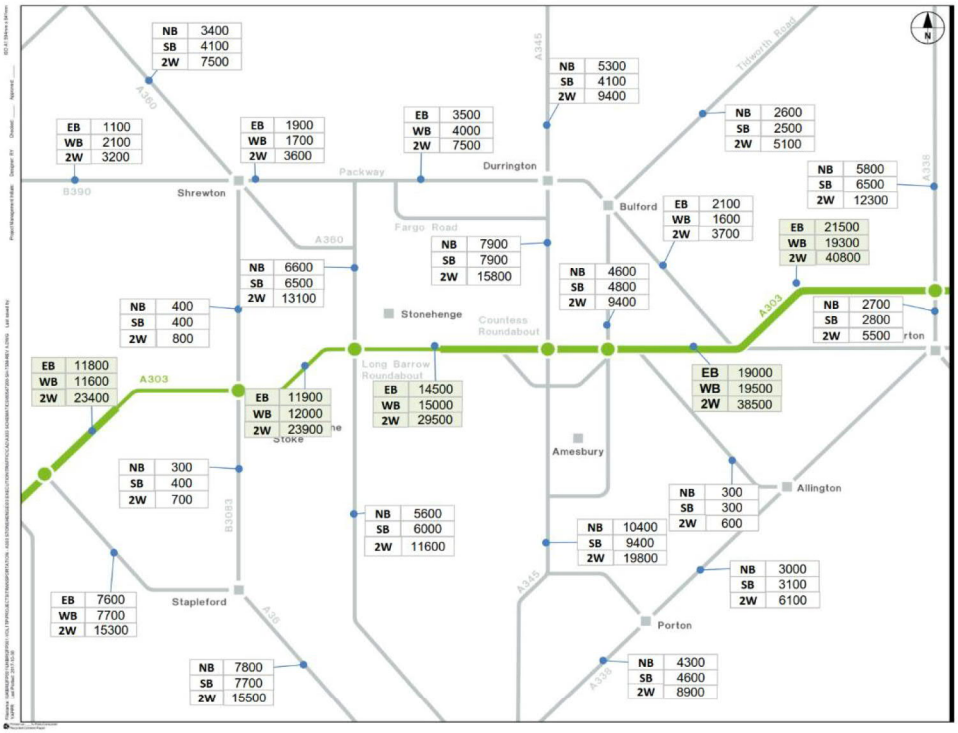
N.9 Average Annual Daily Traffic - Low Growth - Without Scheme – 2026



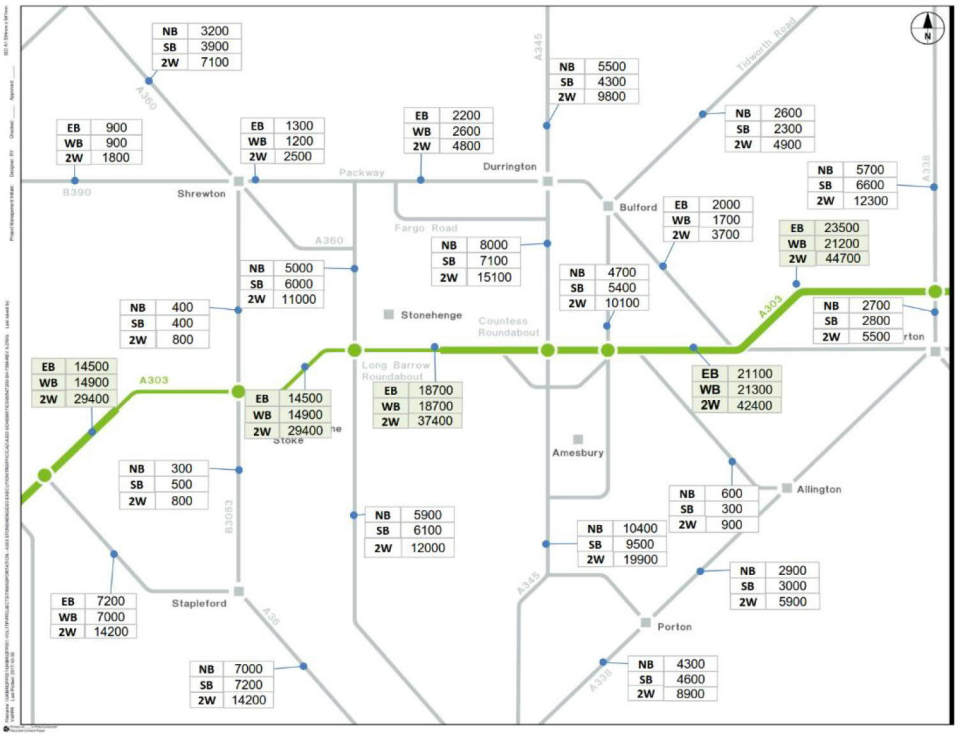
N.10 Average Annual Daily Traffic - Low Growth - With Scheme – 2026



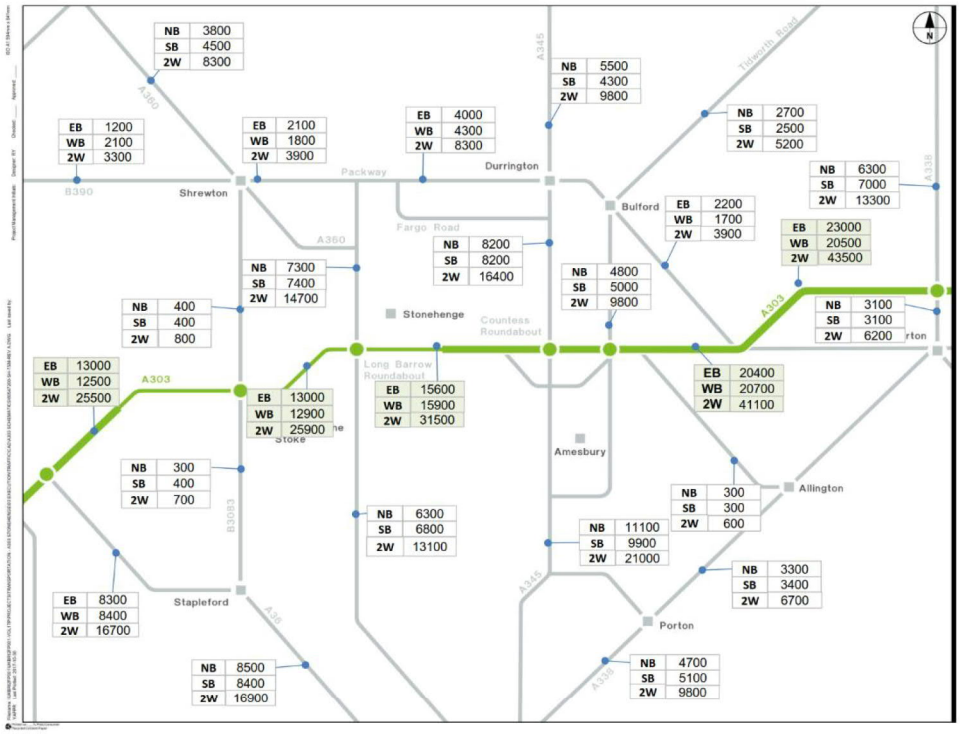
N.11 Average Annual Daily Traffic - Low Growth - Without Scheme – 2031



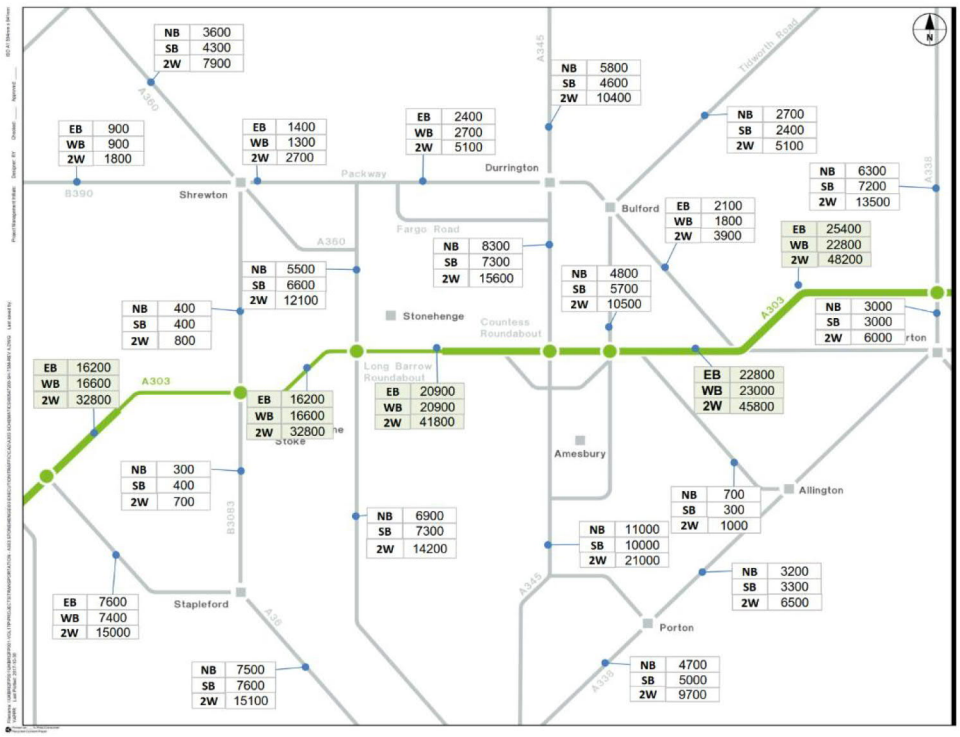
N.12 Average Annual Daily Traffic - Low Growth - With Scheme – 2031



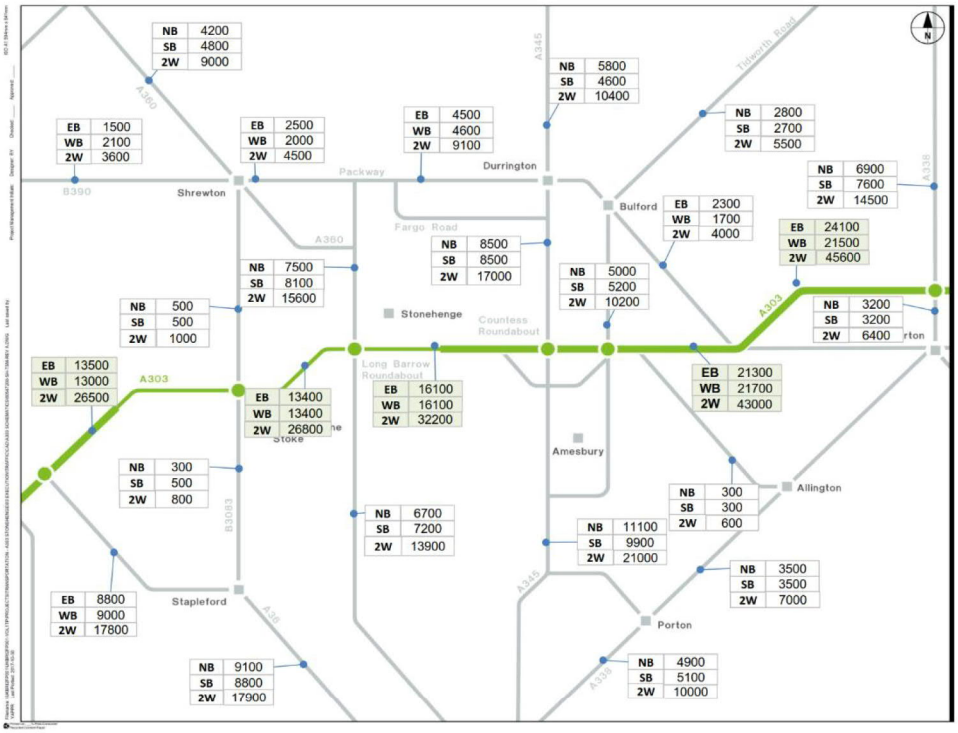
N.13 Average Annual Daily Traffic - Low Growth - Without Scheme – 2041



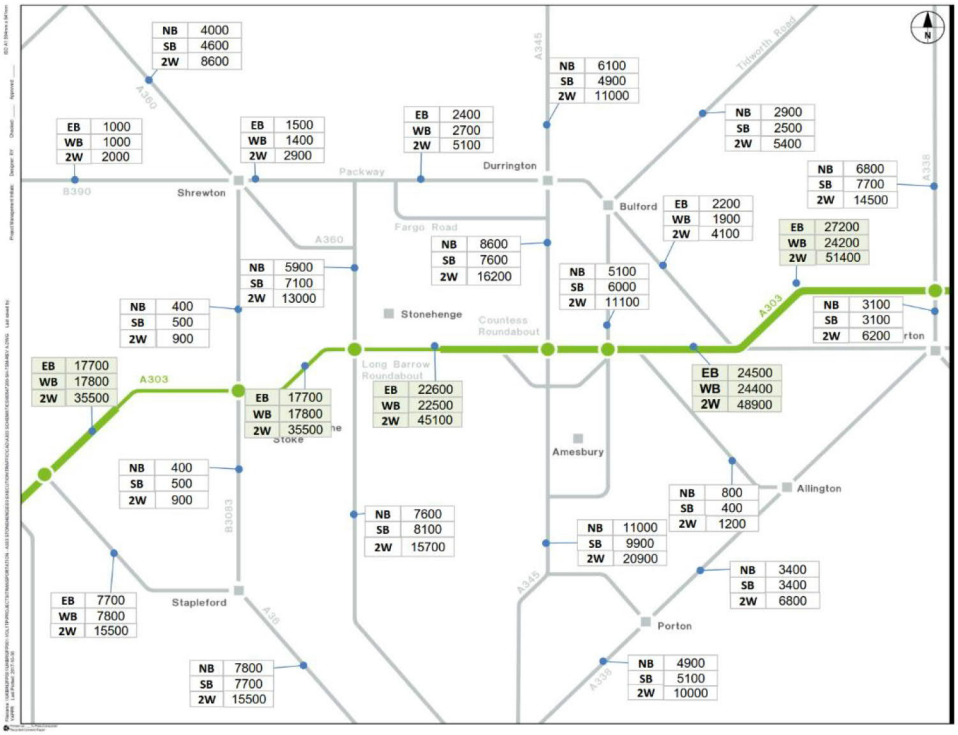
N.14 Average Annual Daily Traffic - Low Growth - With Scheme – 2041



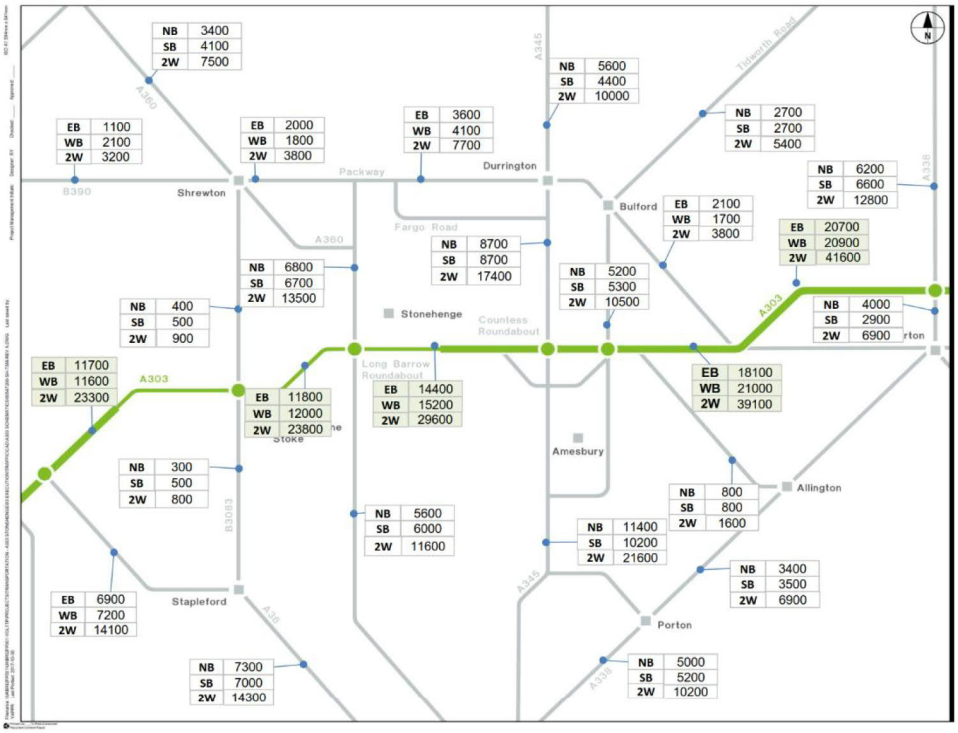
N.15 Average Annual Daily Traffic - Low Growth - Without Scheme – 2051



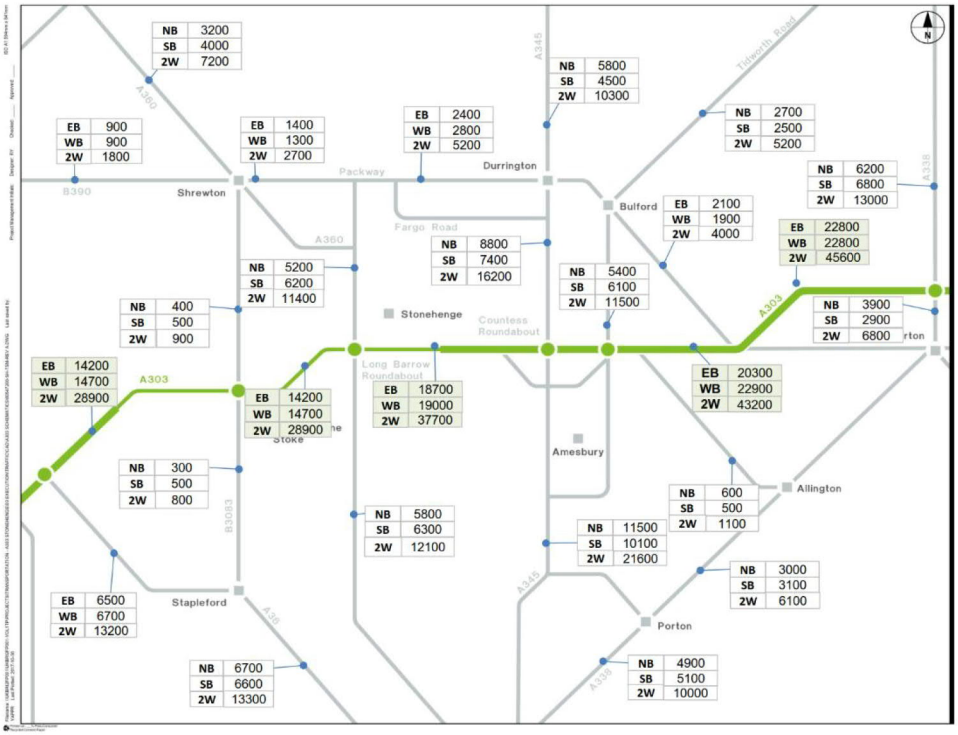
N.16 Average Annual Daily Traffic - Low Growth - With Scheme – 2051



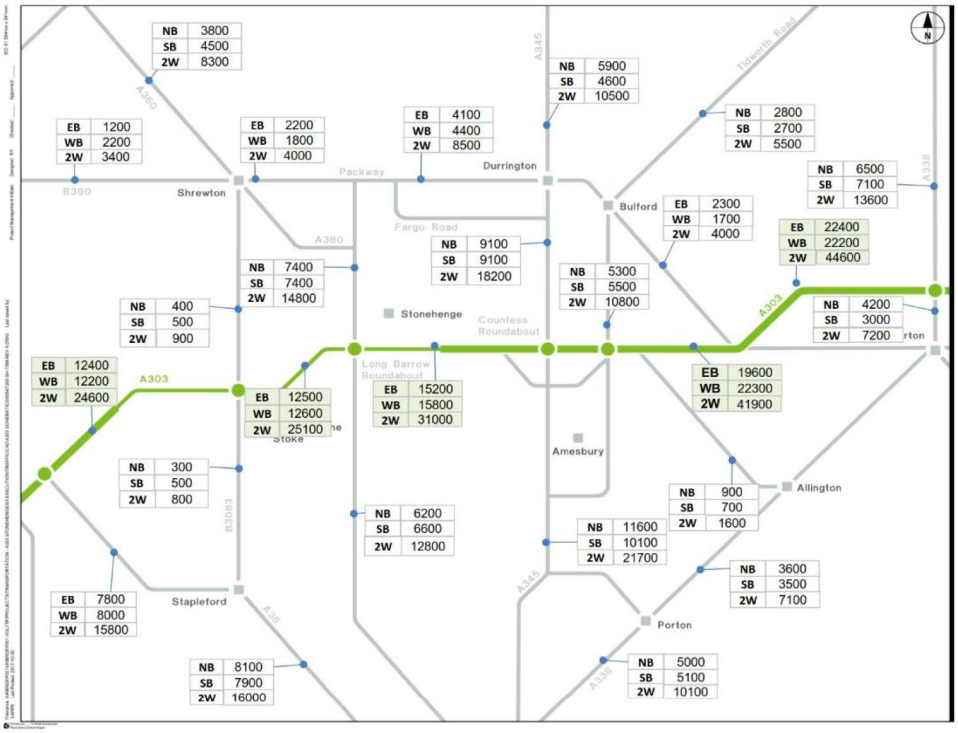
N.17 Average Annual Daily Traffic - Alternative Growth - Without Scheme – 2026



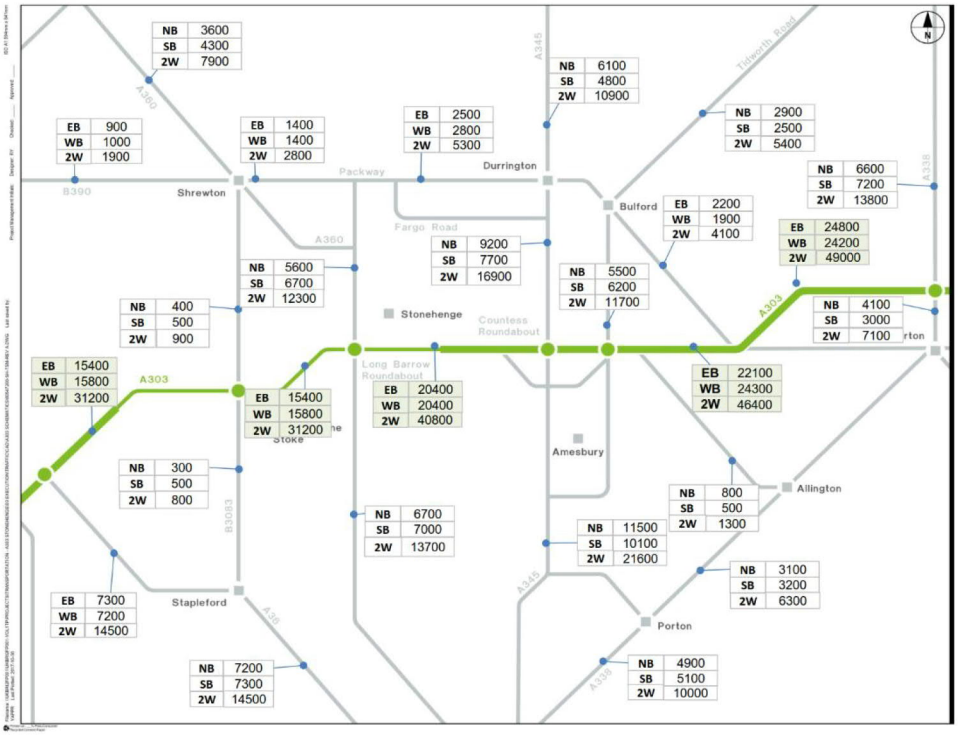
N.18 Average Annual Daily Traffic - Alternative Growth - With Scheme – 2026



