

A303

Sparkford to Ilchester Dualling Scheme

Technical Appraisal Report

Table of Contents

	1
Executive Summary	8
1 Introduction	14
1.1 Scheme Background	14
1.2 Scheme Description	14
1.3 Report Purpose and structure	15
2 Planning Brief	17
2.1 Road Investment Strategy Objectives	17
2.2 Highways England Scheme Objectives	17
3 Existing Conditions	19
3.1 Description of the locality	19
3.2 Existing highway Network	20
3.3 Traffic	20
3.4 Accidents and journey time reliability	24
3.5 Topography, land use, property, and industry	26
3.6 Climate	26
3.7 Drainage	28
3.8 Geology	29
3.9 Mining	30
3.10 Public Utilities	30
3.11 Environmental status (designated areas)	33
3.12 Environment	34
3.13 Accessibility	37
3.14 Integration	38
3.15 Maintenance and repair statement	41
4 Planning factors	42
4.1 Option constraints	42
4.2 Legislation and guidance	43
5 Description of route options	53
5.1 Introduction	53
5.2 Option A2	53
5.3 Option B4	56
5.4 Option E4	59
5.5 Option F1	62
6 Traffic analysis	66
6.1 Traffic data	66
6.2 Traffic analysis methodology	67
6.3 Road layout and standards	70
7 Economic assessment	72
7.1 Application of TUBA/COBALT/QUADRO/WebTAG A1.3	72
7.2 Networks	76
7.3 Results of the economic appraisal	79
7.4 Accident savings	81
8 Safety assessment	82
8.1 Impact on road user – Strategic Safety Action Plan	82
8.2 Reliability and maintenance	103

9 Environmental and social assessment	106
9.1 Introduction	106
9.2 Consultation with statutory environmental bodies	106
9.3 Noise	106
9.4 Air quality and greenhouse gases	107
9.5 Landscape	107
9.6 Historic environment	108
9.7 Biodiversity	108
9.8 Water environment	109
9.9 Physical activity	109
9.10 Journey quality	109
9.11 Severance	110
10 Appraisal summary	111
10.1 Appraisal summary tables (ASTs)	111
10.2 Summary of consultation with stakeholders	111
10.3 Comparison of options	114
11 Programme	118
12 Conclusion and recommendations	119
12.1 Options for public consultation	119
12.2 Preferred solution	122
12.3 Naming of route for public consultation	123
Appendices	124
Appendix A Glossary	125
Appendix B Environmental constraints plan	127
Appendix C Appraisal summary tables	128
Appendix D Scheme programme	129

Executive Summary

Introduction

The A303/A30 corridor forms part of the strategic road network and a strategic link between the south-west peninsula and the rest of the south, south-east and London. More than a third of the corridor is single carriageway which causes significant congestion particularly during peak periods such as holidays, the summer and weekends. This is consistent with its wide use as a route for weekly commuting and holiday traffic.

The A303 between Sparkford and Ilchester is single carriageway and suffers some of the worst congestion along the route corridor. Dualling of this section was first investigated in the 1990s and was most recently announced in the Road Investment Strategy: for the 2015/16 – 2019/20 Road Period (Department for Transport, March 2015). Since its announcement, the scheme has been developed by Highways England and is currently in the option identification stage.

The Department for Transport aspires for the strategic road network to be smoother, smarter and sustainable by 2040 and this scheme supports these aspirations.

Existing conditions

The A303 Sparkford to Ilchester is located in the county of Somerset in the South Somerset District. It passes through a predominantly rural area, consisting mainly of arable farmland. The villages of Sparkford, Queen Camel, West Camel and Yeovilton are situated to the east and south of the existing route. The area is characterised by low lying topography, but the cluster of features known as Camel Hill form a prominent outcrop in this landscape.

There is a significant wealth of assets with designated environmental status near the existing route including landscape, ecological and historical features.

As well as the traffic congestion and poor journey time reliability experienced on this section of the A303, the accident rate on this section is higher than the national rate for A class trunk roads.

Option Identification

Thirteen route options were identified during the option identification stage, which were subject to a sifting process. From the initial thirteen, four were recommended for further assessment. These were:

- Option A2: This would be a part online, part offline route that would follow closely the existing route.
- Option B4: This would be an offline route north of the existing A303. It would follow relatively low lying land around the northern perimeter of Camel Hill.
- Option E4: This option would follow a corridor similar to that of the existing A303 whilst keeping the new works sufficiently separate from the existing carriageway to

minimise traffic disruption during the works and enabling the retention of the existing road for local use.

- Option F1: This would be an offline route to the north of the existing A303. Of the four shortlisted options it would be the route that would reach the furthest north. At its eastern end option, F1 would take a near similar course to option B4. However to the west, this option would follow an alternative corridor north of Steart Hill.

Traffic

The last regional traffic model to be developed for this area was the South West Area Multi Modal Study (SWARMMS) in 2002. A South West Regional Traffic Model is currently being developed but was not scheduled to be ready in time for use in modelling traffic for this scheme at this stage. A local traffic model was therefore developed for appraising this scheme using data from several sources.

Analysis of forecast Annual Average Daily Traffic (AADT) information shows relatively small flow differences between the four route options, with option A2 attracting the highest demand of around 45,000 AADT fifteen years after opening.

Analysis of highway journey times demonstrates that the scheme would modestly improve access times between the strategic road network and planned development locations, and would provide a modest improvement for strategic movements on the east-west stretch of the A303. This reflects the fact that the traffic model represents a neutral month weekday (in accordance with Department for Transport guidance), rather than when peak traffic occurs on Fridays, weekends and bank holidays due to weekly commuting and holiday traffic. These models were validated in accordance with WebTAG guidance. In addition, an off-peak model has been derived from the inter-peak model for the purposes of representing overnight traffic for so that the whole working weekday day is captured, for use especially in for environmental appraisal, but it should be noted that this off-peak model has not been fully validated. This method is used rather than a simple factoring process so that other data such as travel speeds can be extracted along with night-time traffic flows. It should also be noted that higher traffic flows occur at weekends and during holiday periods. At this stage these have not be modelled but have been assessed using annualisation factors to derive benefits from the inter-peak and off peak models. Further modelling of the weekends and holiday periods will be considered in the next stage of scheme development.

The inclusion of the scheme is forecast to result in the attraction of almost all the through traffic on the A303 onto the new route and a substantial reduction on the existing route arrangement.

Road Standards

The dual carriageway option layouts that have been developed in the option identification stage are fully compliant with geometric standards, although permitted relaxations have been employed where this has been deemed to be appropriate.

The aspirations of the *Road Investment Strategy* are that the A303/A30 corridor should be an expressway. Design standards for expressways have yet to be published but Highways England have issued guidance in a Technical Note. The route options have been designed so as not to hinder provision of expressway standards in the long term. It is also expected that the road improvement will become a high load route and headroom clearances for overbridges have been designed accordingly.

The junction strategy is provisional at this stage, the intention being that this can be refined during subsequent stages. In view of the likely high mainline flows which are expected to exceed 40,000 AADT, all junctions have been designed to be fully grade separated. This approach will be reviewed in subsequent stages.

Economic Appraisal

An economic appraisal has been carried out in accordance with the Department for Transport's web-based *Transport Analysis Guidance* (WebTAG). Journey time reliability has been assessed using the method set out in TAG A1.3 Appendix C5 and the environmental impacts on noise, air quality and greenhouse gases have been monetised.

The results of the economic appraisal are presented in Table 1.1.

Table 1.1: Results of economic appraisal

OVERALL IMPACTS	Option A2	Option B4	Option E4	Option F1
Accidents (not assessed by TUBA) ¹	4,221	4,899	5,073	5,147
Roadworks (not assessed by TUBA) ²	-6,117	-1,110	-1,350	-1,227
Greenhouse Gases (not assessed by TUBA) ³	-5,199	-5,306	-5,251	-6,781
Noise (not assessed by TUBA) ⁴	-379	490	-155	593
Air Quality (not assessed by TUBA) ⁵	-34	-88	-76	-149
Economic Efficiency: Consumer Users (Commuting)	36,938	34,710	34,866	33,248
Economic Efficiency: Consumer Users (Other)	70,961	67,411	66,001	64,000
Economic Efficiency: Business Users and Providers	106,506	99,563	96,213	91,812
Wider Public Finances (Indirect Taxation Revenues)	15,156	16,036	17,398	18,041
Present Value of Benefits (PVB)	222,053	216,605	212,719	204,684
Broad Transport Budget Present Value of Costs (PVC)	111,721	111,722	114,366	101,162
OVERALL IMPACTS				
Net Present Value (NPV)	110,332	104,883	98,353	103,522
Initial Benefit to Cost Ratio (BCR)	1.99	1.94	1.86	2.02
Reliability Benefits	8,719	8,326	8,279	8,102
Adjusted BCR	2.07	2.01	1.93	2.10

Notes: All monetary values are expressed in 2010 prices discounted to 2010. 1 - From COBALT; 2 - From QUADRO; 3 - TAG Unit A3 Chapter 2; 4 TAG Unit A3 Chapter 3; 5 - TAG Unit A3 Chapter 4

Predicted accident savings are shown in Table 1.2

Table 1.2 :Predicted accident savings based on local accident rates

Number of Personal Injury Accidents savings	Severity	Values over 60-year appraisal period			
		Option A2	Option B4	Option E4	Option F1
Casualties	Fatal	2	2	2	3
	Serious	19	20	19	21
	Slight	42	63	75	76
Value of accident savings (£000s in 2010 prices discounted to 2010)		4,221	4,899	5,072	5,148

Safety Assessment

A Strategic Safety Action Plan has been prepared based on a desk top safety assessment of the four alignment options, supplemented by a site visit. A number of issues were raised which will need to be taken into account in further development of the design in subsequent stages of the scheme development.

Overall, the main concerns related to junction arrangements and side road alignments. There were no specific concerns which set any of the route options apart, except in the case of option A2. As this route would be partly on the line of the existing A303, there would be no offline diversion route available along the existing road in the event of the A303 being closed to traffic. Also, the current strategy of having a central junction at Downhead Lane would reduce weaving lengths on the dual carriageway which could lead to more weaving type accidents.

A buildability and maintenance assessment, carried out for Highways England by a construction delivery partner, also concluded that option A2 would be more complex to construct and would present higher risks to road users and road workers during construction.

This qualitative assessment is backed up by the QUADRO and COBALT results in the economic appraisal, which show option A2 to have the greatest dis-benefits due to roadworks in construction and the lowest long term accident savings.

Environmental and Social Assessment

In the quantitative appraisal of environmental and social benefits, all route options show dis-benefits in terms of air quality and greenhouse gas dis-benefits. These dis-benefits increase with the distance of the proposed route options from the existing A303, because more vehicles would travel slightly further along these options. Conversely, benefits due to noise increase with the distance from the existing route. This is primarily due to the distance of the proposed routes from local residential areas.

In the qualitative assessments, the route options perform similarly. The exceptions to this are:

- Option A2 would perform better than other options in terms of the effect on landscape and historic environment due to it being partly online and therefore partly contained within an existing road corridor.
- Option F1 would have a slightly greater impact on biodiversity as it would intersect the corner of the Annis Hill Local Wildlife Site, which includes Ancient Woodland.

Overall, the environmental and social assessment concluded variable results across the different route options, with no particular option performing substantially better or worse than another when taking all disciplines into account.

Consultation with Stakeholders

Identifying and engaging with stakeholders has been an integral element of the options generation and development process.

A stakeholder mapping exercise was undertaken during July and August 2015 followed by the first of a series of workshops with key statutory stakeholders in December 2015. The workshop was attended by representatives from:

- Local Authorities: Somerset County Council, South Somerset District Council and Taunton Deane Borough Council
- Statutory environmental bodies: Environment Agency, Natural England and Historic England
- Non-statutory consultee, the National Trust, who were invited due to key interests in this area

In addition to the stakeholder workshops, a group was formed to assist with the development of a non-statutory Statement of Community Consultation (SoCC). The SoCC development group comprised local authority communications, planning and community engagement officers.

A period of stakeholder engagement commenced during the summer of 2016 with a series of meetings with key and statutory stakeholders. The information and views captured during the meetings contributed to route option development and planning of the public consultation period.

Scheme opportunities and constraints were discussed with key stakeholders as part of meeting presentations. Route corridor options were discussed and stakeholders were able to provide feedback on a number of relevant topics including environmental, economic and social elements of the proposal. There is unanimous agreement among key stakeholders that there is a need to upgrade this section of the A303 to increase traffic capacity, reduce congestion and improve motorised and non-motorised accessibility for local communities.

Programme

Key programme dates are:

■ Commence public consultation	January 2017
■ Ministerial Preferred Route Announcement (latest date)	September 2017
■ Application for Development Consent Order	June 2018
■ Publish Development Consent Order (latest date)	October 2019
■ Secretary of State decision (latest date)	October 2019
■ End of legal challenge period	December 2019
■ Start of construction (entry by negotiation)	March 2020
■ Scheme open to traffic	February 2023

Conclusions and recommendations

The four routes assessed in the technical appraisal have both benefits and dis-benefits to the point that the overall differences between them are small. Options A2 and E4 follow the same route over about a third of their length and are broadly within a central corridor close to the existing A303. Similarly, options B4 and F1 follow the same route also over about a third of their length and are broadly within a corridor north of the existing A303.

We therefore conclude that one central and one northern route should be taken forward to public consultation.

In comparing the two central routes, route option A2 emerged as the better route, having both better value for money and a lesser impact on the natural and historic environment; the benefit cost ratio (BCR) for option A2 of 2.07 compares with 1.93 for option E4. Although it performs worse in terms of safety, buildability and maintenance, most of the reasons for this are already taken into account in the economic assessment through the COBALT and QUADRO analyses.

In comparing the two northern routes, option F1 performs better than option B4 in terms of value for money and slightly worse in terms of its environmental impact mainly due to higher dis-benefits associated with air quality and greenhouse gas emissions. In terms of safety, buildability and maintenance, there is no significant difference. Overall, however, we consider the benefits of option F1 outweigh its dis-benefits compared with option B4, particularly F1 has a higher BCR of 2.10 compared with 2.01 for option B4 and it has a lower cost.

We therefore recommend that route options A2 and F1 be taken forward to public consultation.

1 Introduction

1.1 Scheme Background

Dualling of the A303 between Sparkford and Ilchester was first investigated in the early 1990s. It went through public inquiry and orders were prepared but never made. A review of the previous work was carried out in 2003 and the scheme recommended by the Inspector in 1996 was taken to public consultation. The scheme was dropped just prior to draft orders being published in 2004.

The preferred scheme was a combination of online and offline dualling between Hazlegrove Roundabout in the east and the westbound deceleration lane to Podimore in the west.

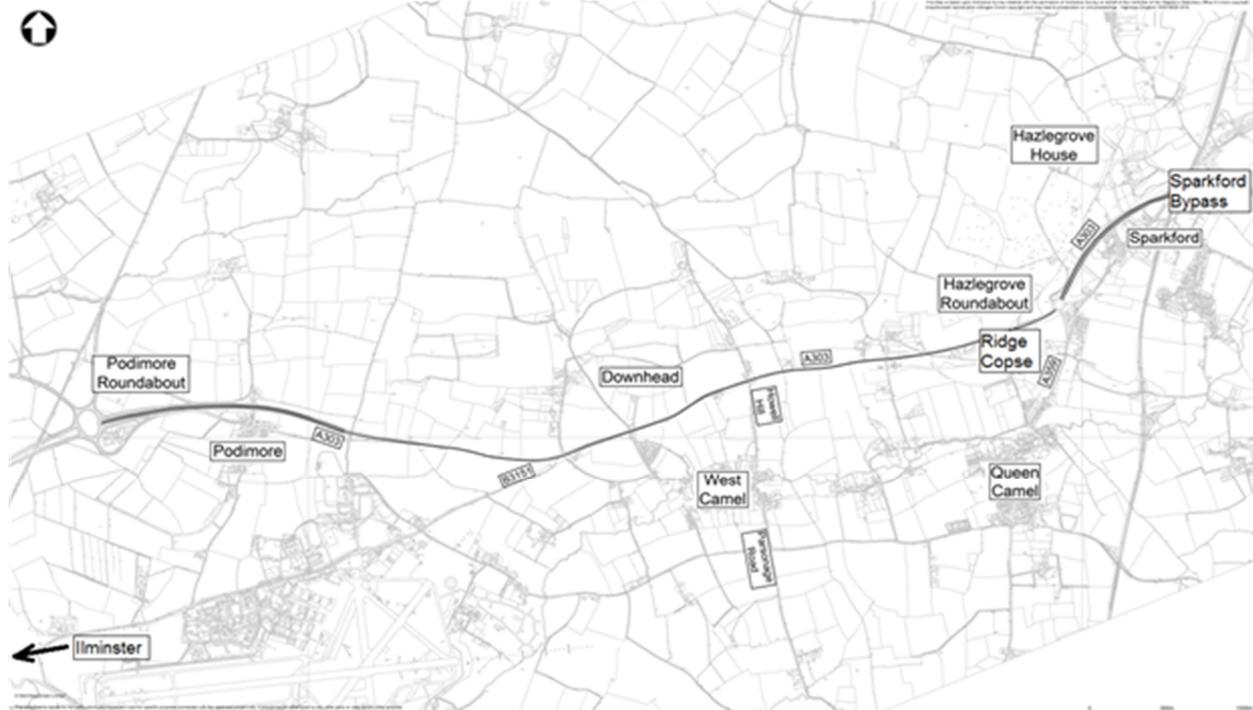
Dualling of the A303 between Sparkford and Ilchester was announced in the *Road Investment Strategy: for the 2015/16 – 2019/20 Road Period* (Department for Transport, March 2015) and is currently in the option identification stage. A new set of options was appraised building on the previous work in 1996 and 2003, and a sifting process identified four options to be taken forward for further appraisal. This further appraisal is presented in this report. For further information of the sifting process, refer to chapter 9 of the *Options Assessment Report* (MMSJV, due for issue in November 2016).

1.2 Scheme Description

The A303/A30 forms part of the strategic road network and a strategic link between the south-west peninsula and the rest of the south, south-east and London. A scheme plan is shown in Figure . A large proportion of the existing A303/A30 corridor (37%) is single carriageway (S2) creating multiple bottlenecks resulting in significant congestion, particularly during peak periods such as the summer and weekends.

The existing section of the A303 between Sparkford and Ilchester is one of the single carriageway sections and is described in detail in chapter 3.2 of this report.

Figure 1.1 A303 Existing Road Layout



Source: MMSJV. This Map is based upon Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office © Crown copyright. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. Highways England 100030649 2015

The proposed scheme would provide a dual carriageway on the A303 trunk road between Sparkford and Ilchester in Somerset. The scheme would link two existing sections of dual carriageway and would be likely to include grade separated interchanges and the removal of at-grade junctions and direct accesses.

1.3 Report Purpose and structure

The Technical Appraisal Report is a product required under Highways England's Project Control Framework. It also forms a part of the Department for Transport's *Transport Appraisal Process*. It has been prepared in accordance with *Guidance on Technical Appraisal Report Initial Scheme Preparation* (Highways Agency (now Highways England), April 2009) and *Transport Analysis Guidance – The Transport Appraisal Process* (Department for Transport, January 2014).

The *Transport Appraisal Process* is a 14 step process. At steps 5-8, a number of options are generated, sifted, developed and reported. This is presented in the *Options Assessment Report* (MMSJV, due to be issued in November 2016). At step 9, modelling and appraisal methodology is clarified. At step 10, further appraisal of the better performing options is undertaken following the methodology produced at step 9. This *Technical Appraisal Report* reports on this further appraisal of the better performing options from the initial sift process.

In accordance with *Guidance on Technical Appraisal Report Initial Scheme Preparation*, this report presents the technical aspects of the highway problem and the sustainable alternative solutions. The *Technical Appraisal Report* brings together the traffic,

economic, safety and environmental assessments, and is the basis for deciding which option(s) should be included in the Public Consultation. The purposes of the report are broadly to:

1. Validate the need for the scheme under the terms of reference set out in the scheme brief.
2. Identify and evaluate sustainable options having regard to the Government's New Approach to Appraisal, economic assessment and value for money, engineering, safety, and effect on the economy, social and environmental factors.
3. Describe with relevant detail all alternatives investigated and set out reasons for rejection of any of those alternatives.
4. Recommend options for public consultation.

This report follows the guideline contents structure suggested in Annex A of the *Guidance on Technical Appraisal Report*. It differs slightly in the following respects:

- The economic assessment is broadened from transport user benefits and cost benefit analyses to include quantitative assessments of roadworks during construction and environmental impacts. This is as agreed with Highways England's Professional and Technical Services.
- The safety assessment includes a section on buildability as requested by the Highways England Integrated Project Team.
- The safety assessment also includes a section on maintenance which ensures that the broader aspects of the Construction (Design and Management) Regulations 2015 are covered not just construction management.

2 Planning Brief

2.1 Road Investment Strategy Objectives

Part 1 chapter 2 of the *Road Investment Strategy: for the 2015/16 – 2019/20 Road Period* (Department for Transport, March 2015) sets out the Department for Transport's aspiration for the strategic road network to be smoother, smarter and sustainable by 2040. The Department for Transport aims to achieve this by focussing on eight key performance areas as set out in part 3 chapter 1 of the *Road Investment Strategy*. These are:

- Making the network safer
- Improving user satisfaction
- Supporting the smooth flow of traffic
- Encouraging economic growth
- Delivering better environmental outcomes
- Helping cyclists, walkers and other vulnerable users of the network
- Achieving real efficiency
- Keeping the network in good condition

2.2 Highways England Scheme Objectives

The objectives for the A303 Sparkford to Ilchester scheme are set out in the *Client Scheme Requirements* (Highways England, August 2015). These are currently under review. The current Client Scheme Requirements are reproduced below,

Transport and operational objectives

The scheme will be developed to be expressway compatible to support the long term aspirations of the *Road Investment Strategy*.

The specific Transport Objectives identified at the Stage 0 Value Management Workshop are:

- Support economic growth
 - Facilitate growth in employment at key locations and centres along the A303/A358/A30 corridor and to the South-west Region
 - Facilitate growth in housing at key development hotspots along the corridor
- Capacity
 - Reduce delays and queues that occur during peak hours and at seasonal times of the year
- Resilience
 - Improve the resilience of the A303/A358/A30 route corridor
- Safety
 - Improve safety along the A303/A358/A30 route corridor
- Connectivity
 - Improve the connectivity of the south-west to the rest of the UK, to reduce peripherality and improve business and growth prospects
- Environmental

- Avoid unacceptable impacts on the surrounding natural and historic environment and landscape. Optimise the environmental opportunities and mitigations that the intervention could bring.
- Reduce severance on local communities
- Promote opportunities to improve the quality of life for local communities

Throughout the design and delivery stages, the scheme should ensure that customers and communities are fully considered. Specifically, this should include:

- Understanding the needs of all segments of customers (including vulnerable users), stakeholders and partners.
- Responding to those needs such that the end product delivers an improved customer experience.
- Assessing the impact of works on roads users and communities, minimising disruption and delivering appropriate mitigation measures. This assessment should also look at issues through customers' eyes.

Organisational objectives

- During construction the effect on the customer impact KPI should be taken into account and close dialogue held with the Regional Intelligence Unit (RIU), Operations Directorate and Somerset County Council to consider traffic delay.
- During design close working with Operations Directorate to consider future maintenance requirements to ensure the scheme is maintainable in a safe manner.
- Current known maintenance requirements are picked up in construction of the scheme and that following completion there is a minimum 5-year maintenance free period to protect customer expectation.
- All asset data to be handed over within a reasonable timescale following agreed handover to Operations Directorate.

(Note: At the option identification stage Value Management workshop, it was recorded that an environmental objective for this scheme going forward should be to identify opportunities for enhancement not just mitigation. Such opportunities will be investigated within the scheme budgetary constraints.)

3 Existing Conditions

This chapter describes existing conditions both along the existing A303 corridor between Sparkford and Ilchester, and also within the area of interest for potential improvement schemes. All references in this chapter to options relate to the proposed route options described in chapter 5 of this report.

3.1 Description of the locality

The existing section of the A303 between Sparkford and Ilchester passes through the civil parishes of Sparkford, Queen Camel, West Camel and Yeovilton, which are located within South Somerset District. The district is situated in the south-west of England within Somerset County and is bordered by the counties of Devon, Dorset and Wiltshire to the west, south and east, and by the districts of Taunton Deane, Sedgemoor and Mendip to the north. South Somerset District is generally rural in character, with substantial levels of arable farming taking place. It covers an area of 959sq km, an area larger than any other district in Somerset.

The villages of Sparkford, Queen Camel, West Camel and Yeovilton are situated to the east and south of all the existing route. They have populations of approximately 1,000 people each, and still have some historical importance. There is evidence that Sparkford, Queen Camel and Yeovilton have been continuously occupied since Roman times while West Camel appears to have Saxon origins. There is evidence of a Romano-British settlement within Queen Camel along the northern edge of the A303, within the scheme area.

The scheme area lies within the Central Plains, Moors and River Basins landscape area of South Somerset. This area is characterised by low lying topography, generally between 10m and 50m above sea level. However, the cluster of features known as Camel Hill, which the current A303 traverses, form a prominent outcrop in this landscape. To the north of Camel Hill lies the River Cary valley, and to the south is the Vale of Ilchester. The district has a significant wealth of historical assets and areas with designated environmental status. The Fosse Way runs north-south roughly 1.5km to the west of the scheme limits. Parts of the villages of Queen Camel and West Camel are situated within conservation areas and have regionally important archaeological sites.

Yeovilton village includes the Fleet Air Arm Museum. This is a major tourist attraction in the south-west which attracts a large number of visitors each year and can be accessed from the A303 via the B3151 junction just to the west of West Camel. The Haynes International Motor Museum is situated approximately 1.5km to the north-east of the scheme limits, and can be accessed from the A303 via the junction at Sparkford.

The 2011 census gives the population of South Somerset District as 162,113. The largest age group in the district were people aged 45-64. Most notably, over 1 in 5 people in the district are aged 65+ (21.6%) which is higher than the national average (16.4%).

South Somerset District is in general a prosperous area with low levels of unemployment (1.8% compared with 3.8% nationally) and good qualification levels.

However, average gross weekly incomes are low (£479.40 compared to the national average of £507.60).

