A358 Taunton to Southfields Dualling Scheme

A358 Technical Traffic Note

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1 Introduction

1.1.1 This document gives an overview of the work carried out by National Highways to assess the impact of the A358 Taunton to Southfields Dualling Scheme on the road network.

1.1.2 It gives an explanation of the traffic modelling and provides information on how the A358 Taunton to Southfields Dualling Scheme traffic model has been developed. How the traffic model compares to observed conditions and how local roads are represented within the model are also outlined.

1.1.3 Forecast traffic flows, a value for money assessment and the impacts of Covid-19 on traffic are explored. Impacts on traffic volumes on the local road network and the impact on routeing through the local road network are also outlined. Finally, the process for mitigating impacts of the changes in traffic flows on the local road network is outlined.

1.1.4 More information on traffic modelling and impacts of the A358 Taunton to Southfields Dualling Scheme on the road network will be documented in a Combined Modelling and Appraisal (ComMA) Report. A ComMA report for the current stage of work (preliminary design) is due to be drafted in 2022.

2 Explanation of traffic modelling

2.1.1 Traffic modelling plays an important role in helping us understand the impact of proposed changes to the road network. The process is used to forecast how traffic flows and journey times change over time. Traffic models are normally constructed to understand typical conditions on an 'average' weekday. A traffic model, like all models, is a simplified representation of the real world.

2.1.2 The traffic model that is used to assess the scheme is updated throughout scheme development; the scheme is developed from concept stage through to construction, with a number of rounds of modelling in between. The model is enhanced as the scheme progresses. Initially it is used to make high-level strategic decisions about the merits of the scheme, then to sift through a number of options to find a preferred solution to the problems identified, and then to develop the design for the preferred option.

2.1.3 The traffic model outputs contain information of how traffic flows and journey times are forecast to change across the area affected by the proposed scheme. Model outputs can be converted to monetary values and these are used to determine how much benefit would result from the proposed scheme in order to inform a value for money assessment.

3 Process of developing a traffic model

3.1.1 The traffic model for the A358 Taunton to Southfields Dualling Scheme has been developed in accordance with guidance published by the government's Department for Transport. This sets out the processes expected to be followed and datasets to be used in developing a traffic model.

3.1.2 Broadly, the process can be summarised into three key steps:

- Traffic data collection and processing
- Creating a model of the existing situation
- Adjusting the model for what is forecast

3.1.3 The steps involved in developing the traffic models are explained in more detail below.

3.1.4 The first step in developing a traffic model is to collect data about trip patterns, traffic volumes and journey times of vehicles that travel on the existing road network. This captures information about the amount of traffic that travels from and to each location represented within the traffic model, which is then analysed and processed into travel demand matrices. Usually separate travel demand matrices are derived for each modelled time period, for example the morning or evening peak.

3.1.5 Separately a virtual representation of the existing road network is developed. This captures key attributes associated with each section of road, such as how the roads are connected to each other, the speeds at which vehicles travel on different roads and the maximum amount of traffic throughput that each road is able to accommodate. Details of junctions, such as junction types, lane markings, and signal timings are also represented within the modelled road network.

3.1.6 The second step is to use the road network and trip matrix to create a base year traffic assignment using specialist traffic modelling software. The assignment process determines which routes individual trips choose through the road network. The traffic modelling software runs through a series of numerical calculations that determine the best route through the road network for each trip that is recorded within the travel demand matrices, which takes into account the time, distance, and any additional costs for each route available.

3.1.7 The base year traffic assignment represents existing conditions and can therefore be compared against observed traffic counts and travel time data. There are certain targets that need to be met in order to demonstrate that a traffic model forms a robust representation of reality, which are set out within government guidance, and the model is adjusted until it represents observed conditions accurately enough for the current assessment purpose.

3.1.8 The third step is to use the specialist traffic modelling software to estimate what is likely to happen to traffic volumes and patterns in the future, alongside implementing any changes to the road network that are proposed by the A358 Taunton to Southfields Dualling Scheme, or by other schemes that are likely to be constructed by that time.

3.1.9 A key aspect of forecasting is to capture future development proposals, such as new housing or employment sites, which will alter trip patterns compared to those that were observed in the traffic data collected for the base year model. The Nexus 25 employment site is one example of a development proposal that was

included in the A358 Taunton to Southfields Dualling Scheme forecast traffic model to ensure that turning movements at the Nexus 25 roundabout align with likely future conditions. The Department for Transport guidance states that the forecast traffic growth must be constrained to set growth levels, which consider projected changes in population, employment, housing, car ownership and trip rates.

3.1.10 Another important aspect is to include other road improvements that are likely to go ahead within the future year networks, as these may change travel patterns or lead to increased traffic volumes passing through the A358 corridor. An example is the A303 Sparkford to Ilchester Dualling scheme, for which construction is underway.

3.1.11 The principle of the forecast traffic assignments is the same as for the base year traffic assignments, with traffic in the forecast year travel demand matrices assigned to the future road network in order to determine how all vehicles would route through the road network.

3.1.12 Two sets of network configurations are then created for all growth scenarios. One represents a road network without the proposed A358 Taunton to Southfields Dualling Scheme included and the other scenario includes the proposed project. The difference between the two modelled scenarios without and with the A358 Taunton to Southfields Dualling Scheme allows the detailed impact that the scheme would have on the A358 corridor and the surrounding road network to be examined.