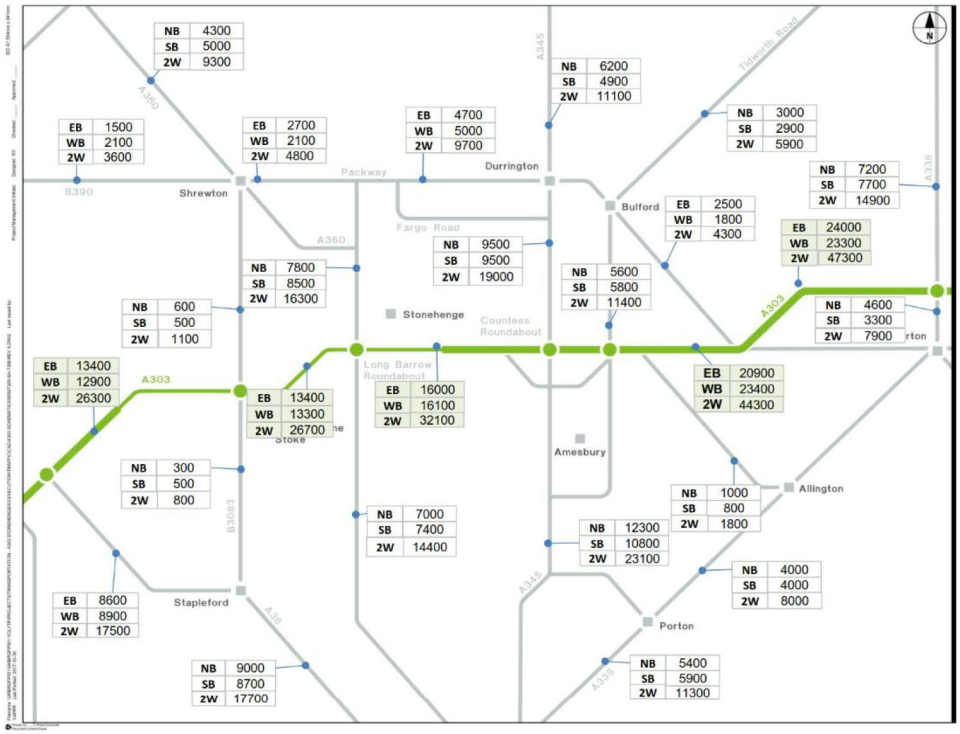
N.19 Average Annual Daily Traffic - Alternative Growth - Without Scheme – 2031



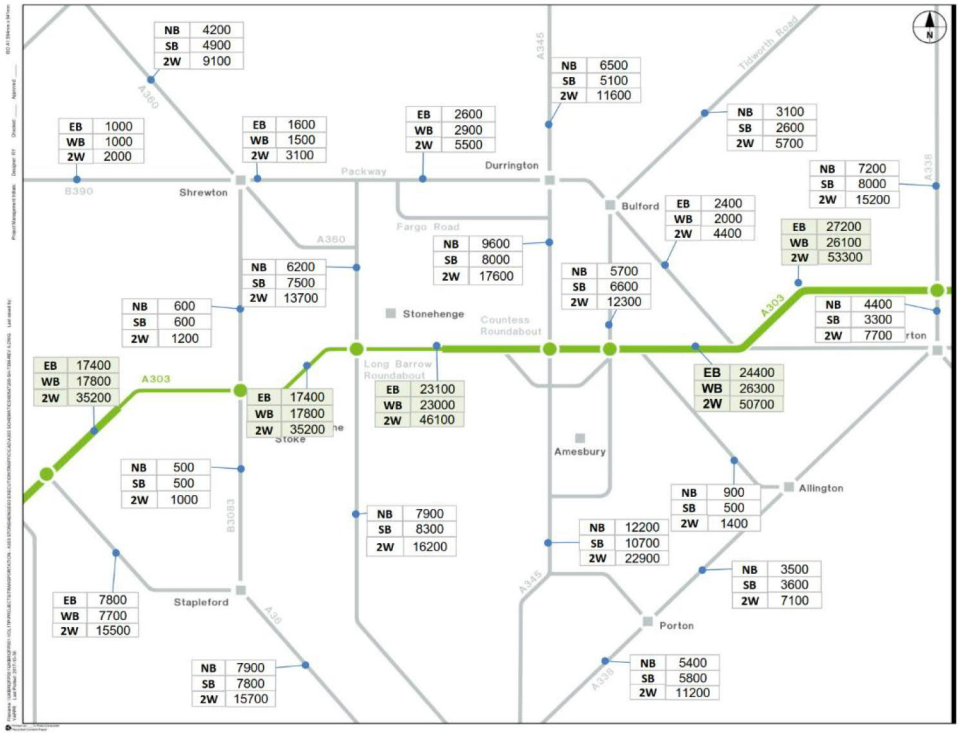
N.20 Average Annual Daily Traffic - Alternative Growth - With Scheme – 2031



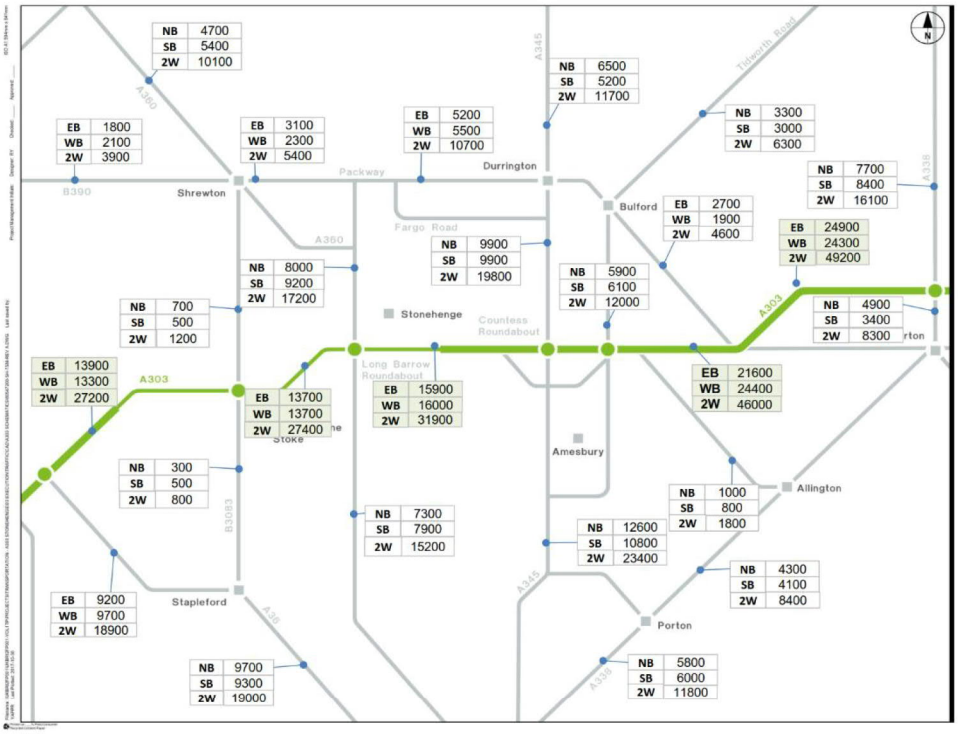
N.21 Average Annual Daily Traffic - Alternative Growth - Without Scheme – 2041



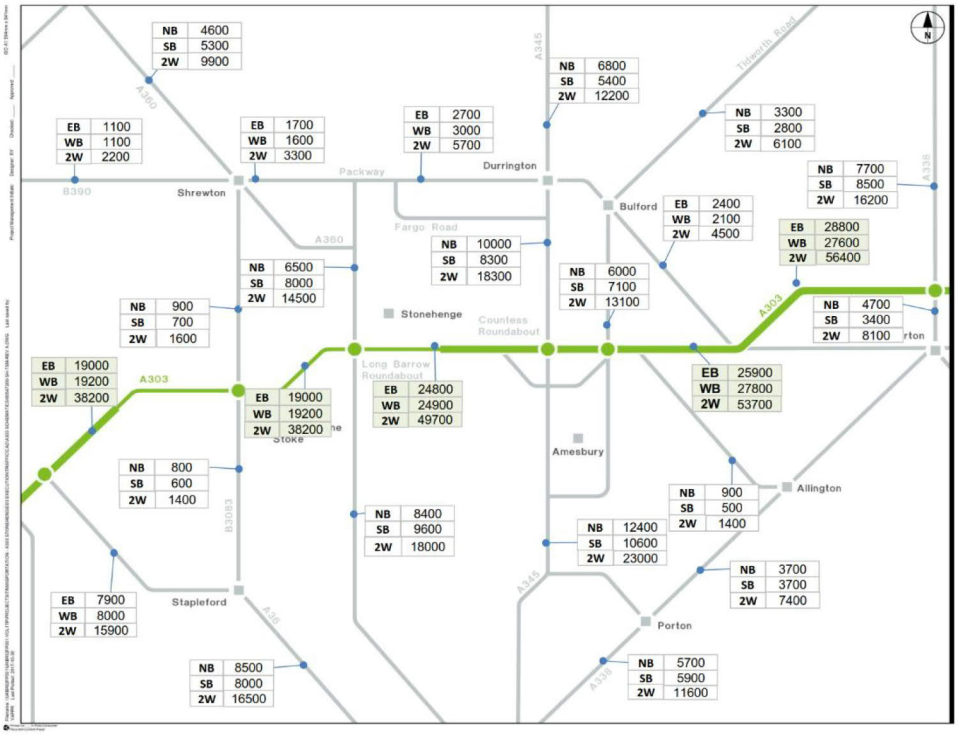
N.22 Average Annual Daily Traffic - Alternative Growth - With Scheme – 2041



N.23 Average Annual Daily Traffic - Alternative Growth - Without Scheme – 2051



N.24 Average Annual Daily Traffic - Alternative Growth - With Scheme - 2051



Appendix O Journey times – High, low and alternative growth scenarios

O.1 Low Growth 2026

Route	Direction	Distance (Km)	AM				IP				PM				Busy Period			
			Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference
1	WB	270.5	02:44:03	02:44:00	-00:00:03	0%	02:43:44	02:43:38	-00:00:06	0%	03:00:17	03:00:08	-00:00:09	0%	02:51:18	02:50:44	-00:00:34	0%
	EB	282.4	02:51:26	02:51:12	-00:00:14	0%	02:42:46	02:42:37	-00:00:09	0%	02:52:13	02:51:52	-00:00:21	0%	02:50:29	02:49:40	-00:00:49	0%
2	WB	239.1	02:37:12	02:34:33	-00:02:39	-2%	02:38:46	02:36:32	-00:02:14	-1%	02:46:47	02:44:33	-00:02:14	-1%	02:59:21	02:52:24	-00:06:57	-4%
	EB	238.7	02:37:39	02:34:24	-00:03:15	-2%	02:34:09	02:31:52	-00:02:17	-1%	02:36:38	02:34:29	-00:02:09	-1%	02:49:57	02:40:26	-00:09:31	-6%
3	WB	242.8	03:20:53	03:20:55	00:00:02	0%	03:18:59	03:19:05	00:00:06	0%	03:29:27	03:29:27	00:00:00	0%	03:25:06	03:25:26	00:00:20	0%
	EB	242.7	03:20:25	03:20:26	00:00:01	0%	03:15:58	03:16:10	00:00:12	0%	03:24:23	03:24:31	00:00:08	0%	03:19:12	03:19:36	00:00:24	0%
4	WB	256.2	03:05:45	03:05:45	00:00:00	0%	03:03:50	03:03:50	00:00:00	0%	03:13:46	03:13:47	00:00:01	0%	03:13:37	03:14:05	00:00:28	0%
	EB	256.0	03:08:11	03:08:07	-00:00:04	0%	02:58:23	02:58:24	00:00:01	0%	03:01:56	03:01:59	00:00:03	0%	03:09:45	03:08:50	-00:00:55	0%
5	WB	40.2	00:32:16	00:32:30	00:00:14	1%	00:32:16	00:32:30	00:00:14	1%	00:32:37	00:32:56	00:00:19	1%	00:32:46	00:32:58	00:00:12	1%
	EB	40.2	00:33:15	00:33:24	00:00:09	0%	00:32:17	00:32:22	00:00:05	0%	00:32:07	00:32:14	00:00:07	0%	00:33:09	00:33:26	00:00:17	1%
6	WB	26.5	00:25:58	00:25:57	-00:00:01	0%	00:25:17	00:25:12	-00:00:05	0%	00:26:28	00:26:12	-00:00:16	-1%	00:27:24	00:25:35	-00:01:49	-7%
	EB	26.5	00:26:03	00:26:02	-00:00:01	0%	00:24:57	00:25:11	00:00:14	1%	00:25:28	00:25:39	00:00:11	1%	00:27:07	00:25:15	-00:01:52	-7%
7	WB	41.1	00:34:44	00:34:45	00:00:01	0%	00:34:37	00:34:37	00:00:00	0%	00:35:06	00:35:07	00:00:01	0%	00:34:53	00:34:50	-00:00:03	0%
	EB	41.2	00:36:28	00:36:22	-00:00:06	0%	00:35:02	00:35:01	-00:00:01	0%	00:35:28	00:35:27	-00:00:01	0%	00:35:26	00:35:20	-00:00:06	0%
8	NB	38.6	00:37:08	00:37:32	00:00:24	1%	00:36:06	00:36:33	00:00:27	1%	00:37:10	00:37:36	00:00:26	1%	00:36:32	00:37:05	00:00:33	2%
	SB	38.6	00:37:41	00:38:11	00:00:30	1%	00:36:23	00:36:51	00:00:28	1%	00:37:30	00:38:00	00:00:30	1%	00:36:39	00:37:14	00:00:35	2%
9	NB	25.7	00:27:30	00:27:11	-00:00:19	-1%	00:27:09	00:27:07	-00:00:02	0%	00:29:20	00:29:24	00:00:04	0%	00:27:13	00:26:52	-00:00:21	-1%
	SB	25.7	00:30:21	00:30:04	-00:00:17	-1%	00:27:57	00:27:58	00:00:01	0%	00:28:49	00:29:01	00:00:12	1%	00:28:35	00:28:10	-00:00:25	-1%
10	NB	23.6	00:24:12	00:24:11	-00:00:01	0%	00:23:31	00:23:31	00:00:00	0%	00:24:21	00:24:24	00:00:03	0%	00:23:32	00:23:28	-00:00:04	0%
	SB	23.6	00:25:28	00:25:27	-00:00:01	0%	00:24:14	00:24:16	00:00:02	0%	00:24:56	00:24:57	00:00:01	0%	00:24:06	00:24:06	00:00:00	0%
11	WB	108.3	01:07:09	01:04:21	-00:02:48	-4%	01:09:18	01:06:44	-00:02:34	-4%	01:09:52	01:07:18	-00:02:34	-4%	01:27:22	01:19:06	-00:08:16	-9%
	EB	108.5	01:09:11	01:05:43	-00:03:28	-5%	01:07:12	01:04:30	-00:02:42	-4%	01:06:22	01:03:46	-00:02:36	-4%	01:19:32	01:08:45	-00:10:47	-14%
11_1	WB	48.9	00:30:26	00:27:19	-00:03:07	-10%	00:30:46	00:27:32	-00:03:14	-11%	00:31:44	00:28:24	-00:03:20	-11%	00:41:33	00:28:32	-00:13:01	-31%
	EB	49.1	00:32:28	00:28:40	-00:03:48	-12%	00:30:38	00:27:35	-00:03:03	-10%	00:30:36	00:27:41	-00:02:55	-10%	00:41:11	00:28:44	-00:12:27	-30%
11_2	WB	59.4	00:36:43	00:37:02	00:00:19	1%	00:38:31	00:39:11	00:00:40	2%	00:38:07	00:38:53	00:00:46	2%	00:45:49	00:50:33	00:04:44	10%
	EB	59.4	00:36:43	00:37:03	00:00:20	1%	00:36:34	00:36:54	00:00:20	1%	00:35:46	00:36:04	00:00:18	1%	00:38:20	00:40:01	00:01:41	4%
12	WB	107.4	01:40:48	01:40:44	-00:00:04	0%	01:40:14	01:40:11	-00:00:03	0%	01:42:20	01:42:13	-00:00:07	0%	01:45:31	01:45:09	-00:00:22	0%
	EB	107.3	01:41:59	01:41:54	-00:00:05	0%	01:39:33	01:39:34	00:00:01	0%	01:43:44	01:43:40	-00:00:04	0%	01:41:05	01:40:49	-00:00:16	0%

O.2 Low Growth 2031

Route	Direction	Distance (Km)	AM				IP				PM				Busy Period			
			Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference
1	WB	270.5	02:45:52	02:45:51	-00:00:01	0%	02:44:51	02:44:44	-00:00:07	0%	03:02:19	03:02:02	-00:00:17	0%	02:55:54	02:55:11	-00:00:43	0%
	EB	282.4	02:54:35	02:54:20	-00:00:15	0%	02:44:57	02:44:48	-00:00:09	0%	02:55:02	02:54:32	-00:00:30	0%	02:55:39	02:54:31	-00:01:08	-1%
2	WB	239.1	02:39:54	02:37:05	-00:02:49	-2%	02:41:18	02:38:56	-00:02:22	-1%	02:49:17	02:47:22	-00:01:55	-1%	03:06:41	02:57:18	-00:09:23	-5%
	EB	238.7	02:40:17	02:36:48	-00:03:29	-2%	02:36:00	02:33:30	-00:02:30	-2%	02:38:14	02:36:15	-00:01:59	-1%	02:54:07	02:44:12	-00:09:55	-6%
3	WB	242.8	03:22:51	03:22:50	-00:00:01	0%	03:20:39	03:20:44	00:00:05	0%	03:31:14	03:31:23	00:00:09	0%	03:27:44	03:28:03	00:00:19	0%
	EB	242.7	03:22:25	03:22:28	00:00:03	0%	03:17:14	03:17:26	00:00:12	0%	03:25:39	03:25:48	00:00:09	0%	03:21:11	03:21:33	00:00:22	0%
4	WB	256.2	03:08:53	03:08:52	-00:00:01	0%	03:06:58	03:06:58	00:00:00	0%	03:19:04	03:19:05	00:00:01	0%	03:18:02	03:18:34	00:00:32	0%
	EB	256.0	03:11:21	03:11:16	-00:00:05	0%	03:00:35	03:00:36	00:00:01	0%	03:05:17	03:05:20	00:00:03	0%	03:15:29	03:14:52	-00:00:37	0%
5	WB	40.2	00:32:42	00:32:55	00:00:13	1%	00:32:38	00:32:51	00:00:13	1%	00:33:04	00:33:24	00:00:20	1%	00:33:18	00:33:27	00:00:09	0%
	EB	40.2	00:33:34	00:33:45	00:00:11	1%	00:32:40	00:32:46	00:00:06	0%	00:32:35	00:32:42	00:00:07	0%	00:33:37	00:33:56	00:00:19	1%
6	WB	26.5	00:26:16	00:26:08	-00:00:08	-1%	00:25:26	00:25:16	-00:00:10	-1%	00:26:41	00:26:18	-00:00:23	-1%	00:27:49	00:25:41	-00:02:08	-8%
	EB	26.5	00:26:10	00:26:04	-00:00:06	0%	00:25:01	00:25:13	00:00:12	1%	00:25:33	00:25:45	00:00:12	1%	00:27:46	00:25:18	-00:02:28	-9%
7	WB	41.1	00:34:50	00:34:51	00:00:01	0%	00:34:43	00:34:42	-00:00:01	0%	00:35:11	00:35:12	00:00:01	0%	00:34:59	00:34:56	-00:00:03	0%
	EB	41.2	00:36:31	00:36:26	-00:00:05	0%	00:35:12	00:35:10	-00:00:02	0%	00:35:40	00:35:38	-00:00:02	0%	00:35:39	00:35:31	-00:00:08	0%
8	NB	38.6	00:37:35	00:37:59	00:00:24	1%	00:36:15	00:36:41	00:00:26	1%	00:37:16	00:37:42	00:00:26	1%	00:36:53	00:37:22	00:00:29	1%
	SB	38.6	00:37:38	00:38:10	00:00:32	1%	00:36:41	00:37:08	00:00:27	1%	00:37:49	00:38:18	00:00:29	1%	00:37:04	00:37:37	00:00:33	1%
9	NB	25.7	00:27:51	00:27:32	-00:00:19	-1%	00:27:11	00:27:10	-00:00:01	0%	00:29:18	00:29:20	00:00:02	0%	00:27:26	00:27:01	-00:00:25	-2%
	SB	25.7	00:29:51	00:29:35	-00:00:16	-1%	00:28:02	00:27:53	-00:00:09	-1%	00:29:05	00:29:06	00:00:01	0%	00:29:08	00:28:09	-00:00:59	-3%
10	NB	23.6	00:24:23	00:24:21	-00:00:02	0%	00:23:31	00:23:32	00:00:01	0%	00:24:17	00:24:18	00:00:01	0%	00:23:38	00:23:34	-00:00:04	0%
	SB	23.6	00:25:24	00:25:24	00:00:00	0%	00:24:18	00:24:19	00:00:01	0%	00:25:03	00:25:05	00:00:02	0%	00:24:10	00:24:09	-00:00:01	0%
11	WB	108.3	01:08:16	01:05:23	-00:02:53	-4%	01:10:17	01:07:40	-00:02:37	-4%	01:10:54	01:08:26	-00:02:28	-3%	01:32:40	01:22:02	-00:10:38	-11%
	EB	108.5	01:10:20	01:06:29	-00:03:51	-5%	01:07:59	01:05:04	-00:02:55	-4%	01:06:51	01:04:15	-00:02:36	-4%	01:22:01	01:10:37	-00:11:24	-14%
11_1	WB	48.9	00:30:41	00:27:24	-00:03:17	-11%	00:31:04	00:27:41	-00:03:23	-11%	00:32:13	00:28:44	-00:03:29	-11%	00:43:58	00:29:13	-00:14:45	-34%
	EB	49.1	00:33:20	00:29:02	-00:04:18	-13%	00:31:03	00:27:46	-00:03:17	-11%	00:30:53	00:27:52	-00:03:01	-10%	00:42:58	00:29:14	-00:13:44	-32%
11_2	WB	59.4	00:37:35	00:37:59	00:00:24	1%	00:39:12	00:39:59	00:00:47	2%	00:38:40	00:39:41	00:01:01	3%	00:48:42	00:52:49	00:04:07	8%
	EB	59.4	00:37:00	00:37:27	00:00:27	1%	00:36:56	00:37:17	00:00:21	1%	00:35:58	00:36:23	00:00:25	1%	00:39:02	00:41:23	00:02:21	6%
12	WB	107.4	01:41:12	01:41:08	-00:00:04	0%	01:40:31	01:40:29	-00:00:02	0%	01:42:46	01:42:41	-00:00:05	0%	01:46:37	01:46:08	-00:00:29	0%
	EB	107.3	01:42:44	01:42:37	-00:00:07	0%	01:39:59	01:40:00	00:00:01	0%	01:44:04	01:43:56	-00:00:08	0%	01:41:50	01:41:30	-00:00:20	0%