House prices were an average of £172,000 in Q2 2013 which is slightly below the England average of £184,000. This information is taken from the website somerseintelligence.org.uk/houseprices-july-2014.

3.2 Existing highway Network

3.1.1 The A303/A30 Corridor

The A303/A30 forms part of the strategic road network and is a strategic link between the south-west peninsula and the rest of the south, south-east and London. The route is comprised of multiple road standards including dual 2-lane all purpose (D2AP), single carriageway 2 lane (S2) and single carriageway sections with overtaking lanes (S2+1) together with associated varying speed limits (from 40mph to 70mph).

A large proportion of the existing A303/A30 corridor (37%) is single carriageway (S2) creating multiple bottlenecks resulting in significant congestion, particularly during peak periods such as the summer and weekends.

3.1.2 Existing A303 Between Sparkford and Ilchester

The existing A303 between Sparkford and Ilchester consists of approximately 5km of single carriageway adjoining existing dual carriageway sections at either end. The single carriageway section runs between the Podimore bypass (a dual carriageway) and Hazlegrove Roundabout.

The local area is categorised as rural having mainly field boundaries. The route is on a ridge line with lower ground located to the north and south. There are no river, rail or major road crossings on the A303 along this section.

The length of the Sparkford-Ilchester section is characterised by a single 2-lane road starting 1.8km east of Podimore Roundabout where it narrows from a dual carriageway. There are a number of priority junctions along the route giving access to the settlements of Queen Camel and West Camel to the south, as well as a number of farm accesses and parking lay-bys. Just west of Hazlegrove Roundabout there is a 2+1 arrangement in the westbound direction. To the east of Hazlegrove Roundabout the route returns to dual 2-lane carriageway.

3.3 Traffic

Along the A303 there are a number of Highways England Open Data Automatic Traffic Count (ATC) sites. On the stretch of road that is due to be updated by the scheme, there is a Highways England Open Data ATC site that has been used to provide current traffic flow data. That data has been obtained for October 2015 and August 2015 to assess the traffic levels and to analyse the daily flow profiles in both a neutral and peak month respectively. The average daily flows for August and October are shown in Table 3.1 for different days of the week. School holidays have been excluded in the averages in October.

Table 3.1: A303 2015 Automatic Traffic Counts

Location: A303 between Hazlegrove Roundabout and Podimore Roundabout	October 24 2-way daily flow	August 24 2-way daily flow
Mon–Thurs Avg 2015	22,300	26,100
Friday Avg 2015	29,500	34,000
Saturday Avg 2015	21,600	29,900
Sunday Avg 2015	23,000	26,400

Counts rounded to nearest 100 vehicles

The A303 suffers from congestion and queuing problems and is recognised in the *Road Investment Strategy: for the 2015/16-2019/20 Road Period* (Department for Transport, March 2015) as one of the long-standing road congestion hot spots in the country. During the summer months, traffic flows on some parts of the route increase by up to 50% exacerbating the situation. The weekday daily average two-way flow in October of 22,300 shown in

Table 3.1, is below the ultimate capacity expected of a single carriageway road, but the average October Friday flow of 29,500 can be seen to be much higher than the average October weekday as well as higher than the October daily average flows for Saturday and Sunday. The flows on October Saturdays and Sundays are, however, of a similar level to those on an average October weekday due to the large element of weekly commuting and holiday traffic on this route. During the summer peak month of August, the daily average flows are significantly higher than October on all days of the week and highest for an average August Friday, Saturday and Sunday when the road operates at capacity during certain times of the day. It is considered that the current delays and queues are caused by insufficient capacity on the single carriageway section of the A303 especially at weekends and during holiday periods.

Figure 3.1 and Figure 3.2 show the average weekday daily flow profiles in October and August. Figure 3.3 shows average August daily flow profiles over the weekend and Bank Holidays. These show how the daily traffic flows are distributed during the hours of the day illustrating that peak hourly traffic flows occur of 2000-2500 vehicles per hour which are reached during consecutive hours especially at weekends and in the August holiday period.

Figure 3.1: A303 Average Weekday Two-Way Hourly Flow Profiles in October

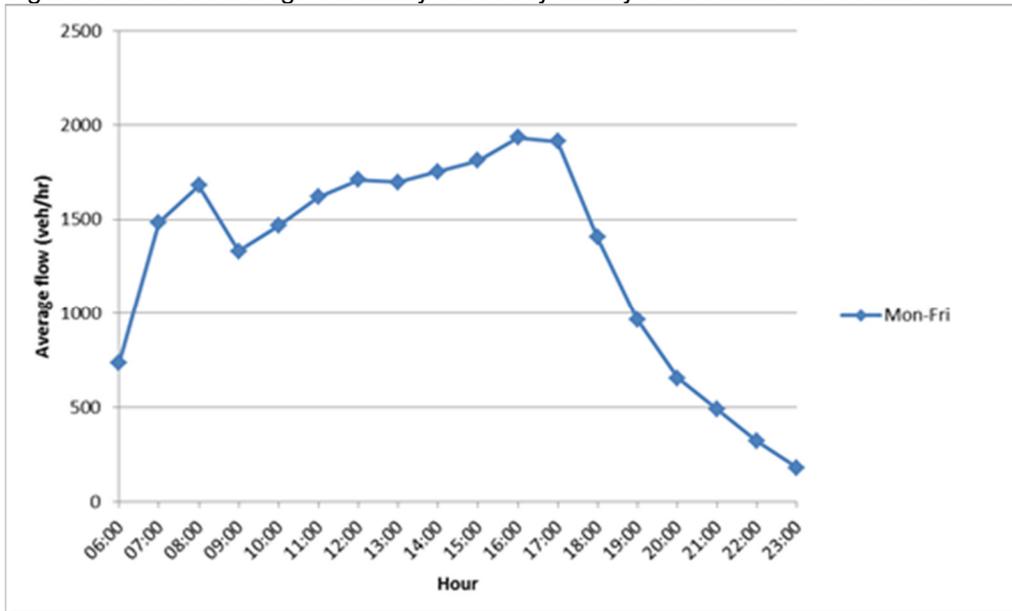


Figure 3.2: A303 Average Weekday Two-Way Hourly Flow Profiles in August

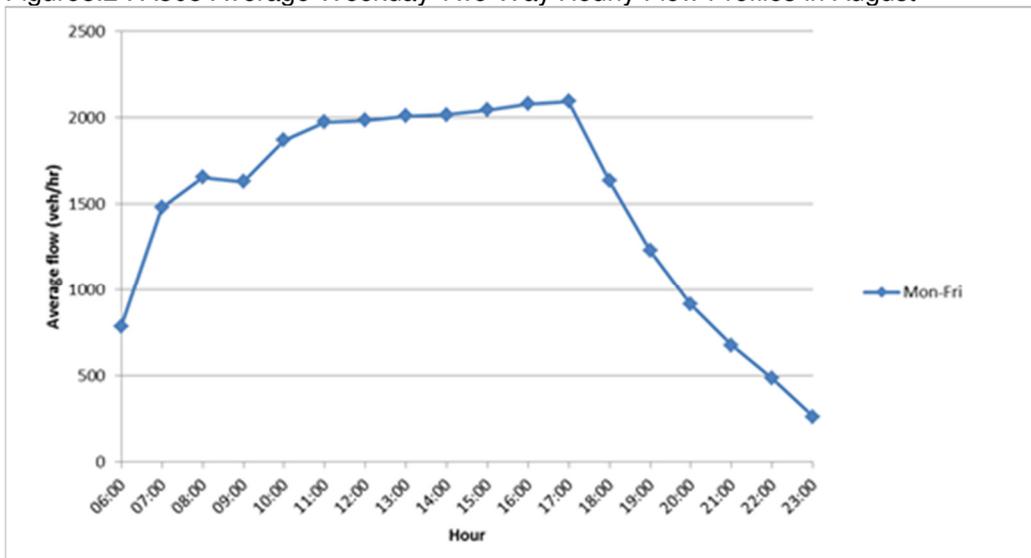
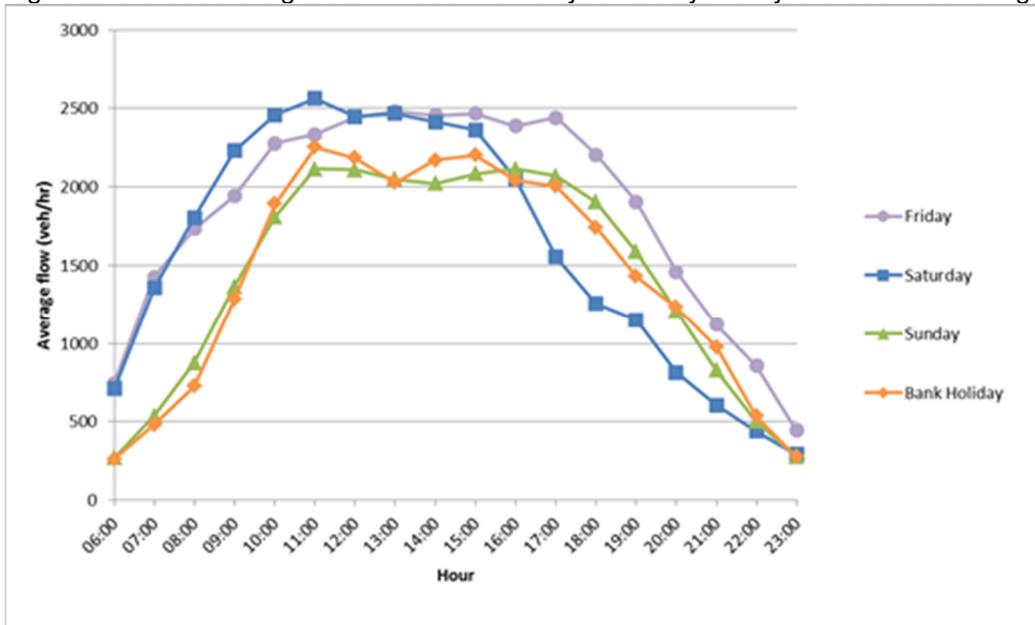


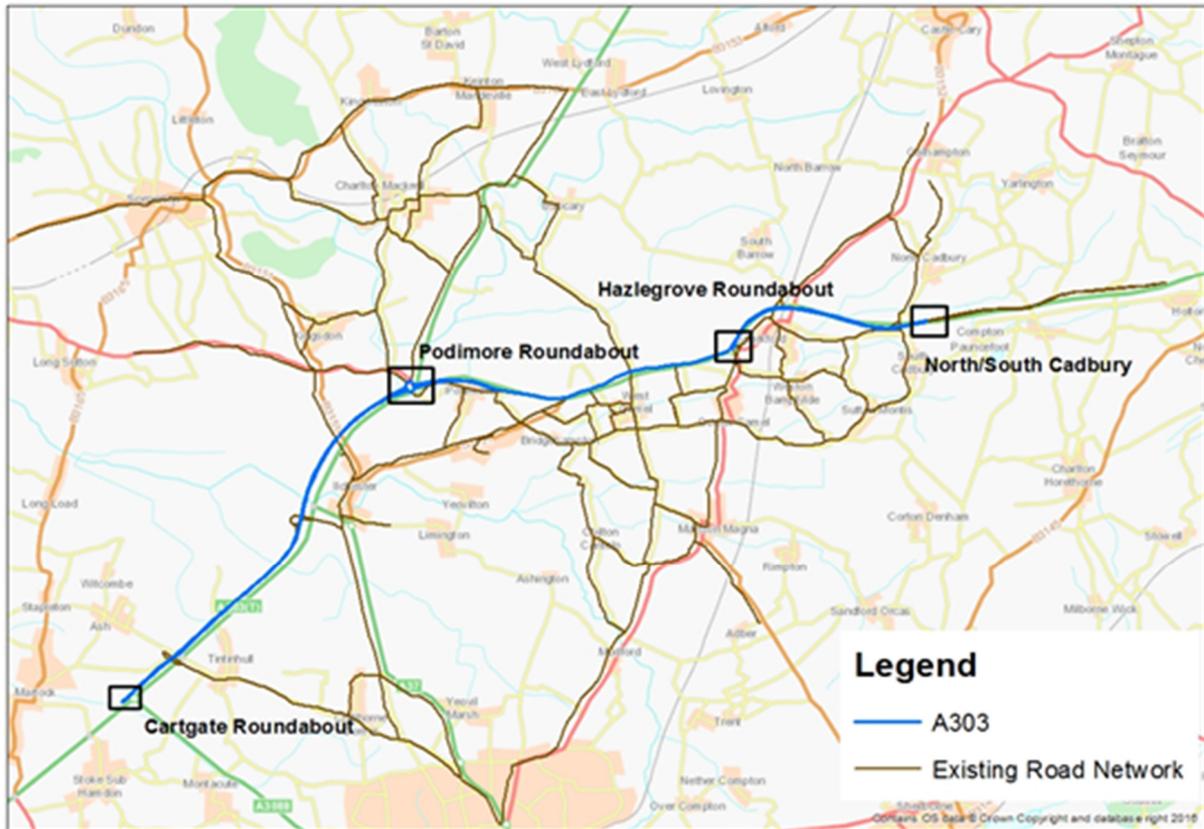
Figure 3.3: A303 Average Weekend and Holiday Two-Way Hourly Flow Profiles in August



As shown in Figure 3.3, the weekend summer flows are much higher than in a neutral month

The base year model constructed from observed data in 2015 shows that on any given weekday between 35% and 50% of the traffic on the existing A303 travels through the local area entirely using the A303 between Cartgate Roundabout and North/South Cadbury, shown in Figure 3.4. The remaining traffic either serves local trip origin and destinations, or is longer distance traffic using routes such as the A37 so only part of their route uses the A303 in the local area with these trips either joining or leaving the A303 in the local area. Daily A303 HGV traffic accounts for around 12% of the total traffic flow on the single carriageway section.

Figure 3.4 : A303 Stretch of Road between Cartgate Roundabout and North/South Cadbury



Source: MMSJV. This Map is based upon Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office © Crown copyright. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. Highways England 100030649 2015.

3.4 Accidents and journey time reliability

3.4.1 Accident analysis methodology

Collision data has been provided for the length of the considered stretch of the A303 by Somerset County Council and Highways England. It has been analysed for the five whole years available (01-Jan-2010 to 31-Dec-2014) from Cartgate Roundabout (at the junction of the A303 with the A3088 west of Ilchester) to the A303 junction with the local roads to North and South Cadbury (east of Sparkford). The collision data was loaded into *KeyAccident v7.2* (software from Keysoft Solutions) where the raw data was processed and certain cleaning processes were carried out such as removing duplicates of the same accident.

The data have been spilt by category into junction and link accidents. Additionally, further analysis has been completed to attribute the link accidents by direction, either the A303 westbound or A303 eastbound.

3.4.2 Accident analysis – A303 route overview

Table 3.2 below summaries the accident numbers for five years along the existing A303

Table 3.2 Accidents by Severity (1 October 2010 to 31 December 2014)

Section Ref	Location	Fatal	Serious	Slight	Total
FA16-1	A303 single carriageway between A359 Roundabout and the A303 dual carriageway section	1	4	19	24
FA16-2	A303 / A359 Sparkford Roundabout	0	3	7	10
TOTAL		1	7	26	34

In total 24 accidents occurred in the five-year period analysed, of which one was fatal, four were serious and 19 were slight. This A303 link has a slightly higher than national average accidents occurring in darkness (37.5% compared to a national average of 26.5% (RRCGB, 2013). Accident patterns are consistent with that typically expected on a roundabout on a high speed road where most accidents were as a result shunts and lane changing. Full details of the accident analysis carried out on the A303 can be found in the *SOBC Review Report* (MMSJV, September 2015).

The accident rate has been calculated for the scheme and is presented in Table 3.3. It shows that the accident rate is higher than the national rate for A class trunk roads.

Table 3.3 :Accident rates

Section Ref	Location	Accident rate per billion vehicle km travelled	National Rate for all A trunk roads Accident rate per billion vehicle km travelled *
FA16	A303 Sparkford to Ilchester	162	113

Calculated from :

- Strategic Road Network Traffic Report TRA41 - Table TRA4112
- Reported Road Casualties on the Strategic Network 2013 Report PR67/4 Table B.1

3.4.3 Journey time reliability

The stress-based approach set out in TAG A1.3 Appendix C.5 has been used to assess journey time reliability benefits. The model shows that the existing A303 has a slightly higher level of stress levels (76%) than the necessary minimum stress level that is required (which is 75% as a way of avoiding exaggerated benefits for changes in stress on roads with low stress levels). However, as the model has been produced at relatively low stress in the neutral working month of October, it does not capture the high flow and stress levels during weekend, bank holiday and school holiday periods. The detail of this is set out in more detail in chapter 4.6 of the *Economic Assessment Report* (MMSJV, August 2016).

Reliability in this context is defined as variation in journey times that transport users are unable to predict. Measurements of the monetised journey time reliability benefits from a scheme proposal should be based solely on the unpredictable variation, because of the extra costs incurred by travellers.

3.5 Topography, land use, property, and industry

3.5.1 Topography

The topography of the scheme area is relatively hilly with a ridge reaching west from Sparkford village for approximately 3km, creating stretches of steep slopes. This ridge has a number of localised summits known as West Camel Hill, Annis Hill, Steart Hill, Camel Hill and Sparkford Hill. Ground levels along this ridge reach a maximum of 78m above ordnance datum (AOD). To the north and south of the area the low lying land forms general farmland, and ground levels fall to approximately 20m AOD.

Dyke Brook in the north runs from east to west towards the River Cary, with its flood plain signifying the northern boundary of the scheme. The River Cam in the south runs from east to west, towards the River Yeo.

The existing A303 carriageway traverses near the top of the ridge following the 60-70m contours for 1km, rising as high as 74m AOD at Camel Hill summit.

3.5.2 Land use, property and industry

The majority of land within the scheme area is rural, much of it in agricultural use. Agricultural land use is a mixture of arable and livestock farming and is mostly of grade two and three ('very good' and 'good') quality, according to the Agricultural Land Classification Map, South West Region (Natural England, August 2010).

There are small collections of agricultural and residential property immediately to the north of the existing A303, and the land further to the north is very sparsely populated until the villages of Babcary and Foddington are reached some 3-4km away. More concentrated settlements are located at Sparkford to the east and Queen Camel and West Camel to the south. The village of Ilchester lies approximately 3km to the south-west of the scheme limits.

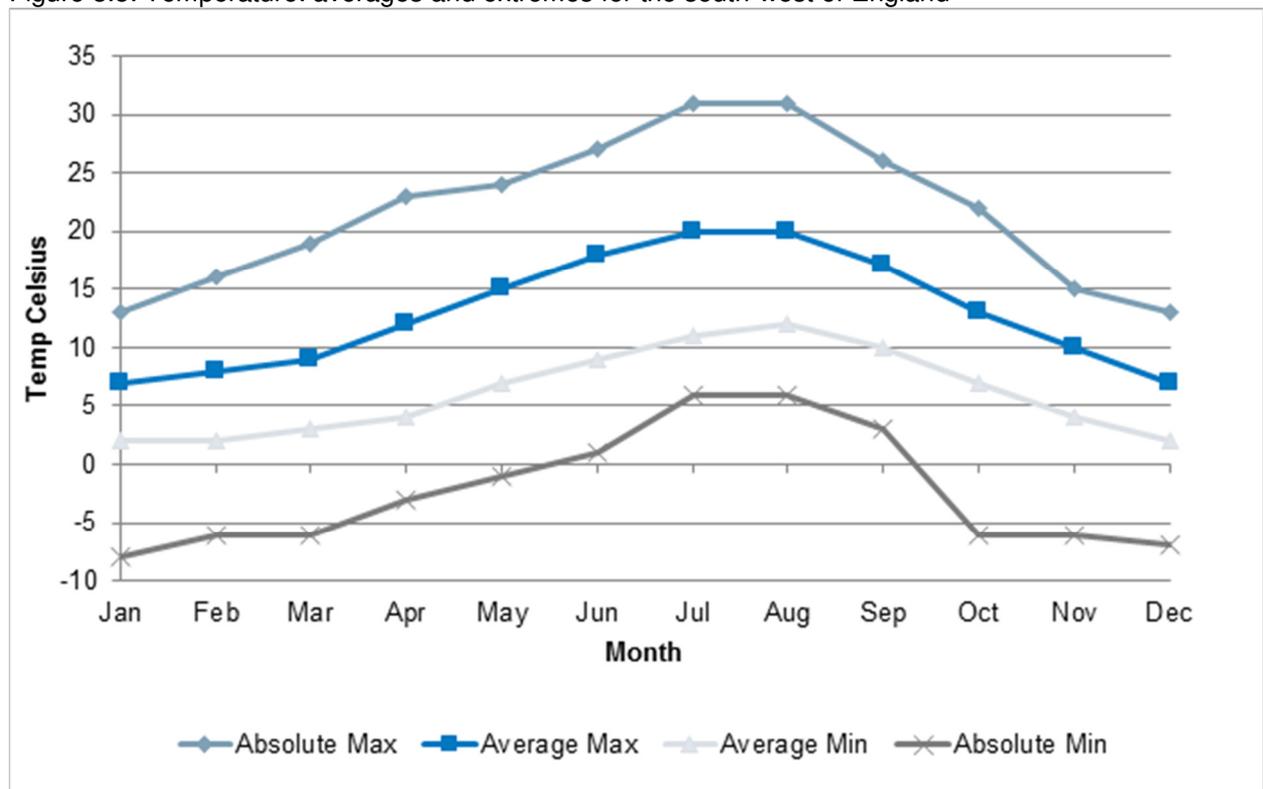
The most notable development in the near vicinity of the scheme is the Royal Naval Air Station (RNAS) Yeovilton which lies on the low lying plain of the Rivers Cam and Yeo. The site occupies approximately 2,000 hectares including two runways, numerous operational buildings and also the Fleet Air Arm Museum.

3.6 Climate

The south-west region of England, in which the proposed scheme lies, experiences an oceanic climate, which is typified by mild weather, with no dry season. The average temperature of all months is lower than 10°C (50.0°F), with the summer months of July and August being the warmest (mean daily maximum of 21°C (68.8°F) (Figure 3.5). During winter, a mean minimum temperature of 1°C (33°F) is common. The adjacent sea temperature for the majority of this region leads to a less extreme seasonal variation than most parts of United Kingdom. However, records for Yeovilton (immediately south of the existing A303 between Sparkford and Ilchester) show that this inland site has comparatively higher extreme maximum and lower extreme minimum temperatures than the average for the south-west.

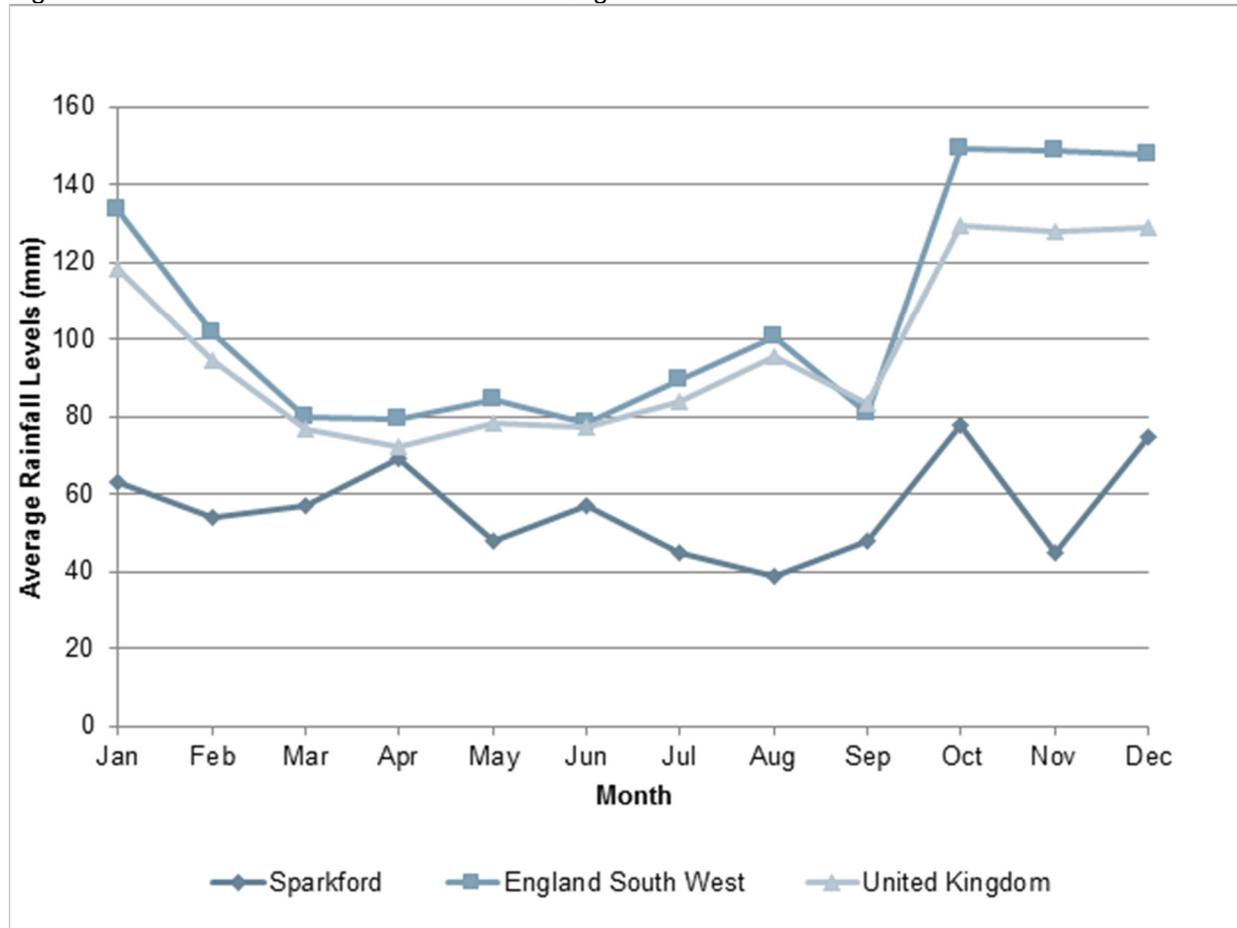
Figure 3.6 compares consolidated data of two decades of monthly average rainfall levels between Sparkford, the south-west of England and UK-wide. It is important to highlight that this analysis was made based on public information available from the websites www.metoffice.gov.uk (UK and south-west England) and www.myweather2.com (Sparkford). The south-west is representative of the wider UK rainfall patterns, but Figure 3.6 indicates that Sparkford receives less rainfall than the UK average. This is because Sparkford and the scheme location is inland and low-lying, in the lee of higher ground, and therefore less affected by Atlantic depression and convection weather patterns, which influence rainfall for the south-west.