4 Model compared to reality

4.1.1 In order to compare the model to reality a series of data collection exercises were undertaken before the model was built. This captured data about traffic flows and journey times on the existing road network. This section sets out what data was collected. The model itself covers a much wider area than just the Taunton to Southfields section of the A358, as it needs to consider how drivers would choose their routes through the strategic road network (motorways and major A roads), and therefore the data collected covers a much wider area than just the local vicinity around the scheme.

4.1.2 In total 385 traffic counts throughout the South West region of England have been used to inform the development of the traffic model. The spread of count locations is shown in Figure 4-1 below.

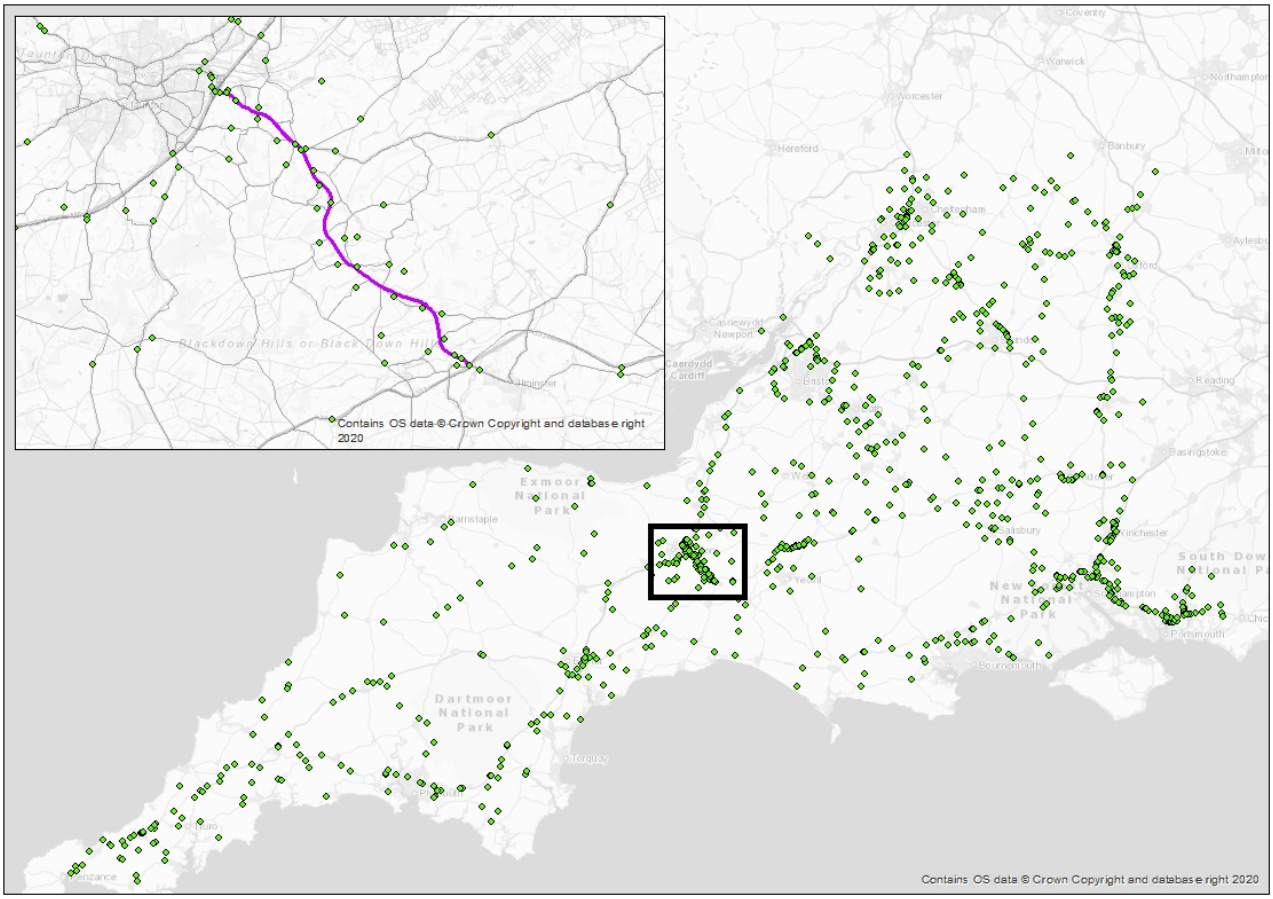

Figure 4-1 Traffic count data used in the traffic model

4.1.3 Government guidance sets out two metrics that need to be checked at each count location in order to determine whether the traffic volumes represented within the traffic model provide a sufficiently close match against observed traffic data to be deemed robust. Details of the metrics can be found in the transport analysis guidance about highway assignment modelling (unit M3.1). Guidance states that 85% of counts should pass these metrics, which is achieved in all modelled time periods in the A358 Taunton to Southfields Dualling Scheme traffic model.

4.1.4 Figure 4-2 below provides a snapshot of how modelled and observed traffic volumes compare along and around the A358 corridor in the morning and evening peak.