O.3 Low Growth 2041

Route	Direction	Distance (Km)	AM				IP				PM				Busy Period			
			Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference
1	WB	270.5	02:49:42	02:49:39	-00:00:03	0%	02:48:57	02:48:48	-00:00:09	0%	03:09:03	03:08:40	-00:00:23	0%	03:07:42	03:06:25	-00:01:17	-1%
	EB	282.4	03:00:36	03:00:09	-00:00:27	0%	02:49:37	02:49:30	-00:00:07	0%	03:00:17	02:59:49	-00:00:28	0%	03:07:07	03:05:08	-00:01:59	-1%
2	WB	239.1	02:44:37	02:41:42	-00:02:55	-2%	02:46:32	02:44:15	-00:02:17	-1%	02:55:01	02:52:53	-00:02:08	-1%	03:18:19	03:07:00	-00:11:19	-6%
	EB	238.7	02:45:04	02:41:27	-00:03:37	-2%	02:39:45	02:36:49	-00:02:56	-2%	02:41:30	02:39:09	-00:02:21	-1%	03:02:34	02:53:10	-00:09:24	-5%
3	WB	242.8	03:27:02	03:27:01	-00:00:01	0%	03:24:43	03:24:45	00:00:02	0%	03:36:59	03:37:12	00:00:13	0%	03:32:47	03:33:52	00:01:05	1%
	EB	242.7	03:26:36	03:26:47	00:00:11	0%	03:20:05	03:20:11	00:00:06	0%	03:28:33	03:28:39	00:00:06	0%	03:25:45	03:25:50	00:00:05	0%
4	WB	256.2	03:14:55	03:14:56	00:00:01	0%	03:13:30	03:13:28	-00:00:02	0%	03:26:10	03:26:05	-00:00:05	0%	03:28:38	03:28:53	00:00:15	0%
	EB	256.0	03:17:43	03:17:47	00:00:04	0%	03:05:33	03:05:31	-00:00:02	0%	03:10:56	03:10:56	00:00:00	0%	03:22:35	03:22:41	00:00:06	0%
5	WB	40.2	00:33:02	00:33:17	00:00:15	1%	00:33:06	00:33:20	00:00:14	1%	00:33:50	00:34:08	00:00:18	1%	00:33:53	00:34:14	00:00:21	1%
	EB	40.2	00:34:02	00:34:21	00:00:19	1%	00:33:08	00:33:15	00:00:07	0%	00:32:58	00:33:10	00:00:12	1%	00:34:17	00:34:32	00:00:15	1%
6	WB	26.5	00:26:24	00:26:14	-00:00:10	-1%	00:25:40	00:25:21	-00:00:19	-1%	00:27:12	00:26:33	-00:00:39	-2%	00:28:30	00:25:51	-00:02:39	-9%
	EB	26.5	00:26:28	00:26:09	-00:00:19	-1%	00:25:04	00:25:16	00:00:12	1%	00:25:39	00:25:47	00:00:08	1%	00:28:24	00:25:23	-00:03:01	-11%
7	WB	41.1	00:34:59	00:34:59	00:00:00	0%	00:34:49	00:34:48	-00:00:01	0%	00:35:20	00:35:19	-00:00:01	0%	00:35:10	00:35:05	-00:00:05	0%
	EB	41.2	00:36:43	00:36:33	-00:00:10	0%	00:35:26	00:35:23	-00:00:03	0%	00:35:52	00:35:48	-00:00:04	0%	00:36:01	00:35:51	-00:00:10	0%
8	NB	38.6	00:37:52	00:38:21	00:00:29	1%	00:36:42	00:37:08	00:00:26	1%	00:37:50	00:38:19	00:00:29	1%	00:37:14	00:37:48	00:00:34	2%
	SB	38.6	00:38:22	00:38:56	00:00:34	1%	00:37:06	00:37:35	00:00:29	1%	00:38:18	00:38:50	00:00:32	1%	00:37:33	00:38:08	00:00:35	2%
9	NB	25.7	00:28:11	00:27:49	-00:00:22	-1%	00:27:38	00:27:33	-00:00:05	0%	00:30:02	00:29:59	-00:00:03	0%	00:27:56	00:27:19	-00:00:37	-2%
	SB	25.7	00:31:00	00:30:36	-00:00:24	-1%	00:28:38	00:28:34	-00:00:04	0%	00:29:44	00:29:38	-00:00:06	0%	00:30:17	00:28:39	-00:01:38	-5%
10	NB	23.6	00:24:32	00:24:29	-00:00:03	0%	00:23:42	00:23:43	00:00:01	0%	00:24:39	00:24:42	00:00:03	0%	00:23:54	00:23:47	-00:00:07	0%
	SB	23.6	00:25:53	00:25:55	00:00:02	0%	00:24:31	00:24:32	00:00:01	0%	00:25:15	00:25:17	00:00:02	0%	00:24:23	00:24:23	00:00:00	0%
11	WB	108.3	01:10:10	01:07:07	-00:03:03	-4%	01:12:07	01:09:31	-00:02:36	-4%	01:12:55	01:10:09	-00:02:46	-4%	01:40:05	01:27:05	-00:13:00	-13%
	EB	108.5	01:12:08	01:07:51	-00:04:17	-6%	01:09:16	01:05:59	-00:03:17	-5%	01:07:42	01:04:51	-00:02:51	-4%	01:26:38	01:16:04	-00:10:34	-12%
11_1	WB	48.9	00:31:13	00:27:40	-00:03:33	-11%	00:31:31	00:27:54	-00:03:37	-11%	00:32:58	00:29:00	-00:03:58	-12%	00:47:37	00:30:23	-00:17:14	-36%
	EB	49.1	00:34:25	00:29:21	-00:05:04	-15%	00:31:46	00:28:03	-00:03:43	-12%	00:31:24	00:28:06	-00:03:18	-11%	00:46:08	00:29:56	-00:16:12	-35%
11_2	WB	59.4	00:38:57	00:39:26	00:00:29	1%	00:40:35	00:41:36	00:01:01	3%	00:39:57	00:41:08	00:01:11	3%	00:52:28	00:56:41	00:04:13	8%
	EB	59.4	00:37:43	00:38:29	00:00:46	2%	00:37:30	00:37:55	00:00:25	1%	00:36:17	00:36:45	00:00:28	1%	00:40:29	00:46:08	00:05:39	14%
12	WB	107.4	01:42:33	01:42:26	-00:00:07	0%	01:41:34	01:41:27	-00:00:07	0%	01:44:33	01:44:27	-00:00:06	0%	01:47:56	01:47:49	-00:00:07	0%
	EB	107.3	01:44:15	01:44:05	-00:00:10	0%	01:40:53	01:40:48	-00:00:05	0%	01:44:47	01:44:41	-00:00:06	0%	01:43:51	01:43:08	-00:00:43	-1%

O.4 Low Growth 2051

Route	Direction	Distance (Km)	AM				IP				PM				Busy Period			
			Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference
1	WB	270.5	02:53:34	02:53:26	-00:00:08	0%	02:53:16	02:53:02	-00:00:14	0%	03:16:21	03:16:07	-00:00:14	0%	03:17:35	03:15:20	-00:02:15	-1%
	EB	282.4	03:06:21	03:05:50	-00:00:31	0%	02:54:43	02:54:32	-00:00:11	0%	03:05:19	03:04:54	-00:00:25	0%	03:18:31	03:15:38	-00:02:53	-1%
2	WB	239.1	02:48:56	02:45:47	-00:03:09	-2%	02:51:35	02:49:21	-00:02:14	-1%	03:00:31	02:57:42	-00:02:49	-2%	03:24:49	03:13:37	-00:11:12	-5%
	EB	238.7	02:49:34	02:45:49	-00:03:45	-2%	02:43:12	02:40:06	-00:03:06	-2%	02:44:31	02:42:02	-00:02:29	-2%	03:10:10	03:00:34	-00:09:36	-5%
3	WB	242.8	03:31:06	03:31:11	00:00:05	0%	03:28:51	03:29:04	00:00:13	0%	03:42:56	03:42:49	-00:00:07	0%	03:37:37	03:39:34	00:01:57	1%
	EB	242.7	03:30:45	03:30:44	-00:00:01	0%	03:22:48	03:22:55	00:00:07	0%	03:31:35	03:31:45	00:00:10	0%	03:29:12	03:30:03	00:00:51	0%
4	WB	256.2	03:21:05	03:20:46	-00:00:19	0%	03:19:09	03:19:10	00:00:01	0%	03:29:51	03:29:39	-00:00:12	0%	03:36:35	03:36:04	-00:00:31	0%
	EB	256.0	03:23:02	03:23:06	00:00:04	0%	03:10:21	03:10:14	-00:00:07	0%	03:13:48	03:13:52	00:00:04	0%	03:28:26	03:28:57	00:00:31	0%
5	WB	40.2	00:33:16	00:33:35	00:00:19	1%	00:33:26	00:33:45	00:00:19	1%	00:34:14	00:34:31	00:00:17	1%	00:34:26	00:35:00	00:00:34	2%
	EB	40.2	00:34:26	00:34:51	00:00:25	1%	00:33:23	00:33:34	00:00:11	1%	00:33:14	00:33:26	00:00:12	1%	00:34:36	00:34:56	00:00:20	1%
6	WB	26.5	00:26:37	00:26:19	-00:00:18	-1%	00:25:51	00:25:27	-00:00:24	-2%	00:27:36	00:26:46	-00:00:50	-3%	00:29:22	00:26:08	-00:03:14	-11%
	EB	26.5	00:26:53	00:26:13	-00:00:40	-2%	00:25:12	00:25:18	00:00:06	0%	00:25:40	00:25:49	00:00:09	1%	00:29:05	00:25:29	-00:03:36	-12%
7	WB	41.1	00:35:05	00:35:04	-00:00:01	0%	00:34:55	00:34:53	-00:00:02	0%	00:35:27	00:35:29	00:00:02	0%	00:35:21	00:35:15	-00:00:06	0%
	EB	41.2	00:36:57	00:36:47	-00:00:10	0%	00:35:34	00:35:31	-00:00:03	0%	00:35:59	00:35:55	-00:00:04	0%	00:36:22	00:36:07	-00:00:15	-1%
8	NB	38.6	00:38:13	00:38:43	00:00:30	1%	00:37:02	00:37:28	00:00:26	1%	00:38:13	00:38:46	00:00:33	1%	00:37:35	00:38:10	00:00:35	2%
	SB	38.6	00:38:55	00:39:29	00:00:34	1%	00:37:29	00:37:56	00:00:27	1%	00:38:37	00:39:15	00:00:38	2%	00:38:00	00:38:35	00:00:35	2%
9	NB	25.7	00:28:24	00:28:05	-00:00:19	-1%	00:27:44	00:27:40	-00:00:04	0%	00:30:07	00:30:01	-00:00:06	0%	00:28:14	00:27:34	-00:00:40	-2%
	SB	25.7	00:30:53	00:30:28	-00:00:25	-1%	00:28:45	00:28:42	-00:00:03	0%	00:29:49	00:29:51	00:00:02	0%	00:30:44	00:28:49	-00:01:55	-6%
10	NB	23.6	00:24:42	00:24:39	-00:00:03	0%	00:23:50	00:23:51	00:00:01	0%	00:24:59	00:25:02	00:00:03	0%	00:24:05	00:23:57	-00:00:08	-1%
	SB	23.6	00:26:05	00:26:08	00:00:03	0%	00:24:40	00:24:41	00:00:01	0%	00:25:24	00:25:27	00:00:03	0%	00:24:27	00:24:24	-00:00:03	0%
11	WB	108.3	01:11:54	01:08:35	-00:03:19	-5%	01:14:07	01:11:30	-00:02:37	-4%	01:15:07	01:11:53	-00:03:14	-4%	01:43:21	01:30:23	-00:12:58	-13%
	EB	108.5	01:13:34	01:09:06	-00:04:28	-6%	01:10:32	01:07:00	-00:03:32	-5%	01:08:28	01:05:31	-00:02:57	-4%	01:31:28	01:20:14	-00:11:14	-12%
11_1	WB	48.9	00:31:51	00:27:55	-00:03:56	-12%	00:32:17	00:28:09	-00:04:08	-13%	00:34:05	00:29:27	-00:04:38	-14%	00:49:05	00:30:56	-00:18:09	-37%
	EB	49.1	00:35:12	00:29:41	-00:05:31	-16%	00:32:30	00:28:20	-00:04:10	-13%	00:31:48	00:28:21	-00:03:27	-11%	00:48:03	00:30:30	-00:17:33	-37%
11_2	WB	59.4	00:40:03	00:40:39	00:00:36	1%	00:41:49	00:43:21	00:01:32	4%	00:41:01	00:42:26	00:01:25	3%	00:54:15	00:59:27	00:05:12	10%
	EB	59.4	00:38:22	00:39:24	00:01:02	3%	00:38:02	00:38:39	00:00:37	2%	00:36:39	00:37:09	00:00:30	1%	00:43:25	00:49:43	00:06:18	15%
12	WB	107.4	01:44:05	01:44:02	-00:00:03	0%	01:42:56	01:42:54	-00:00:02	0%	01:46:21	01:46:14	-00:00:07	0%	01:49:49	01:50:27	00:00:38	1%
	EB	107.3	01:45:45	01:45:23	-00:00:22	0%	01:41:39	01:41:33	-00:00:06	0%	01:45:38	01:45:33	-00:00:05	0%	01:45:01	01:44:29	-00:00:32	-1%

O.5 High Growth 2026

Route	Direction	Distance (Km)	AM				IP				PM				Busy Period			
			Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference
1	WB	270.5	02:46:07	02:46:06	-00:00:01	0%	02:45:42	02:45:32	-00:00:10	0%	03:02:52	03:02:44	-00:00:08	0%	02:56:56	02:56:14	-00:00:42	0%
	EB	282.4	02:55:41	02:55:23	-00:00:18	0%	02:45:32	02:45:16	-00:00:16	0%	02:55:03	02:54:47	-00:00:16	0%	02:56:20	02:55:05	-00:01:15	-1%
2	WB	239.1	02:41:44	02:38:47	-00:02:57	-2%	02:42:46	02:40:33	-00:02:13	-1%	02:51:32	02:48:51	-00:02:41	-2%	03:09:39	02:59:08	-00:10:31	-6%
	EB	238.7	02:41:34	02:37:37	-00:03:57	-2%	02:36:34	02:34:12	-00:02:22	-2%	02:39:02	02:36:38	-00:02:24	-2%	02:56:01	02:45:38	-00:10:23	-6%
3	WB	242.8	03:25:41	03:25:37	-00:00:04	0%	03:22:16	03:22:26	00:00:10	0%	03:35:20	03:35:19	-00:00:01	0%	03:29:05	03:29:37	00:00:32	0%
	EB	242.7	03:24:56	03:25:11	00:00:15	0%	03:18:24	03:18:39	00:00:15	0%	03:27:08	03:27:34	00:00:26	0%	03:22:36	03:22:49	00:00:13	0%
4	WB	256.2	03:10:58	03:11:01	00:00:03	0%	03:08:32	03:08:33	00:00:01	0%	03:19:23	03:19:28	00:00:05	0%	03:19:57	03:20:20	00:00:23	0%
	EB	256.0	03:13:33	03:13:33	00:00:00	0%	03:01:51	03:01:53	00:00:02	0%	03:05:16	03:05:18	00:00:02	0%	03:17:11	03:16:47	-00:00:24	0%
5	WB	40.2	00:32:37	00:32:51	00:00:14	1%	00:32:40	00:32:55	00:00:15	1%	00:33:03	00:33:25	00:00:22	1%	00:33:15	00:33:27	00:00:12	1%
	EB	40.2	00:33:37	00:33:53	00:00:16	1%	00:32:38	00:32:42	00:00:04	0%	00:32:28	00:32:36	00:00:08	0%	00:33:30	00:33:49	00:00:19	1%
6	WB	26.5	00:26:33	00:26:20	-00:00:13	-1%	00:25:36	00:25:22	-00:00:14	-1%	00:27:05	00:26:39	-00:00:26	-2%	00:28:16	00:25:51	-00:02:25	-9%
	EB	26.5	00:26:39	00:26:21	-00:00:18	-1%	00:25:07	00:25:20	00:00:13	1%	00:25:45	00:25:55	00:00:10	1%	00:28:11	00:25:29	-00:02:42	-10%
7	WB	41.1	00:34:56	00:34:57	00:00:01	0%	00:34:48	00:34:48	00:00:00	0%	00:35:21	00:35:21	00:00:00	0%	00:35:06	00:35:04	-00:00:02	0%
	EB	41.2	00:37:08	00:36:55	-00:00:13	-1%	00:35:22	00:35:21	-00:00:01	0%	00:35:50	00:35:47	-00:00:03	0%	00:35:52	00:35:44	-00:00:08	0%
8	NB	38.6	00:37:55	00:38:24	00:00:29	1%	00:36:35	00:37:01	00:00:26	1%	00:37:50	00:38:18	00:00:28	1%	00:37:03	00:37:37	00:00:34	2%
	SB	38.6	00:38:36	00:39:10	00:00:34	1%	00:37:03	00:37:31	00:00:28	1%	00:38:12	00:38:49	00:00:37	2%	00:37:20	00:37:56	00:00:36	2%
9	NB	25.7	00:28:21	00:27:57	-00:00:24	-1%	00:27:42	00:27:38	-00:00:04	0%	00:30:27	00:30:20	-00:00:07	0%	00:27:58	00:27:26	-00:00:32	-2%
	SB	25.7	00:31:28	00:30:56	-00:00:32	-2%	00:28:29	00:28:39	00:00:10	1%	00:29:37	00:29:41	00:00:04	0%	00:30:04	00:28:48	-00:01:16	-4%
10	NB	23.6	00:24:40	00:24:38	-00:00:02	0%	00:23:46	00:23:47	00:00:01	0%	00:24:55	00:24:59	00:00:04	0%	00:23:55	00:23:48	-00:00:07	0%
	SB	23.6	00:26:10	00:26:07	-00:00:03	0%	00:24:31	00:24:33	00:00:02	0%	00:25:19	00:25:20	00:00:01	0%	00:24:20	00:24:17	-00:00:03	0%
11	WB	108.3	01:09:42	01:06:38	-00:03:04	-4%	01:11:23	01:08:52	-00:02:31	-4%	01:12:30	01:09:23	-00:03:07	-4%	01:35:26	01:23:51	-00:11:35	-12%
	EB	108.5	01:11:35	01:07:03	-00:04:32	-6%	01:08:21	01:05:26	-00:02:55	-4%	01:07:28	01:04:36	-00:02:52	-4%	01:23:26	01:11:42	-00:11:44	-14%
11_1	WB	48.9	00:30:58	00:27:31	-00:03:27	-11%	00:31:22	00:27:48	-00:03:34	-11%	00:33:02	00:28:57	-00:04:05	-12%	00:45:51	00:29:57	-00:15:54	-35%
	EB	49.1	00:34:21	00:29:15	-00:05:06	-15%	00:31:16	00:27:53	-00:03:23	-11%	00:31:14	00:28:00	-00:03:14	-10%	00:44:06	00:29:21	-00:14:45	-33%
11_2	WB	59.4	00:38:44	00:39:06	00:00:22	1%	00:40:01	00:41:04	00:01:03	3%	00:39:28	00:40:25	00:00:57	2%	00:49:34	00:53:54	00:04:20	9%
	EB	59.4	00:37:13	00:37:48	00:00:35	2%	00:37:04	00:37:32	00:00:28	1%	00:36:13	00:36:35	00:00:22	1%	00:39:20	00:42:21	00:03:01	8%
12	WB	107.4	01:43:30	01:43:20	-00:00:10	0%	01:41:47	01:41:47	00:00:00	0%	01:46:02	01:45:48	-00:00:14	0%	01:47:55	01:47:43	-00:00:12	0%
	EB	107.3	01:45:01	01:44:51	-00:00:10	0%	01:41:01	01:41:00	-00:00:01	0%	01:45:20	01:45:34	00:00:14	0%	01:42:53	01:42:28	-00:00:25	0%