Figure 3.5: Temperature: averages and extremes for the south-west of England



Source: <http://www.myweather2.com> (consulted in March 2016)

Figure 3.6 Rainfall levels for the south-west of England



Source: UK and England south-west data: <http://www.metoffice.gov.uk> Taunton: <http://www.myweather2.com> (consulted in March 2016)

3.7 Drainage

The drainage inventory on the Highways Agency Drainage Data Management System (HADDMS) has been reviewed to determine the arrangement of the existing drainage.

The existing drainage network along the A303 dual carriageway between the overbridge at Podimore and the westbound deceleration lane to Podimore consists of precast surface water concrete channels when the road is on embankment and filter drains when the road is in cutting. Intermittent gullies are located in the invert of the concrete channels.

From the westbound deceleration lane to Podimore to the B3151 junction, the carriageway is kerbed on both sides of the road with kerb inlet gullies. This section of the A303 has a low point and the drainage on both sides is connected via a culvert which flows from north to south and outfalls into a ditch. At Hawk House, runoff is collected in a filter drain.

From the B3151 junction to the Steart Hill junction, the carriageway is kerbed on both sides with gullies set in the channels of the carriageway on the southern side and segregated kerb inlet gullies on the northern side.

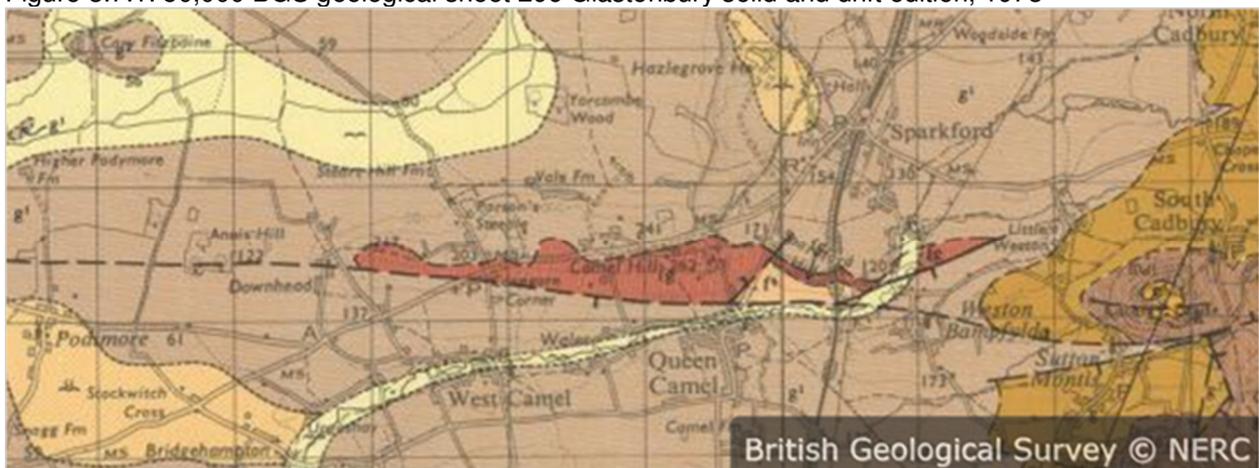
From Steart Hill Junction to the Mattia Diner, the carriageway is kerbed on both sides with gullies set within the channels of the carriageway on both sides.

From Mattia Diner to Hazlegrove Roundabout, the carriageway has continuous kerbs on the northern side and intermittent kerbs on the southern side. There are segregated kerb inlet gullies on both sides. Approximately 160m away from Hazlegrove Roundabout is a culvert connecting the southern side drainage to a soakaway on the northern side of the carriageway.

3.8 Geology

This section has been extracted from the *Preliminary Source Study Report* (MMSJV, May 2016) and it describes the geology of the area in the vicinity of all of the route options. This section should be read in conjunction with the Preliminary Source Study Report. The area is represented in the excerpt of the 1:50,000 scale British Geological Survey (BGS) geological sheet as shown in Figure 3.7.

Figure 3.7:1: 50,000 BGS geological sheet 296 Glastonbury solid and drift edition, 1973



Source: Contains British Geological Survey materials © NERC 2016. This Map is based upon Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office © Crown copyright. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. Highways England 100030649 2016.

Superficial deposits

BGS mapping indicates limited expanses of superficial deposits along the proposed routes. The superficial deposits likely to be encountered across the site comprise:

- Alluvium (clay, silt and gravel), present at central part of F1 and B4, North of existing A303
- River Terrace Deposits (sand and gravel), present at the easternmost of all routes

According to the BGS mapping, alluvium is shown to be absent below the easternmost 1.5km of proposed route options F1 and B4, however the historical borehole records indicate that alluvium and Taelle Gravel are present across option F1, at approximate chainage 1200m.

Provided the scale of the proposed works and uncertainty of the geological mapping, it is considered likely that local areas with a superficial geology of River Terrace deposits may be encountered.

For further information regarding the extent of the superficial deposits, refer to the Preliminary Source Study Report.

Solid geology

The solid geology of the site according to the BGS web-based *Geology of Britain Viewer* comprise:

- Langport Member
- Blue Lias Formation
- Charmouth Mudstone Formation (undifferentiated), of the Lias Group consisting of mudstones

For further information regarding the nature and extents of the solid geology across the site, refer to the Preliminary Source Study Report.

3.9 Mining

According to records on the BGS web-based Coal Authority Interactive Viewer (Coal Authority Coal and Brine) it is unlikely that any coal mine workings present or past are in the vicinity of the route options. Metalliferous mining does not affect the area of study.

3.10 Public Utilities

Following establishment of the shortlisted options, MMSJV have undertaken enquiries in accordance with Appendix C2 of the Code of Practice “Measures Necessary where Apparatus is affected by Major Works” (Diversionary Works) (DfT, June 1992) to determine the location of public utilities within the scheme area. The responses to these enquiries are summarised in Appendix B of the Statutory Undertakers estimate (MMSJV, June 2016).

The results of the C2 enquiry highlight that several undertakers have equipment that may require protection or diversion as a result of the proposed options. These are described below and all locations referred to in are shown in Figure 3.8

Figure 3.8: Locations referred to in relation to public utilities



Source: MMSJV

Wessex Water

Wessex Water records show a distribution main running along the northern verge of the B3151. The main crosses the A303 and continues in the northern verge until it reaches Howell Hill. Spurs run from this main to the village of Downhead, to Plowage Lane, to Steart Hill and to Howell Hill. Although not shown on Wessex Water's plans this distribution main is also likely to serve the properties along the A303. This main is only likely to be affected by options A2 and E4.

A further main crosses the existing Hazlegrove Roundabout under the A359 arm and runs along the back of the southern A303 verge up to the Camel Hill services. From Hazlegrove Roundabout this main runs into Sparkford village through the Sparkford service area site. There is a chance that this main may be affected by option A2 but not the other three options.

A third distribution main runs up Traits Lane from Queens Camel and crosses the A303 to supply Camel Hill Farm. This main is only likely to be affected by option A2.

Foul sewers generally fall from north to south and, as such, foul mains from any properties to the south of the existing road along Howell Hill, Plowage Lane and Traits Lane should not be affected by the scheme. A foul sewer runs down Steart Hill and crosses the existing A303, continuing down Howell Hill. This is likely to be affected by options A2 and E4.

Wessex Water records also indicate that two foul sewers cross the Sparkford bypass between Hazlegrove House and Sparkford village. These sewers are in the vicinity of the eastern tie in for all options and so may be affected.

Scottish and Southern Energy (SSE)

SSE records show an 11KV overhead cable in fields to the north of the route between Podimore and Downhead. At Downhead this splits and runs south, crossing the A303 to feed properties along Plowage Lane and at the junction with the B3151.

A further 11KV overhead cable runs down the east verge of Steart Hill and crosses the A303 to supply properties on Howell Hill. A spur from this cable also supplies the cluster of properties alongside the A303 including the Camel Hill Methodist Church. A high voltage cable joins the A303 southern verge from West Camel to feed the MOD station at Camel Hill.

A low voltage supply crosses the A303 at Plowage Lane to feed The Spinney. This same supply also runs along the A303 southern verge for a short distance, although it is not clear what purpose this serves.

A low voltage supply also runs down Steart Hill. Whilst this does not cross the A303 it does run along the northern verge for a short distance and a spur appears to run across the carriageway to a camera situated in the southern verge.

SSE records show a low voltage supply running up Traits Lane, supplying properties along this road including the Camel Hill MOD and telecommunications sites. It then crosses the A303 to supply Camel Hill Farm and associated properties.

Finally, the records also show a low voltage cable crosses the A303 Sparkford bypass between Hazlegrove House and Sparkford village.

BT

BT records highlight cables that approach the scheme area along the northern verge of the B3151. At the B3151 junction this service runs along the northern verge of the A303 eastwards as far as the property known as Blue Haze. Spurs feed off this cable to Downhead (as far as Mead Farm and Newclose House), The Spinney, Plowage Lane, Steart Hill (as far as Steart Hill Farm) and Howell Hill. The service to Vale Farm is fed from the Steart Hill cable.

To the east of Blue Haze the cable crosses the A303 and runs in the southern verge until Traits Lane. At this point the service splits to feed properties along Traits Lane (including the MOD and telecommunications site) and properties to the north including Camel Hill Farm.

BT supply to the Camel Hill service area is from the south, via Gason Lane and so should not be affected by the scheme.

Finally, BT records indicate a cable running across the Sparkford bypass between Hazlegrove House and Sparkford village.

Global Crossing/Fibernet

Instalcom have provided details of a Global Crossing/Fibernet fibre optic cable which appears to be located within the existing A303 corridor along entire length of scheme. The records provided are not clear enough to determine the exact location of this cable within the road cross section, or exactly what type of cable it is. However measures to protect or divert this apparatus are likely to be required for all options, particularly option A2.

Virgin Media

Virgin's records indicate a fibre optic cable running along the existing A303 carriageway along the full length of the scheme. The records are clear enough to establish that this cable is in the southern verge along the dual carriageway section of the Podimore bypass, the northern verge between the bypass and the existing Hazlegrove Roundabout and the southern verge along the Sparkford bypass.

Network Rail

Instalcom have provided records regarding the presence of a 48-core fibre optic cable running alongside the Wilts, Somerset and Weymouth Railway as it runs in a north-south direction through the eastern limits of the scheme. The proposed scheme is likely to tie into the existing A303 to the west of this point and therefore the railway and cable should not be affected.

Camel Hill signalling station

Camel Hill signalling station, situated to the south-east of the A303/Traits Lane junction, is believed to be disused although this needs to be verified. No particular records have been obtained relating to live services at this site, although currently none of the shortlisted options pass through the site.

Camel Hill telecommunications site

A telecommunications site is located to the south-west of the A303/Traits Lane Junction. Freehold and leasehold interests in this site have been identified during land searches, although no specific information relating to this installation has been received via the C2 process.

3.11 Environmental status (designated areas)

There are no internationally designated sites of nature conservation or heritage value within the scheme extents or within 2km of the proposed route options. However, nationally and locally designated sites of historical, landscape and nature conservation interest are located within the footprint of the route options. They are as follows:

- Two Scheduled Ancient Monuments, which are nationally designated under the Ancient Monuments and Archaeological Areas Act 1979 (as amended). They include a Romano-British settlement immediately south-west of Camel Hill Farm, and Medieval Settlement Remains north of Downhead Manor Farm.

- Numerous nationally listed buildings within 300m of the scheme, including a milestone on the existing A303. These are designated under the Planning (Listed Buildings and Conservation Areas) Act 1990
- One nationally Registered Park and Garden has been identified within or the potential scheme footprint for all options (Hazlegrove House).
- Three locally designated Local Wildlife Sites (LWS) (South Somerset District Council's equivalent of Sites of Importance for Nature Conservations) are located either adjacent to or within 100m of the existing A303, whilst a further two LWS are located within 100m of the proposed offline northern route options B4 and F1.

3.12 Environment

3.12.1 Noise

Two Noise Important Areas are located on the existing A303 just to the east of Camel Cross and approximately 150m to the west of Howell Lane. These are located:

- Within the footprint of option A2
- 600m and 900m to the south of option B4
- Adjacent to option E4, and approximately 165m to the south
- 750m and 900m to the south of option F1

There are several sensitive receptors within 500m of the four route options, these include between 140-230 residential properties, 10-20 farms, one school, and 10-12 commercial properties.

There is currently no baseline noise environment data within the vicinity of the route options. Therefore, in support of the scheme and future environmental assessment, baseline noise monitoring would be required at locations representative of sensitive receptors within the study area.

3.12.2 Local air quality

Based on 2015 roadside NO₂ concentrations projected by the Department for Environment Food and Rural Affairs (Defra) web-based *Pollution Climate Mapping (PCM) Model*, as well as information available on the Defra website (Defra, 2016), no links exceeding 40µg/m³ are present within 10km of any of the proposed route options, and the highest concentration within the study area is 28.88µg/m³.

There are no Air Quality Management Areas (AQMA) located within 1km of all four route options; the nearest AQMA is located between 6km-7.5km south of the route options at Yeovil. This AQMA has been found to have exceedances of the annual NO₂ air quality objective at four monitoring sites within the AQMA. In addition, there is an Automatic Urban and Rural Network monitoring site at Charlton Mackrell, located approximately 4.3km-4.9km northwest of the four route options. This is a rural background monitoring site and has recorded annual mean NO₂ concentrations which are well below the annual NO₂ air quality objective.

There is currently no baseline air quality data in the vicinity of the route options, and therefore an air quality monitoring survey is currently being undertaken in support of the scheme on behalf of Highways England.

There are several residential properties representing sensitive receptors within the vicinity of all four route options. There are approximately 50 properties within 200m of options B4 and F1, 100 within 200m of option A2, and 60 within 200m of option E4.

3.12.3 Landscape

There are no Areas of Outstanding Natural Beauty, National Parks, or Heritage Coasts located within 1km of the route options.

The scheme sits within National Character Area (NCA) 14 Yeovil Scarplands, which is characterised by a series of broad ridges and steep scarps separating sheltered clay vales, with less than 5% of the area being urban. The landscape character of this section of A303 is largely rural with large field patterns and intermittent properties. The existing A303 runs along the top of the partially wooded ridge of Camel Hill before descending to Sparkford. The land to the west of Sparkford is a level area drained by a series of ditches leading to the Dyke Brook and westward to the River Cary. The field pattern north of the existing A303 comprises large geometric field patterns, narrow lanes and thick hedgerows. Blocks of woodland occasionally punctuate the field pattern and are particularly prominent on the western section from Camel Hill to Sparkford.

There are numerous visual receptors located within the scheme's likely Zone of Theoretical Visibility, including approximately 60 footpaths, two bridleways, four restricted byways and one national cycle route. There are also numerous elevated views outside of the 1km study area, including viewpoints from St Michael's Hill and Cadbury Castle.

3.12.4 Townscape

Settlements in a rural environment lie to the south of the existing A303 at the villages of West Camel and Queen Camel. In addition, the villages of Podimore and Sparkford lie to the south of the existing A303 east and west of the route options respectively.

3.12.5 Heritage and historic resources

There are two Scheduled Monuments within 1km of all four route options which includes the Roman-British Settlement immediately south-west of Camel Hill Farm Scheduled Monument, and the medieval settlement remains 100m and 250m north of Downhead Manor Farm Scheduled Monument. In addition, the large multivallate hillfort and associated earthworks at South Cadbury Scheduled Monument is located at an elevated position 1.5km south-east of all four route options.

There are numerous listed buildings within the 1km of all four route options, consisting of Grade I, Grade II and Grade III listed buildings. All four of the proposed route options pass through the southern extent of the Hazlegrove House (Grade II Listed) Registered Park and Garden. In addition, there is an area of Registered Common Land located

600m south of option A2. This is located between All Saint's Church and Parsonage Road.

Queen Camel Conservation Area is located 900m south of options B4, E4 and F1, and 620m south of option A2. In addition, West Camel Conservation Area is located 520m south of option A2.

There are numerous records of archaeological events and finds within 1km of all four route options. The archaeological assets along the line of the proposed route options include Coages Park, and a medieval park with moat and fishpond. Additionally, an Iron Age settlement at Camel Hill is located within 1km of option A2. There are numerous deserted medieval villages and cropmarks relating to the prehistoric and Roman activity in the area. In addition, a cemetery is recorded at West Camel Hill.

3.12.6 Biodiversity

There are no Special Areas of Conservation (SAC), Special Protection Areas or Ramsar designated sites within 2km of the four route options, however one Site of Special Scientific Interest (SSSI) lies 1.3km north-east of all the route options. In addition, there are also no National Nature Reserves, Local Nature Reserves, or Royal Society for the Protection of Birds (RSPB) reserves within 1km of the four route options. However, there are three SACs designated for bat populations located within 30km of all four route options. These include North Somerset and Mendip Bats SAC, Mells Valley SAC and Bracket's Copse SAC. There are 12 Local Wildlife Sites (LWS) within 1km of all four route options. The proposed route alignments of options A2, B4 and E4 pass near the periphery of two LWS, and the proposed route alignment of option F1 passes through the southern extent of the Annis Hill LWS, which includes Ancient Woodland. The main habitats recorded within the study area during the Extended Phase 1 Habitat Survey, undertaken in February and March 2016, were poor semi-improved grassland and arable fields intersected by hedgerows, and scattered trees with small pockets of broad-leaved semi-natural woodland. In addition, this survey work in combination with desktop study has identified habitats suitable to support bats, breeding birds, barn owls, badgers, dormice, reptiles, great crested newts, otters, and water voles. The full findings of the survey are reported in the *Preliminary Ecological Appraisal* (MMSJV, May 2016).

Biodiversity Action Plan Priority Habitats are located within 1km of all four route options which include Ancient Woodland, Deciduous Woodland, Wood-pasture and Parkland, Lowland Calcareous Grassland, Coastal and Floodplain Grazing Marsh, Traditional Orchards and Lowland Meadows.

3.12.7 Water environment

The Environment Agency's indicative flood mapping shows that the four route options are within close proximity of Flood Zone 2 and Flood Zone 3. Flood Zone 2 comprises land assessed as having between a 1-in-100 and 1-in-1000 (1%-0.1%) chance of flooding from fluvial sources each year. Flood Zone 3 comprises land assessed as having a 1% or 1-in-100 or greater chance of flooding from fluvial sources (>1%) each year. The indicative flood mapping also shows that there are areas within the study area at risk of flooding from surface water, particularly along the existing A303 to the north of

Podimore, as well as to the north of the existing A303 within areas identified as Flood Zones 2 and 3. In addition, an area to the south following the route over the River Cam – Lower, is identified as an area at risk of flooding from reservoirs.

The majority of all of the four route options falls within a Surface Water Nitrate Vulnerable Zone.

Two Water Framework Directive (WFD) waterbodies are within the vicinity of the four route options: the River Cam – Lower is 270m south of option A2, 480m south of option E4, and 1.1km south of option F1; and the River Cary – source to confluence with King’s Sedgemoor Drain is 1km north of options A2 and E4, 450m north of option B4, and 80m north of option F1. In addition, the Dyke Brook is location 800m north of options A2 and A4, 200m north of option B4, and 80m north of option F1.

There are no priority outfalls within the footprint of options B4, E4 and F1. However, there is one priority outfall which is listed as ‘not determined’ within the proposed works extent of option A2. In addition, no balancing ponds have been identified within the vicinity of the four route options.

There is no underlying groundwater within the study area for the four route options.

3.12.8 Physical fitness

There are several Public Rights of Ways (PRoW) and restricted byways within the vicinity of the four route options. The number of these within the vicinity of each option is as follows:

- Option A2: 21 footpaths, two bridleways, and two restricted byways
- Option B4: 14 footpaths, one cycle route, two bridleways, and one restricted byway
- Option E4: 16 footpaths, one bridleway, and one restricted byway
- Option F1: 14 footpaths, one cycle route, two bridleways and one restricted byway

3.12.9 Journey ambience

The view from the road to the north and the south of the existing A303 comprise predominantly an agricultural landscape, as well as view of individual settlements within a rural setting.

At present the A303 between Sparkford and Ilchester can experience delays and congestion during peak times.

3.13 Accessibility

3.13.1 Option Values

An option value is the willingness to pay to preserve a transport service option not currently undertaken by other transport modes, beyond the expected value of any future use. The below text provides an overview of the existing conditions of transport services present within the vicinity of all route options. The assessment of option values (and therefore of changes to transport services) can be found in Section 9.12 of this report.

The nearest railway line is between Castle Cary and Charlton Mackrell, approximately 4km to the north of option F1. Castle Cary is the nearest railway station, located approximately 8km north-east of all route options. The Royal Naval Air Station (RNAS) Yeovilton is situated 700m to the south of options A2 and E4, 900M to the south of option F1 and 1.2 km to the south of option B4. Numerous bus and coach services are known to utilise the existing A303 between Sparkford and Ilchester, although there are no scheduled stops along this section of the A303¹. The existing section of the A303 under consideration meets the A359 at a roundabout to the south of Sparkford and runs all the way to Podimore.

3.13.2 Severance

Numerous Public Rights of Ways (PRoWs), undesignated paths and cycle routes are situated within the vicinity of all route options, a number of which have been severed by the existing A303. There is one crossing suitable for non-motorised users (NMU) at Higher Farm Lane Bridge to the north of Podimore. A footway runs alongside the A303 between Howell Hill and Camel Cross, with several community facilities also within close proximity of the A303 including a school, places of worship, public houses and restaurants. There is potential for existing traffic flows on the A303 to significantly impede NMU movements, potentially including vulnerable social groups.

3.13.3 Access to the transport system

Vulnerable social groups are likely to be present throughout the scheme area. The areas north and south of the existing A303 are predominantly rural and therefore there may be people who rely on public services to maintain accessibility to essential services. Children are another vulnerable social group likely to be present within the local area. Hazlegrove House Preparatory School and Nursery is located approximately 600m to the north of all route options and is accessible from the A303/ A359 roundabout to the south of Sparkford.

The A303 corridor is known to be utilised by a number of bus and coach services which connect Sparkford, Queen Camel, West Camel and Podimore to the rest of the south-west region. Five bus or coach service routes have been identified which operate along roads within the vicinity of the route options. These are Somerset service numbers 1, 1B, 5, 8 and 658. Key destinations served by these public transport routes include Sparkford, Queen Camel, West Camel and Podimore.

3.14 Integration

3.14.1 Transport Interchange

The existing A303 meets the A359 at the roundabout to the south of Sparkford. The closest interchange to the western extents of the scheme is located approximately 1km to the west of Podimore, where the A303 meets the A372 and A37. There are no other connections to major road networks along this section of the A303, although there are approximately 10 minor roads (both north and south) which meet the A303 trunk road.

¹ Traveline, 2016, Sparkford (blackford)(centre of), Available at [online]: http://www.travelinesw.com/swe/XSLT_SELTT_REQUEST, [Accessed on 01/07/2016]

There are limited bus services in place for settlements within the vicinity of Sparkford and Podimore, with these services operating in the local area as far as Yeovil to the south, Shepton Mallet to the north and Wincanton to the east.

3.14.2 Land use policy South Somerset District Council administrative area

The South Somerset District Council Local Plan 2006-2028 was adopted in 2015. It includes policies which set out the long term vision and strategic context for managing and accommodating growth within South Somerset District until 2028. Somerset County Council's Future Transport Plan 2011-2026 sets out Somerset County Council's long term strategy for getting the best from transport. Together, these documents set out local requirements with respect for land use policy, for accessibility and the integration of different forms of transport in Somerset.

Table 3.4 below identifies policies with respect to land use, accessibility and transport integration and provides a summary of relevant policies. Further information on local planning and land use policies can be found in section 4.2.3 of this report.

Table 3.4: Land use, accessibility, and transport integration summary for SSDC

Policy	Policy Summary
South Somerset District Council Local Plan 2006- 2028 (Adopted 2015)	
Policy TA1: Low Carbon Travel	New residential and employment developments should where possible provide: Travel Information Packs, charging points for electric vehicles, Green Travel Vouchers for 1 year to use sustainable transport, cycle parking facilities, travel plans and ensure sustainable transport measures are in place. New residential dwelling developments should enable ease of working at home. Where new residential/ employment sites would impact existing public transport planning obligations improved public transport connections increasing accessibility should be delivered.
Policy TA2: Rail	The council will encourage the promotion and protection of land for rail infrastructure development.
Policy TA4: Travel Plans	Travel Plans will be required depending on the size and scale of a development. SSDC sets out the thresholds for development size determining which type of Travel Plan should be in place.
Policy TA5: Transport Impact of a New Development	All new developments are required to address transport implications and to maximise the potential for sustainable transport through safeguarding existing and new transport infrastructure, securing inclusive, safe and convenient NMU access, ensuring the predicted nature and volume of traffic and parked vehicles generated by the development would not have a detrimental impact on the character or amenity of the area, ensure that proposals which require access to the strategic road network are well located on the network, assessing the transport impact of a development with larger schemes to prepare Transport Assessments and require car parking/ vehicle servicing at levels appropriate to the development.
Somerset County Council Future Transport Plan 2011- 2026	
Policy SUS2 Bus and Community Transport Services	SCC will ensure that essential services are maintained where possible in the early years of the plan and work to improve the way services work together in the later years of the plan.
Policy SUS 3 Smarter Choices	SCC will help people make smarter travel choices through providing high quality transport information and encouraging organisation to develop Transport Plans.
Policy SUS 4 Cycling	SCC will support the provision of appropriate and well connected cycling facilities.
Policy SUS 5 Walking	SCC will help people make more trips on foot and see the benefits of walking.
Policy SUS 6 Rights of Way	SCC will work to maintain Rights of Way and improve information available to use them.
Policy SUS 7 Rail	SCC will work with the rail industry and stakeholders to encourage travelling by train.
Policy HLT 1 Stay Active	SCC will give more opportunities to travel in a healthy way, such as by walking or cycling.