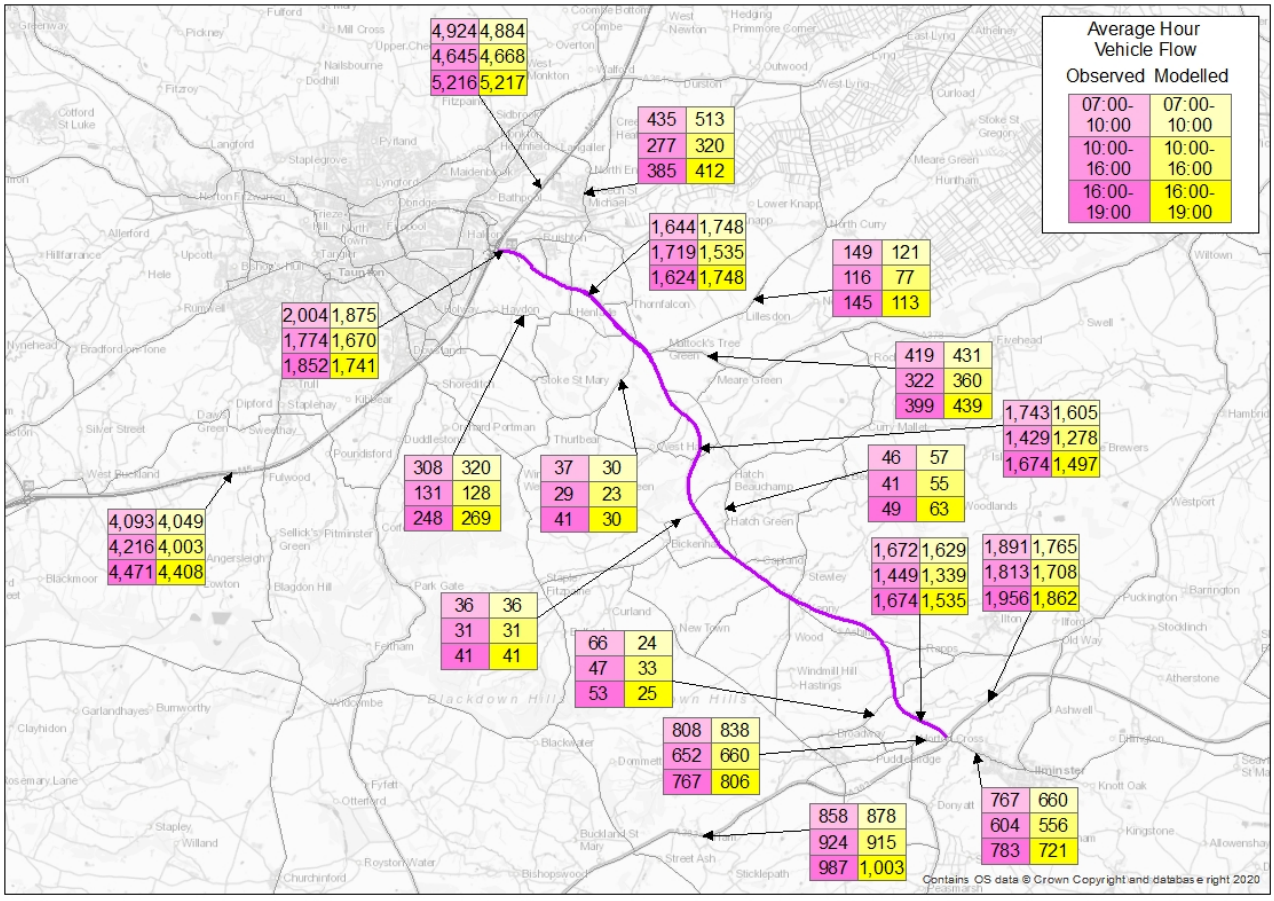

Figure 4-2 Modelled versus observed traffic flows

4.1.5 Journey times on 89 routes have been assessed to ensure that travel times represented within the traffic model provide a robust match against observed journey time data derived from in-vehicle satellite tracking data. All 89 journey time routes are shown in Figure 4-3. The inset focuses in on the area around the A358 corridor. Journey times along the A358 were assessed as part of a longer route between Williton and Southfields roundabout. It also shows that journey times were separately assessed on a route along Greenway Lane and Haydon Lane, which is a popular local ‘rat run’ between the A358 and parts of Taunton.