O.6 High Growth 2031

Route	Direction	Distance (Km)	AM				IP				PM				Busy Period			
			Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference
1	WB	270.5	02:48:37	02:48:34	-00:00:03	0%	02:47:37	02:47:32	-00:00:05	0%	03:07:01	03:06:31	-00:00:30	0%	03:05:29	03:04:19	-00:01:10	-1%
	EB	282.4	03:00:13	02:59:46	-00:00:27	0%	02:48:52	02:48:40	-00:00:12	0%	02:58:54	02:58:16	-00:00:38	0%	03:04:47	03:03:24	-00:01:23	-1%
2	WB	239.1	02:45:24	02:42:08	-00:03:16	-2%	02:46:49	02:44:15	-00:02:34	-2%	02:55:21	02:53:25	-00:01:56	-1%	03:19:18	03:07:07	-00:12:11	-6%
	EB	238.7	02:45:50	02:41:38	-00:04:12	-3%	02:39:22	02:36:38	-00:02:44	-2%	02:41:12	02:39:12	-00:02:00	-1%	03:03:32	02:54:11	-00:09:21	-5%
3	WB	242.8	03:28:53	03:28:50	-00:00:03	0%	03:25:36	03:25:41	00:00:05	0%	03:38:25	03:38:38	00:00:13	0%	03:34:49	03:36:13	00:01:24	1%
	EB	242.7	03:29:04	03:29:11	00:00:07	0%	03:20:43	03:20:59	00:00:16	0%	03:29:25	03:29:44	00:00:19	0%	03:26:13	03:26:39	00:00:26	0%
4	WB	256.2	03:15:56	03:15:59	00:00:03	0%	03:13:14	03:13:15	00:00:01	0%	03:26:24	03:26:29	00:00:05	0%	03:28:18	03:28:46	00:00:28	0%
	EB	256.0	03:18:22	03:18:17	-00:00:05	0%	03:05:04	03:05:03	-00:00:01	0%	03:10:09	03:10:20	00:00:11	0%	03:22:51	03:23:21	00:00:30	0%
5	WB	40.2	00:33:10	00:33:31	00:00:21	1%	00:33:06	00:33:21	00:00:15	1%	00:33:42	00:34:00	00:00:18	1%	00:33:56	00:34:22	00:00:26	1%
	EB	40.2	00:34:04	00:34:22	00:00:18	1%	00:33:08	00:33:15	00:00:07	0%	00:33:01	00:33:13	00:00:12	1%	00:34:11	00:34:29	00:00:18	1%
6	WB	26.5	00:27:22	00:26:49	-00:00:33	-2%	00:25:56	00:25:32	-00:00:24	-2%	00:27:40	00:26:55	-00:00:45	-3%	00:29:09	00:26:06	-00:03:03	-10%
	EB	26.5	00:27:00	00:26:26	-00:00:34	-2%	00:25:14	00:25:25	00:00:11	1%	00:25:57	00:26:05	00:00:08	1%	00:28:59	00:25:38	-00:03:21	-12%
7	WB	41.1	00:35:08	00:35:08	00:00:00	0%	00:34:58	00:34:57	-00:00:01	0%	00:35:36	00:35:35	-00:00:01	0%	00:35:20	00:35:14	-00:00:06	0%
	EB	41.2	00:37:29	00:37:10	-00:00:19	-1%	00:35:37	00:35:36	-00:00:01	0%	00:36:07	00:36:03	-00:00:04	0%	00:36:17	00:36:06	-00:00:11	-1%
8	NB	38.6	00:38:32	00:38:59	00:00:27	1%	00:36:57	00:37:24	00:00:27	1%	00:38:04	00:38:38	00:00:34	1%	00:37:26	00:38:01	00:00:35	2%
	SB	38.6	00:38:46	00:39:27	00:00:41	2%	00:37:26	00:37:54	00:00:28	1%	00:38:53	00:39:28	00:00:35	2%	00:37:59	00:38:34	00:00:35	2%
9	NB	25.7	00:28:55	00:28:31	-00:00:24	-1%	00:27:55	00:27:51	-00:00:04	0%	00:30:39	00:30:29	-00:00:10	-1%	00:28:22	00:27:43	-00:00:39	-2%
	SB	25.7	00:31:33	00:30:52	-00:00:41	-2%	00:28:50	00:28:44	-00:00:06	0%	00:30:14	00:30:10	-00:00:04	0%	00:31:08	00:29:21	-00:01:47	-6%
10	NB	23.6	00:25:01	00:24:58	-00:00:03	0%	00:23:53	00:23:54	00:00:01	0%	00:24:56	00:25:01	00:00:05	0%	00:24:02	00:23:56	-00:00:06	0%
	SB	23.6	00:26:21	00:26:18	-00:00:03	0%	00:24:39	00:24:41	00:00:02	0%	00:25:32	00:25:36	00:00:04	0%	00:24:34	00:24:26	-00:00:08	-1%
11	WB	108.3	01:11:24	01:08:00	-00:03:24	-5%	01:13:18	01:10:24	-00:02:54	-4%	01:14:13	01:11:33	-00:02:40	-4%	01:41:51	01:28:06	-00:13:45	-14%
	EB	108.5	01:13:08	01:08:18	-00:04:50	-7%	01:09:37	01:06:20	-00:03:17	-5%	01:08:12	01:05:25	-00:02:47	-4%	01:28:20	01:17:43	-00:10:37	-12%
11_1	WB	48.9	00:31:40	00:27:43	-00:03:57	-12%	00:31:56	00:28:04	-00:03:52	-12%	00:34:03	00:29:47	-00:04:16	-13%	00:49:29	00:30:45	-00:18:44	-38%
	EB	49.1	00:35:28	00:29:50	-00:05:38	-16%	00:32:01	00:28:11	-00:03:50	-12%	00:31:40	00:28:19	-00:03:21	-11%	00:47:42	00:30:09	-00:17:33	-37%
11_2	WB	59.4	00:39:43	00:40:16	00:00:33	1%	00:41:22	00:42:20	00:00:58	2%	00:40:10	00:41:46	00:01:36	4%	00:52:22	00:57:20	00:04:58	9%
	EB	59.4	00:37:39	00:38:28	00:00:49	2%	00:37:36	00:38:08	00:00:32	1%	00:36:32	00:37:05	00:00:33	2%	00:40:38	00:47:34	00:06:56	17%
12	WB	107.4	01:44:35	01:44:27	-00:00:08	0%	01:43:12	01:43:07	-00:00:05	0%	01:46:34	01:46:30	-00:00:04	0%	01:50:33	01:50:54	00:00:21	0%
	EB	107.3	01:46:43	01:46:34	-00:00:09	0%	01:42:05	01:42:04	-00:00:01	0%	01:46:14	01:46:08	-00:00:06	0%	01:44:45	01:44:22	-00:00:23	0%

O.7 High Growth 2041

Route	Direction	Distance (Km)	AM				IP				PM				Busy Period			
			Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference
1	WB	270.5	02:54:20	02:54:11	-00:00:09	0%	02:53:49	02:53:27	-00:00:22	0%	03:17:12	03:17:05	-00:00:07	0%	03:22:31	03:23:04	00:00:33	0%
	EB	282.4	03:08:38	03:07:57	-00:00:41	0%	02:55:47	02:55:30	-00:00:17	0%	03:05:49	03:05:09	-00:00:40	0%	03:23:47	03:20:53	-00:02:54	-1%
2	WB	239.1	02:52:20	02:48:26	-00:03:54	-2%	02:54:26	02:51:44	-00:02:42	-2%	03:04:02	03:00:55	-00:03:07	-2%	03:33:03	03:19:56	-00:13:07	-6%
	EB	238.7	02:53:23	02:49:03	-00:04:20	-2%	02:45:06	02:41:33	-00:03:33	-2%	02:46:04	02:43:34	-00:02:30	-2%	03:17:25	03:06:31	-00:10:54	-6%
3	WB	242.8	03:36:57	03:36:40	-00:00:17	0%	03:32:14	03:32:19	00:00:05	0%	03:50:05	03:51:03	00:00:58	0%	03:45:10	03:47:53	00:02:43	1%
	EB	242.7	03:36:35	03:36:38	00:00:03	0%	03:25:41	03:25:47	00:00:06	0%	03:33:39	03:34:30	00:00:51	0%	03:34:30	03:35:25	00:00:55	0%
4	WB	256.2	03:25:42	03:25:46	00:00:04	0%	03:22:29	03:22:35	00:00:06	0%	03:36:36	03:36:42	00:00:06	0%	03:43:12	03:44:42	00:01:30	1%
	EB	256.0	03:27:39	03:27:46	00:00:07	0%	03:12:27	03:12:28	00:00:01	0%	03:17:56	03:17:46	-00:00:10	0%	03:36:17	03:36:17	00:00:00	0%
5	WB	40.2	00:33:38	00:34:07	00:00:29	1%	00:33:47	00:34:09	00:00:22	1%	00:34:37	00:34:59	00:00:22	1%	00:34:50	00:35:37	00:00:47	2%
	EB	40.2	00:34:45	00:35:21	00:00:36	2%	00:33:39	00:33:54	00:00:15	1%	00:33:33	00:33:48	00:00:15	1%	00:34:58	00:35:23	00:00:25	1%
6	WB	26.5	00:28:58	00:27:21	-00:01:37	-6%	00:26:16	00:25:46	-00:00:30	-2%	00:28:16	00:27:43	-00:00:33	-2%	00:32:54	00:27:08	-00:05:46	-18%
	EB	26.5	00:27:52	00:26:40	-00:01:12	-4%	00:25:32	00:25:31	-00:00:01	0%	00:26:13	00:26:16	00:00:03	0%	00:30:47	00:25:51	-00:04:56	-16%
7	WB	41.1	00:35:21	00:35:18	-00:00:03	0%	00:35:08	00:35:06	-00:00:02	0%	00:36:03	00:35:58	-00:00:05	0%	00:35:42	00:35:32	-00:00:10	0%
	EB	41.2	00:38:36	00:38:05	-00:00:31	-1%	00:35:55	00:35:50	-00:00:05	0%	00:36:37	00:36:29	-00:00:08	0%	00:37:00	00:36:42	-00:00:18	-1%
8	NB	38.6	00:39:02	00:39:32	00:00:30	1%	00:37:33	00:38:04	00:00:31	1%	00:38:49	00:39:26	00:00:37	2%	00:38:08	00:38:48	00:00:40	2%
	SB	38.6	00:40:03	00:40:45	00:00:42	2%	00:38:14	00:38:45	00:00:31	1%	00:39:34	00:40:19	00:00:45	2%	00:39:19	00:39:48	00:00:29	1%
9	NB	25.7	00:29:27	00:29:01	-00:00:26	-1%	00:28:42	00:28:33	-00:00:09	-1%	00:32:10	00:31:45	-00:00:25	-1%	00:29:15	00:28:21	-00:00:54	-3%
	SB	25.7	00:33:43	00:32:38	-00:01:05	-3%	00:29:52	00:29:42	-00:00:10	-1%	00:31:22	00:31:08	-00:00:14	-1%	00:32:27	00:30:36	-00:01:51	-6%
10	NB	23.6	00:25:25	00:25:18	-00:00:07	0%	00:24:15	00:24:18	00:00:03	0%	00:25:28	00:25:37	00:00:09	1%	00:24:30	00:24:17	-00:00:13	-1%
	SB	23.6	00:27:49	00:27:41	-00:00:08	0%	00:25:05	00:25:06	00:00:01	0%	00:26:15	00:26:19	00:00:04	0%	00:25:02	00:24:50	-00:00:12	-1%
11	WB	108.3	01:14:25	01:10:19	-00:04:06	-6%	01:16:37	01:13:26	-00:03:11	-4%	01:18:00	01:14:29	-00:03:31	-5%	01:50:11	01:35:39	-00:14:32	-13%
	EB	108.5	01:15:51	01:10:27	-00:05:24	-7%	01:12:21	01:08:14	-00:04:07	-6%	01:10:09	01:07:00	-00:03:09	-4%	01:36:59	01:23:32	-00:13:27	-14%
11_1	WB	48.9	00:33:17	00:28:12	-00:05:05	-15%	00:33:36	00:28:30	-00:05:06	-15%	00:36:00	00:30:41	-00:05:19	-15%	00:54:11	00:31:50	-00:22:21	-41%
	EB	49.1	00:37:06	00:30:34	-00:06:32	-18%	00:33:44	00:28:42	-00:05:02	-15%	00:32:58	00:28:50	-00:04:08	-13%	00:52:09	00:31:14	-00:20:55	-40%
11_2	WB	59.4	00:41:07	00:42:07	00:01:00	2%	00:43:01	00:44:56	00:01:55	4%	00:41:59	00:43:47	00:01:48	4%	00:56:00	01:03:48	00:07:48	14%
	EB	59.4	00:38:44	00:39:53	00:01:09	3%	00:38:37	00:39:31	00:00:54	2%	00:37:10	00:38:09	00:00:59	3%	00:44:49	00:52:17	00:07:28	17%
12	WB	107.4	01:47:20	01:47:05	-00:00:15	0%	01:45:45	01:45:32	-00:00:13	0%	01:51:02	01:51:56	00:00:54	1%	01:55:52	01:57:24	00:01:32	1%
	EB	107.3	01:49:41	01:49:12	-00:00:29	0%	01:44:13	01:44:02	-00:00:11	0%	01:47:07	01:47:35	00:00:28	0%	01:48:20	01:47:00	-00:01:20	-1%

O.8 High Growth 2051

Route	Direction	Distance (Km)	AM				IP				PM				Busy Period			
			Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference
1	WB	270.5	03:00:20	03:00:03	-00:00:17	0%	03:00:25	02:59:49	-00:00:36	0%	03:25:56	03:25:49	-00:00:07	0%	03:38:51	03:36:38	-00:02:13	-1%
	EB	282.4	03:15:58	03:15:07	-00:00:51	0%	03:02:32	03:02:13	-00:00:19	0%	03:12:00	03:11:38	-00:00:22	0%	03:36:36	03:34:19	-00:02:17	-1%
2	WB	239.1	02:57:52	02:53:54	-00:03:58	-2%	03:00:37	02:58:04	-00:02:33	-1%	03:10:57	03:07:05	-00:03:52	-2%	03:42:04	03:30:36	-00:11:28	-5%
	EB	238.7	02:59:37	02:55:11	-00:04:26	-2%	02:49:50	02:45:54	-00:03:56	-2%	02:50:11	02:46:55	-00:03:16	-2%	03:26:06	03:17:17	-00:08:49	-4%
3	WB	242.8	03:43:57	03:43:55	-00:00:02	0%	03:37:54	03:38:21	00:00:27	0%	03:59:53	03:59:58	00:00:05	0%	03:55:45	03:57:30	00:01:45	1%
	EB	242.7	03:44:11	03:43:43	-00:00:28	0%	03:30:24	03:30:40	00:00:16	0%	03:39:01	03:39:09	00:00:08	0%	03:43:31	03:44:33	00:01:02	0%
4	WB	256.2	03:34:22	03:34:24	00:00:02	0%	03:31:19	03:31:26	00:00:07	0%	03:44:06	03:44:06	00:00:00	0%	03:57:32	03:59:39	00:02:07	1%
	EB	256.0	03:35:40	03:35:50	00:00:10	0%	03:18:43	03:18:41	-00:00:02	0%	03:22:11	03:21:48	-00:00:23	0%	03:47:32	03:48:14	00:00:42	0%
5	WB	40.2	00:34:09	00:34:37	00:00:28	1%	00:34:24	00:34:47	00:00:23	1%	00:35:04	00:35:30	00:00:26	1%	00:35:28	00:37:01	00:01:33	4%
	EB	40.2	00:35:16	00:36:01	00:00:45	2%	00:33:59	00:34:19	00:00:20	1%	00:33:57	00:34:12	00:00:15	1%	00:35:27	00:36:02	00:00:35	2%
6	WB	26.5	00:29:12	00:28:00	-00:01:12	-4%	00:26:45	00:26:06	-00:00:39	-2%	00:31:01	00:30:33	-00:00:28	-2%	00:34:47	00:29:34	-00:05:13	-15%
	EB	26.5	00:28:43	00:26:54	-00:01:49	-6%	00:25:51	00:25:38	-00:00:13	-1%	00:26:27	00:26:28	00:00:01	0%	00:32:20	00:26:04	-00:06:16	-19%
7	WB	41.1	00:35:29	00:35:25	-00:00:04	0%	00:35:17	00:35:16	-00:00:01	0%	00:36:35	00:36:17	-00:00:18	-1%	00:36:06	00:35:46	-00:00:20	-1%
	EB	41.2	00:40:04	00:39:01	-00:01:03	-3%	00:36:09	00:36:02	-00:00:07	0%	00:37:23	00:37:02	-00:00:21	-1%	00:38:15	00:37:29	-00:00:46	-2%
8	NB	38.6	00:39:30	00:40:09	00:00:39	2%	00:38:01	00:38:43	00:00:42	2%	00:39:14	00:40:05	00:00:51	2%	00:38:39	00:39:10	00:00:31	1%
	SB	38.6	00:40:47	00:41:40	00:00:53	2%	00:38:59	00:39:35	00:00:36	2%	00:40:19	00:41:21	00:01:02	3%	00:40:50	00:41:00	00:00:10	0%
9	NB	25.7	00:30:09	00:29:26	-00:00:43	-2%	00:29:05	00:28:54	-00:00:11	-1%	00:32:28	00:32:11	-00:00:17	-1%	00:30:28	00:28:50	-00:01:38	-5%
	SB	25.7	00:34:09	00:33:04	-00:01:05	-3%	00:30:25	00:30:12	-00:00:13	-1%	00:31:40	00:31:41	00:00:01	0%	00:34:02	00:31:55	-00:02:07	-6%
10	NB	23.6	00:25:53	00:25:50	-00:00:03	0%	00:24:35	00:24:38	00:00:03	0%	00:25:58	00:26:11	00:00:13	1%	00:25:04	00:24:35	-00:00:29	-2%
	SB	23.6	00:28:27	00:28:17	-00:00:10	-1%	00:25:23	00:25:19	-00:00:04	0%	00:26:48	00:26:54	00:00:06	0%	00:25:29	00:25:12	-00:00:17	-1%
11	WB	108.3	01:16:41	01:12:21	-00:04:20	-6%	01:19:04	01:15:48	-00:03:16	-4%	01:21:02	01:16:44	-00:04:18	-5%	01:55:12	01:41:18	-00:13:54	-12%
	EB	108.5	01:18:04	01:12:30	-00:05:34	-7%	01:14:30	01:09:55	-00:04:35	-6%	01:11:42	01:07:56	-00:03:46	-5%	01:40:54	01:28:14	-00:12:40	-13%
11_1	WB	48.9	00:34:12	00:28:39	-00:05:33	-16%	00:34:48	00:28:56	-00:05:52	-17%	00:37:25	00:31:06	-00:06:19	-17%	00:56:27	00:32:44	-00:23:43	-42%
	EB	49.1	00:38:19	00:31:12	-00:07:07	-19%	00:34:48	00:29:07	-00:05:41	-16%	00:33:43	00:29:13	-00:04:30	-13%	00:54:36	00:32:15	-00:22:21	-41%
11_2	WB	59.4	00:42:29	00:43:41	00:01:12	3%	00:44:16	00:46:51	00:02:35	6%	00:43:37	00:45:38	00:02:01	5%	00:58:44	01:08:33	00:09:49	17%
	EB	59.4	00:39:44	00:41:17	00:01:33	4%	00:39:42	00:40:48	00:01:06	3%	00:37:58	00:38:42	00:00:44	2%	00:46:17	00:55:59	00:09:42	21%
12	WB	107.4	01:50:07	01:49:50	-00:00:17	0%	01:47:42	01:47:41	-00:00:01	0%	01:55:14	01:55:02	-00:00:12	0%	02:02:17	02:01:54	-00:00:23	0%
	EB	107.3	01:52:59	01:51:46	-00:01:13	-1%	01:46:16	01:46:07	-00:00:09	0%	01:49:18	01:49:10	-00:00:08	0%	01:51:39	01:49:24	-00:02:15	-2%

O.9 Alternative Growth 2026

Route	Direction	Distance (Km)	AM				IP				PM				Busy Period			
			Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference
1	WB	270.5	02:45:09	02:45:07	-00:00:02	0%	02:44:41	02:44:33	-00:00:08	0%	03:01:35	03:01:25	-00:00:10	0%	02:53:52	02:53:22	-00:00:30	0%
	EB	282.4	02:53:36	02:53:20	-00:00:16	0%	02:44:05	02:43:53	-00:00:12	0%	02:53:42	02:53:16	-00:00:26	0%	02:53:30	02:52:21	-00:01:09	-1%
2	WB	239.1	02:39:27	02:36:39	-00:02:48	-2%	02:40:47	02:38:34	-00:02:13	-1%	02:49:14	02:46:45	-00:02:29	-1%	03:04:43	02:56:12	-00:08:31	-5%
	EB	238.7	02:39:50	02:35:54	-00:03:56	-2%	02:35:20	02:32:59	-00:02:21	-2%	02:37:49	02:35:35	-00:02:14	-1%	02:52:51	02:42:49	-00:10:02	-6%
3	WB	242.8	03:23:00	03:22:59	-00:00:01	0%	03:20:33	03:20:37	00:00:04	0%	03:31:34	03:31:38	00:00:04	0%	03:27:52	03:27:26	-00:00:26	0%
	EB	242.7	03:22:45	03:22:47	00:00:02	0%	03:17:08	03:17:20	00:00:12	0%	03:25:38	03:25:49	00:00:11	0%	03:20:43	03:21:12	00:00:29	0%
4	WB	256.2	03:08:28	03:08:26	-00:00:02	0%	03:06:06	03:06:05	-00:00:01	0%	03:16:31	03:16:35	00:00:04	0%	03:16:29	03:16:58	00:00:29	0%
	EB	256.0	03:10:59	03:10:53	-00:00:06	0%	03:00:11	03:00:13	00:00:02	0%	03:03:31	03:03:35	00:00:04	0%	03:13:48	03:13:08	-00:00:40	0%
5	WB	40.2	00:32:26	00:32:41	00:00:15	1%	00:32:29	00:32:42	00:00:13	1%	00:32:50	00:33:14	00:00:24	1%	00:33:04	00:33:16	00:00:12	1%
	EB	40.2	00:33:27	00:33:40	00:00:13	1%	00:32:27	00:32:34	00:00:07	0%	00:32:18	00:32:25	00:00:07	0%	00:33:18	00:33:36	00:00:18	1%
6	WB	26.5	00:26:14	00:26:08	-00:00:06	0%	00:25:28	00:25:19	-00:00:09	-1%	00:27:02	00:26:42	-00:00:20	-1%	00:27:57	00:25:45	-00:02:12	-8%
	EB	26.5	00:26:32	00:26:17	-00:00:15	-1%	00:25:03	00:25:17	00:00:14	1%	00:25:38	00:25:49	00:00:11	1%	00:27:42	00:25:25	-00:02:17	-8%
7	WB	41.1	00:34:50	00:34:51	00:00:01	0%	00:34:45	00:34:45	00:00:00	0%	00:35:21	00:35:18	-00:00:03	0%	00:35:00	00:34:57	-00:00:03	0%
	EB	41.2	00:36:58	00:36:43	-00:00:15	-1%	00:35:12	00:35:11	-00:00:01	0%	00:35:39	00:35:38	-00:00:01	0%	00:35:39	00:35:32	-00:00:07	0%
8	NB	38.6	00:37:40	00:38:06	00:00:26	1%	00:36:22	00:36:49	00:00:27	1%	00:37:36	00:38:04	00:00:28	1%	00:36:52	00:37:26	00:00:34	2%
	SB	38.6	00:38:12	00:38:49	00:00:37	2%	00:36:45	00:37:11	00:00:26	1%	00:37:55	00:38:31	00:00:36	2%	00:37:04	00:37:42	00:00:38	2%
9	NB	25.7	00:28:46	00:28:30	-00:00:16	-1%	00:27:34	00:27:33	-00:00:01	0%	00:30:14	00:30:22	00:00:08	0%	00:27:50	00:27:21	-00:00:29	-2%
	SB	25.7	00:31:12	00:30:44	-00:00:28	-1%	00:28:23	00:28:31	00:00:08	0%	00:29:55	00:29:52	-00:00:03	0%	00:29:32	00:28:39	-00:00:53	-3%
10	NB	23.6	00:24:56	00:24:52	-00:00:04	0%	00:23:45	00:23:45	00:00:00	0%	00:25:00	00:25:00	00:00:00	0%	00:23:47	00:23:41	-00:00:06	0%
	SB	23.6	00:25:55	00:25:53	-00:00:02	0%	00:24:24	00:24:26	00:00:02	0%	00:25:24	00:25:24	00:00:00	0%	00:24:17	00:24:15	-00:00:02	0%
11	WB	108.3	01:08:27	01:05:34	-00:02:53	-4%	01:10:23	01:07:51	-00:02:32	-4%	01:11:19	01:08:23	-00:02:56	-4%	01:31:30	01:22:01	-00:09:29	-10%
	EB	108.5	01:10:39	01:06:25	-00:04:14	-6%	01:07:46	01:04:57	-00:02:49	-4%	01:06:54	01:04:12	-00:02:42	-4%	01:21:27	01:10:07	-00:11:20	-14%
11_1	WB	48.9	00:30:51	00:27:35	-00:03:16	-11%	00:31:10	00:27:45	-00:03:25	-11%	00:32:34	00:28:46	-00:03:48	-12%	00:43:56	00:29:52	-00:14:04	-32%
	EB	49.1	00:33:42	00:28:59	-00:04:43	-14%	00:30:57	00:27:44	-00:03:13	-10%	00:30:55	00:27:53	-00:03:02	-10%	00:42:37	00:29:05	-00:13:32	-32%
11_2	WB	59.4	00:37:35	00:37:59	00:00:24	1%	00:39:13	00:40:06	00:00:53	2%	00:38:44	00:39:36	00:00:52	2%	00:47:33	00:52:09	00:04:36	10%
	EB	59.4	00:36:57	00:37:26	00:00:29	1%	00:36:48	00:37:12	00:00:24	1%	00:35:59	00:36:18	00:00:19	1%	00:38:49	00:41:01	00:02:12	6%
12	WB	107.4	01:41:55	01:41:51	-00:00:04	0%	01:40:58	01:40:53	-00:00:05	0%	01:43:28	01:43:22	-00:00:06	0%	01:47:30	01:46:27	-00:01:03	-1%
	EB	107.3	01:43:39	01:43:30	-00:00:09	0%	01:40:14	01:40:12	-00:00:02	0%	01:44:26	01:44:24	-00:00:02	0%	01:41:52	01:41:39	-00:00:13	0%