3.14.3 Other government policies

The *National Planning Policy Framework* (Department for Communities and Local Government, March 2012) and *National Policy Statement for National Networks* (Department for Transport, December 2014) both require applicants to promote sustainable transport, improve accessibility and integrate transport modes. The government requires local authorities to work with transport providers and neighbouring authorities to develop strategies for the provision of large scale roadside facilities to support growth of ports, airports or other major generators of travel demand in their areas and maximise sustainable transport modes. A Transport Statement or Transport Assessment is required for all developments that generate significant movements of traffic. Decisions will consider whether opportunities for sustainable transport modes have been taken up and if safe and suitable access to sites can be achieved for all people. Decisions will only be prevented or refused on transport grounds where residual cumulative impacts of development are severe. Furthermore, the protection and enhancement of public rights of way and access is encouraged, for instance where the national road network severs communities and community facilities and acts as a barrier for walking and cycling, developers are expected to correct historic problems and ensure easier and safer access for non-motorised users. The government's strategy for improving accessibility for disabled people is set out in *Transport for Everyone* (Department for Transport, December 2012), which is an action plan to improve accessibility for all. Compliance with the Equalities Act (2010) is also expected.

Further information on guidance at a national level can be found in section 4.2.2 of this report.

3.15 Maintenance and repair statement

The A303 between the Hazlegrove Roundabout and the Podimore bypass is part of Area 2 of Highways England's strategic road network and is currently maintained by Skanska under an Asset Support Contract.

Discussion has taken place with Skanska who have confirmed that the Area 2 maintenance programme is needs driven with a value management process in place to prioritise rehabilitation schemes over a 1–2-year timeframe.

Skanska have provided records indicating that a new surface course was applied to the majority of the carriageway as recently as 2014. However, no information is currently available regarding the structural condition of the pavement and foundation. Good records of the existing road drainage system exist on the Highways Agency Drainage Data Management System (HADDMS). As far as has been determined by desk studies at this stage of the project, there are no significant structures such as retaining walls, underbridges or overbridges along the existing A303 within the proposed scheme limits.

Further liaison will be required with the Asset Support Contractor to determine further details of the condition of the road and associated infrastructure, particularly for sections of online widening where there is an opportunity to integrate the existing carriageway into the scheme as one half of the proposed dual carriageway. In these circumstances it will be necessary to determine the residual life of the existing pavement to assess the level of rehabilitation needed to incorporate the pavement into the works.

4 Planning factors

4.1 Option constraints

Constraint mapping has been undertaken and has identified the following constraints within 1km of the proposed route options:

- Environmental constraints
 - Scheduled Monuments
 - Ancient woodland
 - Local Wildlife Sites equivalent to Sites of Importance for Nature Conservation
 - Rivers and areas of water
 - Areas susceptible to flooding (Flood Zones 2 and 3)
 - Local Geological Sites equivalent to Regionally Important Geological Sites
 - Registered Common Land
 - Noise Important Areas
 - Registered Parks and Gardens
 - Utilities
 - Conservation Areas
 - National Trust Land
 - Historic Landfill
 - Archaeological events and finds
- Land-use and community constraints
 - Listed buildings
 - Public Rights of Way
 - Planning applications
 - Strategic Development Areas
 - Areas of tourism

The environmental constraints plan can be found in Appendix B and provides an illustration of the existing A303 between Sparkford and Ilchester in relation to statutory and non-statutory environmental designations within 1km of all the proposed route options. A detailed description of the environmental constraints is contained in chapter 3.12 of this report.

4.2 Legislation and guidance

4.2.1 Legislation

Relevant Relevant International, European, and National land use planning and environmental legislation applicable to the scheme and identified scheme constraints has been listed in Table 4.1 below².

Table 4.1: Key International and National Environmental Legislation

Topic	Key International, European and National Environmental Legislation
Air Quality	<p>International and European</p> <ul style="list-style-type: none"> ■ The Ambient Air Quality Directive (2008/50/EC) - Sets legally binding limits for concentrations in outdoor air of major air pollutants that impact public health such as particulate matter (PM₁₀ and PM_{2.5}) and nitrogen dioxide (NO₂). <ul style="list-style-type: none"> – The proposed options have the potential to reduce air quality. The scheme would need to ensure that pollutant limits are not exceeded. <hr/> <p>National</p> <ul style="list-style-type: none"> ■ The Air Quality Standards Regulations 2010 – Implements the EU's Directive 2008/50/EC and transposes the Directive's binding limit values into 'air quality standards' (AQSS) with attainment dates in line with the Directive. The standards are based on the assessment of the effects of each pollutant on human health including the effects on sensitive groups or on ecosystems. <ul style="list-style-type: none"> – The scheme would need to ensure that pollutant limits are not exceeded and that sensitive receptors are not adversely affected. ■ Air Quality (England) Regulations 2000 and Air Quality (England) (Amendment) Regulations 2002 – Set out objectives to reach a certain level of air quality within a given time period and work alongside Part IV of the Environment Act 1995, which requires the Secretary of State to produce an action plan (the AQS) and for local authorities to monitor the air quality in their area. <ul style="list-style-type: none"> – The proposed options have the potential to reduce air quality. The scheme would need to ensure that air quality objectives are met. ■ The Environmental Protection Act 1990, Section 79(1)(d) - Defines one type of 'statutory nuisance' as 'any dust, steam, smell or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance'. Where a local authority is satisfied that a statutory nuisance exists, or is likely to occur or recur, it must serve an abatement notice. <ul style="list-style-type: none"> – The construction stage of any of the proposed options has the potential to cause nuisance. <hr/> <p>Cultural Heritage</p> <p>International and European</p> <ul style="list-style-type: none"> ■ No applicable legislation. <hr/> <p>National</p> <ul style="list-style-type: none"> ■ The Ancient Monuments and Archaeological Areas Act 1979 – Provides for the protection of Scheduled Monuments through a designated schedule of monuments and also allows the Secretary of State to designate areas of archaeological importance. <ul style="list-style-type: none"> – Relevant with regard to the impact upon the setting of the Scheduled Monuments that have the potential to be affected by the proposed scheme. ■ The Planning (Listed Buildings and Conservation Areas) Act 2009 – Provides for the protection of Listed Buildings and Conservation Areas. <ul style="list-style-type: none"> – Relevant with regard to the impact upon the setting of the Listed Buildings that have the potential to be affected by the proposed scheme. <hr/> <p>Nature Conservation and Biodiversity</p> <p>International and European</p> <ul style="list-style-type: none"> ■ The EC Directive on the Conservation of Natural Habitats and of Wild Flora and Fauna ('Habitats Directive 1982') (as amended) (92/43/EEC) – Promotes the maintenance of biodiversity by requiring Member States to take measures to maintain or restore natural habitats and wild species listed on the Annexes to the Directive at a favourable conservation status, introducing robust protection for those habitats and species of European importance. <ul style="list-style-type: none"> – There are numerous protected habitats and species within the footprint of all of the proposed options.

² The legislation included in Table 4.1 contains key relevant legislation and is not exhaustive.

Topic	Key International, European and National Environmental Legislation
	<ul style="list-style-type: none"> ■ The EC Directive on the Conservation of Wild Birds ('Birds Directive 1979') (as amended) (79/409/EEC). Provides a framework for the conservation and management of, and human interactions with, wild birds in Europe. <ul style="list-style-type: none"> – There are habitats suitable for wild birds, including nesting and breeding birds, within the footprint of all the proposed options.
	<p>National</p> <ul style="list-style-type: none"> ■ Wildlife and Countryside Act 1981 (as amended) – Protects all wild birds, certain wild animals and certain wild plants. <ul style="list-style-type: none"> – There are numerous habitats and species of conservation importance within the footprint of all the proposed options. ■ Conservation of Habitats and Species Regulations 2010 – Provide for the designation and protection of 'European sites', the protection of 'European protected sites', and the adaptation of planning and other controls for the protection of European sites. <ul style="list-style-type: none"> – There are three Special Areas of Conservation designated for their bat populations within 30km of the existing A303. ■ Countryside and Rights of Way (CRoW) Act 2000 – Places a duty on Government Departments to have regard for the conservation of biodiversity and maintain lists of species and habitats for which conservation steps should be taken or promoted. <ul style="list-style-type: none"> – There are numerous habitats and species of conservation importance within the footprint of all the proposed options. ■ Natural Environment and Rural Communities (NERC) Act 2006 – Requires public bodies, including local authorities, <i>'to have regard to the conservation of biodiversity in England'</i> when carrying out their normal functions. <ul style="list-style-type: none"> – There are numerous habitats and species of conservation importance within the footprint of all the proposed options.
Noise and Vibration	<p>International and European</p> <ul style="list-style-type: none"> ■ EC Directive on the assessment and management of environmental noise (2002/49/EC) - Sets out a common approach to avoid, prevent and reduce the effects on human health of exposure to noise, through an assessment of noise in Member States. Such information should be made available to the public. <ul style="list-style-type: none"> – Both construction and operation phases for all the proposed options have the potential to increase noise levels and adversely affect sensitive receptors. <p>National</p> <ul style="list-style-type: none"> ■ The Environmental Protection Act 1990, Part III – Under Part III of the Act, certain matters are declared to be 'statutory nuisances', including 'noise that is prejudicial to health or a nuisance and is emitted from or caused by a vehicle, machinery...'. <ul style="list-style-type: none"> – Construction activities associated with the proposed options could lead to a statutory nuisance if best practice measures are not undertaken to prevent noisy and dust-creating works.
Road Drainage and the Water Environment	<p>International and European</p> <ul style="list-style-type: none"> ■ The EC Water Framework Directive (WFD) (2000/60/EC) – Sets an overarching programme to deliver long-term protection of the water environment and to improve the chemical and ecological health of all waters (groundwater and surface water) and associated wetlands. <ul style="list-style-type: none"> – There are three WFD waterbodies within close proximity to the route options. ■ The EC Directive on the Conservation of Natural Habitats and of Wild Flora and Fauna ('Habitats Directive 1982') as amended (92/43/EEC) – Promotes the maintenance of biodiversity by requiring Member States to take measures to maintain or restore natural habitats and wild species listed on the Annexes to the Directive at a favourable conservation status, introducing robust protection for those habitats and species of European importance. <ul style="list-style-type: none"> – There are rivers, streams and areas of standing water with the potential to support biodiversity that require protection. ■ The EC Directive on the Conservation of Wild Birds ('Birds Directive 1979') as amended (79/409/EEC) - Provides a framework for the conservation and management of, and human interactions with, wild birds in Europe. <ul style="list-style-type: none"> – There are numerous waterbodies with the potential to support wild birds that require protection. <p>National</p> <ul style="list-style-type: none"> ■ The Water Environment (WFD) (England and Wales) Regulations 2003 – Implements the WFD Directive into UK Legislation to ensure that the objectives of the Water Framework Directive are met.

Topic	Key International, European and National Environmental Legislation
	<ul style="list-style-type: none"> – There are three WFD waterbodies within close proximity to the proposed options. ■ The Flood and Water Management Act 2010 – Makes provisions about water, including provision about the management of risks in connection with flooding and coastal erosion. <ul style="list-style-type: none"> – The proposed options lie within close proximity to Flood Zones 2 and 3.
Geology, Soils and Materials	<p>International and European</p> <ul style="list-style-type: none"> ■ The EC Water Framework Directive (WFD) (2000/60/EC) - Sets an overarching programme to deliver long-term protection of the water environment and to improve the chemical and ecological health of all waters (groundwater and surface water) and associated wetlands. <ul style="list-style-type: none"> – There are three WFD waterbodies within close proximity to the proposed options. ■ The EC Framework Directive on Waste (2008/98/EC) – Requires member states to take appropriate measures to encourage the prevention or reduction of waste production and its harmfulness, and secondly the recovery of waste by means of recycling, re-use or reclamation or any other process with a view to extracting secondary raw materials, or the use of waste as a source of energy. <ul style="list-style-type: none"> – The construction activities associated with all of the proposed options will lead to the production of some waste.
	<p>National</p> <ul style="list-style-type: none"> ■ The Environmental Protection Act (EPA) 1990, Part II – This section sets out a regime for regulating and licencing the acceptable disposal of controlled waste on land. Controlled waste is any household, industrial and commercial waste. Part II stipulates that controlled waste must be treated, stored and disposed of in a manner that is not likely to cause pollution of the environment or harm to human health. <ul style="list-style-type: none"> – The construction of the scheme will require the disposal of some controlled waste. ■ The Environmental Protection Act (EPA) 1990, Part IIA – Part IIA principally deals with sites where individual historic contamination linkages present a “Significant Possibility of Significant Harm” (SPOSH) or a “Significant Possibility of Significant Pollution to Controlled Waters” (SPOSPCOW) representing an unacceptable level of contamination risk for each linkage. <ul style="list-style-type: none"> – There are two historic landfills either directly within or adjacent to the footprints of the proposed options with the potential for contaminated land to be present. ■ The Contaminated Land (England) Regulations 2006 (as amended) – Set out provisions relating to the identification and remediation of contaminated land under Part 2A of the Environmental Protection Act 1990. <ul style="list-style-type: none"> – There are two historic landfills either directly within or adjacent to the footprints of the proposed options. ■ Waste (England and Wales) Regulations 2011 (as amended) – Require organisations to confirm that they have applied the Waste Hierarchy, ensuring that waste is dealt in the priority of prevention, preparation for re-use, recycling, other recovery, and disposal. <ul style="list-style-type: none"> – Any waste generated during the construction of the proposed scheme is to be dealt with in line with the Waste Hierarchy. ■ The Hazardous Waste (England and Wales) Regulations 2009 – Define what constitutes hazardous waste and set out the controls on handling such wastes. The movement of hazardous waste is to be documented by a system of consignment notes. <ul style="list-style-type: none"> – The construction of the scheme may lead to the production of some hazardous waste. ■ Environmental Protection (Duty of care) Regulations 1991 – Sets out the documentary requirements as part of waste management. Transfers of waste must be accompanied by a transfer note containing a description of the waste, details concerning the ‘transferer’ and the ‘transferee’, and the place and time of the transfer. <ul style="list-style-type: none"> – The construction of the scheme will require the disposal of some controlled waste. ■ Clean Neighbourhoods and Environment Act 2005 – Sets out new provisions for local environmental and social issues such as litter, fly-tipping and anti-social behaviour. <ul style="list-style-type: none"> – Will be of particular relevance during the construction of the proposed scheme. ■ Landfill (England and Wales) Regulations 2002 (as amended) – Aims to reduce the negative environmental and health impacts associated with landfilling waste. <ul style="list-style-type: none"> – The scheme has the potential to produce waste that cannot be used and will therefore need to be landfilled. ■ Control of Substances Hazardous to Health Regulations 2002 (COSHH) and Construction and Design Management (CDM) Regulations 1994 – Under these sets of regulations, where a

Topic	Key International, European and National Environmental Legislation
	<p>developer knows or suspects the presence of contaminated soil, provision must be made to ensure that risks to the public and site works are controlled.</p> <ul style="list-style-type: none"> – There are two historic landfills either directly within or adjacent to the footprints of the proposed options with the potential for contaminated land to be present.
Environmental Planning	<p>International and European</p> <ul style="list-style-type: none"> ■ The Environmental Impact Assessment (EIA) Directive (2011/92/EU) (as amended) – Before development consent is given, Member States must take all measures necessary to make sure that projects likely to have significant effects on the environment by virtue of their nature, size or location are subject to an Environmental Impact Assessment (EIA). <ul style="list-style-type: none"> – The scheme will be subject to an EIA as this type of development falls within Annex 1 of the EIA Directive. <hr/> <p>National</p> <ul style="list-style-type: none"> ■ The Planning Act 2008 – Establishes a system to deal with Nationally Significant Infrastructure Projects (NSIPs) and to introduce a community infrastructure levy that can be charged on developers by local authorities. <ul style="list-style-type: none"> – The area of development for the proposed options is, on average, 60 hectares, which exceeds the relevant threshold of 12.5 hectares in section 22 (4) (b) of the Planning Act 2008 2008 for the construction or alteration of highways, other than motorways, where the speed limit for any class of vehicle is expected to be 50 miles per hour or greater. The scheme is therefore considered an NSIP for the purposes of sections 14 (1) (h) and 22 of the 2008 Act. ■ The Highway and Railway (Nationally Significant Infrastructure Project) Order 2013 – Made amendments to the Planning Act 2008 to ensure that highway-related development is only considered an NSIP where it exceeds specific limits and or is likely to have significant effects on the environment. <ul style="list-style-type: none"> – As described above, the scheme is considered to be an NSIP. ■ The Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 (as amended) – These regulations are in accordance with the Planning Act 2008 and impose various procedural requirements, in particular the carrying out of an EIA in relation to applications for development consent and subsequent consent. <ul style="list-style-type: none"> – The scheme will be subject to an EIA as this type of development falls within Annex 1 of the EIA Directive.

Source: Table prepared by MMSJV

4.2.2 Guidance

Guidance at the national level for each environmental topic is set out in the *National Planning Policy Framework (NPPF)* (Department for Communities and Local Government, March 2012), *National Planning Practice Guidance (NPPG)* (Department for Communities and Local Government, March 2014), and the *National Policy Statement for National Networks (NPSNN)* (Department for Transport, December 2014). A summary of each is given below, and Table 4.2 provides a summary of the guidance relevant to each environmental topic contained within the documents.

National Planning Policy Framework (NPPF) and National Planning Practice Guidance (NPPG)

The NPPF and guidance within the NPPG form the national planning policy guidance. The NPPF sets out the Government’s planning policies for England and how these are expected to be applied. The framework acts as guidance for local planning authorities and decision-makers, both in drawing up plans and making decisions about planning applications. The NPPG brings together planning guidance on various topics into one place, and its launch coincided with the cancelling of the majority of Government Circulars which had previously given guidance on many aspects on planning. Listed in Table 4.2 are the policies from the NPPF of relevance to each environmental topic.

National Policy Statement for National Networks (NPSNN)

There are no specific policies for nationally significant infrastructure projects in the NPPF. The Secretary of State for Transport determines these in accordance with the *Planning Act 2008* and relevant national policy statements (NPS) for major infrastructure, as well as any other matters that are considered both important and relevant. Policies within the NPSNN will be particularly relevant should the scheme be promoted as a Nationally Significant Infrastructure Project (NSIP), requiring a Development Consent Order (DCO) application.

Table 4.2: National Policy

Topic	Relevant National Policies
Air Quality and Greenhouse Gases	<p>NPPF</p> <p>Compliance with EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas (AQMA) and the cumulative impacts on air quality from individual sites in local areas is a requirement. Developments which contribute to or put at an unacceptable risk from, unacceptable levels of air pollution, should be prevented.</p>
	<p>NPSNN</p> <p>Where (after considering mitigation) a project would lead to a significant air quality impact in relation to EIA and/or lead to deterioration in air quality in a zone/agglomeration, substantial air quality considerations should be given. The Secretary of State should refuse consent where, after taking into account mitigation, the air quality impacts of the scheme will either result in a zone/agglomeration which is currently reported as being compliant with the Air Quality Directive becoming noncompliant, or affect the ability of a non-compliant area to achieve compliance.</p>
Cultural Heritage	<p>NPPF</p> <p>Significant weight should be given to the conservation of heritage assets, and where development will lead to less than substantial harm to the significance of a designated heritage asset, the harm should be weighed against the public benefits of the proposal. Refusal of consent is required when a scheme would result in the substantial harm or total loss of significance of a designated heritage asset, unless substantial public benefits outweigh that harm or loss.</p>
	<p>NPSNN</p> <p>The Secretary of State should identify and assess the particular significance of any heritage asset that may be affected by a development, whilst the significance of the heritage asset and value they hold now and in the future should also be considered. Substantial harm to or loss of designated assets of the highest significance should be wholly exceptional. Where a proposed development would lead to the substantial harm or total loss of significance of a heritage asset, the Secretary of State should refuse consent unless it can be demonstrated that substantial public benefits outweigh the loss or harm.</p>
Landscape	<p>NPPF</p> <p>The planning system should contribute to and enhance the natural and local environment by protecting and enhancing valued landscapes, geological conservation interest and soils, whilst decisions should encourage the effective use of land by re-using land which has been previously developed.</p>
	<p>NPSNN</p> <p>The scheme assessment should consider any relevant national and local development policy, significant effects during construction and operation, and visibility and conspicuousness. Compliance with the respective duties in section 11A of the National Parks and Access to Countryside Act 1949 and section 85 of the Countryside and Rights of Way Act 2000 is required. Local designations should be given consideration in decision making by the Secretary of State, and the Secretary of State will judge whether visual effects on sensitive receptors outweigh the benefits of the development.</p>
Nature Conservation and Biodiversity	<p>NPPF</p> <p>Paragraph 118 states that if significant harm (to biodiversity) cannot be avoided, adequately mitigated, or (as a last resort) compensated then consent should be refused. Consent should also be refused if irreplaceable habitats such as ancient woodland and/ or veteran trees are lost or deteriorate in quality as a result of the scheme, unless the need for and benefits of the development clearly outweigh the loss. Additionally, where a project would be likely to adversely affect a SSSI, the development would not ordinarily be permitted, unless the benefits of the development clearly outweigh impacts on the features of the qualifying features of the SSSI. Projects on land within or outside an ecological designation, but likely to have an adverse effect upon the site are not favoured.</p>
	<p>NPSNN</p> <p>The applicant should show how the project has taken advantage of opportunities to conserve and enhance biodiversity conservation interests including appropriate mitigation measures. Prior to granting Development Consent, the Secretary of State must, under the Habitats Regulations, consider whether the project would be likely to have a significant effect on the objectives of a European site, or on any site to which the same protection.</p>
	<p>NPPF</p>

Topic	Relevant National Policies
Noise and Vibration	<p>Paragraph 123 requires projects to avoid noise giving rise to significant adverse impacts on health and quality of life, to mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise, and to identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason. Developments which contribute to unacceptable levels or place unacceptable risk of adverse effects from noise pollution should be prevented.</p>
	<p>NPSNN</p> <p>Developments to be undertaken in accordance with the statutory requirements for noise. Applicants should ensure that the development avoids significant adverse noise impacts on health and quality of life, and mitigates/ minimises other adverse impacts on health and quality of life from noise, and contributes to improvements to health and quality of life through effective management and control of noise. For most national network projects, the relevant Noise Insulation Regulations will apply.</p>
Road Drainage and the Water Environment	<p>NPPF</p> <p>Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk, but where development is necessary, a Flood Risk Assessment (FRA) should support the proposal. The planning system should contribute to and enhance the natural and local environment by preventing both new and existing development from contributing to or being adversely affected by unacceptable levels of water pollution.</p>
	<p>NPSNN</p> <p>Applications for schemes in Flood Zones 2 and 3 should be accompanied by a FRA. In addition, applications for schemes that are located within Flood Zone 1 and are 1 hectare in area or greater, or subject to other sources of flooding (local watercourses, surface water, groundwater or reservoirs), or where the Environment Agency has notified the local planning authority that there are critical drainage problems, should also be accompanied by an FRA. For projects which may be affected by, or may add to flood risk, sufficiently early pre-application discussions should be sought between the applicant and the Environment Agency, and, where relevant, other flood risk management bodies. Surface water flood issues also need to be understood and then taken account of.</p>
People and Communities	<p>NPPF</p> <p>The government is committed to ensuring that the planning system does everything it can to support sustainable economic growth. Planning decisions should guard against the unnecessary loss of valued facilities and services, particularly where this would reduce the community's ability to meet its day- to- day needs, whilst protection and enhancement of Public Rights of Way (PRoW) and access and seeking opportunities to provide better facilities for users, for example by adding links to existing rights of way networks should be sought by the applicant.</p>
	<p>NPSNN</p> <p>For the development of the national road networks to be sustainable they should be designed to minimise social and environmental impacts to improve quality of life. Evidence should be provided by applicants, demonstrating that reasonable opportunities have been considered to deliver environmental and social benefits as part of schemes. Existing open space should not be developed unless the land is surplus to requirements or the loss would be replaced by equivalent or better provision in terms of quantity and quality in a suitable location. PRoWs, National Trails, and other rights of access to land (eg open access land) are important recreational facilities for walkers, cyclists and equestrians. Applicants should consider appropriate mitigation measures to address adverse effects on coastal access, National Trails, other PRoWs and open access land and, where appropriate, to consider what opportunities there may be to improve access.</p>
Geology, Soils and Materials	<p>NPPF</p> <p>The planning system should contribute to and enhance the natural and local environment by protecting and enhancing valued landscapes, geological conservation interest and soils, whilst local planning authorities should consider the benefits (such as economic) of the best and most versatile (BMV) land. Where significant development is demonstrated to be necessary, local planning authorities should seek to use areas of poorer quality land in preference to that of higher quality.</p>
	<p>NPSNN</p> <p>Where necessary, land stability should be considered in respect of new development, as set out in the NPPF and supporting planning guidance. Specifically, proposals should be appropriate for the location,</p>

Topic	Relevant National Policies
	including preventing unacceptable risks from land instability. The decision-maker should take into account the economic and other benefits of the best and most versatile agricultural land.

Source: Table prepared by MMSJV

Road Investment Strategy (RIS) Policy Paper and Highways England Strategic Business Plan

In addition to the above national guidance documents, the *Road Investment Strategy: for the 2015/16 – 2019/20 Road Period* (Department for Transport, March 2015) outlines a long-term programme to improve England's strategic road network. The *Road Investment Strategy* comprises:

- A long-term vision for England's motorways and major roads, outlining how the Department for Transport will create smooth, smart and sustainable roads.
- A multi-year investment plan that will be used to improve the network and create better roads for users.
- High-level objectives for the first roads period 2015 to 2020.

There is substantial provision within the *Road Investment Strategy* to ensure that the programme of investment is delivered in a way that minimises impact on the environment. The *Strategic Business Plan 2015-2020* (Highways England, December 2014) sets out how Highways England will deliver the investment plan and performance requirements of the *Road Investment Strategy* over the coming five years. One of the key objectives of the Strategic Business Plan is for an 'improved environment', where the impact of the activities are further reduced ensuring a long-term and sustainable benefit to the environment. With this in mind, Highways England have created a series of ring-fenced funds to address a range of specific issues over and above the traditional focus of road investment. These funds allow for actions beyond business as usual and will help the Company invest in retrofitting measures to improve the existing road network as well as maximising the opportunities offered by new road schemes to deliver additional improvements at the same time. Those of relevance to the scheme include:

- Environment: A £300 million Environment Fund to deliver specific enhancements to the network. This will enable the Company to deliver the improved environmental outcomes. In particular, the fund will be used to mitigate the worst impacts of noise on those living close to the network, support the transition to low-carbon road transport, improve local water quality and resilience to flooding, maintain an attractive landscape, and work to halt the loss of biodiversity.
- Cycling, Safety and Integration: Highways England strives to do even more to deliver improved outcomes for those living and working near the network, for example through the provision of new crossings and also the intention to produce their first National Cycling Strategy by the end of 2015. Highways England has also ring-fenced £250 million in a Cycling, Safety and Integration Fund to help deliver improvements in these areas through both bespoke interventions, as well as enhancements to new and existing schemes. This includes investing £100 million to improve cycling provision on at least 200 sections of the network, as well as ensuring all new schemes are cycle-proofed. Around another £105 million will be spent on additional measures to boost safety that extend beyond the high safety

standards already in place. Highways England have also stated that the strategic road network must be easier to get over, under or around to ensure that roads serve communities instead of severing them. Around £45 million of the Cycling, Safety and Integration fund is therefore dedicated to improving all elements of integration.