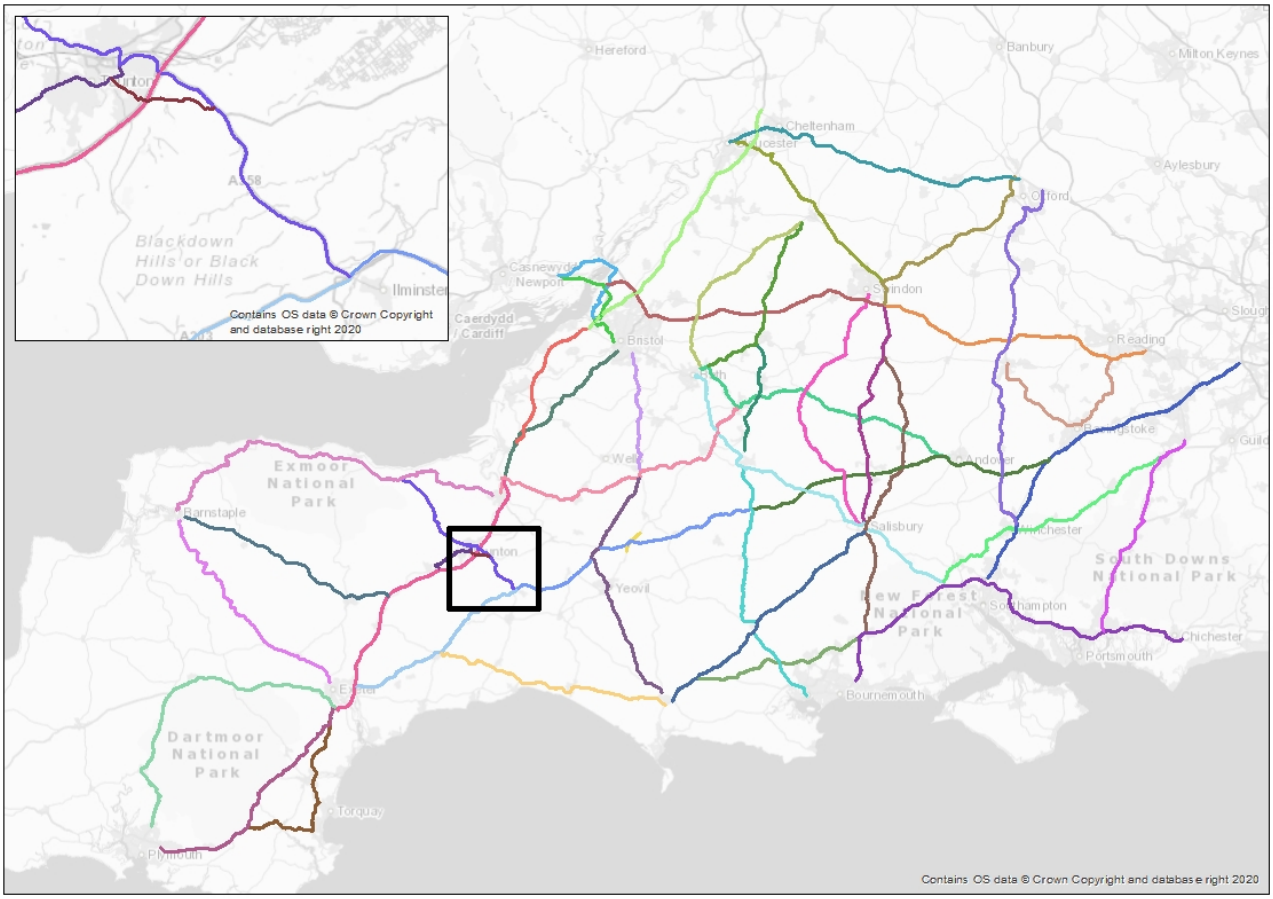

Figure 4-3 Journey time routes assessed in the traffic model

4.1.6 Transport analysis guidance sets out that modelled journey times should be within 15% of observed travel times for at least 85% of all journey time routes. This is achieved in all modelled time periods.

4.1.7 Table 4-1 below shows a comparison of observed and modelled journey times along the A358 between M5 junction 25 and Southfields roundabout. The accuracy of journey times along the A358 corridor is shown to be robust as the difference between modelled and observed times is within the 15% threshold defined in guidance in all time periods.

Table 4-1 Journey times on A358 between junction 25 and Southfields roundabout

Time Period	Direction	Observed journey time	Modelled journey time	% Difference
Morning peak (07:00-10:00)	Eastbound	13 min 11 sec	13 min 53 sec	5%
	Westbound	13 min 05 sec	13 min 43 sec	5%
Inter-peak (10:00-16:00)	Eastbound	12 min 22 sec	13 min 05 sec	6%
	Westbound	12 min 04 sec	13 min 06 sec	9%
Evening peak (16:00-19:00)	Eastbound	12 min 53 sec	13 min 13 sec	3%
	Westbound	12 min 19 sec	13 min 27 sec	9%

5 Representation of local roads in the traffic model

5.1.1 National Highways has developed a set of regional traffic models covering the whole of England. These were developed to form a consistent set of models that could be used to assess large strategic road network changes.

5.1.2 The South West Regional Traffic Model has been used as the basis for the A358 Taunton to Southfields Dualling Scheme model. In keeping with its strategic function the South West Regional Traffic Model focuses primarily on the strategic road network with limited representation of local roads. For the purpose of assessing the A358 Taunton to Southfields Dualling Scheme the model has been enhanced to incorporate a number of local roads around the scheme.

5.1.3 The scheme would have an impact on traffic patterns and traffic volumes on the surrounding local road network as a result of junctions with the existing A358 being closed. A detailed review of the local road network was therefore undertaken to determine which parts of the local road network are likely to see changes in traffic flows as a result of the scheme, for example as a result of existing junctions with the A358 being closed. A number of local roads along the A358 corridor were identified for inclusion in the traffic model based on this review.

5.1.4 With the exception of Park Barn Lane, which provides access to a small number of local properties only, every local road that joins onto the A358 is now captured within the traffic model. The extent of the local road network around the A358 corridor included in the traffic model is shown in Figure 5-1 below.