O.10 Alternative Growth 2031

Route	Direction	Distance (Km)	AM				IP				PM				Busy Period			
			Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference
1	WB	270.5	02:47:12	02:47:11	-00:00:01	0%	02:46:13	02:46:06	-00:00:07	0%	03:04:26	03:04:05	-00:00:21	0%	03:00:30	02:59:39	-00:00:51	0%
	EB	282.4	02:57:26	02:57:00	-00:00:26	0%	02:46:52	02:46:41	-00:00:11	0%	02:56:58	02:56:28	-00:00:30	0%	02:59:59	02:58:31	-00:01:28	-1%
2	WB	239.1	02:43:00	02:40:00	-00:03:00	-2%	02:44:01	02:41:38	-00:02:23	-1%	02:52:34	02:50:22	-00:02:12	-1%	03:13:41	03:02:18	-00:11:23	-6%
	EB	238.7	02:43:07	02:39:05	-00:04:02	-2%	02:37:36	02:35:05	-00:02:31	-2%	02:39:43	02:37:43	-00:02:00	-1%	02:58:26	02:48:33	-00:09:53	-6%
3	WB	242.8	03:26:07	03:26:07	00:00:00	0%	03:22:49	03:22:53	00:00:04	0%	03:34:48	03:35:01	00:00:13	0%	03:30:49	03:31:05	00:00:16	0%
	EB	242.7	03:25:43	03:25:53	00:00:10	0%	03:18:51	03:19:02	00:00:11	0%	03:27:26	03:27:41	00:00:15	0%	03:23:42	03:24:03	00:00:21	0%
4	WB	256.2	03:12:20	03:12:41	00:00:21	0%	03:10:06	03:10:06	00:00:00	0%	03:22:43	03:22:49	00:00:06	0%	03:22:56	03:23:34	00:00:38	0%
	EB	256.0	03:15:00	03:14:56	-00:00:04	0%	03:03:00	03:02:58	-00:00:02	0%	03:07:41	03:07:42	00:00:01	0%	03:19:17	03:19:00	-00:00:17	0%
5	WB	40.2	00:32:56	00:33:14	00:00:18	1%	00:32:52	00:33:06	00:00:14	1%	00:33:26	00:33:46	00:00:20	1%	00:33:36	00:33:46	00:00:10	0%
	EB	40.2	00:33:50	00:34:07	00:00:17	1%	00:32:54	00:33:00	00:00:06	0%	00:32:47	00:32:58	00:00:11	1%	00:33:55	00:34:13	00:00:18	1%
6	WB	26.5	00:26:43	00:26:27	-00:00:16	-1%	00:25:43	00:25:25	-00:00:18	-1%	00:27:30	00:26:53	-00:00:37	-2%	00:28:32	00:25:54	-00:02:38	-9%
	EB	26.5	00:26:45	00:26:21	-00:00:24	-1%	00:25:08	00:25:20	00:00:12	1%	00:25:47	00:25:56	00:00:09	1%	00:28:28	00:25:32	-00:02:56	-10%
7	WB	41.1	00:35:00	00:35:00	00:00:00	0%	00:34:51	00:34:51	00:00:00	0%	00:35:30	00:35:26	-00:00:04	0%	00:35:10	00:35:05	-00:00:05	0%
	EB	41.2	00:37:13	00:36:56	-00:00:17	-1%	00:35:25	00:35:23	-00:00:02	0%	00:35:54	00:35:51	-00:00:03	0%	00:35:57	00:35:50	-00:00:07	0%
8	NB	38.6	00:38:13	00:38:41	00:00:28	1%	00:36:40	00:37:04	00:00:24	1%	00:37:43	00:38:17	00:00:34	2%	00:37:12	00:37:49	00:00:37	2%
	SB	38.6	00:38:20	00:38:56	00:00:36	2%	00:37:04	00:37:33	00:00:29	1%	00:38:25	00:38:57	00:00:32	1%	00:37:32	00:38:05	00:00:33	1%
9	NB	25.7	00:29:17	00:28:58	-00:00:19	-1%	00:27:43	00:27:41	-00:00:02	0%	00:30:18	00:30:22	00:00:04	0%	00:28:04	00:27:33	-00:00:31	-2%
	SB	25.7	00:30:58	00:30:35	-00:00:23	-1%	00:28:35	00:28:30	-00:00:05	0%	00:30:23	00:30:13	-00:00:10	-1%	00:30:17	00:28:46	-00:01:31	-5%
10	NB	23.6	00:25:13	00:25:08	-00:00:05	0%	00:23:48	00:23:49	00:00:01	0%	00:25:02	00:25:01	-00:00:01	0%	00:23:56	00:23:48	-00:00:08	-1%
	SB	23.6	00:25:57	00:25:57	00:00:00	0%	00:24:31	00:24:32	00:00:01	0%	00:25:36	00:25:37	00:00:01	0%	00:24:19	00:24:17	-00:00:02	0%
11	WB	108.3	01:10:08	01:07:02	-00:03:06	-4%	01:11:46	01:09:08	-00:02:38	-4%	01:12:56	01:10:03	-00:02:53	-4%	01:37:56	01:25:09	-00:12:47	-13%
	EB	108.5	01:12:04	01:07:25	-00:04:39	-6%	01:08:45	01:05:42	-00:03:03	-4%	01:07:32	01:04:51	-00:02:41	-4%	01:24:44	01:13:15	-00:11:29	-14%
11_1	WB	48.9	00:31:12	00:27:43	-00:03:29	-11%	00:31:34	00:27:58	-00:03:36	-11%	00:33:26	00:29:26	-00:04:00	-12%	00:47:19	00:30:22	-00:16:57	-36%
	EB	49.1	00:34:47	00:29:27	-00:05:20	-15%	00:31:29	00:27:59	-00:03:30	-11%	00:31:17	00:28:07	-00:03:10	-10%	00:45:04	00:29:43	-00:15:21	-34%
11_2	WB	59.4	00:38:56	00:39:18	00:00:22	1%	00:40:11	00:41:09	00:00:58	2%	00:39:30	00:40:36	00:01:06	3%	00:50:36	00:54:47	00:04:11	8%
	EB	59.4	00:37:17	00:37:57	00:00:40	2%	00:37:15	00:37:43	00:00:28	1%	00:36:14	00:36:43	00:00:29	1%	00:39:40	00:43:31	00:03:51	10%
12	WB	107.4	01:43:08	01:43:00	-00:00:08	0%	01:41:34	01:41:30	-00:00:04	0%	01:44:43	01:44:34	-00:00:09	0%	01:48:11	01:47:36	-00:00:35	-1%
	EB	107.3	01:44:54	01:44:39	-00:00:15	0%	01:40:57	01:40:54	-00:00:03	0%	01:45:07	01:45:02	-00:00:05	0%	01:43:17	01:42:48	-00:00:29	0%

O.11 Alternative Growth 2041

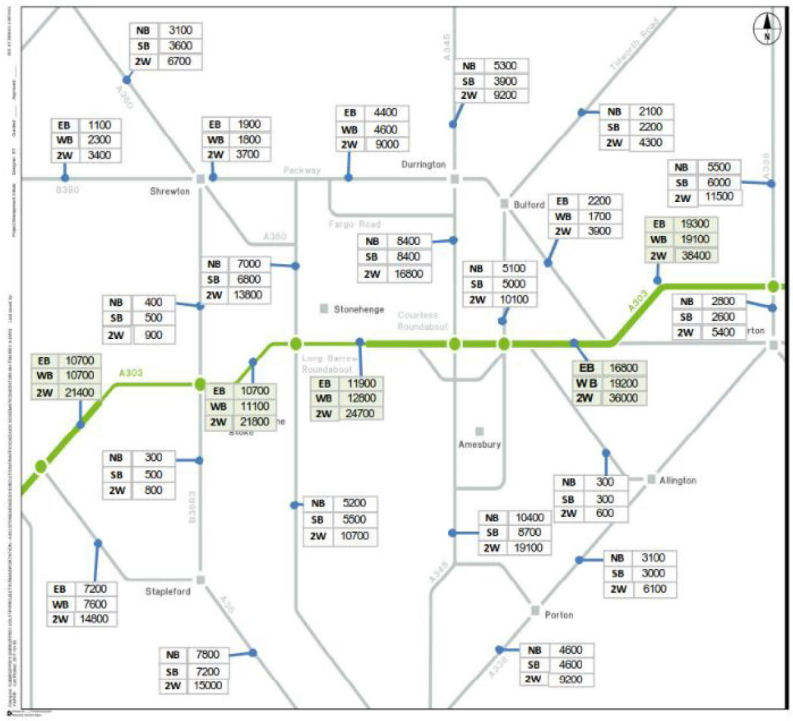
Route	Direction	Distance (Km)	AM				IP				PM				Busy Period			
			Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference
1	WB	270.5	02:51:43	02:51:35	-00:00:08	0%	02:51:17	02:51:00	-00:00:17	0%	03:13:12	03:12:55	-00:00:17	0%	03:14:12	03:12:23	-00:01:49	-1%
	EB	282.4	03:04:43	03:04:11	-00:00:32	0%	02:52:44	02:52:32	-00:00:12	0%	03:03:07	03:02:32	-00:00:35	0%	03:15:45	03:12:53	-00:02:52	-1%
2	WB	239.1	02:48:33	02:45:17	-00:03:16	-2%	02:50:36	02:48:21	-00:02:15	-1%	02:59:51	02:57:10	-00:02:41	-1%	03:26:29	03:12:59	-00:13:30	-7%
	EB	238.7	02:49:18	02:45:03	-00:04:15	-3%	02:42:22	02:39:06	-00:03:16	-2%	02:43:34	02:41:21	-00:02:13	-1%	03:10:24	02:59:44	-00:10:40	-6%
3	WB	242.8	03:31:23	03:31:29	00:00:06	0%	03:28:41	03:28:54	00:00:13	0%	03:42:34	03:42:20	-00:00:14	0%	03:38:15	03:40:33	00:02:18	1%
	EB	242.7	03:31:23	03:31:26	00:00:03	0%	03:22:37	03:22:44	00:00:07	0%	03:31:14	03:31:38	00:00:24	0%	03:29:16	03:30:11	00:00:55	0%
4	WB	256.2	03:20:09	03:20:24	00:00:15	0%	03:17:53	03:17:55	00:00:02	0%	03:31:09	03:31:00	-00:00:09	0%	03:36:07	03:35:57	-00:00:10	0%
	EB	256.0	03:22:22	03:22:25	00:00:03	0%	03:09:02	03:08:52	-00:00:10	0%	03:14:14	03:14:16	00:00:02	0%	03:28:02	03:28:39	00:00:37	0%
5	WB	40.2	00:33:18	00:33:41	00:00:23	1%	00:33:24	00:33:43	00:00:19	1%	00:34:16	00:34:34	00:00:18	1%	00:34:25	00:35:05	00:00:40	2%
	EB	40.2	00:34:29	00:34:54	00:00:25	1%	00:33:24	00:33:33	00:00:09	0%	00:33:14	00:33:29	00:00:15	1%	00:34:37	00:34:58	00:00:21	1%
6	WB	26.5	00:27:26	00:26:42	-00:00:44	-3%	00:25:59	00:25:34	-00:00:25	-2%	00:28:13	00:27:22	-00:00:51	-3%	00:29:47	00:26:21	-00:03:26	-12%
	EB	26.5	00:27:25	00:26:32	-00:00:53	-3%	00:25:18	00:25:25	00:00:07	0%	00:25:56	00:26:02	00:00:06	0%	00:29:44	00:25:40	-00:04:04	-14%
7	WB	41.1	00:35:10	00:35:09	-00:00:01	0%	00:34:59	00:34:58	-00:00:01	0%	00:35:51	00:35:44	-00:00:07	0%	00:35:30	00:35:21	-00:00:09	0%
	EB	41.2	00:37:53	00:37:21	-00:00:32	-1%	00:35:43	00:35:39	-00:00:04	0%	00:36:13	00:36:07	-00:00:06	0%	00:36:32	00:36:16	-00:00:16	-1%
8	NB	38.6	00:38:34	00:39:07	00:00:33	1%	00:37:10	00:37:39	00:00:29	1%	00:38:26	00:39:07	00:00:41	2%	00:37:43	00:38:19	00:00:36	2%
	SB	38.6	00:39:16	00:40:01	00:00:45	2%	00:37:40	00:38:11	00:00:31	1%	00:39:04	00:39:44	00:00:40	2%	00:38:22	00:38:53	00:00:31	1%
9	NB	25.7	00:29:46	00:29:20	-00:00:26	-1%	00:28:18	00:28:12	-00:00:06	0%	00:31:18	00:31:26	00:00:08	0%	00:28:44	00:28:04	-00:00:40	-2%
	SB	25.7	00:32:40	00:31:57	-00:00:43	-2%	00:29:28	00:29:19	-00:00:09	-1%	00:31:27	00:30:58	-00:00:29	-2%	00:31:31	00:29:42	-00:01:49	-6%
10	NB	23.6	00:25:30	00:25:25	-00:00:05	0%	00:24:05	00:24:05	00:00:00	0%	00:25:31	00:25:31	00:00:00	0%	00:24:16	00:24:05	-00:00:11	-1%
	SB	23.6	00:26:58	00:26:55	-00:00:03	0%	00:24:51	00:24:53	00:00:02	0%	00:26:07	00:26:05	-00:00:02	0%	00:24:41	00:24:36	-00:00:05	0%
11	WB	108.3	01:12:22	01:08:55	-00:03:27	-5%	01:14:22	01:11:44	-00:02:38	-4%	01:15:52	01:12:38	-00:03:14	-4%	01:46:06	01:30:55	-00:15:11	-14%
	EB	108.5	01:14:13	01:09:12	-00:05:01	-7%	01:10:42	01:07:02	-00:03:40	-5%	01:08:45	01:05:50	-00:02:55	-4%	01:32:34	01:20:00	-00:12:34	-14%
11_1	WB	48.9	00:32:19	00:28:09	-00:04:10	-13%	00:32:34	00:28:19	-00:04:15	-13%	00:34:59	00:30:06	-00:04:53	-14%	00:51:52	00:31:17	-00:20:35	-40%
	EB	49.1	00:36:01	00:29:57	-00:06:04	-17%	00:32:43	00:28:24	-00:04:19	-13%	00:32:04	00:28:31	-00:03:33	-11%	00:49:07	00:30:41	-00:18:26	-38%
11_2	WB	59.4	00:40:02	00:40:45	00:00:43	2%	00:41:47	00:43:25	00:01:38	4%	00:40:53	00:42:31	00:01:38	4%	00:54:13	00:59:37	00:05:24	10%
	EB	59.4	00:38:11	00:39:15	00:01:04	3%	00:37:59	00:38:38	00:00:39	2%	00:36:40	00:37:18	00:00:38	2%	00:43:27	00:49:19	00:05:52	14%
12	WB	107.4	01:45:01	01:44:54	-00:00:07	0%	01:43:50	01:43:47	-00:00:03	0%	01:47:16	01:47:12	-00:00:04	0%	01:51:23	01:52:24	00:01:01	1%
	EB	107.3	01:47:00	01:46:42	-00:00:18	0%	01:42:21	01:42:17	-00:00:04	0%	01:46:21	01:46:21	00:00:00	0%	01:45:50	01:45:11	-00:00:39	-1%

O.12 Alternative Growth 2051

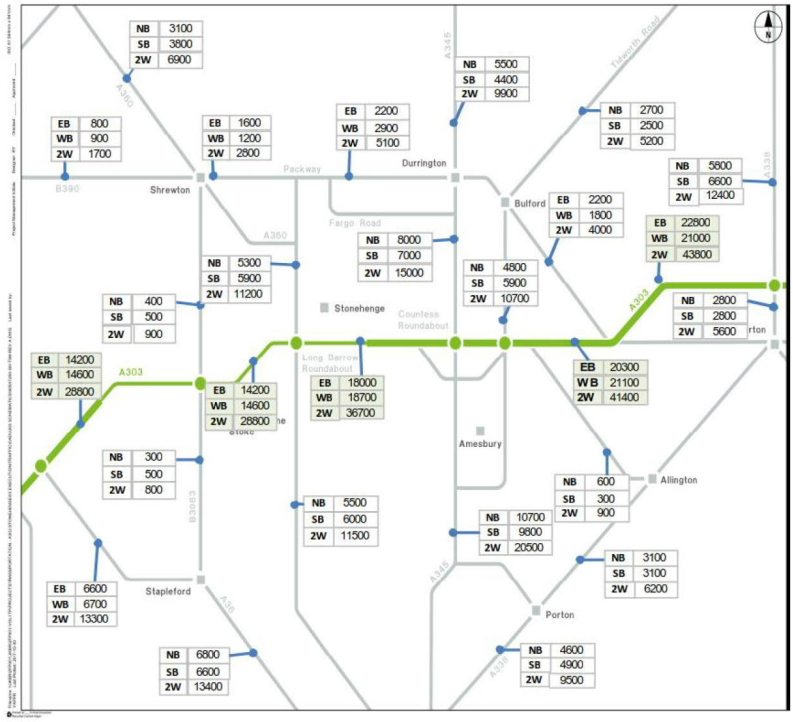
Route	Direction	Distance (Km)	AM				IP				PM				Busy Period			
			Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference
1	WB	270.5	02:56:51	02:56:37	-00:00:14	0%	02:56:40	02:56:13	-00:00:27	0%	03:21:22	03:21:14	-00:00:08	0%	03:27:33	03:24:58	-00:02:35	-1%
	EB	282.4	03:11:19	03:10:35	-00:00:44	0%	02:58:30	02:58:15	-00:00:15	0%	03:08:47	03:08:28	-00:00:19	0%	03:28:42	03:25:28	-00:03:14	-2%
2	WB	239.1	02:53:39	02:50:05	-00:03:34	-2%	02:56:10	02:53:44	-00:02:26	-1%	03:06:03	03:03:00	-00:03:03	-2%	03:34:25	03:22:07	-00:12:18	-6%
	EB	238.7	02:54:55	02:50:36	-00:04:19	-2%	02:46:35	02:42:55	-00:03:40	-2%	02:47:20	02:44:23	-00:02:57	-2%	03:19:33	03:08:48	-00:10:45	-5%
3	WB	242.8	03:37:59	03:38:05	00:00:06	0%	03:33:31	03:33:43	00:00:12	0%	03:50:25	03:50:18	-00:00:07	0%	03:46:03	03:49:04	00:03:01	1%
	EB	242.7	03:37:09	03:37:04	-00:00:05	0%	03:26:24	03:26:31	00:00:07	0%	03:35:18	03:35:23	00:00:05	0%	03:35:01	03:36:06	00:01:05	1%
4	WB	256.2	03:27:34	03:27:38	00:00:04	0%	03:25:02	03:25:15	00:00:13	0%	03:36:32	03:36:15	-00:00:17	0%	03:45:00	03:45:56	00:00:56	0%
	EB	256.0	03:29:28	03:29:29	00:00:01	0%	03:14:31	03:14:26	-00:00:05	0%	03:17:43	03:17:35	-00:00:08	0%	03:37:26	03:37:38	00:00:12	0%
5	WB	40.2	00:33:42	00:34:10	00:00:28	1%	00:33:54	00:34:16	00:00:22	1%	00:34:41	00:35:05	00:00:24	1%	00:35:03	00:35:54	00:00:51	2%
	EB	40.2	00:34:51	00:35:27	00:00:36	2%	00:33:42	00:33:59	00:00:17	1%	00:33:37	00:33:51	00:00:14	1%	00:35:07	00:35:31	00:00:24	1%
6	WB	26.5	00:28:07	00:26:58	-00:01:09	-4%	00:26:15	00:25:45	-00:00:30	-2%	00:28:26	00:27:58	-00:00:28	-2%	00:32:50	00:27:07	-00:05:43	-17%
	EB	26.5	00:28:03	00:26:40	-00:01:23	-5%	00:25:31	00:25:30	-00:00:01	0%	00:26:03	00:26:08	00:00:05	0%	00:30:45	00:25:49	-00:04:56	-16%
7	WB	41.1	00:35:15	00:35:14	-00:00:01	0%	00:35:09	00:35:08	-00:00:01	0%	00:36:12	00:36:01	-00:00:11	-1%	00:35:45	00:35:34	-00:00:11	-1%
	EB	41.2	00:39:01	00:37:48	-00:01:13	-3%	00:35:52	00:35:46	-00:00:06	0%	00:36:25	00:36:15	-00:00:10	0%	00:37:05	00:36:45	-00:00:20	-1%
8	NB	38.6	00:39:01	00:39:34	00:00:33	1%	00:37:33	00:38:07	00:00:34	2%	00:38:50	00:39:33	00:00:43	2%	00:38:14	00:38:52	00:00:38	2%
	SB	38.6	00:40:00	00:40:50	00:00:50	2%	00:38:14	00:38:46	00:00:32	1%	00:39:27	00:40:16	00:00:49	2%	00:39:05	00:39:40	00:00:35	1%
9	NB	25.7	00:30:19	00:29:52	-00:00:27	-1%	00:28:32	00:28:25	-00:00:07	0%	00:31:41	00:31:49	00:00:08	0%	00:29:18	00:28:25	-00:00:53	-3%
	SB	25.7	00:32:38	00:32:01	-00:00:37	-2%	00:29:45	00:29:37	-00:00:08	0%	00:31:37	00:31:19	-00:00:18	-1%	00:32:08	00:30:21	-00:01:47	-6%
10	NB	23.6	00:25:48	00:25:42	-00:00:06	0%	00:24:19	00:24:20	00:00:01	0%	00:25:59	00:25:58	-00:00:01	0%	00:24:32	00:24:13	-00:00:19	-1%
	SB	23.6	00:27:26	00:27:19	-00:00:07	0%	00:25:03	00:25:04	00:00:01	0%	00:26:33	00:26:30	-00:00:03	0%	00:24:55	00:24:46	-00:00:09	-1%
11	WB	108.3	01:14:31	01:10:43	-00:03:48	-5%	01:16:50	01:13:44	-00:03:06	-4%	01:18:26	01:14:55	-00:03:31	-4%	01:49:59	01:36:22	-00:13:37	-12%
	EB	108.5	01:16:04	01:10:48	-00:05:16	-7%	01:12:36	01:08:28	-00:04:08	-6%	01:10:01	01:06:47	-00:03:14	-5%	01:37:48	01:24:42	-00:13:06	-13%
11_1	WB	48.9	00:33:13	00:28:33	-00:04:40	-14%	00:33:44	00:28:40	-00:05:04	-15%	00:36:17	00:30:47	-00:05:30	-15%	00:53:41	00:32:04	-00:21:37	-40%
	EB	49.1	00:37:07	00:30:28	-00:06:39	-18%	00:33:45	00:28:45	-00:05:00	-15%	00:32:47	00:28:49	-00:03:58	-12%	00:52:15	00:31:17	-00:20:58	-40%
11_2	WB	59.4	00:41:17	00:42:10	00:00:53	2%	00:43:06	00:45:04	00:01:58	5%	00:42:08	00:44:07	00:01:59	5%	00:56:18	01:04:17	00:07:59	14%
	EB	59.4	00:38:56	00:40:19	00:01:23	4%	00:38:50	00:39:43	00:00:53	2%	00:37:14	00:37:58	00:00:44	2%	00:45:32	00:53:24	00:07:52	17%
12	WB	107.4	01:46:54	01:46:44	-00:00:10	0%	01:45:34	01:45:22	-00:00:12	0%	01:49:20	01:49:05	-00:00:15	0%	01:55:16	01:57:03	00:01:47	2%
	EB	107.3	01:49:08	01:48:33	-00:00:35	-1%	01:43:50	01:43:43	-00:00:07	0%	01:47:42	01:47:40	-00:00:02	0%	01:47:45	01:46:40	-00:01:05	-1%