4.2.3 Local Policy

Local planning and land-use policy of relevance to the scheme is outlined below.

South Somerset District Council Local Plan 2006-2028

The *South Somerset District Council (SSDC) Local Plan 2006-2028* was adopted in 2015 and defines the spatial implications of economic, social and environmental change. The local plan includes a collection of policies which set out the long-term vision and strategic context for managing and accommodating growth within South Somerset. Policies based around environmental protection include the following:

- Policy EQ1: Addressing Climate Change in South Somerset – The Council will support proposals for new development where they have demonstrated how climate change mitigation and adaptation will be delivered, through the inclusion of a number of measures.
- Policy EQ2: General Development – ‘Development will be designed to achieve a high quality, which promotes South Somerset’s local distinctiveness and preserves or enhances the character and appearance of the district.
- Policy EQ3: Historic Environment – ‘Heritage assets will be conserved and where appropriate enhanced for their historic significance and important contribution to local distinctiveness, character and sense of place.
- Policy EQ4: Biodiversity - All proposals for development, including those which would affect sites of regional and local biodiversity, nationally and internationally protected sites of geological interest will:
 - Protect the biodiversity value of land and buildings and minimise fragmentation of habitats and promote coherent ecological networks;
 - Maximise opportunities for restoration, enhancement and connection of natural habitats.
 - Incorporate beneficial biodiversity conservation features where appropriate.
 - Protect and assist recovery of identified priority species.
 - Ensure that Habitat Features, Priority Habitats and Geological Features that are used by bats and other wildlife are protected and that the design including proposals for lighting does not cause severance or is a barrier to movement.
- Policy EQ5: Green Infrastructure – Development proposals should provide and/or maintain a network of connected and multifunctional open spaces that meet particular policy requirements.
- Policy EQ6: Woodland and Forests – The loss of ancient woodland as well as ancient or veteran trees should be protected against loss wherever possible.

Policy EQ7: Pollution Control - Development that, on its own or cumulatively, would result in air, light, noise, water quality or other environmental pollution or harm to amenity, health or safety will only be permitted if the potential adverse effects would be mitigated to an acceptable level by other environmental controls, or by measures included in the proposals.

A major part of the local plan is the identification of broad locations for employment and housing growth and accompanying policies for assessing development proposals, taking account of the National Planning Policy Framework and the National Planning Practice Guidance. Between Podimore and Sparkford, land has been set aside for one development only (an extension to the existing school at Queen Camel (Reference CR/QUCA/1)). No further development land has been allocated within the local plan between Sparkford and Podimore. South Somerset District Council had previously set aside land for upgrades to the A303 between Sparkford and Podimore through the previous local plan (1991- 2011 Policy TP9). However within Appendix 2 of the adopted local plan, this Policy TP9 is considered to be completed and 'covered by the Highways Agency' and is no longer in place.

South Somerset District Council Strategic Housing Land Availability Assessment 2013

The South Somerset *Strategic Housing Land Availability Assessment* (SHLAA) (South Somerset District Council, December, 2013) forms part of the evidence base for the SSDC Local Plan. Numerous potential housing sites have been identified within the SHLAA. These may come forward in future iterations of the SSDC Local Plan. They are described in further detail in chapter 5.1 of the *NMU Context Report* (MMSJV, April 2016). Notable development proposals include Reference E/QUCA/0003 (at Sparkford Hill) which proposes 215 dwellings within the next 15 years and is also identified as a suitable future employment and retail site (refer to the SHLAA, Appendix D). Reference E/SPAR/0001 is located immediately to the south-west of Sparkford and proposes 35 dwellings within the next 10 years. This site is also recognised as a potential future 'mixed use' development site. A further 14 suitable housing sites have been identified in West Camel, Queen Camel and Sparkford parishes, with the number of proposed dwellings at these sites ranging from 1 to 64.

Somerset County Council's Future Transport Plan 2011-2026

Somerset County Council's Future Transport Plan (Somerset County Council, February 2011) sets out the council's long term strategy for getting the best from transport. The plan covers the period between 2011 and 2026 and replaces *Somerset's Second Local Transport Plan*, which expired in March 2011. The plan contains a schedule of policies that include the following:

- SUS 10 Landscape and Biodiversity: Enhancing the landscape and biodiversity of the local area.
- ECN Sustainable Development: Ensuring that sustainable development is at the forefront of thinking.
- SAF 1 Road Safety: Improving the road safety around Somerset.
- HLT 3 Air Quality: Minimising the effect any changes to Somerset's transport systems have on air pollution.

5 Description of route options

5.1 Introduction

The route options described in this chapter are those that are recommended in the *Options Assessment Report* (MMSJV, due for issue in November 2016) to be taken forward for further assessment.

5.2 Option A2

5.2.1 Description of route

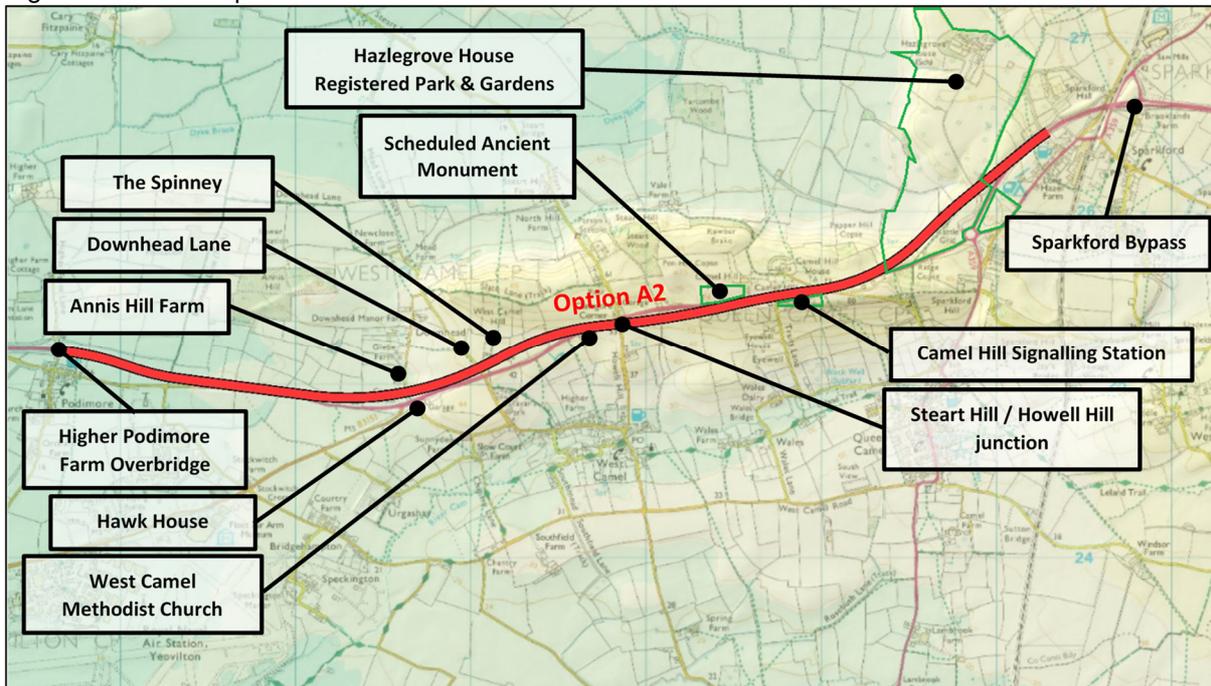
Option A2 would follow the existing corridor of the A303 very closely, although in many locations it would be aligned just to the north or south of the existing carriageway to allow re-use of the existing route for local access, to avoid property or facilitate construction. At its maximum offset the route would typically be 100m either north or south of the existing A303. The option is illustrated in Figure 5.1.

The route would start at the Higher Podimore Farm Overbridge and, heading east, follow the existing A303 until the transition from dual to single carriageway. At this point, the route would shift north of the existing A303 so that the carriageway could be retained as a local road between West Camel and Podimore. It would pass between Annis Hill Farm and Hawk House, which is the location of a Noise Important Area. After this, the proposed road would be in a small cutting approximately 3m deep.

The route would then rise up West Camel Hill maintaining a distance of approximately 50 – 100m from the existing A303, and the depth of the cutting would increase to approximately 10m. This would result in severance of Downhead Lane and the access to the property known as The Spinney. The route would then continue to the north of the Noise Important Area at the West Camel Methodist Church and then cross the line of the existing A303 at the Steart Hill / Howell Hill junction. At this point, the proposed road level would be similar to the existing A303 to facilitate the management of traffic during construction.

The road would then briefly take a southerly alignment on an embankment up to 6m high before re-joining the line of the existing road. The level of the proposed road at this location would also match that of the existing to facilitate construction. It would then pass to the south of the Scheduled Ancient Monument at Vale Farm and north of the MOD signalling station at Camel Hill. Finally the route would descend the eastern slope of Camel Hill on an embankment up to 9m high, bypassing the existing Hazlegrove Roundabout to the north through the Registered Park and Garden associated with Hazlegrove House and then tie into the existing A303 north of Sparkford village.

Figure 5.1: Route option A2



Source: MMSJV. This Map is based upon Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office © Crown copyright. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. Highways England 100030649 2015.

5.2.2 Possible junctions

Two junction locations are suggested for this route option. The first, at Downhead Lane, would enable traffic to interchange between Steart Hill, Howell Hill and Downhead Lane and the proposed road in a similar location to the current road layout. The second junction, at Hazlegrove, would enable interchange between the proposed road and the A359, High Street Sparkford, the access to Hazlegrove House and the Sparkford services.

The proposed size and layout of these junctions would be determined during further design development and would be based upon predicted traffic volumes and relevant design standards.

It should be noted that the economic appraisal described in chapter 0 of this report assumes two junctions on this route option. If the Downhead Lane junction were removed, the economic case would be expected to improve.

5.2.3 Structures

Overbridges would be required at the two junctions. An underpass is also proposed to connect properties at Camel Hill Farm with Traits Lane and the local road network to the south.

It is not expected that significant retaining solutions or culverts would be required although, this being an online option, modest retaining solutions may be required as the design develops and constraints become clear.

5.2.4 Compliance with standards

The horizontal and vertical alignment of this option would be fully compliant with Highways England's geometric design standards for fully grade-separated junctions.

The layout of Downhead Lane and Hazlegrove Junctions would be compliant with Highways England standards for junctions. As design development progresses and constraints become clear, it may be necessary to relax the standard of provision in which case the appropriate technical approval would be obtained prior to incorporating any reduced elements into the design.

It is anticipated the spacing between the proposed junction at Hazlegrove and the existing A359 junction on the eastbound carriageway of the Sparkford bypass may be less than the minimum permitted to enable satisfactory weaving manoeuvres. This will be reviewed as the design develops and, if the distance cannot be increased, technical approval would be sought for this element.

5.2.5 Drainage

The vertical profile of this option would comprise a high point roughly at the centre and low points at either end. There would therefore likely be two main drainage outfalls. The western catchment would connect to the existing highway drainage network at the Podimore BYPASS which in turn would outfall west to a tributary of the River Cary. The east catchment would outfall to the north via a new ditch to a tributary of Dyke Brook.

5.2.6 Summary of benefits

- This would be the shortest route.
- It would use the existing road corridor as much as possible and thus minimise new or increased environmental impact.
- It would include the potential to re-use existing carriageway construction, subject to condition surveys and geometric design development.
- It would include no relaxations from horizontal or vertical alignment standards.

5.2.7 Summary of issues

- This route may require two grade separated junctions.
- Based on correspondence from utility companies, this option would affect the largest amount of existing services compared with other route options and is also likely to require the relocation of the telecommunication masts adjacent to Traits Lane.
- It would require the greatest amount of side road modifications compared with the other options including removal of the connection to the A303 at Gason Lane and Traits Lane.

- It would impact on the existing businesses at Camel Hill services and Crusty Cottage bakery.
- There would be difficulty in managing traffic during construction.
- It would have the largest earthworks requirement.
- Unless a suitable parallel local route could be developed this option may not be as resilient as the offline options in terms of providing a temporary diversion route in the event of incidents or maintenance works that would require the closure of the main carriageway.

5.3 Option B4

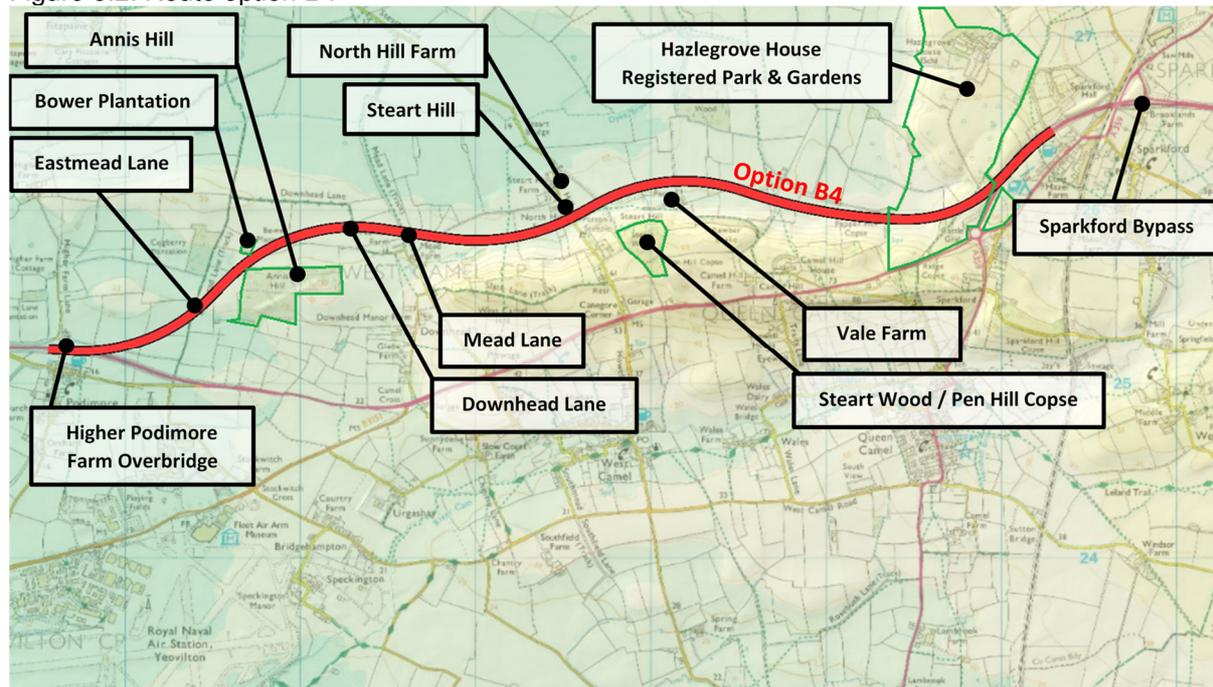
5.3.1 Description of route

Option B4 would be an offline route, taking a course to the north of the existing A303 carriageway. In contrast to option A2 which would pass over the top of Camel Hill, option B4 would follow relatively low lying land around the northern perimeter of Camel Hill. The option is illustrated in Figure 5.2.

The route would commence at the Higher Podimore Farm Overbridge and, heading east, immediately turn north severing the Eastmead Lane bridleway to pass between the two local wildlife sites of Annis Hill and Bower Plantation. The route would then take an easterly course severing the Downhead Lane byway and Mead Lane. At this point, the route would traverse the relatively low lying flat plain at the edge of the Dyke Brook flood plain. The route would continue eastwards to pass south of North Hill Farm and then cross Steart Hill (road) and continue north of Steart Wood Ancient Woodland. The vertical profile of the proposed road would reach a local crest at this point, having generally followed the gently undulating profile of the existing ground since leaving the existing A303. Following this, the route would curve south-east whilst passing just north of Vale Farm and crossing two associated farm access tracks. The road would then rise up to pass through the Hazlegrove House Registered Park and Gardens and re-join the A303 Sparkford bypass.

It would be possible to maintain traffic, unaffected, on the existing A303 during construction although there would be some disruption during tie-in works at each scheme limit.

Figure 5.2: Route option B4



Source: MMSJV. This Map is based upon Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office © Crown copyright. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. Highways England 100030649 2015.

5.3.2 Possible junctions

It is likely that a junction would be required at Hazlegrove to enable continued interchange between the A303 and the A359, High Street Sparkford, the access to Hazlegrove House and the Sparkford services.

Because this is an offline improvement the existing A303 carriageway could be retained in situ as a local road, including all the associated minor side road junctions. This would mean that a junction at the centre of the scheme, for example the Downhead Lane junction on route option A2, would not be required.

5.3.3 Structures

An overbridge would be required at the Hazlegrove junction. Up to three further structures would be required including accommodation bridges at Vale Farm and Downhead Lane and a road overbridge at Steart Hill.

It is not expected that significant retaining solutions or culverts would be required.

5.3.4 Compliance with Standards

The horizontal and vertical alignment of this option would be fully compliant with Highways England's geometric design standards, although the alignment at the eastern end of the route would incorporate a permitted relaxation below desirable minimum horizontal curvature.

The layout of Hazlegrove Junction would be compliant with Highways England standards for junctions. However as design development progresses and constraints become clear, it may be necessary to relax the standard of provision in which case the appropriate technical approval would be obtained prior to incorporating any reduced elements into the design.

It is anticipated the spacing between the proposed junction at Hazlegrove and the existing A359 junction on the eastbound Sparkford bypass carriageway may be less than the minimum permitted to enable satisfactory weaving manoeuvres. This would be reviewed as the design develops and, if the distance could not be increased, technical approval would be sought for this element.

5.3.5 Drainage

As the majority of this option would follow the relatively flat ground adjacent to the Dyke Brook flood plain, the vertical profile would undulate to follow the existing ground whilst maintaining a minimum longitudinal gradient for drainage purposes. There would therefore likely be a number of outfalls for the road drainage. Along the central and eastern sections these would outfall to the Dyke Brook via new ditches and existing tributaries and at the western extent in the vicinity of Podimore the proposed drainage would outfall west to a tributary of the River Cary.

5.3.6 Summary of Benefits

- This option would require only one grade separated junction at Hazlegrove.
- The existing A303 would be retained and provide a good facility for local access. It would also provide a route for the diversion of traffic in the event of incidents or maintenance on the new road.
- It would move traffic impacts such as noise and air quality away from receptors along the existing route, and introduce new impacts to fewer receptors.
- It would have a relatively low earthworks requirement as a result of following low lying and flat ground to the north of the scheme area.
- The mainline is compliant with geometric standards.
- Based on communications with utility companies, this route would affect fewer existing services than the part online route, option A2.
- Traffic management during construction would be relatively straightforward. Much of the scheme could be constructed without impacting upon traffic on the A303, except at tie-ins at either end of the scheme and where construction site access were required.

5.3.7 Summary of issues

- It would pass through relatively undeveloped countryside and would incur visual impact particularly on views from the north which may not be possible to mitigate fully.
- This option would be likely to impact upon the Ancient Woodland and Local Wildlife Site at Steart Hill Copse as a result of the diversion of Steart Hill (road). The area of

this site that may be required for construction of the road diversion would be in the region of 0.5 hectare. There would also potentially be a small amount of land acquisition required at Annis Hill Local Wildlife Site.

5.4 Option E4

5.4.1 Description of route

This option explores the possibility of following a corridor similar to that of the existing A303, thus avoiding the environmental dis-benefits of the fully offline options, whilst keeping the new works sufficiently separate from the existing carriageway to minimise traffic disruption during the works and enabling the retention of the existing road for local use. The option is illustrated in Figure 5.3.

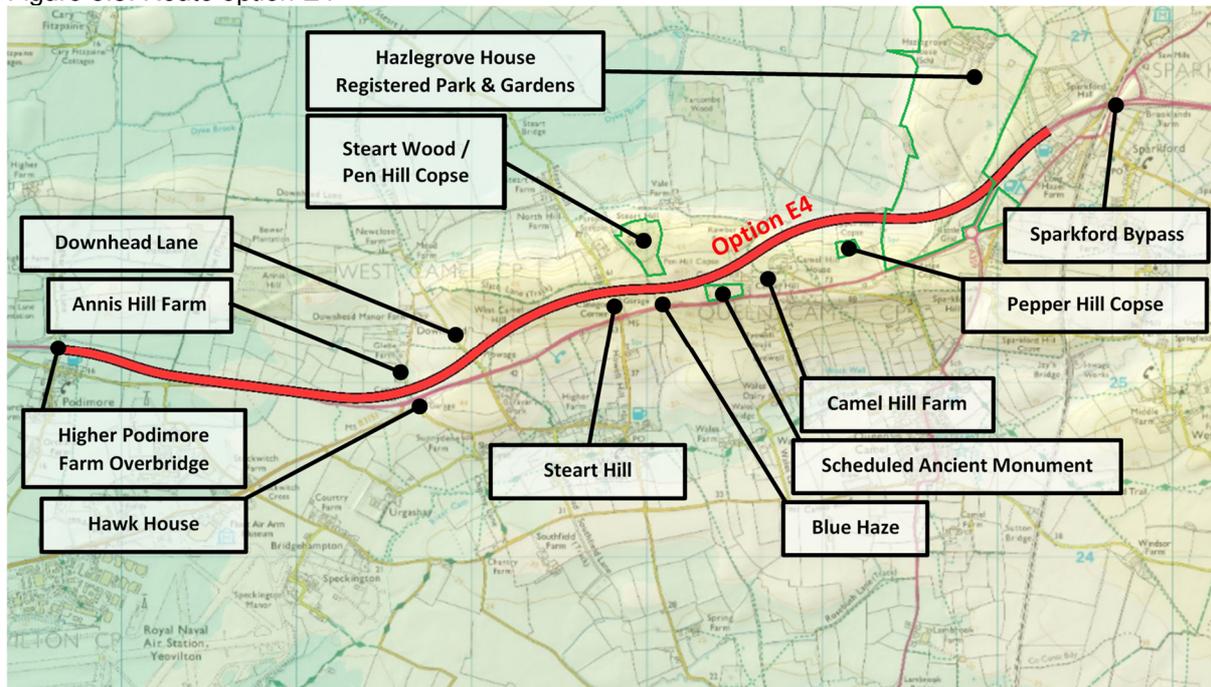
The route would start at the Higher Podimore Farm Overbridge and, heading east, follow the existing A303 until the transition from dual to single carriageway. At this point, the route would shift north of the existing A303 so that the carriageway could be retained as a local road between West Camel and Podimore. The route would pass between Annis Hill Farm and Hawk House, which is a Noise Important Area, and then cross Downhead Lane approximately 150m north of the existing A303.

The route would then curve back to a more easterly direction and cross Steart Hill (road) between the residential property known as Knockdolian and the byway known as Slate Lane.

Following the Steart Hill crossing, the route would continue to rise up Camel Hill, although it would be necessary to construct this in a cutting approximately 15m deep as it would not be possible to follow the ground profile within the constraints of vertical alignment standards. The road would pass closely between the Pen Hill Copse Ancient Woodland and the residential property known as Blue Haze, and then very close to the Camel Hill Scheduled Ancient Monument. A modest retaining solution may be required to avoid cutting slopes impacting upon the Scheduled Ancient Monument. The route would then pass to the north of Camel Hill Farm before emerging from the steep eastern face of Camel Hill on an embankment approximately 15m high. The route would then take an arcing path to the north of Pepper Hill Copse, through the Hazlegrove House Registered Park and Gardens and return to tie into the A303 Sparkford bypass.

It would be possible to maintain traffic, unaffected, on the existing A303 during construction although there would be some disruption during tie-in works at each scheme limit.

Figure 5.3: Route option E4



Source: MMSJV. This Map is based upon Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office © Crown copyright. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. Highways England 100030649 2015.

5.4.2 Possible junctions

It is likely that a junction would be required at Hazlegrove to enable continued interchange between the A303 and the A359, High Street Sparkford, the access to Hazlegrove House and also the Sparkford Services.

Because this would be an offline improvement the existing A303 carriageway could be retained in situ as a local road, including all the associated minor side road junctions. This would mean that a junction at the centre of the scheme would not be required.

5.4.3 Structures

An overbridge would be required at the Hazlegrove junction. Up to three further structures would be required including road bridges at Downhead Lane, Steart Hill and near Vale Farm.

A retaining solution may be required to avoid impacting on the Scheduled Ancient Monument site at the Camel Hill cutting.

It is not expected that culverts would be required.

5.4.4 Compliance with standards

The horizontal and vertical alignment of this option would be fully compliant with Highways England's geometric design standards, although the alignment at the eastern

end of the route would incorporate a permitted relaxation below desirable minimum horizontal curvature.

The layout of Hazlegrove Junction would generally be compliant with Highways England standards for junctions. As design development progressed and constraints became apparent, it may be necessary to relax the standard of provision in which case the appropriate technical approval would be obtained prior to incorporate any reduced elements into the design.

It is anticipated the spacing between the proposed junction at Hazlegrove and the existing A359 junction on the eastbound carriageway may be less than the minimum permitted to enable satisfactory weaving manoeuvres. This would be reviewed as the design developed and, if the distance could not be increased, technical approval would be sought for this element.

5.4.5 Drainage

The vertical profile of this option would comprise a high point roughly at the centre and low points at either end. There would therefore likely be two main drainage outfalls. The western catchment would connect to the existing highway drainage network at Podimore which in turn would outfall west to a tributary of the River Cary. The east catchment would outfall to the north via a new ditch to a tributary of Dyke Brook.