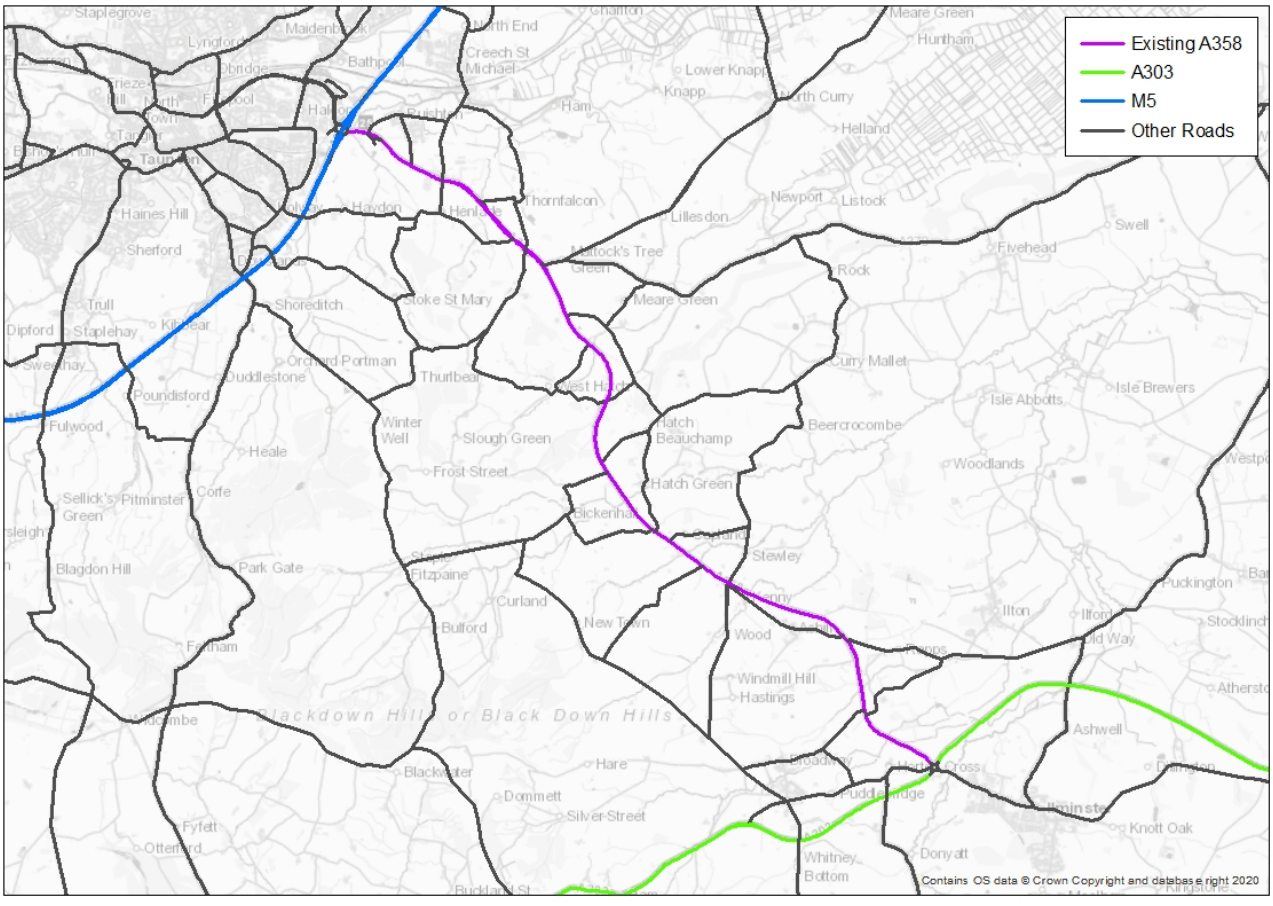

Figure 5-1 Road network around the A358 corridor represented in the traffic model

5.1.5 A comprehensive set of traffic counts was used as input to the traffic model to ensure that traffic volumes, both on strategic and on local roads, are reflective of reality. The accuracy of traffic flows on a selection of local roads within the traffic model is shown in Figure 4-2.

6 Forecast traffic flows and journey times

6.1.1 Traffic forecasts have been developed for the A358 Taunton to Southfields Dualling Scheme opening year (2028) and for a future year 15 years after opening (2043). Figure 6-1 shows a comparison of base year (2015) and forecast year annual average daily traffic flows, which represent two-way flows. Traffic flows are presented in units of thousands of vehicles. Forecast year traffic flows are shown for the scenarios without the A358 dualling and with the A358 dualling included.