Appendix P AADT flow diagrams – Core growth sensitivity test scenario

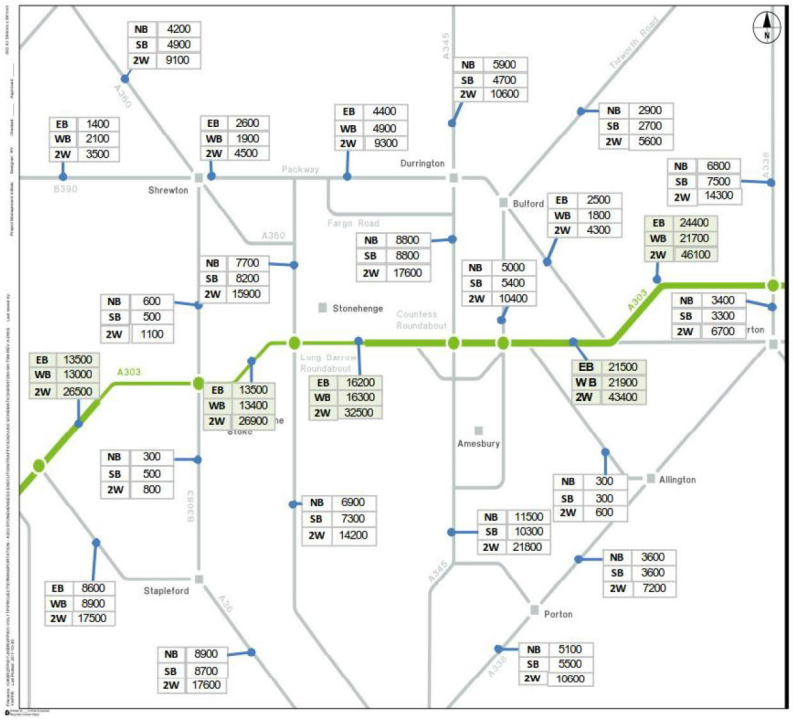
P.1 Average Annual Daily Traffic - Core Growth Sensitivity Test - Without Scheme – 2026



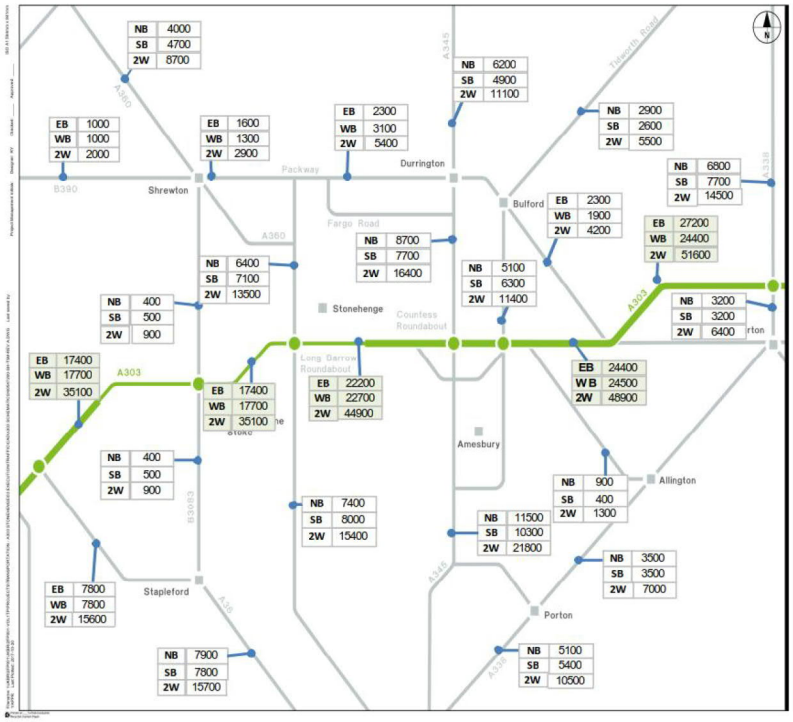
P.2 Average Annual Daily Traffic - Core Growth Sensitivity Test - With Scheme – 2026



P.3 Average Annual Daily Traffic - Core Growth Sensitivity Test - Without Scheme – 2041



P.4 Average Annual Daily Traffic - Core Growth Sensitivity Test - With Scheme – 2041



Appendix Q Journey times – Core growth sensitivity test scenario

Q.1 Core Growth Sensitivity Test 2026

Route	Direction	Distance (Km)	AM				IP				PM				Busy Period			
			Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference
1	WB	270.5	02:44:50	02:44:48	-00:00:02	0%	02:44:26	02:44:20	-00:00:06	0%	03:01:24	03:01:15	-00:00:09	0%	02:54:17	02:53:35	-00:00:42	0%
	EB	282.4	02:52:58	02:52:44	-00:00:14	0%	02:43:39	02:43:26	-00:00:13	0%	02:53:22	02:52:56	-00:00:26	0%	02:53:54	02:52:49	-00:01:05	-1%
2	WB	239.1	02:38:36	02:35:48	-00:02:48	-2%	02:40:10	02:38:00	-00:02:10	-1%	02:48:49	02:46:28	-00:02:21	-1%	03:06:13	02:56:22	-00:09:51	-5%
	EB	238.7	02:39:14	02:35:45	-00:03:29	-2%	02:35:04	02:32:49	-00:02:15	-1%	02:37:37	02:35:27	-00:02:10	-1%	02:53:37	02:43:17	-00:10:20	-6%
3	WB	242.8	03:22:11	03:22:11	00:00:00	0%	03:20:04	03:20:09	00:00:05	0%	03:31:12	03:31:09	-00:00:03	0%	03:27:17	03:27:36	00:00:19	0%
	EB	242.7	03:22:09	03:22:14	00:00:05	0%	03:16:50	03:17:03	00:00:13	0%	03:25:22	03:25:33	00:00:11	0%	03:20:49	03:21:11	00:00:22	0%
4	WB	256.2	03:07:37	03:07:36	-00:00:01	0%	03:05:29	03:05:29	00:00:00	0%	03:16:08	03:16:11	00:00:03	0%	03:16:52	03:17:21	00:00:29	0%
	EB	256.0	03:10:09	03:10:03	-00:00:06	0%	02:59:49	02:59:49	00:00:00	0%	03:03:19	03:03:20	00:00:01	0%	03:14:15	03:13:35	-00:00:40	0%
5	WB	40.2	00:32:23	00:32:39	00:00:16	1%	00:32:26	00:32:40	00:00:14	1%	00:32:47	00:33:09	00:00:22	1%	00:33:04	00:33:18	00:00:14	1%
	EB	40.2	00:33:24	00:33:34	00:00:10	0%	00:32:25	00:32:31	00:00:06	0%	00:32:17	00:32:23	00:00:06	0%	00:33:22	00:33:38	00:00:16	1%
6	WB	26.5	00:27:53	00:28:17	00:00:24	1%	00:25:24	00:25:42	00:00:18	1%	00:26:27	00:26:31	00:00:04	0%	00:27:50	00:26:09	-00:01:41	-6%
	EB	26.5	00:26:01	00:25:55	-00:00:06	0%	00:25:00	00:25:11	00:00:11	1%	00:25:59	00:26:11	00:00:12	1%	00:27:45	00:25:21	-00:02:24	-9%
7	WB	41.1	00:34:49	00:34:50	00:00:01	0%	00:34:42	00:34:41	-00:00:01	0%	00:35:13	00:35:12	-00:00:01	0%	00:34:59	00:34:55	-00:00:04	0%
	EB	41.2	00:36:40	00:36:34	-00:00:06	0%	00:35:08	00:35:07	-00:00:01	0%	00:35:37	00:35:36	-00:00:01	0%	00:35:39	00:35:31	-00:00:08	0%
8	NB	38.6	00:37:34	00:37:57	00:00:23	1%	00:36:17	00:36:43	00:00:26	1%	00:37:28	00:37:51	00:00:23	1%	00:36:51	00:37:22	00:00:31	1%
	SB	38.6	00:38:02	00:38:30	00:00:28	1%	00:36:38	00:37:03	00:00:25	1%	00:37:52	00:38:24	00:00:32	1%	00:37:01	00:37:37	00:00:36	2%
9	NB	25.7	00:27:54	00:27:34	-00:00:20	-1%	00:27:21	00:27:19	-00:00:02	0%	00:29:30	00:29:30	00:00:00	0%	00:27:38	00:27:07	-00:00:31	-2%
	SB	25.7	00:30:40	00:30:19	-00:00:21	-1%	00:28:07	00:28:09	00:00:02	0%	00:29:32	00:29:37	00:00:05	0%	00:29:21	00:28:26	-00:00:55	-3%
10	NB	23.6	00:24:22	00:24:21	-00:00:01	0%	00:23:36	00:23:37	00:00:01	0%	00:24:34	00:24:36	00:00:02	0%	00:23:45	00:23:39	-00:00:06	0%
	SB	23.6	00:25:43	00:25:42	-00:00:01	0%	00:24:20	00:24:22	00:00:02	0%	00:25:06	00:25:08	00:00:02	0%	00:24:15	00:24:13	-00:00:02	0%
11	WB	108.3	01:07:59	01:05:06	-00:02:53	-4%	01:10:03	01:07:34	-00:02:29	-4%	01:10:57	01:08:09	-00:02:48	-4%	01:32:49	01:21:47	-00:11:02	-12%
	EB	108.5	01:10:07	01:06:19	-00:03:48	-5%	01:07:37	01:04:54	-00:02:43	-4%	01:06:48	01:04:10	-00:02:38	-4%	01:21:54	01:10:20	-00:11:34	-14%
11_1	WB	48.9	00:30:41	00:27:26	-00:03:15	-11%	00:30:59	00:27:40	-00:03:19	-11%	00:32:08	00:28:36	-00:03:32	-11%	00:44:29	00:29:03	-00:15:26	-35%
	EB	49.1	00:33:09	00:28:55	-00:04:14	-13%	00:30:52	00:27:45	-00:03:07	-10%	00:30:52	00:27:54	-00:02:58	-10%	00:42:55	00:29:09	-00:13:46	-32%
11_2	WB	59.4	00:37:18	00:37:39	00:00:21	1%	00:39:04	00:39:53	00:00:49	2%	00:38:49	00:39:32	00:00:43	2%	00:48:19	00:52:43	00:04:24	9%
	EB	59.4	00:36:58	00:37:24	00:00:26	1%	00:36:45	00:37:08	00:00:23	1%	00:35:55	00:36:16	00:00:21	1%	00:38:59	00:41:11	00:02:12	6%
12	WB	107.4	01:41:28	01:41:24	-00:00:04	0%	01:40:44	01:40:41	-00:00:03	0%	01:43:13	01:43:01	-00:00:12	0%	01:46:49	01:46:22	-00:00:27	0%
	EB	107.3	01:43:11	01:43:05	-00:00:06	0%	01:40:02	01:40:02	00:00:00	0%	01:44:15	01:44:12	-00:00:03	0%	01:41:51	01:41:36	-00:00:15	0%

Q.2 Core Growth Sensitivity Test 2031

Route	Direction	Distance (Km)	AM				IP				PM				Busy Period			
			Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference
1	WB	270.5	02:46:42	02:46:41	-00:00:01	0%	02:45:42	02:45:35	-00:00:07	0%	03:03:51	03:03:29	-00:00:22	0%	03:00:52	03:00:07	-00:00:45	0%
	EB	282.4	02:56:18	02:55:54	-00:00:24	0%	02:46:07	02:45:56	-00:00:11	0%	02:56:29	02:55:47	-00:00:42	0%	03:00:28	02:58:54	-00:01:34	-1%
2	WB	239.1	02:41:54	02:38:57	-00:02:57	-2%	02:43:07	02:40:46	-00:02:21	-1%	02:51:36	02:49:36	-00:02:00	-1%	03:14:57	03:02:47	-00:12:10	-6%
	EB	238.7	02:42:04	02:38:29	-00:03:35	-2%	02:37:06	02:34:36	-00:02:30	-2%	02:39:23	02:37:27	-00:01:56	-1%	02:59:45	02:49:09	-00:10:36	-6%
3	WB	242.8	03:25:04	03:24:59	-00:00:05	0%	03:22:05	03:22:09	00:00:04	0%	03:33:44	03:33:55	00:00:11	0%	03:30:39	03:31:09	00:00:30	0%
	EB	242.7	03:24:45	03:24:56	00:00:11	0%	03:18:21	03:18:33	00:00:12	0%	03:26:58	03:27:14	00:00:16	0%	03:23:36	03:23:54	00:00:18	0%
4	WB	256.2	03:11:11	03:11:08	-00:00:03	0%	03:09:08	03:09:09	00:00:01	0%	03:21:54	03:22:01	00:00:07	0%	03:23:18	03:24:02	00:00:44	0%
	EB	256.0	03:13:42	03:13:46	00:00:04	0%	03:02:07	03:02:06	-00:00:01	0%	03:07:03	03:07:09	00:00:06	0%	03:19:24	03:19:13	-00:00:11	0%
5	WB	40.2	00:32:51	00:33:08	00:00:17	1%	00:32:47	00:33:01	00:00:14	1%	00:33:20	00:33:41	00:00:21	1%	00:33:37	00:33:51	00:00:14	1%
	EB	40.2	00:33:43	00:33:58	00:00:15	1%	00:32:50	00:32:56	00:00:06	0%	00:32:45	00:32:55	00:00:10	1%	00:33:57	00:34:15	00:00:18	1%
6	WB	26.5	00:28:46	00:28:56	00:00:10	1%	00:25:35	00:25:48	00:00:13	1%	00:26:49	00:26:40	-00:00:09	-1%	00:28:25	00:26:18	-00:02:07	-7%
	EB	26.5	00:26:08	00:25:55	-00:00:13	-1%	00:25:04	00:25:14	00:00:10	1%	00:26:03	00:26:17	00:00:14	1%	00:28:24	00:25:27	-00:02:57	-10%
7	WB	41.1	00:34:57	00:34:58	00:00:01	0%	00:34:47	00:34:47	00:00:00	0%	00:35:19	00:35:17	-00:00:02	0%	00:35:08	00:35:05	-00:00:03	0%
	EB	41.2	00:36:47	00:36:40	-00:00:07	0%	00:35:20	00:35:18	-00:00:02	0%	00:35:50	00:35:47	-00:00:03	0%	00:35:56	00:35:49	-00:00:07	0%
8	NB	38.6	00:38:06	00:38:30	00:00:24	1%	00:36:30	00:36:54	00:00:24	1%	00:37:34	00:38:01	00:00:27	1%	00:37:11	00:37:43	00:00:32	1%
	SB	38.6	00:38:04	00:38:35	00:00:31	1%	00:36:56	00:37:25	00:00:29	1%	00:38:19	00:38:47	00:00:28	1%	00:37:29	00:38:00	00:00:31	1%
9	NB	25.7	00:28:20	00:27:55	-00:00:25	-1%	00:27:26	00:27:24	-00:00:02	0%	00:29:30	00:29:26	-00:00:04	0%	00:27:52	00:27:17	-00:00:35	-2%
	SB	25.7	00:30:18	00:29:58	-00:00:20	-1%	00:28:16	00:28:08	-00:00:08	0%	00:29:48	00:29:46	-00:00:02	0%	00:30:03	00:28:30	-00:01:33	-5%
10	NB	23.6	00:24:35	00:24:33	-00:00:02	0%	00:23:38	00:23:39	00:00:01	0%	00:24:32	00:24:35	00:00:03	0%	00:23:53	00:23:47	-00:00:06	0%
	SB	23.6	00:25:40	00:25:40	00:00:00	0%	00:24:24	00:24:26	00:00:02	0%	00:25:14	00:25:19	00:00:05	0%	00:24:16	00:24:16	00:00:00	0%
11	WB	108.3	01:09:26	01:06:25	-00:03:01	-4%	01:11:14	01:08:39	-00:02:35	-4%	01:12:10	01:09:35	-00:02:35	-4%	01:39:02	01:25:26	-00:13:36	-14%
	EB	108.5	01:11:16	01:07:12	-00:04:04	-6%	01:08:29	01:05:32	-00:02:57	-4%	01:07:22	01:04:45	-00:02:37	-4%	01:25:49	01:13:52	-00:11:57	-14%
11_1	WB	48.9	00:30:58	00:27:32	-00:03:26	-11%	00:31:20	00:27:51	-00:03:29	-11%	00:32:41	00:29:02	-00:03:39	-11%	00:48:05	00:30:17	-00:17:48	-37%
	EB	49.1	00:34:02	00:29:20	-00:04:42	-14%	00:31:19	00:27:58	-00:03:21	-11%	00:31:12	00:28:06	-00:03:06	-10%	00:45:59	00:29:47	-00:16:12	-35%
11_2	WB	59.4	00:38:27	00:38:52	00:00:25	1%	00:39:54	00:40:48	00:00:54	2%	00:39:29	00:40:32	00:01:03	3%	00:50:57	00:55:09	00:04:12	8%
	EB	59.4	00:37:14	00:37:51	00:00:37	2%	00:37:09	00:37:34	00:00:25	1%	00:36:10	00:36:39	00:00:29	1%	00:39:50	00:44:05	00:04:15	11%
12	WB	107.4	01:42:28	01:42:21	-00:00:07	0%	01:41:11	01:41:07	-00:00:04	0%	01:44:02	01:43:56	-00:00:06	0%	01:47:56	01:47:32	-00:00:24	0%
	EB	107.3	01:44:15	01:44:06	-00:00:09	0%	01:40:39	01:40:39	00:00:00	0%	01:44:49	01:44:45	-00:00:04	0%	01:43:09	01:42:41	-00:00:28	0%

Q.3 Core Growth Sensitivity Test 2041

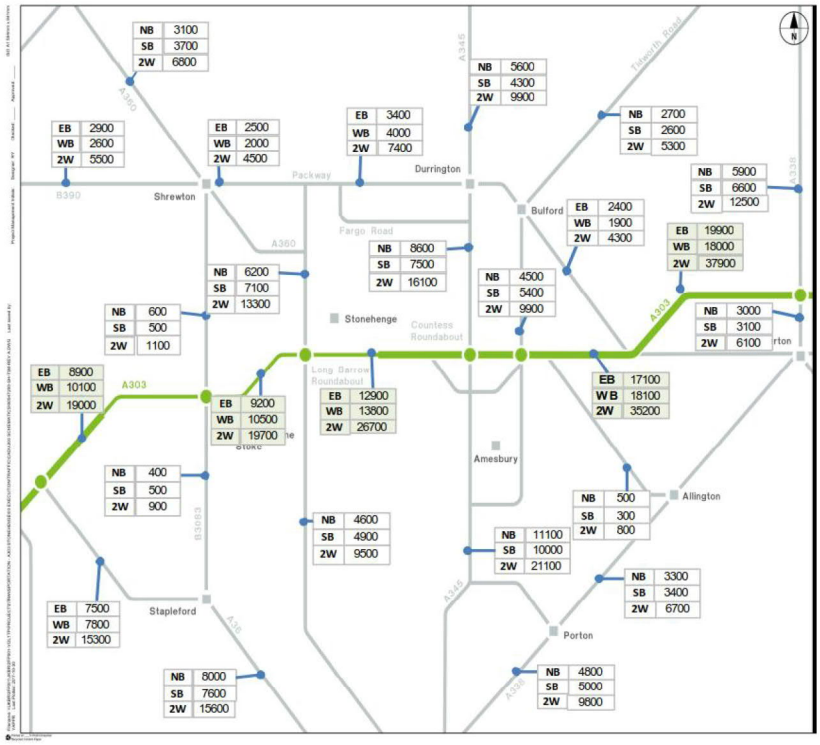
Route	Direction	Distance (Km)	AM				IP				PM				Busy Period			
			Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference
1	WB	270.5	02:50:55	02:50:50	-00:00:05	0%	02:50:30	02:50:16	-00:00:14	0%	03:12:24	03:12:06	-00:00:18	0%	03:16:24	03:14:27	-00:01:57	-1%
	EB	282.4	03:03:10	03:02:38	-00:00:32	0%	02:51:33	02:51:24	-00:00:09	0%	03:02:26	03:01:59	-00:00:27	0%	03:18:25	03:15:07	-00:03:18	-2%
2	WB	239.1	02:47:00	02:43:41	-00:03:19	-2%	02:49:09	02:47:04	-00:02:05	-1%	02:58:46	02:56:14	-00:02:32	-1%	03:27:54	03:14:28	-00:13:26	-6%
	EB	238.7	02:47:50	02:44:12	-00:03:38	-2%	02:41:31	02:38:28	-00:03:03	-2%	02:43:06	02:40:40	-00:02:26	-1%	03:12:48	03:01:43	-00:11:05	-6%
3	WB	242.8	03:29:57	03:29:59	00:00:02	0%	03:27:17	03:27:25	00:00:08	0%	03:40:56	03:41:14	00:00:18	0%	03:38:40	03:40:47	00:02:07	1%
	EB	242.7	03:29:54	03:30:03	00:00:09	0%	03:21:48	03:21:53	00:00:05	0%	03:30:44	03:30:59	00:00:15	0%	03:29:33	03:30:36	00:01:03	1%
4	WB	256.2	03:18:41	03:18:41	00:00:00	0%	03:16:34	03:16:31	-00:00:03	0%	03:30:10	03:29:59	-00:00:11	0%	03:37:16	03:37:17	00:00:01	0%
	EB	256.0	03:20:36	03:20:44	00:00:08	0%	03:08:02	03:07:39	-00:00:23	0%	03:13:16	03:13:30	00:00:14	0%	03:29:26	03:29:59	00:00:33	0%
5	WB	40.2	00:33:13	00:33:34	00:00:21	1%	00:33:19	00:33:36	00:00:17	1%	00:34:10	00:34:27	00:00:17	1%	00:34:33	00:35:14	00:00:41	2%
	EB	40.2	00:34:19	00:34:43	00:00:24	1%	00:33:18	00:33:27	00:00:09	0%	00:33:12	00:33:27	00:00:15	1%	00:34:45	00:35:06	00:00:21	1%
6	WB	26.5	00:28:55	00:28:55	00:00:00	0%	00:25:51	00:25:55	00:00:04	0%	00:27:30	00:27:04	-00:00:26	-2%	00:29:40	00:26:48	-00:02:52	-10%
	EB	26.5	00:26:37	00:26:03	-00:00:34	-2%	00:25:11	00:25:17	00:00:06	0%	00:26:15	00:26:27	00:00:12	1%	00:29:42	00:25:35	-00:04:07	-14%
7	WB	41.1	00:35:09	00:35:08	-00:00:01	0%	00:34:54	00:34:53	-00:00:01	0%	00:35:31	00:35:31	00:00:00	0%	00:35:30	00:35:21	-00:00:09	0%
	EB	41.2	00:37:10	00:36:55	-00:00:15	-1%	00:35:36	00:35:33	-00:00:03	0%	00:36:06	00:36:02	-00:00:04	0%	00:36:33	00:36:16	-00:00:17	-1%
8	NB	38.6	00:38:23	00:38:53	00:00:30	1%	00:37:01	00:37:27	00:00:26	1%	00:38:15	00:38:50	00:00:35	2%	00:37:44	00:38:16	00:00:32	1%
	SB	38.6	00:38:54	00:39:32	00:00:38	2%	00:37:29	00:37:57	00:00:28	1%	00:38:55	00:39:31	00:00:36	2%	00:38:17	00:38:50	00:00:33	1%
9	NB	25.7	00:28:43	00:28:20	-00:00:23	-1%	00:27:58	00:27:55	-00:00:03	0%	00:30:31	00:30:20	-00:00:11	-1%	00:28:36	00:27:47	-00:00:49	-3%
	SB	25.7	00:31:43	00:31:03	-00:00:40	-2%	00:28:58	00:28:53	-00:00:05	0%	00:30:32	00:30:32	00:00:00	0%	00:31:16	00:29:25	-00:01:51	-6%
10	NB	23.6	00:24:48	00:24:47	-00:00:01	0%	00:23:51	00:23:53	00:00:02	0%	00:25:03	00:25:07	00:00:04	0%	00:24:12	00:24:04	-00:00:08	-1%
	SB	23.6	00:26:24	00:26:20	-00:00:04	0%	00:24:43	00:24:43	00:00:00	0%	00:25:32	00:25:36	00:00:04	0%	00:24:37	00:24:32	-00:00:05	0%
11	WB	108.3	01:11:35	01:08:03	-00:03:32	-5%	01:13:28	01:11:03	-00:02:25	-3%	01:15:02	01:12:00	-00:03:02	-4%	01:46:53	01:32:00	-00:14:53	-14%
	EB	108.5	01:13:16	01:08:51	-00:04:25	-6%	01:10:09	01:06:46	-00:03:23	-5%	01:08:29	01:05:30	-00:02:59	-4%	01:34:31	01:21:24	-00:13:07	-14%
11_1	WB	48.9	00:32:03	00:27:52	-00:04:11	-13%	00:31:59	00:28:08	-00:03:51	-12%	00:34:11	00:29:35	-00:04:36	-13%	00:52:09	00:31:16	-00:20:53	-40%
	EB	49.1	00:35:08	00:29:46	-00:05:22	-15%	00:32:16	00:28:21	-00:03:55	-12%	00:31:53	00:28:25	-00:03:28	-11%	00:49:58	00:30:49	-00:19:09	-38%
11_2	WB	59.4	00:39:31	00:40:11	00:00:40	2%	00:41:28	00:42:55	00:01:27	3%	00:40:51	00:42:25	00:01:34	4%	00:54:43	01:00:43	00:06:00	11%
	EB	59.4	00:38:08	00:39:05	00:00:57	2%	00:37:52	00:38:25	00:00:33	1%	00:36:36	00:37:05	00:00:29	1%	00:44:32	00:50:35	00:06:03	14%
12	WB	107.4	01:44:22	01:44:15	-00:00:07	0%	01:43:01	01:42:58	-00:00:03	0%	01:46:35	01:46:33	-00:00:02	0%	01:51:17	01:52:18	00:01:01	1%
	EB	107.3	01:46:09	01:45:53	-00:00:16	0%	01:41:51	01:41:48	-00:00:03	0%	01:46:05	01:46:01	-00:00:04	0%	01:45:50	01:45:06	-00:00:44	-1%