5.4.6 Summary of benefits

- This option would require only one grade separated junction at Hazlegrove.
- The existing A303 would be retained and provide a good facility for local access. It would also provide a route for the diversion of traffic in the event of incidents or maintenance on the new road.
- The mainline would be compliant with geometric standards.
- Based on communications with utility companies, this route would affect fewer existing services than the part online route, option A2.
- Traffic management during construction would be relatively straightforward. Much of the scheme could be constructed without impacting upon traffic on the A303, except at tie-ins at either end of the scheme and where construction site access was required.
- There should be no requirement for acquisition of land associated with Local Wildlife Sites or Ancient Woodland.

5.4.7 Summary of issues

- It would not necessarily move traffic impacts such as noise and air quality away from receptors along the existing route.
- It would have a relatively high earthworks requirement as a result of traversing Camel Hill.

- There would be a potential departure from standards in the eastbound weaving length between the proposed Hazlegrove Junction and existing A349.
- There would be severance and visual intrusion as the route crossed Steart Hill (road).
- Approximately 15m deep cutting through Camel Hill and 15m high embankment on eastern approach to the Camel Hill cutting would be required.
- A retaining solution may be required to avoid impact on the Camel Hill Scheduled Ancient Monument.

5.5 Option F1

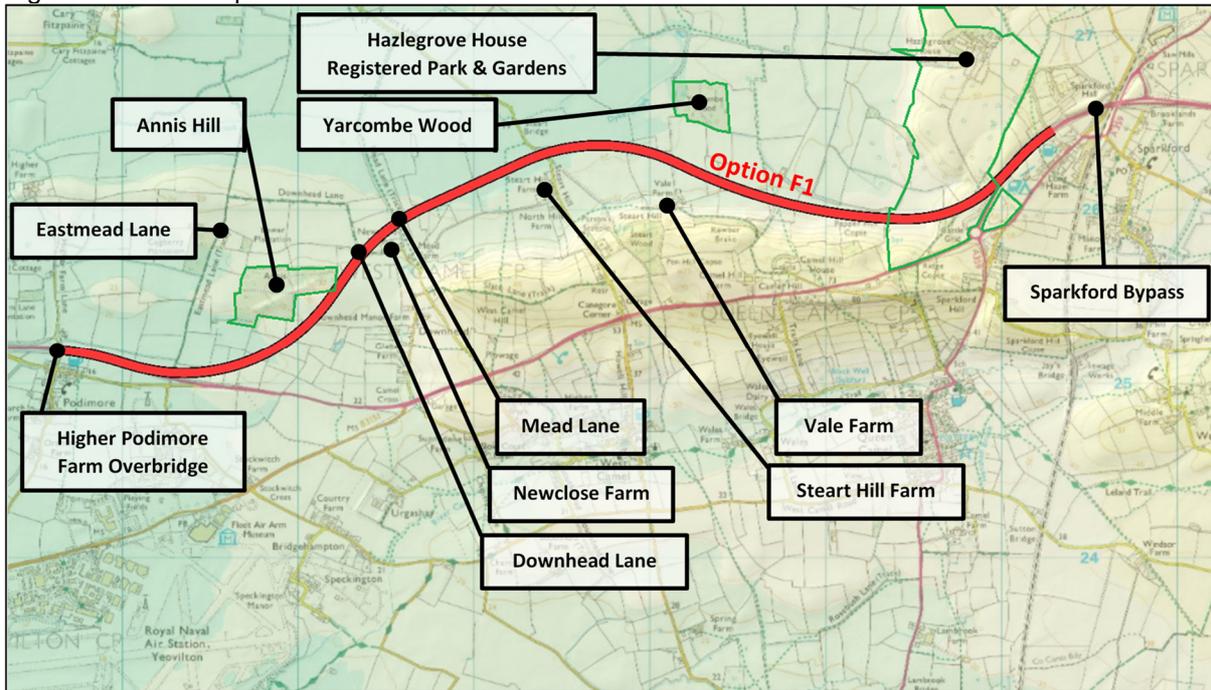
5.5.1 Description of route

Option F1 would be an offline route to the north of the existing A303. Of the four shortlisted options it would be the route that reached the furthest north. At its eastern end option, F1 would take a near similar course to option B4. However to the west, this option would follow an alternative corridor around Annis Hill and Steart Hill Farm. The option is illustrated in Figure 5.5.

The route would start at the Higher Podimore Farm Overbridge and, heading east, follow the existing A303 for approximately 400m. The route would then curve northwards, severing the Eastmead Lane bridleway, to pass through the southwestern corner of Annis Hill. The road would be in a cutting of depth up to 9m through the corner of Annis Hill. The route would cross Downhead Lane and pass close to the north-west of Newclose Farm before taking a more easterly path across Mead Lane and then across relatively flat ground to Steart Hill (road). The route would cross Steart Hill to the north of Steart Hill Farm, and then turn to a south-easterly direction passing between the Ancient Woodland of Yarcombe Wood and Vale Farm. At this point, the route would be similar to option B4 as it climbed to cross the Registered Park and Gardens of Hazlegrove House and tie into the A303 Sparkford bypass.

It would generally be possible to maintain traffic, unaffected, on the existing A303 during construction although there would be some disruption during tie-in works at each scheme limit.

Figure 5.5: Route option F1



Source: MMSJV. This Map is based upon Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office © Crown copyright. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. Highways England 100030649 2015.

5.5.2 Possible junctions

As for option B4, it is likely that a junction would be required at Hazlegrove to enable continued interchange between the A303 and the A359, High Street Sparkford, the access to Hazlegrove House and the Sparkford services.

Because this would be an offline improvement the existing A303 carriageway could be retained in situ as a local road, including all the associated minor side road junctions. This would mean that a junction at the centre of the scheme would not be required.

5.5.3 Structures

An overbridge would be required at the Hazlegrove junction. Up to three further structures would be required including accommodation bridges at Vale Farm and Downhead Lane, and a road overbridge at Steart Hill.

It is not expected that significant retaining solutions or culverts would be required.

5.5.4 Compliance with standards

The horizontal and vertical alignment of this option would be fully compliant with Highways England's geometric design standards, although the alignment at the eastern end of the route would incorporate a permitted relaxation below desirable minimum horizontal curvature.

The layout of Hazlegrove Junction would generally be compliant with Highways England standards for junctions. As design development progressed and constraints became clear, it may be necessary to relax the standard of provision in which case the appropriate technical approval would be obtained prior to incorporate any reduced elements into the design.

It is anticipated the spacing between the proposed junction at Hazlegrove and the existing A359 junction on the eastbound carriageway may be less than the minimum permitted to enable satisfactory weaving manoeuvres. This would be reviewed as the design develops and, if the distance could not be increased, technical approval would be sought for this element.

5.5.5 Drainage

There would likely be two main drainage outfalls for this option. The western catchment would drain the road between Higher Podimore Farm Overbridge and the crest at the Annis Hill cutting. This would connect to the existing drainage network at Podimore which would outfall west to a tributary of the River Cary. The eastern catchment would drain to the low point of the road located near the centre of the scheme and would outfall north via a new ditch to a tributary of the Dyke Brook.

5.5.6 Summary of benefits

- This option would require only one grade separated junction at Hazlegrove.
- The existing A303 would be retained and provide a good facility for local access. It would also provide a route for the diversion of traffic in the event of incidents or maintenance on the new road.
- It would move traffic impacts such as noise and air quality away from receptors along the existing route, and introduce new impacts to fewer receptors.
- It would have a relatively low earthworks requirement as a result of following low lying and flat ground to the north of the scheme area.
- The mainline would be compliant with geometric standards.
- Based on communications with utility companies, this route would affect fewer existing services than the part online route, option A2.
- Traffic management during construction would be relatively straightforward. Much of the scheme could be constructed without impacting upon traffic on the A303, except at tie-ins either end of the scheme and where construction site access is required.

5.5.7 Summary of issues

- It would pass through relatively undeveloped countryside and would incur visual impact particularly on views from the north which may not be possible to mitigate fully.
- This option would be likely to involve the construction of a cutting approximately 9m deep through the eastern edge of the Annis Hill Local Wildlife Site. The area of this site that may be required for construction of this cutting may be in the region of 0.75 hectare.

6 Traffic analysis

6.1 Traffic data

A traffic model based on that developed in the *South West Area Multi Modal Study* (SWARMMS)³ was used for assessing the A303 schemes in the *Strategic Outline Business Case* (SOBC)⁴. This was updated for the SOBC using 2013 traffic data from the Department for Transport's Traffic Database and local authorities along the A303 as well as additional surveys carried out by CH2MHill. However, the original 2001 origin-destination data (ie Roadside Interview Data) used to build the original demand matrices was not updated. Consequently, it was decided that the SWARMMS-based model, as updated for the SOBC, should be used only to give an indication of the wide area reassignment increases on the A303 for assessment purposes in the absence of the South West Regional Traffic Model (SWRTM) which is being developed. For option identification stage appraisal, a local traffic model was therefore developed using data described below.

The following existing traffic data sources were collated and reviewed:

- *A303/A30/A358 Corridor Feasibility Study Stage 1 Report* (CH2MHill, February 2015)
- *A303 Sparkford to Ilchester Strategic Outline Business Case* (CH2MHill, January 2015)
- Scoping and preliminary work for the South West Regional Traffic Model (SWRTM) including the ITN-based SATURN 'buffer' network for the region and the forthcoming mobile phone-based trip matrix
- Available existing transport models including SWARMMS-based model as updated for the SOBC (the OD data in the SWARMMS-based model is from 2001, though the model base was uplifted to 2013 counts)
- Available traffic data from Highways England Open Data and local authorities
- Count Data obtained from Somerset County Council.

Based on the review of the data available and an understanding of the data required to build the model, additional traffic data collection was undertaken. This consisted of:

- Manual Classified Turning Counts
- Automatic Traffic Counts
- Roadside Interview Surveys

Six one-day manual classified turning counts have been undertaken along the A303 to record local traffic movements and provide vehicle classifications on the 7 October 2015.

Automatic traffic counters attached to pneumatic tubes were installed at ten sites for a two-week period on various side roads along the A303, as well as on the north western

³ SWARMMS carried out by Halcrow (now CH2MHill) on behalf of Government Office for the South West, October 2002

⁴ *Strategic Outline Business Case*, CH2MHill, January 2015

exit from Podimore Roundabout and along the A359, south of Hazlegrove Roundabout. The surveys took place during the first two weeks of October 2015.

Roadside interviews were carried out at four different sites in October 2015.

Observed journey time data has been sourced from Trafficmaster⁵ and three journey time routes have been defined to cover the principal routes in the study area.

Full details of the traffic survey data used as part of the A303 Sparkford to Ilchester local traffic model can be found in the *Traffic Data Collection Report* (MMSJV, March 2016).

6.2 Traffic analysis methodology

The purpose of developing the new local traffic model was to forecast the traffic impacts of options for dualling the existing single carriageway A303 and to provide the evidence base for scheme appraisal. The following sections describe how the base model was built and used to produce future year forecasts for the scheme options.

6.2.1 Base year model

The local highway traffic model has been developed in SATURN⁶, in accordance with the Department for Transport's *Transport Analysis Guidance* (WebTAG), to represent three weekday time periods that are consistent with the SWRTM model time periods. These are an average AM peak period hour (07:00-10:00), an average hour in the inter-peak (10:00-16:00) and an average PM peak period hour (16:00-19:00) for an average Monday to Friday weekday in October 2015 (excluding school holidays). A weekday off peak period (19.00-07.00) model has also been derived from the inter-peak model to assist with data provided for appraisal purposes. It should be noted that higher traffic flows occur at weekends and during holiday periods but, at this stage, these have not been modelled. Seasonal traffic will be addressed in the next stage of the scheme, the option selection stage.

The development of the highway model relied on new surveys described in chapter 6.1 of this report.

The SATURN model comprises of 25 zones and a local road network. This network includes the section of the A303 between Sparkford and Ilchester comprising the single carriageway section and two roundabout junctions at Hazlegrove and Podimore; the A37 from Yeovil to Ilchester and north of Podimore roundabout; and the A359 from Yeovil to Hazlegrove Roundabout and to the north via Sparkford. A series of side roads are also represented in the model providing access to the A303, for instance at West Camel and Queen Camel. The network comprises two areas:

- Fully Modelled Area (FMA) – this is the local area which includes Sparkford and Ilchester over which the proposed intervention has its main local impact, includes

⁵ Trafficmaster data is GPS-based data available from the Department for Transport

⁶ [Simulation and Assignment of Traffic to Urban Road Networks](#)

most links in the area, explicit modelling of junction delays as well as representing the effect of traffic volume on speed using speed flow relationships.

- External Area – the impacts of interventions can be assumed to be negligible here, except for wider area reassignments that will be assessed by other means. In the case of the Sparkford to Ilchester local traffic model the external network represents those links providing access into the FMA. The links are modelled using speed flow relationships.

Trip matrices have been prepared based on both observed and synthetic data as set out in chapter 5 of the *Local Model Validation Report* (MMSJV, June 2016). Details of checks undertaken at key stages in the development of the matrices are presented in the *Local Model Validation Report* to ensure that the provenance of the matrices is maintained. Checks include analysis of the observed and synthetic matrices prior to merging and, after merging, comparisons with counts before applying matrix estimation. Detailed analyses of the effects of matrix estimation are also documented in line with current WebTAG guidance.

The SATURN model convergence meets WebTAG criteria in all time periods. The model achieves a good level of flow calibration with results indicating a close match to observations on the calibration screenlines and for individual link counts, with the required WebTAG criteria being met in all time periods for both all vehicles and cars.

Flow validation has been undertaken against independent data not used in calibration or for the matrix building exercise. An assessment of the validation process shows that the model also achieves a good level of flow validation in each of the modelled time periods, meeting the WebTAG validation criteria in all cases.

In addition, the journey time validation is considered to be very good in all time periods with the model recreating journey times that are representative on key routes in the modelled area.

In conclusion, it is considered that the base year highway assignment models developed for the 2015 A303 Sparkford to Ilchester local traffic model demonstrate a good representation of traffic behaviour in the study area and form a robust basis from which future year forecasts and option testing can be developed.

6.2.2 Traffic forecasting

Forecasts have been prepared for two forecast years, the scheme opening year 2022 and a design year 15 years later, 2037. Two demand forecast methods were used, the first accounting for the spatial allocation of local development and the second relying wholly on using the Department for Transport's National Trip End Model and Road Transport Forecast databases. The first method produced forecasts in the local model that were dominated by local development resulting in unrealistically low growth for strategic movements on the A303. The forecasts presented in the *Traffic Forecasting Report* (MMSJV, September 2016) have therefore relied on the second method, but the description of the first method is retained in the report as it will need to be revisited when SWRTM is used for the appraisal in later stages.

The traffic forecasts have been prepared assuming a fixed matrix on an origin-destination basis using the local SATURN traffic model. Variable demand modelling has not been implemented at this stage but wider area reassignments have been assessed using the SWARMMS model that will be updated with the SWRTM in Stage 2.

Future year Most Likely networks have been based on the 2015 validated model. The schemes included in the Most Likely scenario were identified following an assessment of the likelihood of each scheme going ahead. However, since there is no other highway scheme proposal in the model area, the Do Minimum networks are identical to the Base Year networks.

Results indicate that the numbers of trips are forecast to increase for future forecast years of 2022 and 2037 above base year 2015 values across the study area. As the model has been run with a fixed trip matrix this means the initial future year trip matrices loaded on the Do Minimum and the Do Something networks are the same.

The four route options defined in chapter 5 of this report were assessed. Analysis of Annual Average Daily Traffic (AADT) information shows relatively small flow differences between the Do Something scenarios, with the online option A2 attracting the highest demand of around 45,000 AADT in the design year 2037.

Analysis of highway journey times demonstrates that the scheme would modestly improve access times between the strategic road network and the planned development locations, and would provide a modest improvement for strategic movements on the east-west stretch of the A303. The forecasts indicate that the traffic on the A303 would benefit from savings of around 2.5 to 4 minutes per trip. This is considered modest reflecting that the model represents a neutral month weekday, rather than when peak traffic occurs on this route on Fridays, weekends and bank holidays due to weekly commuting and holiday traffic.

Network performance is forecast to perform satisfactorily in both the Do Minimum and in all the four options tested in the Do Something scenario, identified through an assessment of junction performance within highway model and journey times across the network in both 2022 and 2037. The inclusion of the scheme is forecast to result in the attraction of almost all the through traffic on the A303 into the new route and a substantial reduction on the existing route arrangement.

The *Traffic Forecasting Report* (MMSJV, September 2016) contains diagrams showing the forecast traffic for each of the options for the Most Likely scenario only. It does not contain forecasts for Low or High sensitivity test forecasts at this stage. These sensitivity tests will need to be undertaken in the next stage.

6.3 Road layout and standards

6.3.1 Road geometry

A high quality layout has been developed to understand the range of possible constraints that may be factors in the development of the route options. The option layouts are therefore fully compliant with geometric standards, although permitted relaxations have been employed where this has been deemed to be appropriate.

The aspirations of the *Road Investment Strategy* are that the A303/A30/A358 corridor should be an expressway. Design standards for expressways have yet to be published although Highways England have provided provisional guidance in the form of a Technical Note, *Expressway Technical Note_HE_DES_V1.0_20160309* (Highways England, March 2016). The content of this Technical Note and the design approach taken in response to this are documented in the *Implementation Report for New Standards* (MMSJV, August 2016).

The design speed for each link has been selected in accordance with the references in Table 6.1.

Table 6.1: Link design speeds

Link Type	Design Speed (kph)	Reference
Mainline (Expressway)	120A	Expressway Technical Note_HE_DES_V1.0_20160309
Interchange Links	85	TD22/06 Table 4/1
Slip Roads	70	TD22/06 Table 4/1
Dumb-bell Link Roads	70	TD22/06 Table 4/1
Single Carriageways	-	To be selected on a case by case basis, depending on location and adopting authority requirements
Compact Connectors	30	TD40/94 Paragraph 6.5

Source: Design Manual for Roads and Bridges (DMRB), Volume 6 Road Geometry, Section 2 Junctions, TD 22/06, Layout of Grade Separated Junctions, Highways England, 2006
 Highways England Design Manual for Roads and Bridges (DMRB), Volume 6 Road Geometry, Section 2 Junctions, TD 40/94, Layout of Compact Grade Separated Junctions, Highways England, 1994
 Expressway Technical Note_HE_DES_V1.0_20160309, Highways England, March 2016

As the designs develop, conflicts between technical, environmental, economic and community objectives will be assessed and, if appropriate, alignments will be optimised through the application of further relaxations and departures from standard to derive a balanced solution.

The cross sections of the proposed route and side roads will be designed in accordance with *TD27/05 Cross Sections and Headroom* (DMRB, Volume 6, Road Geometry, Section 1 Links, Highways England 2005). Headroom clearances are also determined from this standard. It is expected that the road improvement will become a high load route and headroom clearances for overbridges have been designed accordingly.

It may be more appropriate to provide reduced cross sections for some minor side roads to be consistent with the character of the road and this approach will be applied in consultation with the local highway authority.

The Expressway Technical Note indicates that non-motorised users (NMU) may be banned from expressways. The scheme objectives currently include the requirement for the scheme to be expressway compatible to support the aspirations of the *Road Investment Strategy*. The design should not therefore hinder provision of expressway standards in the long term. At this stage, NMU provision has not been detailed, however a NMU routes survey has been undertaken and this will help inform future NMU designs.

6.3.2 Junction strategy: location and layout

A preliminary assessment has been undertaken to determine requirements for junction locations for each option. This aims to provide a similar level of interconnectivity between the new road and adjacent side road network as is currently the case. This assessment has concluded with junction locations summarised in Table 6.2.

During subsequent stages of option assessment, the junction locations in Table 6.2 will be validated against an assessment of accident, delay, capital and maintenance costs. This will enable the most appropriate junction location and layout to be taken into consideration prior to Preferred Route Announcement.

Table 6.2: Junction locations

Option	Junction	For interchange between the expressway and:
Option A2	Downhead Lane	Stear Hill, West Camel, B3151
	Hazlegrove	Sparkford, A359, Queen Camel
Option B4	Hazlegrove	Sparkford, A359, Queen Camel
		West Camel, Steart Hill and B3151 via retained A303 carriageway
Option E4	Hazlegrove	Sparkford, A359, Queen Camel
		West Camel, Steart Hill and B3151 via retained A303 carriageway
Option F1	Hazlegrove	Sparkford, A359, Queen Camel
		West Camel, Steart Hill and B3151 via retained A303 carriageway

An early assessment has been made to determine whether full grade separation standards in accordance with TD22/06⁷ or compact grade separation in accordance with TD40/94⁸ would be most appropriate. In view of the likely high mainline flows, which are expected to exceed 40,000 AADT, all junctions are currently designed to fully grade-separated standards. This approach will be reviewed as relevant design parameters become available.

⁷ Design Manual for Roads and Bridges, Volume 6, Road Geometry, Section 2 Junctions, TD22/06 Layout of Grade Separated Junctions, Highways England 2006

⁸ Design Manual for Roads and Bridges, Volume 6, Road Geometry, Section 2 Junctions, TD 40/94 Layout of Compact Grade Separated Junctions, Highways England 1994

7 Economic assessment

7.1 Application of TUBA/COBALT/QUADRO/WebTAG A1.3

The Department for Transport's *Transport Analysis Guidance* (WebTAG) provide a detailed methodology for quantifying a wide range of potential impacts of a transport scheme and monetising them wherever possible. According to the WebTAG guidelines, the potential impacts of the improvements are categorised under the main objectives as Economy, Environment, Society and Public Accounts. These objectives are further subdivided into sub-objectives. The economic assessment of the A303 Sparkford to Ilchester scheme assesses impacts according to the guidelines and the results are summarised in an Appraisal Summary Table (AST) as prescribed in the WebTAG guidelines.

An assessment of the wider economic impacts has also been undertaken using the consultant's own approach. This approach has been carried out using TEAM (Mott MacDonald's Transparent Economic Assessment Model) and a full description of this process and the assumptions made can be found in chapter 6.4.2 of the *Land Use and Economic Development Report* (MMSJV, May 2016). This indicates that the wider economic impacts are positive and likely to be significant, providing further justification for the scheme.

The transport users' economic appraisal has been undertaken using the computer program TUBA (Transport Users Benefit Appraisal) Version 1.9.6, with an updated economics file to take on board changes in the forthcoming WebTAG guidance (November 2016). Using trip and cost matrices from the traffic model, TUBA calculates user benefits and produces results for various degrees of disaggregation and summarises the outputs. For calculating accident benefits COBALT (Cost and Benefit of Accidents – Light Touch) version 13_02 was used. For calculating benefits caused by queues and delays as a result of scheme construction, the QUADRO version 14 (QUEues And Delays at ROadworks) program was used. With both programs the latest 2016 economics files were used to comply with the forthcoming November 2016 WebTAG guidance. Journey time reliability has been assessed using the method set out in TAG A1.3 Appendix C.5.

The economic analysis is based on matrices from the application of a fixed trip matrix on an origin-destination basis using the local SATURN (Simulation and Assignment of Traffic to Urban Road Networks) traffic model. The economic appraisal has been carried out for a scenario that uses National Trip End Model (NTEM) 6.2 growth rates with no specific representation of local developments. The reasoning and justification of this approach is explained in the *Traffic Forecasting Report* (MMSJV, August 2016).

Other impacts such as noise, air quality and greenhouse gases have also been monetised. These impacts are described in chapter 9 of this report and summarised in the *Appraisal Summary Tables* (MMSJV, September 2016) reproduced in Appendix C.

7.1.1 TUBA assumptions

The appraisal is based on matrices of trips and costs extracted from the transport model. From these, TUBA calculates the user benefits in time, fuel vehicle operating

costs (VOC), non-fuel VOC and charges. Scheme costs are input and both benefits and costs are discounted to the present value year (2010) in accordance with WebTAG unit A1.1 paragraph 2.7.6.

TUBA has been used to appraise four scheme options as described in the *Economic Appraisal Report* (MMSJV, October 2016). The scheme will be opened in 2022. Forecasts have been produced for the opening year and 15 years later, 2037. The appraisal period is 60 years from scheme opening. Assumptions for the economic appraisal including economic parameters and annualisation factors that form inputs to the TUBA economic appraisal process include:

- After the year of 2037, user benefits are assumed not to grow and are subject to normal discounting to 2010 present value year and changes to other economic parameters.
- The economic analysis is based on a fixed origin-destination basis using the local SATURN traffic model.
- Any economic benefits are based on differences between the 'with' and 'without' scheme scenarios.
- Economic benefits are estimated for all hours and days of a full calendar year and have been derived from the weekday traffic models with off peak and weekend benefits derived by a process of factoring.
- The final appraisal has been carried out on scenarios that have been grown by the NTEM 6.2 growth rates alone. At this stage local developments have been excluded so that they may be better modelled in Stage 2 with the South West Regional Traffic Model (SWRTM). Since the forecasting work was carried out, a revised version 7 of NTEM has been released. This has been compared with v6.2 which shows that growth for some trip purposes has increased but reduced for other trips so the changes are likely to balance out and therefore the effect on the economic benefits will be quite modest or small.
- Scheme option costs have been assessed by Highway England's cost consultants Benchmark based on design information provided which was further refined for route option A2.

Full results from this analysis can be found in chapter 5.4 of the *Economic Appraisal Report*.

7.1.2 Accident assumptions in COBALT

COBALT (Cost and Benefits of Accidents – Light Touch) is the industry standard software provide by the Department for Transport which is used to derive the accident (or collision) impacts of a scheme. Accidents for the most recent five-year period were entered into the COBALT network along with the existing and future annual average daily traffic flows from the traffic model. Somerset County Council provided accident data between 2010 and 2014.

COBALT calculates existing accident rates based upon the Somerset County Council records and uses these to estimate future accident numbers in the Do-Minimum

scenario, whilst rates for new carriageways in the scheme options are based upon default accident rates. COBALT then compares the predicted numbers of accidents with and without the scheme and converts them into monetary values by multiplying the numbers of accidents by their monetised costs.

COBALT outputs the accident benefits for the scheme over the 60-year appraisal period in 2010 prices and discounted to 2010.

Full results from this analysis can be found in in Chapter 5.4 of the *Economic Appraisal Report* on Accident Savings.

7.1.3 Construction delay in QUADRO and maintenance delay

Some delays to the local road network will be caused during the construction of the A303 Sparkford bypass. Consequently, a QUADRO- based economic assessment was performed to analyse the potential construction and maintenance impact due to the implementation of the improvements.