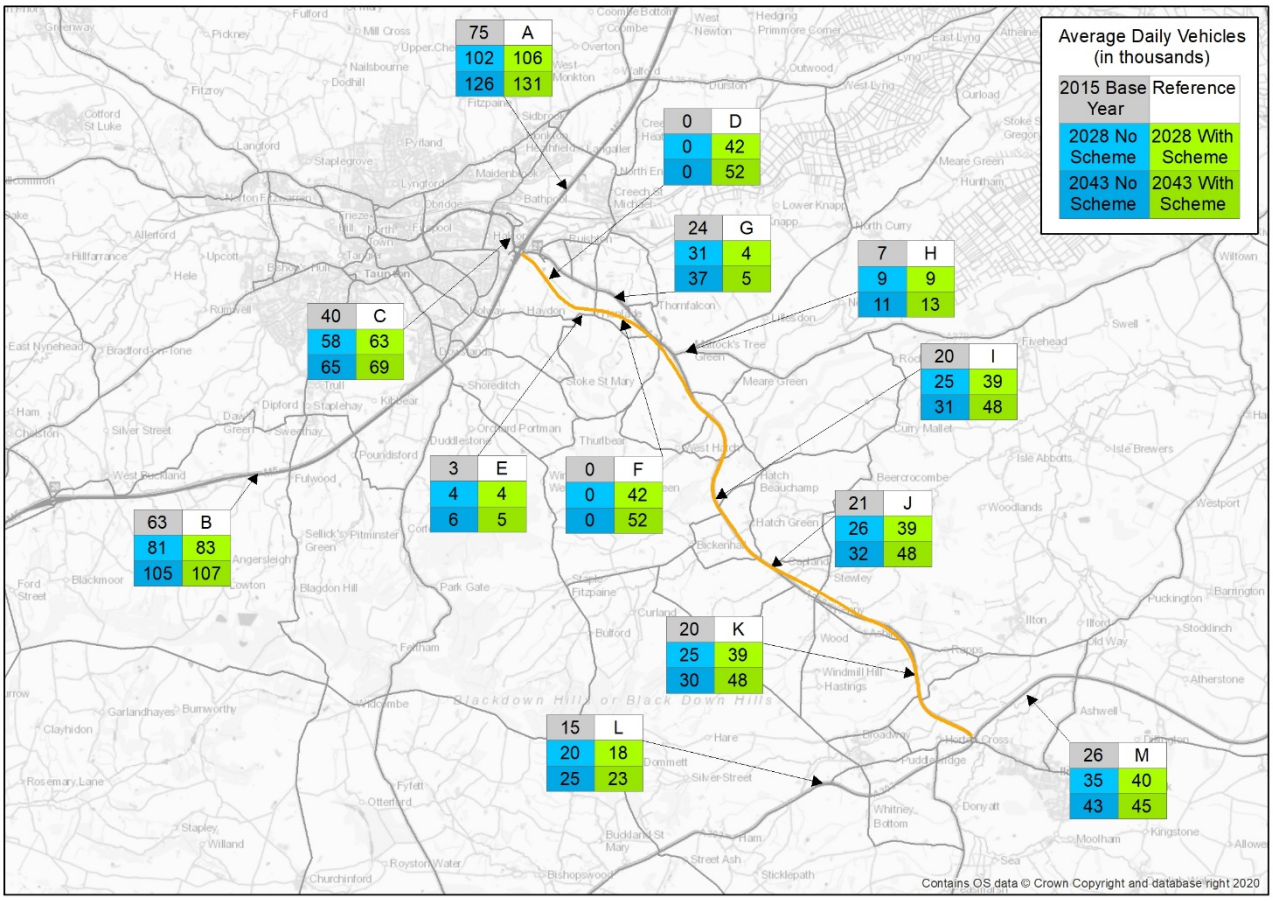

Figure 6-1 Daily traffic flows in the traffic model

6.1.2 Forecast journey times along the A358 corridor between M5 junction 25 and Southfields roundabout are shown in Table 6-1. Journey time savings are forecast to be between approximately 5 minutes and 6 minutes and 30 seconds.

Table 6-1 Journey times on A358 between junction 25 and Southfields roundabout

Time Period	Direction	Journey time without scheme	Journey time with scheme	Journey time saving
Year 2028				
Morning peak (07:00-10:00)	Eastbound	17 min 47 sec	12 min 34 sec	5 min 13 sec
	Westbound	15 min 57 sec	10 min 17 sec	5 min 40 sec
Inter-peak (10:00-16:00)	Eastbound	16 min 43 sec	11 min 25 sec	5 min 18 sec
	Westbound	15 min 04 sec	10 min 06 sec	4 min 58 sec
Evening peak (16:00-19:00)	Eastbound	17 min 09 sec	11 min 39 sec	5 min 30 sec
	Westbound	15 min 17 sec	10 min 11 sec	5 min 06 sec
Year 2043				
Morning peak (07:00-10:00)	Eastbound	20 min 10 sec	14 min 12 sec	5 min 58 sec
	Westbound	17 min 00 sec	10 min 55 sec	6 min 05 sec
Inter-peak (10:00-16:00)	Eastbound	18 min 07 sec	11 min 49 sec	6 min 18 sec
	Westbound	16 min 03 sec	10 min 22 sec	5 min 41 sec
Evening peak (16:00-19:00)	Eastbound	19 min 31 sec	13 min 06 sec	6 min 25 sec
	Westbound	16 min 00 sec	10 min 21 sec	5 min 39 sec

7 Value for money assessment

7.1.1 The differences in both traffic volumes and journey times form some of the key inputs that are used to determine how much impact the A358 Taunton to Southfields Dualling Scheme has compared to a future network without the scheme included. A value for money assessment is undertaken to analyse a range of different aspects that are impacted by the scheme.

7.1.2 Direct traffic impacts in the form of time savings to users of the A358 form a significant part of those benefits, but the value for money assessment also covers various other aspects such as road safety and environmental impacts. In the value for money assessment the benefits of the scheme are compared to the costs of constructing it.

7.1.3 An update of this value for money assessment is currently underway based on the latest scheme proposal. The most recent value for money assessment from when the preferred route for the scheme was announced indicated that the benefits of the proposed scheme would be 21% higher than the scheme costs.

8 Impact of Covid-19 on traffic patterns and volumes

8.1.1 There is an accepted level of uncertainty in traffic forecasting as future traffic levels are dependent on a number of assumptions including population growth, job growth and economic growth. This uncertainty is captured in a systematic way through the creation of low, central, and high growth scenarios.