Q.4 Core Growth Sensitivity Test 2051

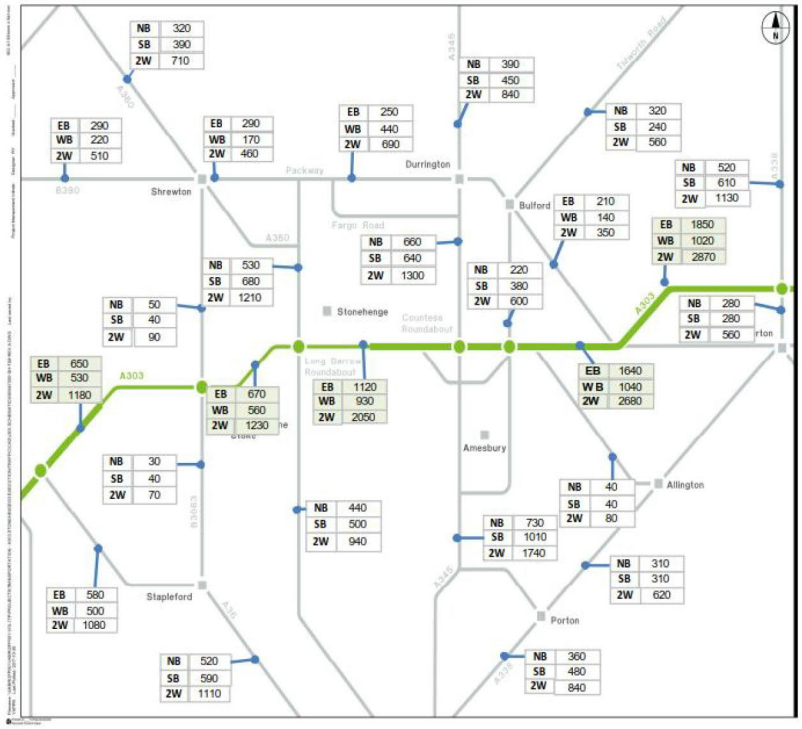
Route	Direction	Distance (Km)	AM				IP				PM				Busy Period			
			Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	With scheme (hh:mm:ss)	Difference	% Difference
1	WB	270.5	02:55:22	02:55:13	-00:00:09	0%	02:55:28	02:55:02	-00:00:26	0%	02:55:28	02:55:02	-00:00:26	0%	03:34:29	03:31:50	-00:02:39	-1%
	EB	282.4	03:09:14	03:08:39	-00:00:35	0%	02:56:56	02:56:43	-00:00:13	0%	02:56:56	02:56:43	-00:00:13	0%	03:32:40	03:29:49	-00:02:51	-1%
2	WB	239.1	02:51:50	02:48:10	-00:03:40	-2%	02:54:11	02:52:05	-00:02:06	-1%	02:54:11	02:52:05	-00:02:06	-1%	03:38:41	03:25:36	-00:13:05	-6%
	EB	238.7	02:52:47	02:48:55	-00:03:52	-2%	02:45:33	02:42:03	-00:03:30	-2%	02:45:33	02:42:03	-00:03:30	-2%	03:23:41	03:13:06	-00:10:35	-5%
3	WB	242.8	03:35:23	03:35:36	00:00:13	0%	03:31:36	03:31:50	00:00:14	0%	03:31:36	03:31:50	00:00:14	0%	03:47:22	03:49:55	00:02:33	1%
	EB	242.7	03:34:43	03:34:43	00:00:00	0%	03:25:09	03:25:11	00:00:02	0%	03:25:09	03:25:11	00:00:02	0%	03:36:18	03:36:58	00:00:40	0%
4	WB	256.2	03:25:07	03:25:25	00:00:18	0%	03:22:41	03:22:55	00:00:14	0%	03:22:41	03:22:55	00:00:14	0%	03:47:02	03:48:11	00:01:09	1%
	EB	256.0	03:26:48	03:26:52	00:00:04	0%	03:12:53	03:12:49	-00:00:04	0%	03:12:53	03:12:49	-00:00:04	0%	03:39:37	03:40:40	00:01:03	0%
5	WB	40.2	00:33:33	00:33:56	00:00:23	1%	00:33:45	00:34:05	00:00:20	1%	00:33:45	00:34:05	00:00:20	1%	00:35:24	00:36:36	00:01:12	3%
	EB	40.2	00:34:41	00:35:10	00:00:29	1%	00:33:37	00:33:52	00:00:15	1%	00:33:37	00:33:52	00:00:15	1%	00:35:30	00:35:59	00:00:29	1%
6	WB	26.5	00:29:08	00:28:42	-00:00:26	-1%	00:26:02	00:26:02	00:00:00	0%	00:26:02	00:26:02	00:00:00	0%	00:32:56	00:27:34	-00:05:22	-16%
	EB	26.5	00:27:01	00:26:09	-00:00:52	-3%	00:25:21	00:25:19	-00:00:02	0%	00:25:21	00:25:19	-00:00:02	0%	00:30:51	00:25:43	-00:05:08	-17%
7	WB	41.1	00:35:16	00:35:13	-00:00:03	0%	00:35:02	00:35:01	-00:00:01	0%	00:35:02	00:35:01	-00:00:01	0%	00:35:51	00:35:37	-00:00:14	-1%
	EB	41.2	00:37:37	00:37:11	-00:00:26	-1%	00:35:45	00:35:41	-00:00:04	0%	00:35:45	00:35:41	-00:00:04	0%	00:37:17	00:36:47	-00:00:30	-1%
8	NB	38.6	00:38:46	00:39:16	00:00:30	1%	00:37:23	00:37:52	00:00:29	1%	00:37:23	00:37:52	00:00:29	1%	00:38:20	00:38:51	00:00:31	1%
	SB	38.6	00:39:30	00:40:14	00:00:44	2%	00:37:58	00:38:27	00:00:29	1%	00:37:58	00:38:27	00:00:29	1%	00:39:03	00:39:34	00:00:31	1%
9	NB	25.7	00:28:57	00:28:31	-00:00:26	-1%	00:28:05	00:28:01	-00:00:04	0%	00:28:05	00:28:01	-00:00:04	0%	00:29:15	00:28:08	-00:01:07	-4%
	SB	25.7	00:31:42	00:31:03	-00:00:39	-2%	00:29:09	00:28:56	-00:00:13	-1%	00:29:09	00:28:56	-00:00:13	-1%	00:31:51	00:29:56	-00:01:55	-6%
10	NB	23.6	00:25:02	00:24:58	-00:00:04	0%	00:24:02	00:24:03	00:00:01	0%	00:24:02	00:24:03	00:00:01	0%	00:24:31	00:24:13	-00:00:18	-1%
	SB	23.6	00:26:49	00:26:44	-00:00:05	0%	00:24:49	00:24:48	-00:00:01	0%	00:24:49	00:24:48	-00:00:01	0%	00:24:51	00:24:38	-00:00:13	-1%
11	WB	108.3	01:13:36	01:09:41	-00:03:55	-5%	01:15:40	01:12:58	-00:02:42	-4%	01:15:40	01:12:58	-00:02:42	-4%	01:53:30	01:38:55	-00:14:35	-13%
	EB	108.5	01:14:57	01:10:19	-00:04:38	-6%	01:11:55	01:08:06	-00:03:49	-5%	01:11:55	01:08:06	-00:03:49	-5%	01:40:50	01:27:55	-00:12:55	-13%
11_1	WB	48.9	00:33:00	00:28:10	-00:04:50	-15%	00:33:03	00:28:26	-00:04:37	-14%	00:33:03	00:28:26	-00:04:37	-14%	00:55:49	00:32:14	-00:23:35	-42%
	EB	49.1	00:36:02	00:30:13	-00:05:49	-16%	00:33:18	00:28:40	-00:04:38	-14%	00:33:18	00:28:40	-00:04:38	-14%	00:54:26	00:31:36	-00:22:50	-42%
11_2	WB	59.4	00:40:35	00:41:30	00:00:55	2%	00:42:37	00:44:31	00:01:54	4%	00:42:37	00:44:31	00:01:54	4%	00:57:40	01:06:40	00:09:00	16%
	EB	59.4	00:38:54	00:40:05	00:01:11	3%	00:38:36	00:39:25	00:00:49	2%	00:38:36	00:39:25	00:00:49	2%	00:46:24	00:56:19	00:09:55	21%
12	WB	107.4	01:45:39	01:45:35	-00:00:04	0%	01:44:30	01:44:22	-00:00:08	0%	01:44:30	01:44:22	-00:00:08	0%	01:55:46	01:57:06	00:01:20	1%
	EB	107.3	01:47:55	01:47:31	-00:00:24	0%	01:43:04	01:42:56	-00:00:08	0%	01:43:04	01:42:56	-00:00:08	0%	01:48:09	01:46:45	-00:01:24	-1%

Appendix R Flow diagrams – Construction scenarios

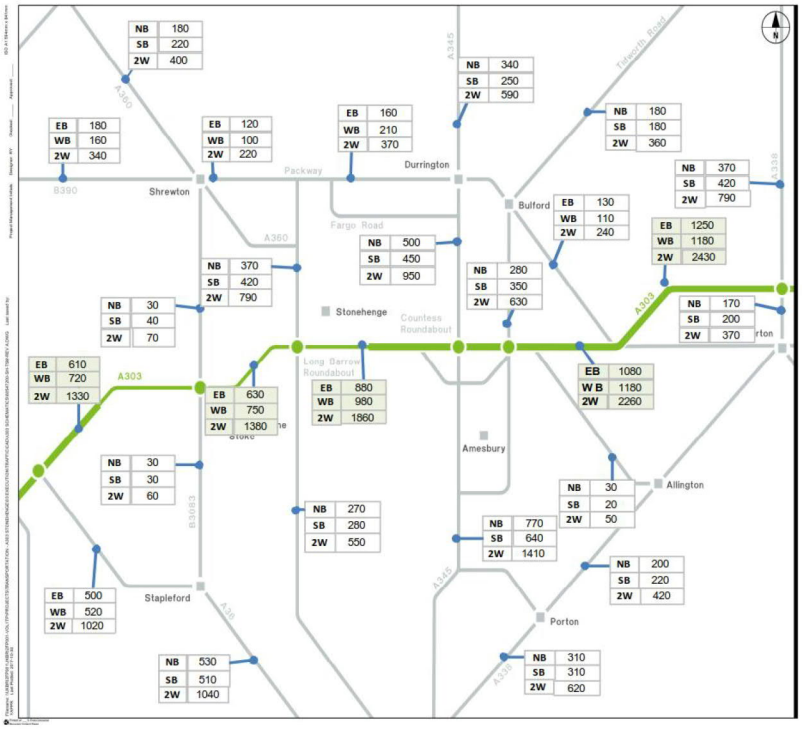
R.1 Annual Average Daily Traffic, Construction Phase 1 (Vehicles)



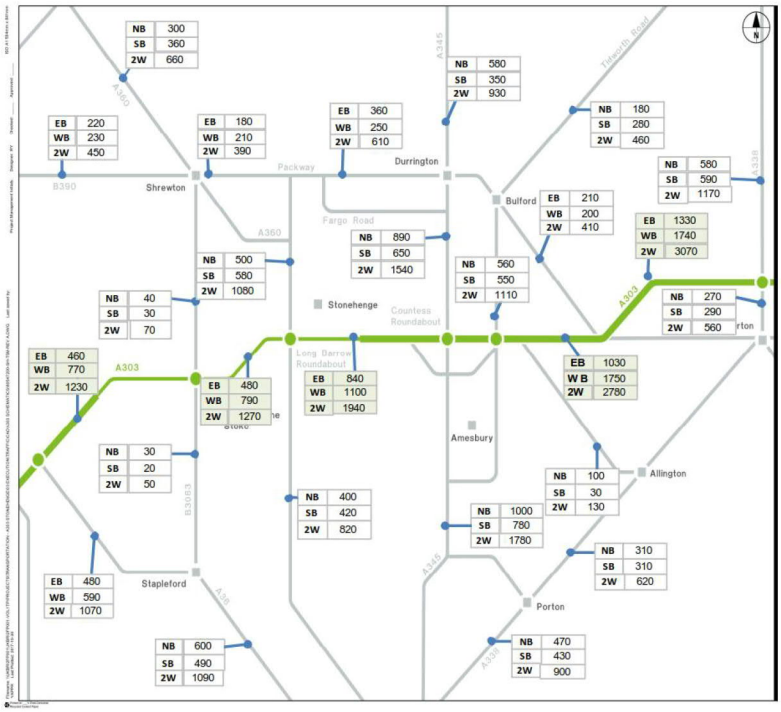
R.2 AM Peak Flows, Construction Phase 1 (Vehicles)



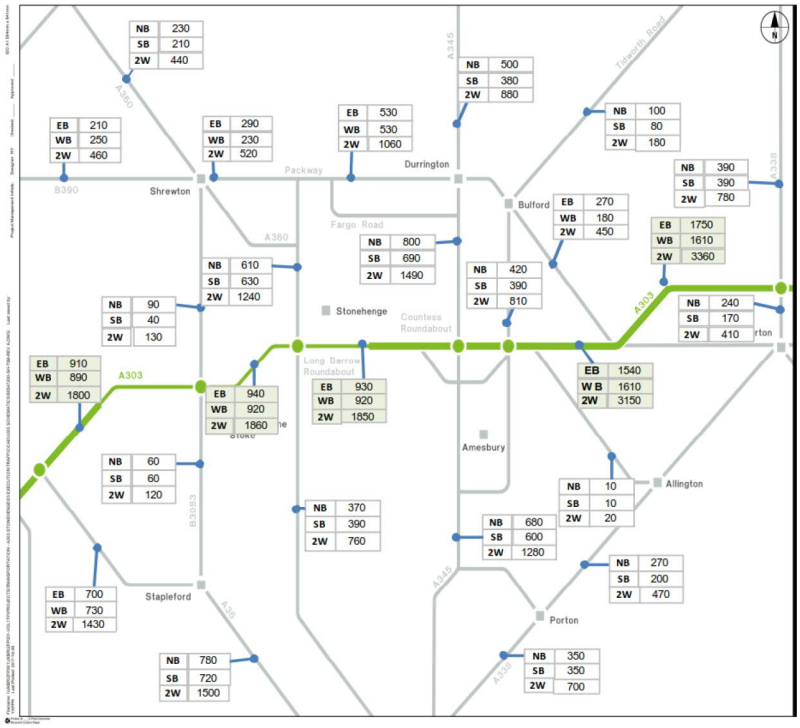
R.3 Interpeak, Construction Phase 1 (Vehicles)



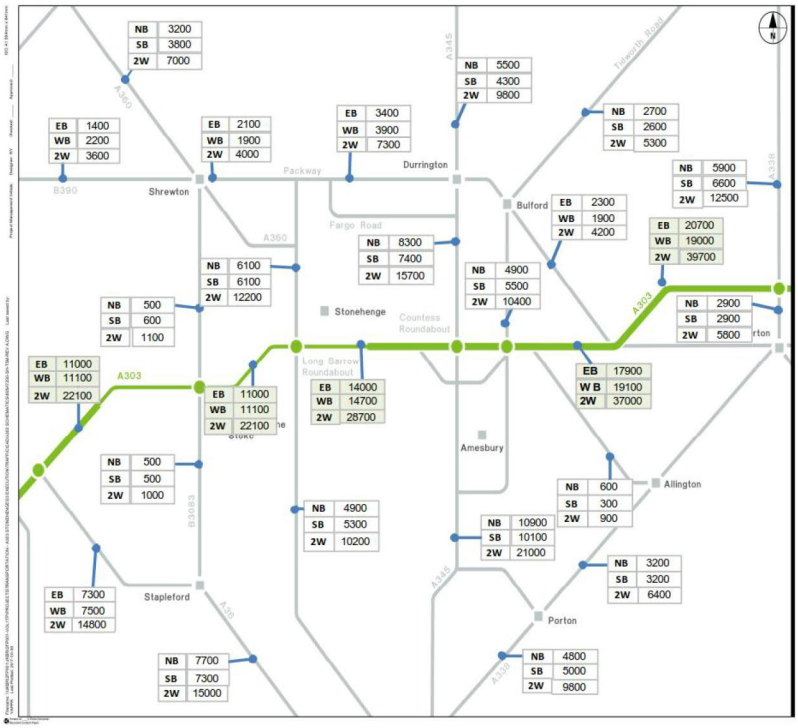
R.4 PM Peak Flows, Construction Phase 1 (Vehicles)



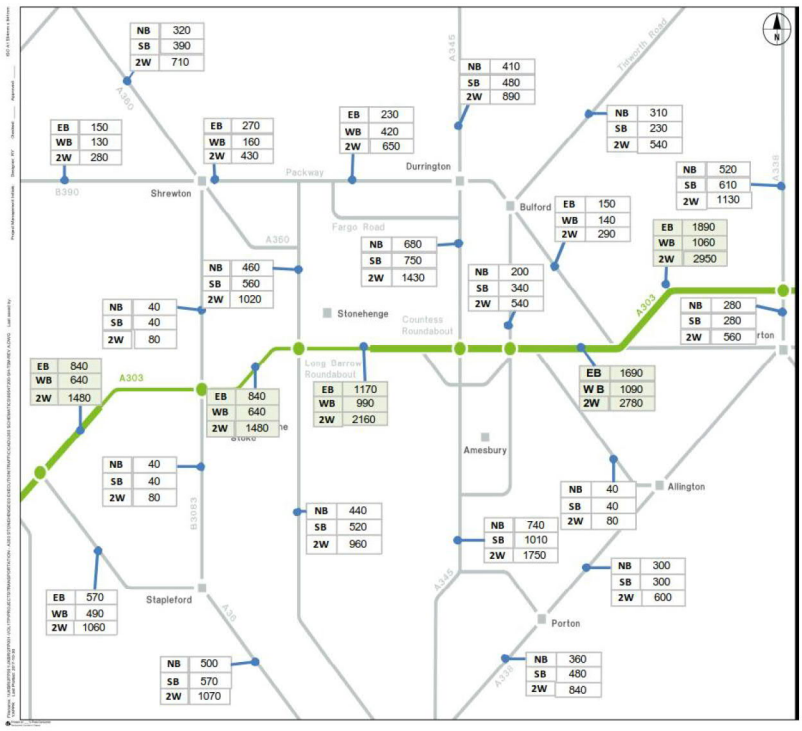
R.5 Busy Period Flows, Construction Phase 1 (Vehicles)