This assessment assesses the dis-benefits caused by construction of each of the options taking account of the traffic management proposals during construction and the time periods for which they are expected to be in place. The dis-benefits occur as a result of roadworks causing delays to traffic (both due to physical presence of the works and any delays caused by breakdowns or accidents occurring within the works), leading to impacts on travel times, vehicle operating costs, carbon emissions and accident costs. Full results from this analysis can be found in the chapter 5 of the *Economic Appraisal Report* which also contains details of the assumptions made in the assessment.

It has been agreed with Highways England that delays due to maintenance will not need to be assessed in the options identification stage of the scheme and can be presented in the next stage. It should be noted that delays due to maintenance are likely to decrease due to the increase in network capacity with the scheme.

7.1.4 Journey time reliability benefits using WebTAG A1.3 Appendix C.5

'Reliable journeys' is one of the sub-objectives within the 'Economy' section of scheme appraisal and the estimate provided in this section is aimed at addressing this sub-objective for the A303 Sparkford to Ilchester scheme. The term 'reliability' is often used interchangeably with 'travel time variability' or 'journey time variability'. The stress-based approach set out in TAG A1.3 Appendix C.5 has been used to assess journey time reliability benefits. Full results from this analysis can be found in in chapter 5.6 of the *Economic Appraisal Report*.

7.1.5 Noise

The noise appraisal has been undertaken in accordance with TAG unit A3 chapter 2. Net present values (NPV) have been calculated for changes in noise, amenity and several specific health issues. To derive the NPVs, calculated values for each house within the respective option study areas required independent entries in the WebTAG Noise Worksheets for 'with' and 'without' scheme in both opening and design years. The

study areas used in the calculations were consistent with the DMRB approach, which in broad terms has been determined by minimum changes of 1dB in a comparison between 'with' and 'without' scheme scenarios in the year of Opening, or the equivalent in the Design Year of 3dB. Thus the study areas for each option were different due to variations in traffic models.

Night-time noise has been calculated based on conversion from daytime to night-time using the relationship between daytime and night-time traffic flows identified within a Transport Research Laboratory report as discussed in DMRB. Owing to the preliminary stage of design, mitigation in the form of additional bunds or barriers has not been incorporated into the appraisal, and this has provided a more realistic reflection of overall benefits and dis-benefits.

To provide a worst case assessment for the impact of the scheme in the local area, the forecasts have accounted for potential wider area reassignment as explained in the *Traffic Forecasting Report* (MMSJV, October 2016).

7.1.6 Air Quality

The air quality appraisal has been undertaken in accordance with *Transport Appraisal Guidance* (TAG) unit A3 chapter 3. Net present values (NPV) have been calculated for both local and regional changes in air quality. To derive the NPV, calculations have only been undertaken in the air quality worksheets for any roads within 200m of the scheme options that meet the DMRB local air quality screening criteria in the traffic model. Such roads comprise: road alignment changes by 5m or more, daily traffic flow change by 1000 Annual Average Daily Traffic (AADT) or more, Heavy duty vehicle (HDV) flows, which comprise HGVs and buses, change by 200 AADT or more, daily average speeds change by 10kmph or more or peak hour speed change by 20kmph or more. A review of traffic data for the base year, opening year and design year 'with' and 'without scheme' scenarios has been undertaken with calculations taking into account AADT flows and average flows in the morning AM (07:00- 10:00), inter peak (10:00- 16:00), evening PM (16:00-1900) and off peak (19:00- 07:00) periods including percentage of HDVs and average speeds outputs for the preceding periods. Changes in air quality have been appraised using the Department for Transport's *Local Air Quality Workbook* and *Air Quality Valuation Workbook*.

To provide a worst case assessment for the impact of the scheme in the local area the forecasts have accounted for potential wider area reassignment as explained in the *Traffic Forecasting Report* (MMSJV, October 2016). The wider area reassignments for the local area were estimated from an older SWARMMS-based traffic model. However, for the regional impact it is important to account consistently for all the changes. As only a local traffic model has been produced at this stage which does not capture the changes that occur remote from the local area, for example reassignments from the M4 motorway, then a fixed matrix approach has been applied that excludes the wider area reassignment from the 'with scheme' case. This issue will be fully addressed in the option selection stage with the application of the SWRTM whereby benefits from the traffic reductions remote from the study area can be accounted for in a regional assessment alongside the local impacts of wider area reassignment. The use of SWRTM will also account for variable demand modelling.

7.1.7 Greenhouse gases

The greenhouse gases appraisal has been undertaken in accordance with TAG Unit A3 Chapter 4. To derive the NPV of change in carbon dioxide equivalent (CO₂e) emissions for each option, traffic data has been provided comprising AADT flows including percentage HGVs, average link speeds for the AADT period and link lengths for each scenario assessed. Traffic data was used to calculate vehicle emissions of greenhouse gases (as CO₂e) for the opening year and design year of the scheme using factors derived from the Department for Transport's *WebTAG Databook v1.5*. Linear interpolation was used to calculate vehicle emissions between 2022 and 2037; these values were input into the Department for Transport's *Greenhouse Gases Workbook* to calculate the NPV. In accordance with the economics appraisal, the greenhouse gas appraisal assumes no change in greenhouse gas emissions beyond 2037. Refer to the *Appraisal Specification Report Addendum* (MMSJV, October 2016) for further information.

For the same reasons given above for the assessment of regional air quality, the greenhouse gases assessment has used a fixed matrix approach that excludes the wider area reassignment estimate.

7.2 Networks

Figure 7.1 shows the without-scheme scenario, the local traffic model network is overlaying a map base of the local area. Figure 7.2 to Figure 7.5 show the graphical representations of the future forecast networks as they appear in with-scheme networks; the pink links show the new model links added to represent each of the four scheme options that have been tested.

Figure 7.2: A303 Sparkford to Ilchester network – with option A2



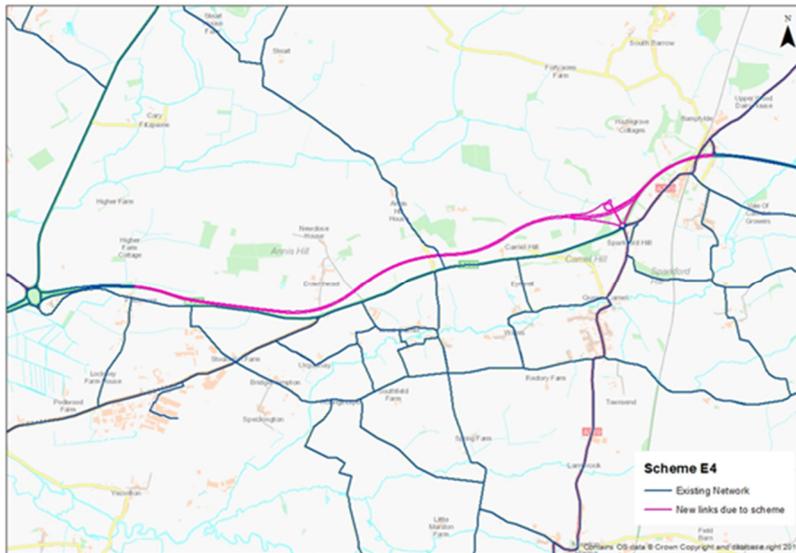
Source: MMSJV. This Map is based upon Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office © Crown copyright. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. Highways England 100030649 2015.

Figure 7.3: A303 Sparkford to Ilchester network – with option B4



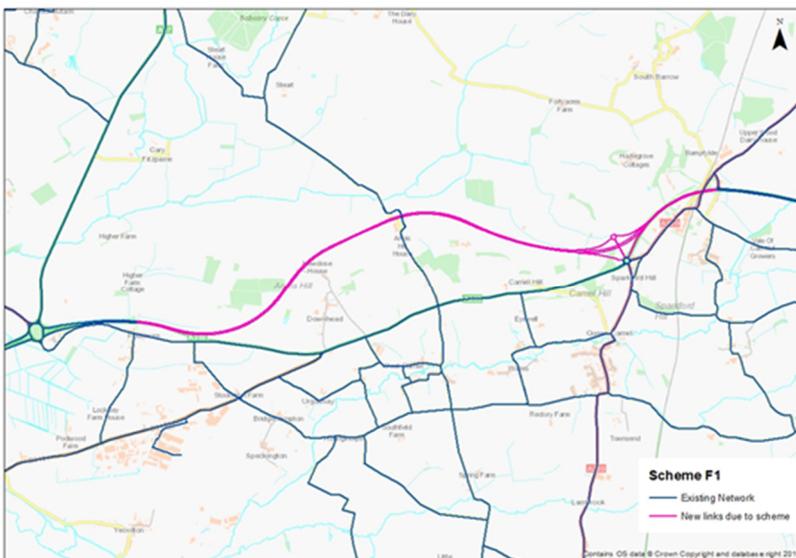
Source: MMSJV. This Map is based upon Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office © Crown copyright. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. Highways England 100030649 2015

Figure 7.4: A303 Sparkford to Ilchester network – with option E4



Source: MMSJV. This Map is based upon Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office © Crown copyright. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. Highways England 100030649 2015.

Figure 7.5: A303 Sparkford to Ilchester network – with option F1



Source: MMSJV. This Map is based upon Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office © Crown copyright. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. Highways England 100030649 2015.

7.3 Results of the economic appraisal

The overall impacts are summarised in the Analysis of Monetised Costs and Benefits table, which includes all results from the TUBA, COBALT and QUADRO programs as well as the WebTAG-based assessments for reliability, noise, air quality and greenhouse gases. These are shown in Table 7.1.

Route option A2 is the only online option amongst the four considered schemes, so it produces the highest costs due to roadworks. Also, option A2 has a more complex road structure with more junctions and roundabouts, so it also produces the smallest amount of benefits from the accident analysis. However, these figures for the accident and roadworks and accident analysis for option A2 are outweighed by the higher benefits in transport user economic efficiency. The other three options all produce very similar benefits or dis-benefits to each other from the TUBA, COBALT and QUADRO analyses. The calculations for greenhouse gases show that all scheme options result in dis-benefits due to higher traffic speeds with option F1 having that largest dis-benefit due to its longer scheme length. The monetised noise and air quality impacts are relatively small compared with other monetised impacts.

The Net Present Value (NPV) results indicate that all the options provide value for money. The options will result in Benefit Cost Ratios (BCR) between 1.86 and 2.02 with the initial BCR and between 1.93 and 2.10 with the adjusted BCR that includes reliability benefits. Under the Department for Transport's value for money criteria, these represent medium to high value for money with the BCR around the BCR threshold of 2.0 between medium and high value for money. However, it should also be noted that the assessment of wider economic benefits undertaken with TEAM shows that these benefits are likely to be significant, providing further justification for the scheme.

Table 7.1: Analysis of Monetised Cost Benefits (£000s)

OVERALL IMPACTS	Option A2	Option B4	Option E4	Option F1
Accidents (not assessed by TUBA) ¹	4,221	4,899	5,073	5,147
Roadworks (not assessed by TUBA) ²	-6,117	-1,110	-1,350	-1,227
Greenhouse Gases (not assessed by TUBA) ³	-5,199	-5,306	-5,251	-6,781
Noise (not assessed by TUBA) ⁴	-379	490	-155	593
Air Quality (not assessed by TUBA) ⁵	-34	-88	-76	-149
Economic Efficiency: Consumer Users (Commuting)	36,938	34,710	34,866	33,248
Economic Efficiency: Consumer Users (Other)	70,961	67,411	66,001	64,000
Economic Efficiency: Business Users and Providers	106,506	99,563	96,213	91,812
Wider Public Finances (Indirect Taxation Revenues)	15,156	16,036	17,398	18,041
Present Value of Benefits (PVB)	222,053	216,605	212,719	204,684
Broad Transport Budget Present Value of Costs (PVC)	111,721	111,722	114,366	101,162
OVERALL IMPACTS				
Net Present Value (NPV)	110,332	104,883	98,353	103,522
Initial Benefit to Cost Ratio (BCR)	1.99	1.94	1.86	2.02
Reliability Benefits	8,719	8,326	8,279	8,102
Adjusted BCR	2.07	2.01	1.93	2.10

Notes: All monetary values are expressed in 2010 prices discounted to 2010 1 - From COBALT, 2 -From QUADRO, 3 -TAG Unit A3 Chapter 2,4 - TAG Unit A3 Chapter 3,5 - TAG Unit A3 Chapter 4

7.4 Accident savings

Full details of the predicted accidents and accident savings from the COBALT 60-year appraisal period are shown in Table 5.4 of the Economic Assessment Report. The accident savings for each option, which contribute to the analysis of monetised cost benefits in Chapter 7.3 of this report, are reproduced in the table below. This shows a saving in accidents for the options over the 60-year appraisal period of two or three fatal, 19-21 serious and 42-76 slight accidents.

It should be noted that the COBALT assessment used observed data except for new links and junctions, where the COBALT default values were used. A review of the accident data revealed that 84% of all current links in the area of modelling had no accidents recorded on them over the 5-year observation period, and hence over the COBALT 60-year appraisal period these links would be assumed to be free of accidents. It is possible that assessment using locally observed data for the existing network could have under-estimated the level of benefits.

Table 7.2: Predicted accident savings based on local accident rates

Number of Personal Injury Accidents savings	Severity	Values over 60-year appraisal period			
		Option A2	Option B4	Option E4	Option F1
Casualties	Fatal	2	2	2	3
	Serious	19	20	19	21
	Slight	42	63	75	76
Value of accident savings (£000s in 2010 prices discounted to 2010)		4,221	4,899	5,072	5,148

8 Safety assessment

8.1 Impact on road user – Strategic Safety Action Plan

8.1.1 Highways England Policy

A key measure of Highways England's performance involves making its network a safer place, both to use and to work on. Highways England acknowledges that it cannot entirely eliminate risk on the road network but that it can recognise risk, assess it and implement any controls which are reasonably required. The early route option selection stage provides the greatest scope for eliminating hazards and risk reduction.

Highways England has been set a challenging target by the Government to achieve a 40% reduction in the number of killed or seriously injured (KSI) accidents by 2020, with a longer term aim being to get as close as possible to zero by 2040.

The document *Health and Safety, Our Approach* (Highways England, November 2015) identifies three at-risk populations that it is responsible for (excluding its employees working away from offices):

- Road users
- Customer operations staff (eg Traffic Officers)
- Road workers and other supply chain employees

The design process for this scheme should at all times consider the safety of these populations.

The scheme objectives are identified in the *Client Scheme Requirements* (Highways England, August 2015). For safety, the objective is to improve safety along the A303/A358/A30 corridor.

The selection of more prescriptive safety objectives for the scheme will be set out in more detail in the Safety Plan which will be prepared later in the scheme programme. The plan is expected to include:

- For road users, the safety objective is a reduction in Personal Injury Collisions and no increase in severity ratio
- For road workers, risks will be managed to be 'tolerable' as set out in Part 3 of *Reducing risks, protecting people* (Health and Safety Executive, 2001), with the aim to implement reasonably practicable control measures to drive residual risk towards the 'broadly acceptable' region.

8.1.2 Route options

A number of alignment options were developed during the option identification stage. These were rationalised to four options: option A2, option B4, option F1, and option E4 during the option sifting. Option A2 largely follows the current alignment of the A303, while the other three options run wholly offline.

A desk top safety assessment of the four alignment options was carried out, supplemented by a site visit during which the locations of the tie-ins between the

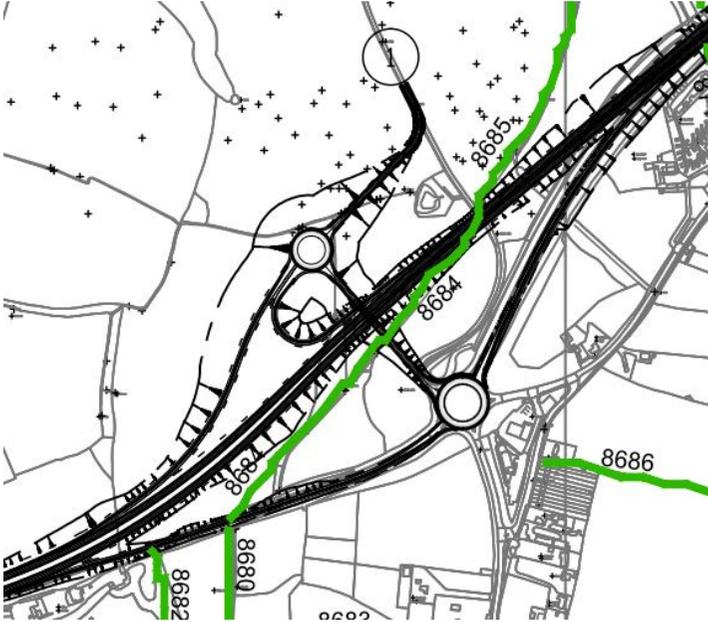
existing road and non-motorised user (NMU) networks and the proposed road alignments were observed first hand.

It is noted that no information on existing usage of the various NMU routes in the area was available at the time of this review and has therefore not been considered. Route usage will be considered further in the *NMU Audit Report* (MMSJV, due for issue later in 2016).

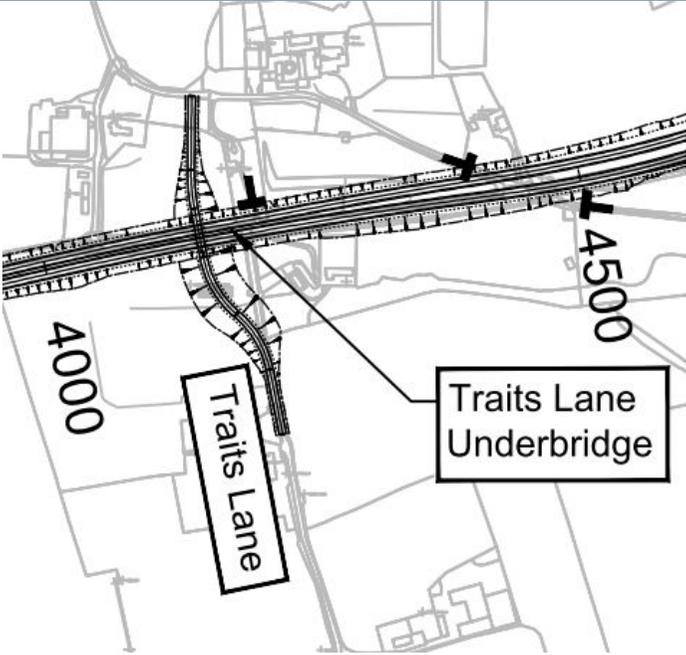
Road safety review comments on the four alignment options are summarised in the tables below.

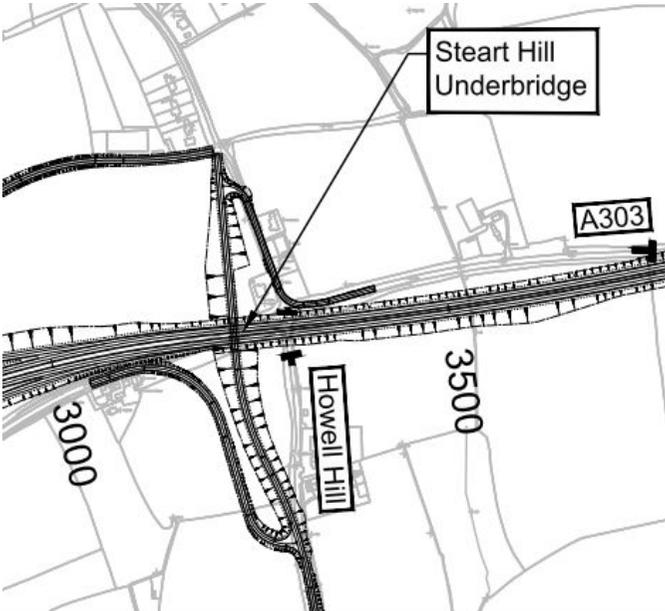
Table 8.1: Route option A2 road safety review comments

Location	Option design/existing feature	Route option A2 road safety comments
Various locations	Tie-in of new access roads into existing highway network	<p>The new side roads are intended to be a minimum 6.5m wide, but will tie in to tracks no more than 3 or 4m wide. This could lead to sudden changes in speed and inappropriate overtaking manoeuvres.</p> <p>New side roads should be designed such that they maintain the character of the existing lanes they tie in to* and thereby maintain consistent low motor vehicle speeds.</p> <p>*Note, it is acceptable to provide additional carriageway width at structures as a 'future-proofing' measure.</p> <p>(See item 6 of the Executive Summary in Surrey County Council Quiet Lanes Initiative Final Report - <i>Engineering Quiet Lanes in the Surrey Hills AONB: Predicting Drivers' Speed</i>, Uzzell D., Leach R., Department of Psychology, University of Surrey May 2001.)</p>
Various locations	Upgrading of existing A303 alignment to dual carriageway standard	<p>Several footpaths currently intersect the existing A303 in a north-south direction, including the long-distance Celtic Way. These routes currently cross the A303 at grade. It is unclear from the option design how these will be catered for in the upgraded dual carriageway design.</p> <p>At-grade NMU crossings on high speed roads are not advisable. All NMU crossings of the A303 should be designed to be grade-separated.</p>
Whole scheme	Upgrading of existing A303 alignment to dual carriageway standard	<p>Upgrading an existing trunk road will bring construction workers in closer proximity to live traffic, compared to the offline schemes. This has significant potential to create more hazards for workers and their supply chain.</p>
Hazlegrove Junction	Provision of new grade-separated junction	<p>Currently the at-grade Hazlegrove Roundabout acts as a speed reducing feature along the A303. Converting this to a grade-separated junction is likely to lead to increased traffic speeds on the mainline, potentially leading to increased severity of accidents.</p> <p>(See chapter 5.2 of Nilsson, G. (2004) '<i>Traffic safety dimensions and the power model to describe the effect of speed on safety</i>'. Bulletin 221, Lund Institute of Technology, Lund.</p> <p>Also chapter 8.1 of Taylor, M. C., Baruya A. and Kennedy J. V. (2002) '<i>The Relationship Between Speed and Accidents on Rural Single-Carriageway Roads</i>' TRL Report TRL511 prepared for Road Safety Division, Department for Transport, Local Government and the Regions).</p>

Location	Option design/existing feature	Route option A2 road safety comments
Hazlegrove Junction	Provision of new grade-separated junction	<p>The location of the new junction at Hazlegrove overlies an existing footpath (see diagram below). It is unclear from the option design how this NMU route will be catered for within the design of the junction. The incorporation of this footpath into the design of the junction will need to be carefully considered, to avoid unnecessary at-grade crossing of the slip roads or the new dual carriageway, while maintaining a reasonably direct route.</p> 
Hazlegrove Junction - southern roundabout	Conversion of existing 5-arm roundabout with one minor arm providing access to Hazlegrove Preparatory School only to full five-arm roundabout forming part of new grade separated junction and changed function of some arms.	<p>As a general rule, the more arms on a roundabout the more risk of accidents. In paragraph 2.2 of <i>TD16/07 Geometric Design of Roundabouts</i> (Design Manual for Roads and Bridges Volume 6, section 2 part 3, Highways England 2007) it states that the number of accidents per year at roundabouts increases with the number of arms because of the corresponding increase in conflict points. It provides the following figures; 4-arm = 1.79 accidents/year, 5-arm = 3.66 accidents/year, 6-arm 5.95 accidents/year. These figures suggest a 6-arm roundabout is 1.6 times more dangerous than a 5-arm roundabout and 3.3 times more dangerous than a 4-arm roundabout. Converting the Hazlegrove Roundabout from 4-arms plus a school access to a full 5-arm roundabout therefore has the potential to increase accident rates at this junction.</p> <p>It is acknowledged that this will be offset to some extent by the lower traffic flows likely to use the roundabout in future and the alteration of the existing eastern A303 arm from dual carriageway to a single carriageway slip-road. In paragraph 2.2 of <i>TD16/07</i> it states that 'on average, there are more</p>

Location	Option design/existing feature	Route option A2 road safety comments
		<p>accidents at roundabouts with at least one approach that is dual carriageway compared with roundabouts where none of the approaches are dual carriageway roads'.</p> <p>With this option a further benefit is that traffic bound for the B3151 can route via the new junction at West Camel, so avoiding the Hazlegrove Roundabout. However, the design of this junction should take into account future traffic flows compared to existing traffic flows, and any change in the routes taken through the junction. (Note: the local traffic model shows that traffic will re-assign to the new junction at West Camel.)</p>
Hazlegrove Junction - southern roundabout	Conversion of existing 5-arm roundabout with one minor arm providing access to Hazlegrove Preparatory School only to full five-arm roundabout forming part of new grade separated junction and changed function of some arms.	<p>This roundabout has a historic accident problem with 11 accidents (8 slight, 3 serious) occurring between 2010 and 2014.</p> <p>Any alterations to this roundabout should take account of existing accident types and their potential causes.</p>
Hazlegrove Junction - southern roundabout	Conversion of existing 5-arm roundabout with one minor arm providing access to Hazlegrove Preparatory School only to full five-arm roundabout forming part of new grade separated junction and changed function of some arms.	<p>It appears that the new overbridge arm to the southern roundabout will be on a steep downhill incline which may result in loss of control and fail to stop accidents at the roundabout.</p> <p>Minimise the gradient as far as possible and consider surfacing options during detailed design.</p>
Hazlegrove Junction - northern roundabout	New roundabout as part of Hazlegrove grade-separated junction	<p>It appears that the new northern roundabout will be located on the crest of an embankment with steep approach roads which can make it difficult for drivers to appreciate the layout of the junction with the potential to cause loss of control and junction overshoot collisions.</p> <p>Ensure that drivers approaching the roundabout on all arms can adequately appreciate the layout and have adequate forward visibility to the give way points.</p>
Hazlegrove Junction - northern roundabout	New roundabout as part of Hazlegrove grade-separated junction	<p>Entry geometry for all three arms of the northern roundabout appears to be poor. This may lead to increased entry speeds and re-start and side-on collisions.</p> <p>Ensure adequate deflection is provided.</p>
Hazlegrove Junction - northern roundabout	New roundabout as part of Hazlegrove grade-separated junction	<p>Approach speeds are likely to be high along the eastbound off-slip approach arm.</p> <p>Ensure vehicle speeds are reduced through design before they reach the roundabout. Consider appropriate speed limits at the junction and on the off-slip.</p>
Upgraded A303 between Hazlegrove Junction and Downhead Lane Junction	Upgrading of existing A303 alignment	<p>Upgrading of the existing A303 alignment with no parallel local access road provision limits opportunities for east-west movements by local traffic. This may encourage 'junction hopping' by local traffic between the two proposed junctions with its associated adverse safety implications due to excessive merging/weaving on the mainline, or else use of inappropriate local roads, many of which are of very low standard. (Note: the local traffic model shows traffic re-assigning to the new dual carriageway.) This contrasts with the other three options which retain the existing A303 alignment for use by local traffic and those road users prohibited from using an expressway (if that is what this scheme becomes). Additionally, the relatively short distance between slip roads of 1.4km is just acceptable for an all-purpose trunk road but may not be acceptable for an expressway.</p>