8.1.2 Covid-19 has had a significant impact on traffic levels since March 2020, in particular during periods of lockdown. Whilst traffic levels dipped during the first lockdown in 2020, they have steadily increased, particularly due to demand for home delivery and online shopping. As of July 2021, overall traffic levels were back up to 97% of pre-Covid-19 levels (with goods vehicles at 107%).

8.1.3 The long-term future impacts that Covid-19 will have on traffic levels are not yet known. Traffic data shows that traffic levels have recovered to broadly typical levels and therefore future year traffic levels are very likely to be closest to existing central growth forecasts. Low and high growth sensitivity tests are being produced in addition to central growth forecasts to allow us to assess a range of possible future outcomes and the impact that these may have on the scheme.

9 Impact on traffic flows on the local road network

9.1.1 Figure 9-1 below indicates where changes in traffic volumes are forecast on the local road network as a result of the A358 Taunton to Southfields Dualling Scheme. The data has been extracted from the forecast traffic model. Sections of road are shown schematically as straight lines rather than following the true alignment of each road as this is how they are visually represented within the traffic model.

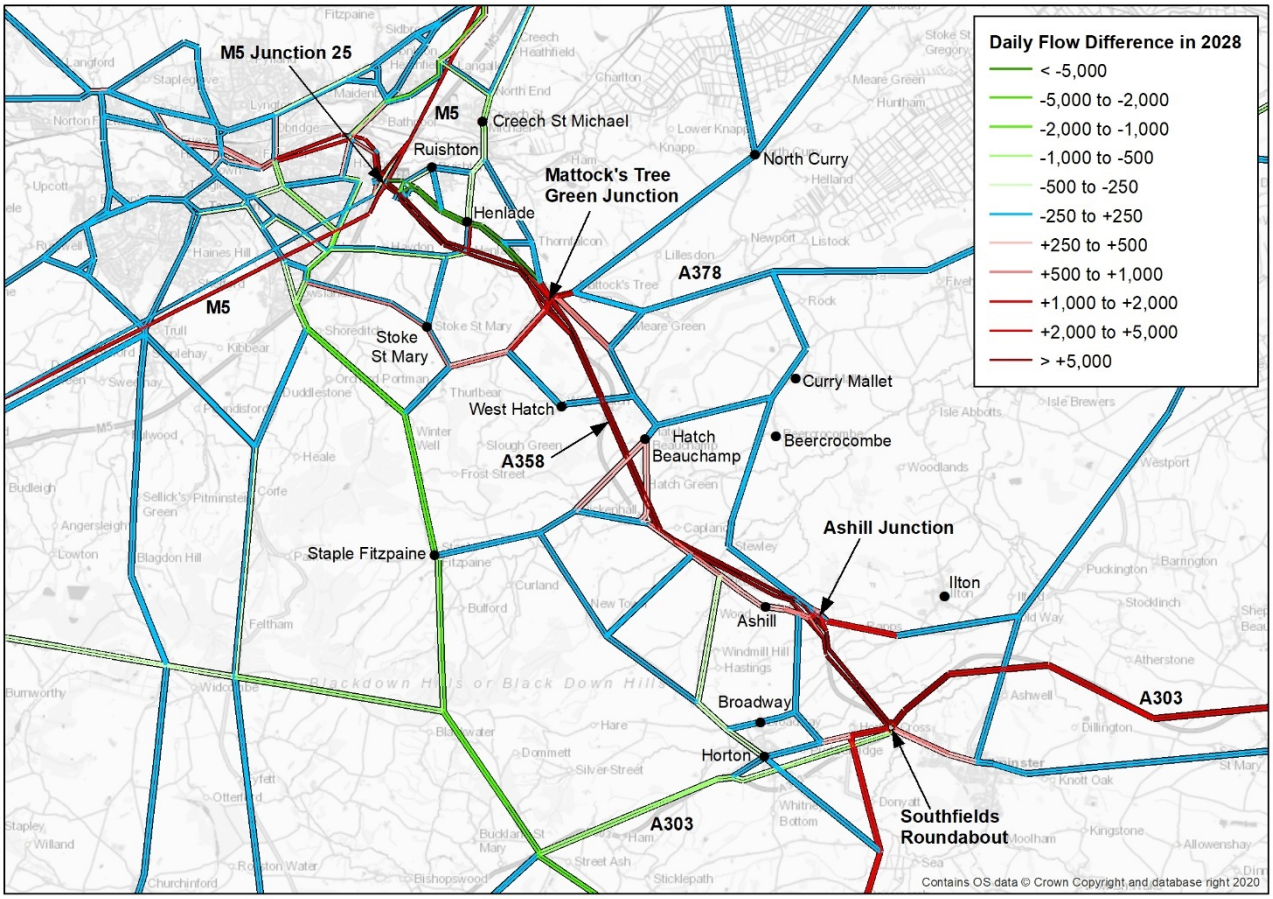

Figure 9-1 Forecast changes in daily traffic volumes on the local road network

9.1.2 The impact on the local road network around the A358 corridor would be broadly neutral in most locations as indicated by the blue lines. Increases in traffic flows, as indicated by the red lines, would be focused predominantly around the access points to the proposed A358 dual carriageway at Mattock's Tree Green junction and Ashill junction. Decreases in traffic flows are indicated by the green lines.