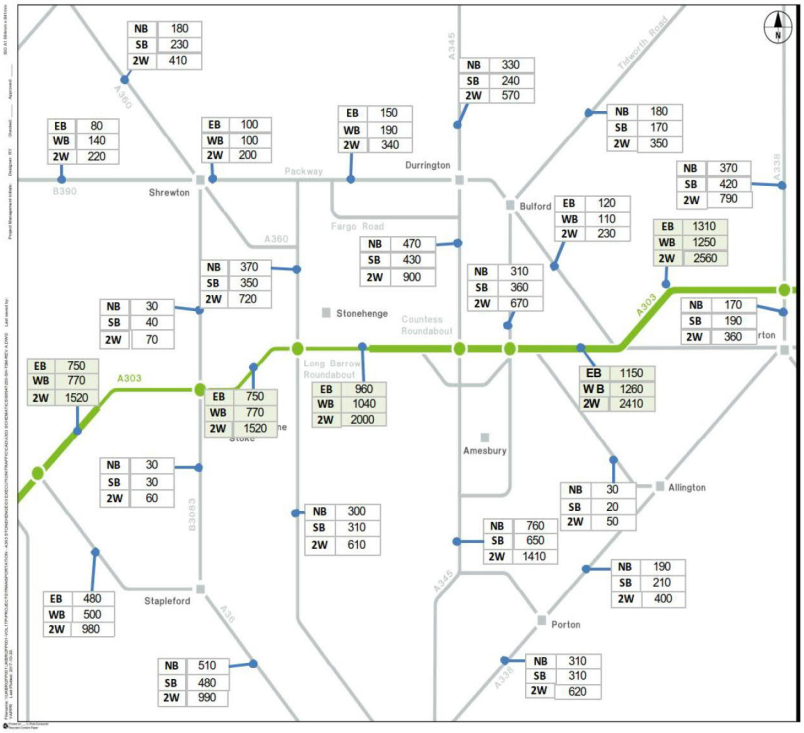
R.6 Annual Average Daily Traffic, Construction Phase 2 (Vehicles)



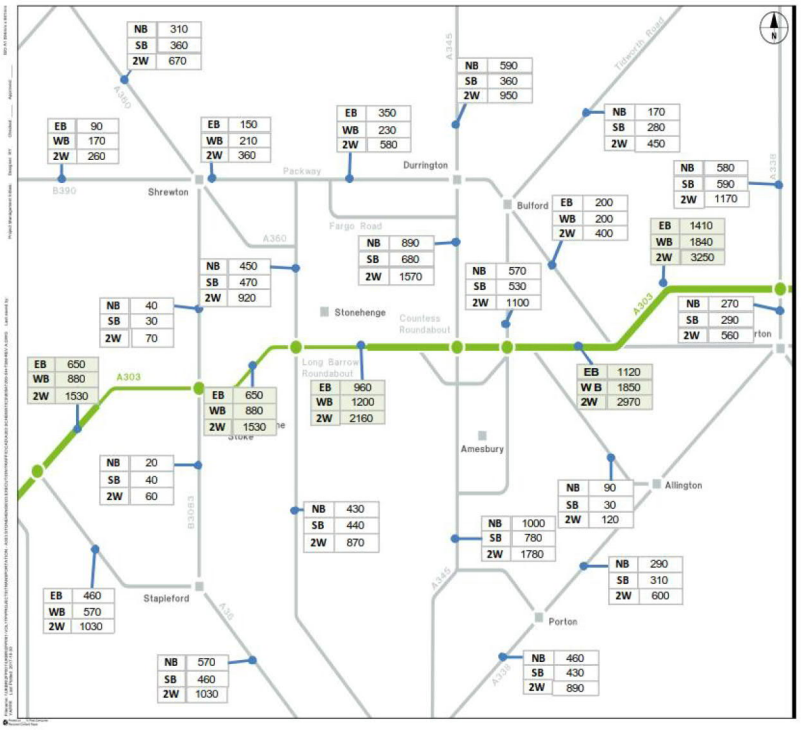
R.7 AM Peak Flows, Construction Phase 2 (Vehicles)



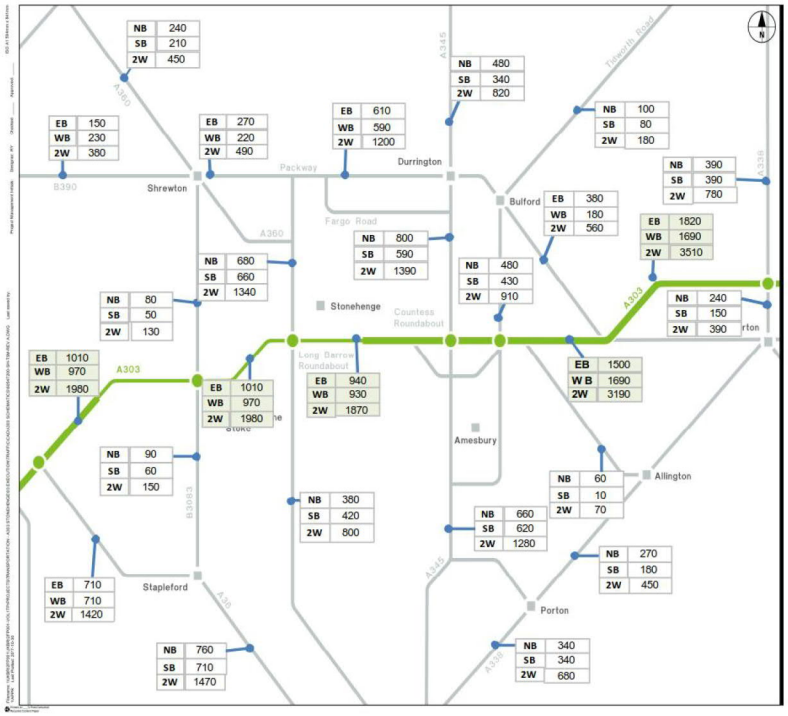
R.8 Interpeak, Construction Phase 2 (Vehicles)



R.9 PM Peak Flows, Construction Phase 2 (Vehicles)



R.10 Busy Period Flows, Construction Phase 2 (Vehicles)



Appendix S Journey times – Construction scenarios

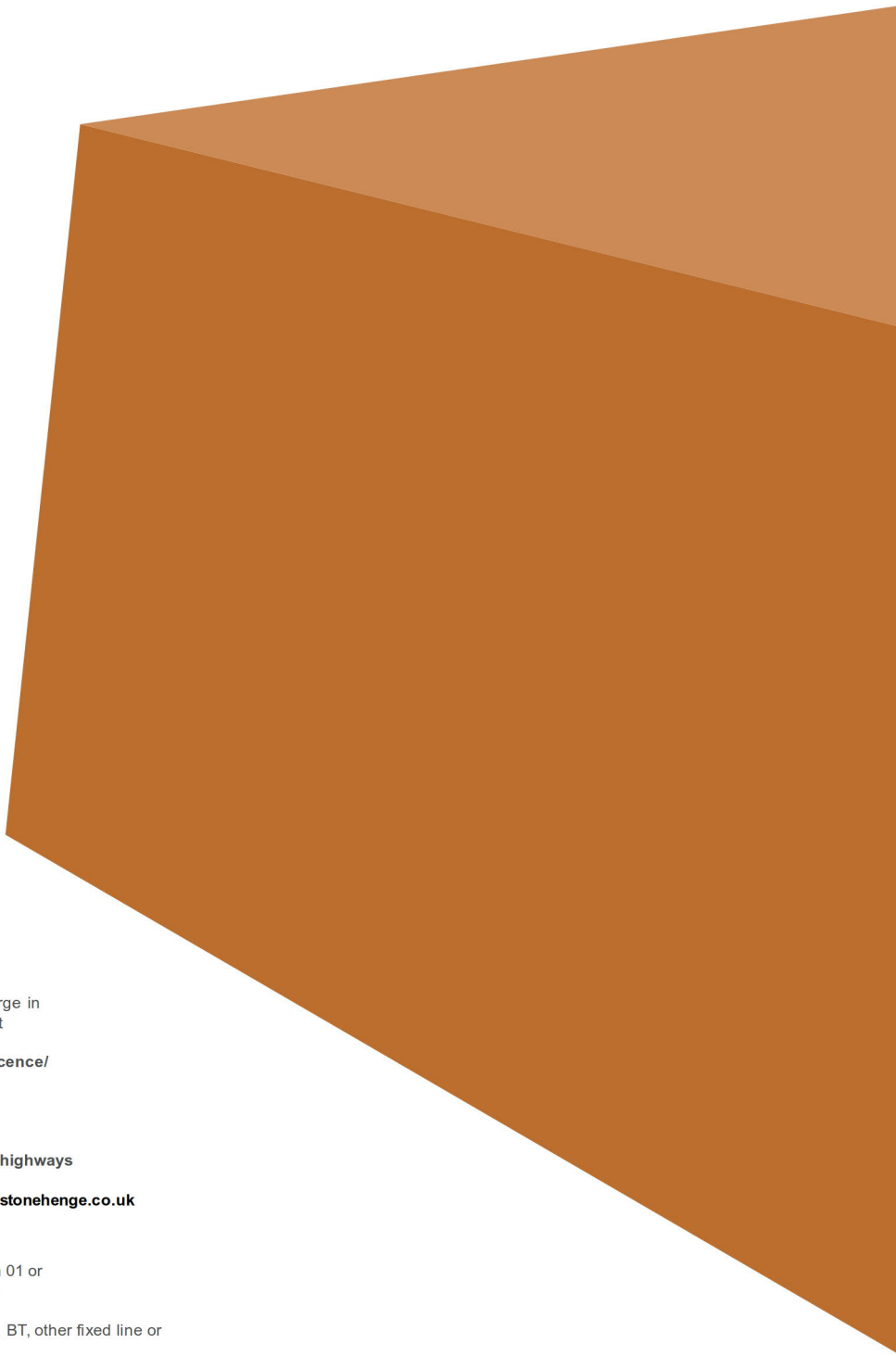
S.1 Construction Phase 1

Route	Direction	Distance (Km)	AM				IP				PM				Busy Period			
			Without scheme (hh:mm:ss)	Construction Phase 1 (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	Construction Phase 1 (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	Construction Phase 1 (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	Construction Phase 1 (hh:mm:ss)	Difference	% Difference
1	WB	270.5	02:45:08	02:45:13	00:00:05	0%	02:44:40	02:44:48	00:00:08	0%	03:01:34	03:01:49	00:00:15	0%	02:53:51	02:54:09	00:00:18	0%
	EB	282.4	02:53:35	02:53:46	00:00:11	0%	02:44:05	02:44:13	00:00:08	0%	02:53:39	02:54:05	00:00:26	0%	02:53:29	02:53:56	00:00:27	0%
2	WB	239.1	02:39:18	02:40:55	00:01:37	1%	02:40:42	02:42:03	00:01:21	1%	02:48:57	02:49:33	00:00:36	0%	03:04:29	03:02:30	-00:01:59	-1%
	EB	238.7	02:39:33	02:41:56	00:02:23	1%	02:35:20	02:38:53	00:03:33	2%	02:37:48	02:40:56	00:03:08	2%	02:52:51	02:54:10	00:01:19	1%
3	WB	242.8	03:22:50	03:22:58	00:00:08	0%	03:20:31	03:20:32	00:00:01	0%	03:31:27	03:31:21	-00:00:06	0%	03:27:07	03:27:23	00:00:16	0%
	EB	242.7	03:22:35	03:22:41	00:00:06	0%	03:17:07	03:17:11	00:00:04	0%	03:25:35	03:25:30	-00:00:05	0%	03:20:45	03:20:35	-00:00:10	0%
4	WB	256.2	03:08:25	03:08:26	00:00:01	0%	03:06:05	03:06:08	00:00:03	0%	03:16:30	03:16:26	-00:00:04	0%	03:16:29	03:16:28	-00:00:01	0%
	EB	256.0	03:10:53	03:10:54	00:00:01	0%	03:00:11	03:00:13	00:00:02	0%	03:03:32	03:03:30	-00:00:02	0%	03:13:47	03:13:50	00:00:03	0%
5	WB	40.2	00:32:25	00:32:23	-00:00:02	0%	00:32:29	00:32:36	00:00:07	0%	00:32:49	00:32:55	00:00:06	0%	00:33:01	00:33:04	00:00:03	0%
	EB	40.2	00:33:26	00:33:08	-00:00:18	-1%	00:32:27	00:32:17	-00:00:10	-1%	00:32:18	00:32:04	-00:00:14	-1%	00:33:17	00:33:16	-00:00:01	0%
6	WB	26.5	00:26:14	00:27:02	00:00:48	3%	00:25:26	00:25:36	00:00:10	1%	00:26:45	00:27:03	00:00:18	1%	00:27:48	00:27:03	-00:00:45	-3%
	EB	26.5	00:26:21	00:27:23	00:01:02	4%	00:25:02	00:25:42	00:00:40	3%	00:25:36	00:26:26	00:00:50	3%	00:27:37	00:26:41	-00:00:56	-3%
7	WB	41.1	00:34:50	00:34:53	00:00:03	0%	00:34:44	00:34:46	00:00:02	0%	00:35:13	00:35:19	00:00:06	0%	00:34:58	00:35:00	00:00:02	0%
	EB	41.2	00:36:43	00:36:51	00:00:08	0%	00:35:12	00:35:16	00:00:04	0%	00:35:39	00:35:44	00:00:05	0%	00:35:38	00:35:43	00:00:05	0%
8	NB	38.6	00:37:32	00:38:16	00:00:44	2%	00:36:20	00:37:05	00:00:45	2%	00:37:32	00:38:08	00:00:36	2%	00:36:49	00:37:31	00:00:42	2%
	SB	38.6	00:38:06	00:38:16	00:00:10	0%	00:36:43	00:37:05	00:00:22	1%	00:37:52	00:38:08	00:00:16	1%	00:37:01	00:37:31	00:00:30	1%
9	NB	25.7	00:27:54	00:27:47	-00:00:07	0%	00:27:25	00:27:04	-00:00:21	-1%	00:29:52	00:30:00	00:00:08	0%	00:27:37	00:27:13	-00:00:24	-1%
	SB	25.7	00:30:53	00:30:57	00:00:04	0%	00:28:11	00:28:10	-00:00:01	0%	00:29:15	00:29:16	00:00:01	0%	00:29:18	00:28:36	-00:00:42	-2%
10	NB	23.6	00:24:26	00:24:28	00:00:02	0%	00:23:38	00:23:39	00:00:01	0%	00:24:37	00:24:49	00:00:12	1%	00:23:44	00:23:47	00:00:03	0%
	SB	23.6	00:25:46	00:25:52	00:00:06	0%	00:24:22	00:24:25	00:00:03	0%	00:25:07	00:25:11	00:00:04	0%	00:24:15	00:24:18	00:00:03	0%
11	WB	108.3	01:08:19	01:11:57	00:03:38	5%	01:10:18	01:13:42	00:03:24	5%	01:11:00	01:13:59	00:02:59	4%	01:31:17	01:31:33	00:00:16	0%
	EB	108.5	01:10:21	01:12:52	00:02:31	4%	01:07:46	01:11:25	00:03:39	5%	01:06:53	01:10:31	00:03:38	5%	01:21:24	01:23:10	00:01:46	2%
11_1	WB	48.9	00:30:42	00:34:31	00:03:49	12%	00:31:03	00:34:57	00:03:54	13%	00:32:12	00:35:49	00:03:37	11%	00:43:24	00:45:27	00:02:03	5%
	EB	49.1	00:33:22	00:36:02	00:02:40	8%	00:30:57	00:34:44	00:03:47	12%	00:30:54	00:34:46	00:03:52	13%	00:42:33	00:44:48	00:02:15	5%
11_2	WB	59.4	00:37:36	00:37:25	-00:00:11	0%	00:39:14	00:38:53	-00:00:21	-1%	00:38:47	00:38:19	-00:00:28	-1%	00:47:53	00:46:16	-00:01:37	-3%
	EB	59.4	00:36:58	00:36:50	-00:00:08	0%	00:36:49	00:36:40	-00:00:09	0%	00:35:59	00:35:44	-00:00:15	-1%	00:38:50	00:38:21	-00:00:29	-1%
12	WB	107.4	01:41:46	01:41:57	00:00:11	0%	01:40:55	01:41:00	00:00:05	0%	01:43:22	01:43:25	00:00:03	0%	01:46:45	01:47:10	00:00:25	0%
	EB	107.3	01:43:28	01:43:38	00:00:10	0%	01:40:12	01:40:19	00:00:07	0%	01:44:22	01:44:31	00:00:09	0%	01:41:53	01:41:58	00:00:05	0%

S.2 Construction Phase 2

Route	Direction	Distance (Km)	AM				IP				PM				Busy Period			
			Without scheme (hh:mm:ss)	Construction Phase 2 (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	Construction Phase 2 (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	Construction Phase 2 (hh:mm:ss)	Difference	% Difference	Without scheme (hh:mm:ss)	Construction Phase 2 (hh:mm:ss)	Difference	% Difference
1	WB	270.5	02:45:08	02:45:09	00:00:01	0%	02:44:40	02:44:42	00:00:02	0%	03:01:34	03:01:35	00:00:01	0%	02:53:51	02:53:54	00:00:03	0%
	EB	282.4	02:53:35	02:53:36	00:00:01	0%	02:44:05	02:44:08	00:00:03	0%	02:53:39	02:53:50	00:00:11	0%	02:53:29	02:53:35	00:00:06	0%
2	WB	239.1	02:39:18	02:39:40	00:00:22	0%	02:40:42	02:40:55	00:00:13	0%	02:48:57	02:49:03	00:00:06	0%	03:04:29	03:03:56	-00:00:33	0%
	EB	238.7	02:39:33	02:39:43	00:00:10	0%	02:35:20	02:35:56	00:00:36	0%	02:37:48	02:38:14	00:00:26	0%	02:52:51	02:53:39	00:00:48	0%
3	WB	242.8	03:22:50	03:22:55	00:00:05	0%	03:20:31	03:20:31	00:00:00	0%	03:31:27	03:31:26	-00:00:01	0%	03:27:07	03:27:12	00:00:05	0%
	EB	242.7	03:22:35	03:22:40	00:00:05	0%	03:17:07	03:17:08	00:00:01	0%	03:25:35	03:25:32	-00:00:03	0%	03:20:45	03:20:41	-00:00:04	0%
4	WB	256.2	03:08:25	03:08:25	00:00:00	0%	03:06:05	03:06:05	00:00:00	0%	03:16:30	03:16:29	-00:00:01	0%	03:16:29	03:16:32	00:00:03	0%
	EB	256.0	03:10:53	03:10:53	00:00:00	0%	03:00:11	03:00:11	00:00:00	0%	03:03:32	03:03:30	-00:00:02	0%	03:13:47	03:13:47	00:00:00	0%
5	WB	40.2	00:32:25	00:32:29	00:00:04	0%	00:32:29	00:32:34	00:00:05	0%	00:32:49	00:32:58	00:00:09	0%	00:33:01	00:33:01	00:00:00	0%
	EB	40.2	00:33:26	00:33:20	-00:00:06	0%	00:32:27	00:32:27	00:00:00	0%	00:32:18	00:32:18	00:00:00	0%	00:33:17	00:33:23	00:00:06	0%
6	WB	26.5	00:26:14	00:26:35	00:00:21	1%	00:25:26	00:25:37	00:00:11	1%	00:26:45	00:26:51	00:00:06	0%	00:27:48	00:27:24	-00:00:24	-1%
	EB	26.5	00:26:21	00:26:40	00:00:19	1%	00:25:02	00:25:25	00:00:23	2%	00:25:36	00:25:56	00:00:20	1%	00:27:37	00:27:01	-00:00:36	-2%
7	WB	41.1	00:34:50	00:34:53	00:00:03	0%	00:34:44	00:34:45	00:00:01	0%	00:35:13	00:35:15	00:00:02	0%	00:34:58	00:35:00	00:00:02	0%
	EB	41.2	00:36:43	00:36:46	00:00:03	0%	00:35:12	00:35:13	00:00:01	0%	00:35:39	00:35:40	00:00:01	0%	00:35:38	00:35:42	00:00:04	0%
8	NB	38.6	00:37:32	00:38:10	00:00:38	2%	00:36:20	00:37:06	00:00:46	2%	00:37:32	00:38:08	00:00:36	2%	00:36:49	00:37:33	00:00:44	2%
	SB	38.6	00:38:06	00:38:50	00:00:44	2%	00:36:43	00:37:26	00:00:43	2%	00:37:52	00:38:35	00:00:43	2%	00:37:01	00:37:43	00:00:42	2%
9	NB	25.7	00:27:54	00:27:30	-00:00:24	-1%	00:27:25	00:27:25	00:00:00	0%	00:29:52	00:30:02	00:00:10	1%	00:27:37	00:27:43	00:00:06	0%
	SB	25.7	00:30:53	00:30:36	-00:00:17	-1%	00:28:11	00:28:27	00:00:16	1%	00:29:15	00:29:17	00:00:02	0%	00:29:18	00:29:25	00:00:07	0%
10	NB	23.6	00:24:26	00:24:27	00:00:01	0%	00:23:38	00:23:39	00:00:01	0%	00:24:37	00:24:45	00:00:08	1%	00:23:44	00:23:46	00:00:02	0%
	SB	23.6	00:25:46	00:25:48	00:00:02	0%	00:24:22	00:24:25	00:00:03	0%	00:25:07	00:25:11	00:00:04	0%	00:24:15	00:24:15	00:00:00	0%
11	WB	108.3	01:08:19	01:08:41	00:00:22	1%	01:10:18	01:10:32	00:00:14	0%	01:11:00	01:11:07	00:00:07	0%	01:31:17	01:30:42	-00:00:35	-1%
	EB	108.5	01:10:21	01:10:30	00:00:09	0%	01:07:46	01:08:24	00:00:38	1%	01:06:53	01:07:31	00:00:38	1%	01:21:24	01:22:20	00:00:56	1%
11_1	WB	48.9	00:30:42	00:31:15	00:00:33	2%	00:31:03	00:31:32	00:00:29	2%	00:32:12	00:32:30	00:00:18	1%	00:43:24	00:43:32	00:00:08	0%
	EB	49.1	00:33:22	00:33:34	00:00:12	1%	00:30:57	00:31:38	00:00:41	2%	00:30:54	00:31:38	00:00:44	2%	00:42:33	00:43:41	00:01:08	3%
11_2	WB	59.4	00:37:36	00:37:36	00:00:00	0%	00:39:14	00:39:09	-00:00:05	0%	00:38:47	00:38:46	-00:00:01	0%	00:47:53	00:47:19	-00:00:34	-1%
	EB	59.4	00:36:58	00:36:56	-00:00:02	0%	00:36:49	00:36:46	-00:00:03	0%	00:35:59	00:35:53	-00:00:06	0%	00:38:50	00:38:39	-00:00:11	0%
12	WB	107.4	01:41:46	01:41:51	00:00:05	0%	01:40:55	01:40:56	00:00:01	0%	01:43:22	01:43:21	-00:00:01	0%	01:46:45	01:46:51	00:00:06	0%
	EB	107.3	01:43:28	01:43:33	00:00:05	0%	01:40:12	01:40:14	00:00:02	0%	01:44:22	01:44:26	00:00:04	0%	01:41:53	01:41:54	00:00:01	0%

If you need help accessing this or any other Highways England information, please call **0300 123 5000** and we will help you.



This document is also available on our website at **www.gov.uk/highways**

If you have any enquiries about this document email **info@a303stonehenge.co.uk** or call **0300 123 5000***.

*Calls to 03 numbers cost no more than a national rate call to an 01 or 02 number and must count towards any inclusive minutes in the same way as 01 and 02 calls.
These rules apply to calls from any type of line including mobile, BT, other fixed line or payphone. Calls may be recorded or monitored.