9.1.3 An assessment of the local roads where increases in traffic flows are shown is underway in order to determine whether the roads are of a suitable standard to accommodate the additional traffic. In most cases the affected roads have sufficient capacity to cater for the forecast uplift in traffic. Locations where this applies include Village Road, Rapps Road and the old A303 between Suggs Lane and Horton Cross.

9.1.4 Improvements are under consideration at selected locations where the forecast increase in traffic may potentially lead to congestion and these will be reviewed with Somerset County Council as the local highway authority.

10 Impact on routeing through the local road network

10.1.1 The proposed scheme would close all junctions where the local road network meets with the existing single carriageway A358, replacing them with two split level junctions at Mattock's Tree Green and Ashill for local road access, where traffic would be able to connect to the A358 via slip roads. All private means of access directly onto the A358 would be removed and alternative access via the local road network would be provided. Split level junctions and alternative access provision to the A358 is safer than the numerous existing junctions and private accesses along the A358.

10.1.2 The changes in access points to the A358 would result in some traffic travelling to and from local communities choosing different routes through the local road network, as the only places to access the A358 dual carriageway from the local road network between M5 junction 25 and Southfields roundabout would be at the Nexus 25 roundabout and the two new split level junctions.

10.1.3 The schematic diagram in Figure 10-1 indicates how traffic from local communities would typically route through the local road network to access the A358 Taunton to Southfields Dualling Scheme.

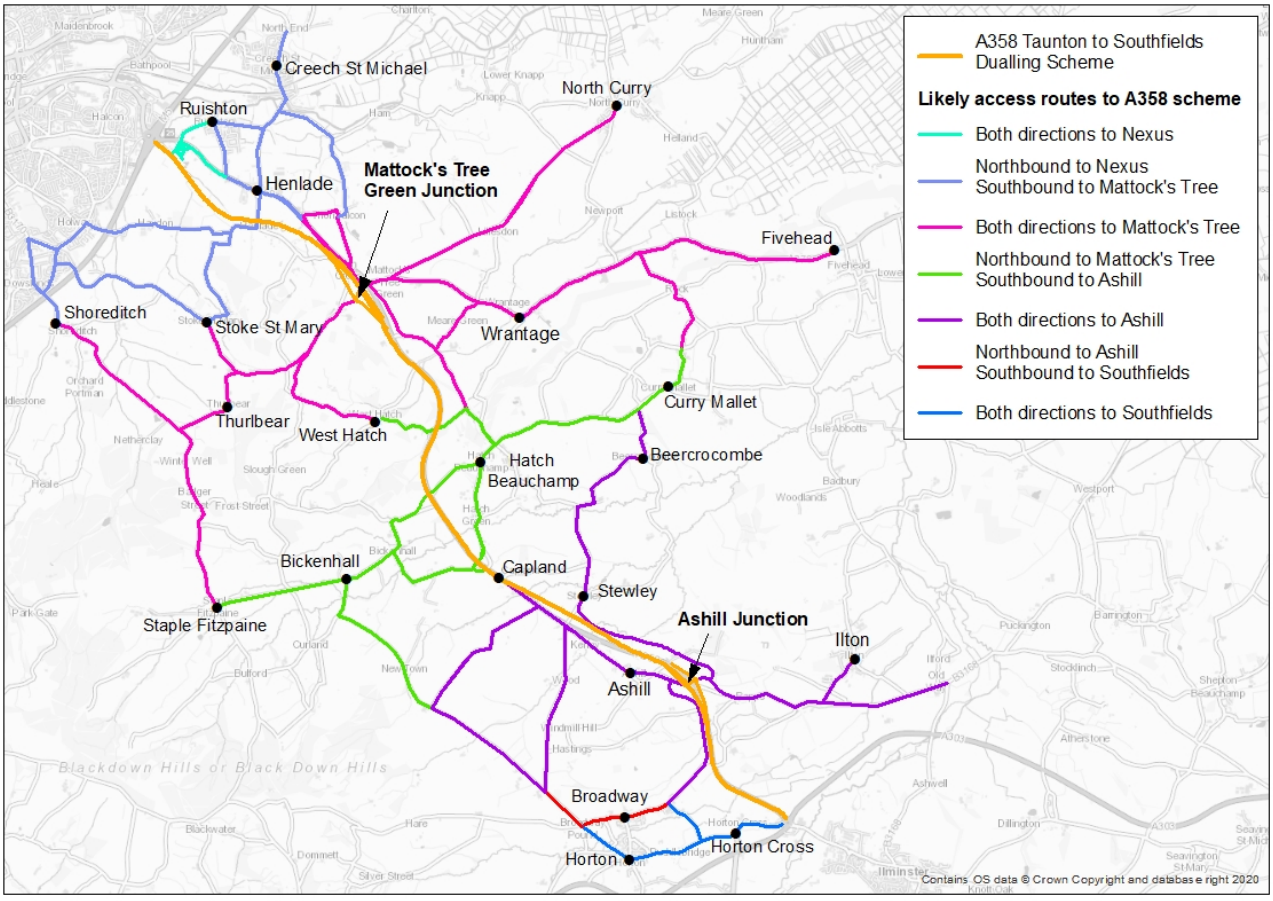

Figure 10-1 Likely access routes from local communities to the A358 scheme