Location	Option design/existing feature	Route option A2 road safety comments
<p>Traits Lane underbridge</p>	<p>New underbridge for local access</p>	<p>Consider providing a local access road or an easily identifiable east-west route made up of existing links and suitable for local and prohibited traffic.</p>  <p>It appears that forward visibility may be inadequate on the southern approach to the Traits Lane underbridge due to the proposed S-shaped alignment through a cutting. This may lead to head-on collisions.</p> <p>Ensure the alignment is appropriate for the speeds of traffic anticipated on the approach to the underbridge.</p>
<p>Traits Lane underbridge</p>	<p>New underbridge for local access</p>	<p>Visibility problems could be exacerbated by the vertical alignment of Traits Lane at the underpass. In daylight this could create a dark area through which drivers must pass, and which may affect older drivers in particular due to a slower accommodation reflex, ie their eyes are slower to adapt to changes in contrast. This may lead to loss of control or head-on collisions.</p> <p>Ensure that there is no sudden or significant change in contrast as the side road passes under the bridge. This may require use of artificial lighting or a change in long-section or cross-section.</p>

Location	Option design/existing feature	Route option A2 road safety comments
Stear Hill Underbridge	New underbridge tied into local roads and upgrade of byway	<p>The new underbridge carriageway and the upgrade of an existing byway to full highway standard is proposed to tie into the existing highway network at an existing crossroads to the north of the mainline. Crossroads are intrinsically unsafe, particularly where a significant proportion of the flow on the minor roads is cross movement which could lead to junction overshoot collisions. Upgrading of two of the approaches to this junction could also increase vehicle speeds and worsen safety.</p> <p>Consider re-alignment to a staggered crossroads and reducing the standards of the new side roads below the proposed 6.5m wide cross section.</p> 
Stear Hill Underbridge	New underbridge tied into local roads and upgrade of byway	<p>Visibility problems could be exacerbated by the vertical alignment of the local road at the underpass. In daylight this could create a dark area through which drivers must pass, and which may affect older drivers in particular due to a slower accommodation reflex, ie their eyes are slower to adapt to changes in contrast. This may lead to loss of control or head-on collisions.</p> <p>Ensure that there is no sudden or significant change in contrast as the side road passes under the bridge. This may require use of artificial lighting or a change in long-section or cross-section.</p>
Downhead Lane Junction	Provision of new grade-separated junction	<p>The location of the new Downhead Lane junction overlies a number of footpaths and a footway along the south side of the existing mainline. It is unclear from the option design how NMU routes will be</p>

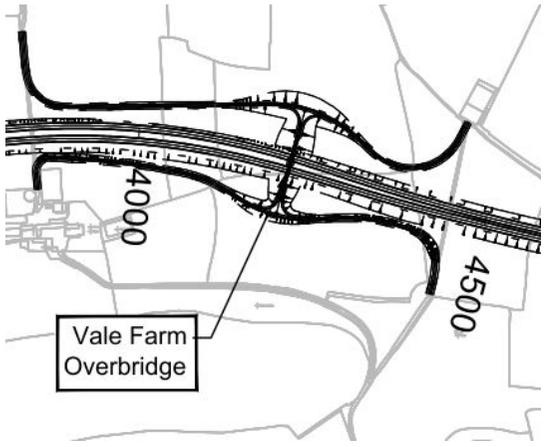
Location	Option design/existing feature	Route option A2 road safety comments
		<p>catered for within the design of the junction. There is a definite need to cater for NMU movements in the vicinity of the new junction, particularly considering its close proximity to several settlements.</p> <p>The incorporation of these NMU routes into the design of the junction will need to be carefully considered, to avoid unnecessary at-grade crossing of the slip roads or the new dual carriageway, while maintaining a reasonably direct route.</p>
Podimore Junction	Existing roundabout on A303, west of the scheme limits, retained	<p>This will become the first at-grade junction westbound drivers come to for some distance. This may lead to an increase in accidents.</p> <p>Consider methods for warning drivers of the upcoming junction and ways of reducing vehicle speeds on the approach.</p>

Table 8.2: Route option B4 road safety review comments

Location	Option design/existing feature	Route option B4 road safety comments
Various locations	Tie-in of new access roads into existing highway network	<p>The new side roads are intended to be a minimum 6.5m wide, but will tie-in to tracks no more than 3 or 4m wide. This could lead to sudden changes in speed and inappropriate overtaking manoeuvres.</p> <p>New side roads should be designed such that they maintain the character of the existing lanes they tie in to* and thereby maintain consistent low motor vehicle speeds.</p> <p>*Note, it is acceptable to provide additional carriageway width at structures as a 'future-proofing' measure.</p> <p>(See item 6 of the Executive Summary in <i>Engineering Quiet Lanes in the Surrey Hills AONB: Predicting Drivers' Speed</i>, Uzzell D., Leach R., 2001.)</p>
Various locations	New offline highway alignment	<p>Several footpaths and bridleways intersect the new highway alignment in a north-south direction, including the long-distance Celtic Way. It is unclear from the option design how these will be catered for in the upgraded dual carriageway design.</p> <p>At-grade NMU crossings on high speed roads are not advisable. All NMU crossings of the A303 should be designed to be grade-separated.</p>
Hazlegrove Junction	Provision of new grade-separated junction	<p>Currently the at-grade Hazlegrove Roundabout acts as a speed reducing feature along the A303. Converting this to a grade-separated junction is likely to lead to increased traffic speeds on the mainline, potentially leading to increased severity of accidents (see chapter 5.2 of Nilsson, G., (2004) also chapter 8.1 of Taylor M.C., <i>et al</i>, (2002)).</p>
Hazlegrove Junction	Provision of new grade-separated junction	<p>The location of the new junction at Hazlegrove overlies an existing footpath (see diagram below). It is unclear from the option design how this NMU route will be catered for within the design of the junction.</p>

Location	Option design/existing feature	Route option B4 road safety comments
		 <p>The incorporation of this footpath into the design of the junction will need to be carefully considered to avoid unnecessary crossing of carriageways and its associated dangers or at-grade crossing of the new dual carriageway while maintaining a reasonably direct route.</p>
<p>Hazlegrove Junction - southern roundabout</p>	<p>Conversion of 5-arm roundabout to 6-arm roundabout and changed function of some arms</p>	<p>An extra arm has been added to the existing 5-arm roundabout without any increase in roundabout size. The resultant roundabout looks cramped with potentially inadequate spacing between arms leading to increased accidents. Furthermore, as a general rule the more arms the more risk of accidents. Paragraph 2.2 of <i>TD16/07</i> states that the number of accidents per year at roundabouts increases with the number of arms because of the corresponding increase in conflict points. It provides the following figures; 4-arm = 1.79 accidents/year, 5-arm = 3.66 accidents/year, 6-arm 5.95 accidents/year. These figures suggest a 6-arm roundabout is 1.6 times more dangerous than a 5-arm roundabout and 3.3 times more dangerous than a 4-arm roundabout. Converting the Hazlegrove Roundabout from 4-arms plus a school access to a full 6-arm roundabout has the potential to increase accident rates at this junction.</p> <p>It is acknowledged that this will be offset by the lower traffic flows likely to use the roundabout in future and the change in function of some of the arms, such as the existing A303 eastern arm becoming a one-way off-slip and the western A303 arm becoming a local road.</p> <p>However, the design of this junction should take into account future changes in traffic flows and should take careful consideration of arm spacing and geometry. It may be necessary to enlarge the roundabout to accommodate all arms or to reduce the number of arms by rationalising the network.</p>

Location	Option design/existing feature	Route option B4 road safety comments
Hazlegrove Junction - southern roundabout	Conversion of 5-arm roundabout to 6-arm roundabout and changed function of some arms	<p>This roundabout has a historic accident problem with 11 accidents (8 slight, 3 serious) occurring between 2010 and 2014.</p> <p>Any alterations to this roundabout should take account of existing accident types and their potential causes.</p>
Hazlegrove Junction - northern roundabout	New roundabout as part of Hazlegrove grade-separated junction	<p>It appears that the new northern roundabout will be located on the crest of an embankment with steep approach roads which can make it difficult for drivers to appreciate the layout of the junction with the potential to cause loss of control and junction overshoot collisions.</p> <p>Ensure that drivers approaching the roundabout on all arms can adequately appreciate the layout and have adequate forward visibility to the give way points.</p>
Hazlegrove Junction - northern roundabout	New roundabout as part of Hazlegrove grade-separated junction	<p>Entry geometry for all three arms of the northern roundabout appears to be poor. This may lead to increased entry speeds and accidents.</p> <p>Ensure adequate deflection is provided.</p>
Hazlegrove Junction - northern roundabout	New roundabout as part of Hazlegrove grade-separated junction	<p>Approach speeds are likely to be high along the eastbound off-slip approach arm.</p> <p>Ensure vehicle speeds are reduced through design before they reach the roundabout. Consider appropriate speed limits at the junction and on the off-slip.</p>
Existing A303	Existing A303 highway retained	<p>The option drawing provided does not indicate any proposed alterations to the existing A303. With a new offline highway proposed the existing A303 will become an important east-west route for local access, including NMU, particularly if certain vehicle types are banned from using the new highway. Greatly reduced traffic levels on the existing A303 may encourage increased vehicle speeds. NMU will not be adequately catered for as there are currently very limited provisions for pedestrians, cyclists and equestrians, limited to a short section of footway.</p> <p>As a guide, cycle-specific infrastructure should be provided where 85th percentile vehicle speeds are above 20mph or traffic flows are above 2000pcu/day (where pcu=passenger car unit). Where infrastructure is provided for NMU it should be designed such that pedestrians, cyclists and equestrians do not come into conflict and cyclists may make use of their potentially higher speeds.</p>

Location	Option design/existing feature	Route option B4 road safety comments
Vale Farm Overbridge	Provision of new overbridge and new local access roads	<p>The bell mouths of the two proposed T-junctions appear unnecessarily wide which could lead to inappropriate vehicle speeds through the junction. Design the junctions in line with the nature of the local roads.</p> 
Vale Farm Overbridge	Provision of new overbridge and new local access roads	<p>The long distance Celtic Way footpath crosses through the location of the proposed Vale Farm overbridge and access roads. The incorporation of this footpath into the design of the overbridge will need to be carefully considered to avoid unnecessary crossing of carriageways and its associated dangers or at-grade crossing of the new dual carriageway while maintaining a reasonably direct route.</p>
Downhead Lane Overbridge	T-junction proposed at northern end of overbridge at bend in road	<p>Ensure adequate forward visibility to the T-junction from all approaches given that it is located at a bend in the road.</p>
Existing local access road east of Podimore village	Existing T-junction between two local roads retained, with existing slip road from A303 becoming local access road	<p>The existing T-junction of two local roads at this location is poorly designed (see photo) with traffic allowed to leave the A303 at speed on a straight alignment of road to a conflict point with turning traffic. Careful consideration of the future layout of this junction is recommended to ensure a safe design.</p>

Location	Option design/existing feature	Route option B4 road safety comments
		
Podimore Junction	Existing roundabout on A303, west of the scheme limits, retained	<p>This will become the first at-grade junction westbound drivers come to for some distance. This may lead to an increase in accidents.</p> <p>Consider methods for warning drivers of the upcoming junction and ways of reducing vehicle speeds on the approach.</p>

Table 8.3: Route option E4 road safety review comments

Location	Option design/existing feature	Route option E4 road safety comments
Various locations	Tie-in of new access roads into existing highway network	<p>The new side roads are intended to be a minimum 6.5m wide, but will tie-in to tracks no more than 3 or 4m wide. This could lead to sudden changes in speed and inappropriate overtaking manoeuvres.</p> <p>New side roads should be designed such that they maintain the character of the existing lanes they tie in to* and thereby maintain consistent low motor vehicle speeds.</p> <p>*Note, it is acceptable to provide additional carriageway width at structures as a 'future-proofing' measure.</p> <p>(See item 6 of the Executive Summary in <i>Engineering Quiet Lanes in the Surrey Hills AONB: Predicting Drivers' Speed</i>, Uzzell D., Leach R., 2001.)</p>

Location	Option design/existing feature	Route option E4 road safety comments
Various locations	New offline highway alignment	<p>Several footpaths currently intersect the new highway alignment in a north-south direction, including the long-distance Celtic Way. It is unclear from the option design how these will be catered for in the upgraded dual carriageway design.</p> <p>At-grade NMU crossings on high speed roads are not advisable. All NMU crossings of the A303 should be designed to be grade-separated.</p>
Hazlegrove Junction	Provision of new grade-separated junction	<p>Currently the at-grade Hazlegrove Roundabout acts as a speed reducing feature along the A303. Converting this to a grade-separated junction is likely to lead to increased traffic speeds on the mainline, potentially leading to increased severity of accidents (see chapter 5.2 of Nilsson, G., (2004) also chapter 8.1 of Taylor M.C., <i>et al</i>, (2002)).</p>
Hazlegrove Junction	Provision of new grade-separated junction	<p>The location of the new junction at Hazlegrove overlies an existing footpath (see diagram below). It is unclear from the option design how this NMU route will be catered for within the design of the junction.</p>  <p>The incorporation of this footpath into the design of the junction will need to be carefully considered to avoid unnecessary crossing of carriageways and its associated dangers or at-grade crossing of the new dual carriageway while maintaining a reasonably direct route.</p>
Hazlegrove Junction - southern roundabout	Conversion of 5-arm roundabout to 6-arm roundabout and changed function of some arms	<p>An extra arm has been added to the existing 5-arm roundabout without any increase in roundabout size. The resultant roundabout looks cramped with potentially inadequate spacing between arms leading to increased accidents. Furthermore, as a general rule the more arms the more risk of accidents.</p>

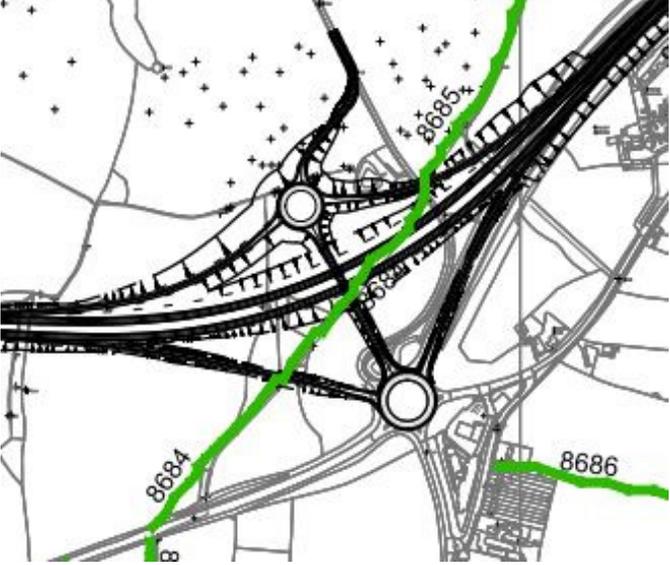
Location	Option design/existing feature	Route option E4 road safety comments
		<p>Paragraph 2.2 of <i>TD16/07</i> states that the number of accidents per year at roundabouts increases with the number of arms because of the corresponding increase in conflict points. It provides the following figures; 4-arm = 1.79 accidents/year, 5-arm = 3.66 accidents/year, 6-arm 5.95 accidents/year. These figures suggest a 6-arm roundabout is 1.6 times more dangerous than a 5-arm roundabout and 3.3 times more dangerous than a 4-arm roundabout. Converting the Hazlegrove Roundabout from 4-arms plus a school access to a full 6-arm roundabout has the potential to increase accident rates at this junction.</p> <p>It is acknowledged that this will be offset by the lower traffic flows likely to use the roundabout in future and the change in function of some of the arms, such as the existing A303 eastern arm becoming a one-way off-slip and the western A303 arm becoming a local road.</p> <p>However, the design of this junction should take into account future changes in traffic flows and should take careful consideration of arm spacing and geometry. It may be necessary to enlarge the roundabout to accommodate all arms or to reduce the number of arms by rationalising the network.</p>
Hazlegrove Junction - southern roundabout	Conversion of 5-arm roundabout to 6-arm roundabout and changed function of some arms	<p>This roundabout has a historic accident problem with 11 accidents (8 slight, 3 serious) occurring between 2010 and 2014.</p> <p>Any alterations to this roundabout should take account of existing accident types and their potential causes.</p>
Hazlegrove Junction - northern roundabout	New roundabout as part of Hazlegrove grade-separated junction	<p>It appears that the new northern roundabout will be located on the crest of an embankment with steep approach roads which can make it difficult for drivers to appreciate the layout of the junction with the potential to cause loss of control and junction overshoot collisions.</p> <p>Ensure that drivers approaching the roundabout on all arms can adequately appreciate the layout and have adequate forward visibility to the give way points.</p>
Hazlegrove Junction - northern roundabout	New roundabout as part of Hazlegrove grade-separated junction	<p>Entry geometry for all three arms of the northern roundabout appears to be poor. This may lead to increased entry speeds and accidents.</p> <p>Ensure adequate deflection is provided.</p>
Hazlegrove Junction - northern roundabout	New roundabout as part of Hazlegrove grade-separated junction	<p>Approach speeds are likely to be high along the eastbound off-slip approach arm.</p> <p>Ensure vehicle speeds are reduced through design before they reach the roundabout. Consider appropriate speed limits at the junction and on the off-slip.</p>
Camel Hill Overbridge	New overbridge with T-junctions at either end	<p>Ensure adequate forward visibility to the two proposed T-junctions from all approaches given that they are located at bends in the road.</p>
Camel Hill Overbridge	New overbridge with T-junctions at either end	<p>The new overbridge overlies an existing footpath (see diagram below). The incorporation of this footpath into the design of the junction will need to be carefully considered to avoid unnecessary crossing of carriageways and its associated dangers or at-grade crossing of the new dual carriageway while maintaining a reasonably direct route.</p>

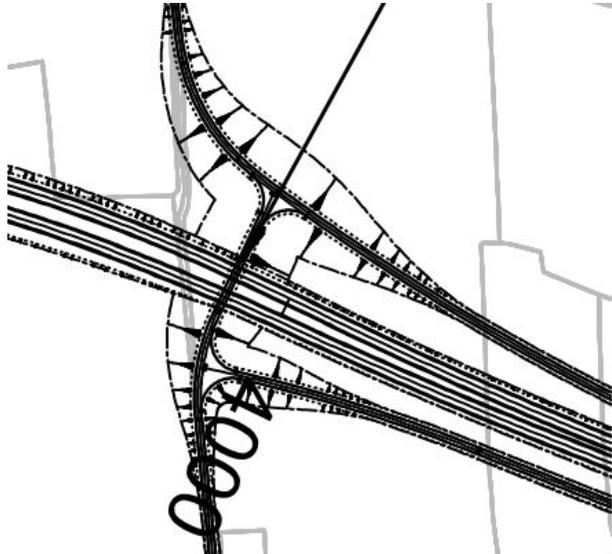
Location	Option design/existing feature	Route option E4 road safety comments
		
Downhead Lane underbridge	New underbridge tied into existing crossroads	<p>The new underbridge will upgrade an existing road that forms the northern arm of an existing crossroads. Crossroads are intrinsically unsafe, particularly where a significant proportion of the flow on the minor roads is cross movement. Upgrading of one of the approaches to this junction could increase vehicle speeds and worsen safety here.</p>
Downhead Lane underbridge	New underbridge tied into existing crossroads	<p>In daylight the underpass could create a dark area through which drivers must pass, and which may affect older drivers in particular due to a slower accommodation reflex, ie their eyes are slower to adapt to changes in contrast. This may lead to loss of control or head-on collisions.</p> <p>Ensure that there is no sudden or significant change in contrast as the side road passes under the bridge. This may require use of artificial lighting or a change in long-section or cross-section.</p>
Downhead Lane underbridge	New under bridge tied into existing crossroads	<p>Two footpaths intersect at the proposed location of the new underbridge.</p>

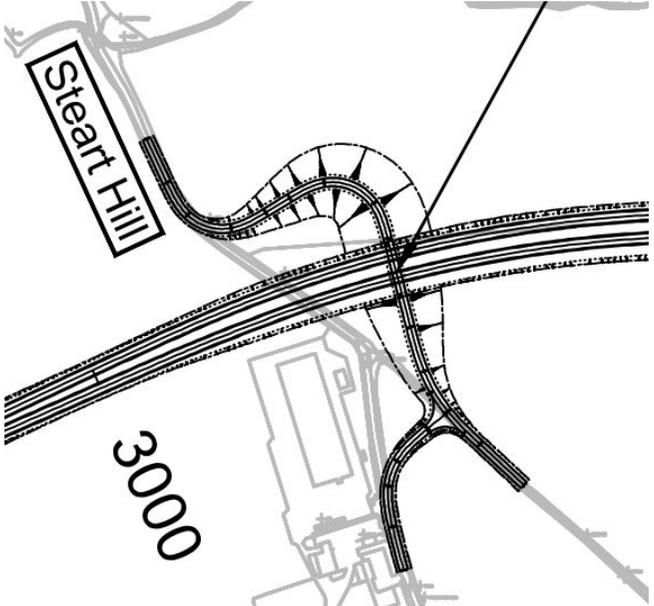
Location	Option design/existing feature	Route option E4 road safety comments
		<p>The incorporation of these footpaths into the design of the junction will need to be carefully considered to avoid unnecessary crossing of carriageways and its associated dangers or at-grade crossing of the</p>  <p>new dual carriageway while maintaining a reasonably direct route.</p>
Existing A303	Existing A303 highway retained	<p>The option drawing provided does not indicate any proposed alterations to the existing A303. With a new offline highway proposed the existing A303 will become an important east-west route for local access, including NMU, particularly if certain vehicle types are banned from using the new highway. Greatly reduced traffic levels on the existing A303 may encourage increased vehicle speeds. NMU will not be adequately catered for as there are currently very limited provisions for pedestrians, cyclists and equestrians, limited to a short section of footway.</p> <p>As a guide, cycle-specific infrastructure should be provided where 85th percentile vehicle speeds are above 20mph or traffic flows are above 2000pcu/day. Where infrastructure is provided for NMU it should be designed such that pedestrians, cyclists and equestrians do not come into conflict and cyclists may make use of their potentially higher speeds.</p>
Podimore Junction	Existing roundabout on A303, west of the scheme limits, retained	<p>This will become the first at-grade junction westbound drivers come to for some distance. This may lead to an increase in accidents.</p> <p>Consider methods for warning drivers of the upcoming junction and ways of reducing vehicle speeds on the approach.</p>

Table 8.5: 2.5 Route option F1 road safety review comments

Location	Option design/existing feature	Route option F1 road safety comments
Various locations	Tie-in of new access roads into existing highway network	<p>The new side roads are intended to be a minimum 6.5m wide, but will tie-in to tracks no more than 3 or 4m wide. This could lead to sudden changes in speed and inappropriate overtaking manoeuvres.</p> <p>New side roads should be designed such that they maintain the character of the existing lanes they tie in to* and thereby maintain consistent low motor vehicle speeds.</p> <p>*Note, it is acceptable to provide additional carriageway width at structures as a 'future-proofing' measure.</p> <p>(See item 6 of the Executive Summary in <i>Engineering Quiet Lanes in the Surrey Hills AONB: Predicting Drivers' Speed</i>, Uzzell D., Leach R., 2001.)</p>
Various locations	New offline highway alignment	<p>Several footpaths currently intersect the new highway alignment in a north-south direction, including the long-distance Celtic Way. It is unclear from the option design how these will be catered for in the upgraded dual carriageway design.</p> <p>At-grade NMU crossings on high speed roads are not advisable. All NMU crossings of the A303 should be designed to be grade-separated.</p>
Hazlegrove Junction	Provision of new grade-separated junction	<p>Currently the at-grade Hazlegrove Roundabout acts as a speed reducing feature along the A303. Converting this to a grade-separated junction is likely to lead to increased traffic speeds on the mainline, potentially leading to increased severity of collisions (see chapter 5.2 of Nilsson, G., (2004) also chapter 8.1 of Taylor M.C., <i>et al.</i> (2002)).</p>
Hazlegrove Junction	Provision of new grade-separated junction	<p>The location of the new junction at Hazlegrove overlies an existing footpath (see diagram below). It is unclear from the option design how this NMU route will be catered for within the design of the junction.</p> <p>The incorporation of this footpath into the design of the junction will need to be carefully considered to avoid unnecessary crossing of carriageways and its associated dangers or at-grade crossing of the new dual carriageway while maintaining a reasonably direct route.</p>

Location	Option design/existing feature	Route option F1 road safety comments
		
<p>Hazlegrove Junction - southern roundabout</p>	<p>Conversion of 5-arm roundabout to 6-arm roundabout and changed function of some arms</p>	<p>An extra arm has been added to the existing 5-arm roundabout without any increase in roundabout size. The resultant roundabout looks cramped with potentially inadequate spacing between arms leading to increased accidents. Furthermore, as a general rule the more arms the more risk of accidents. Paragraph 2.2 of <i>TD16/07</i> states that the number of accidents per year at roundabouts increases with the number of arms because of the corresponding increase in conflict points. It provides the following figures; 4-arm = 1.79 accidents/year, 5-arm = 3.66 accidents/year, 6-arm 5.95 accidents/year. These figures suggest a 6-arm roundabout is 1.6 times more dangerous than a 5-arm roundabout and 3.3 times more dangerous than a 4-arm roundabout. Converting the Hazlegrove Roundabout from 4-arms plus a school access to a full 6-arm roundabout has the potential to increase accident rates at this junction.</p> <p>It is acknowledged that this will be offset by the lower traffic flows likely to use the roundabout in future and the change in function of some of the arms, such as the existing A303 eastern arm becoming a one-way off-slip and the western A303 arm becoming a local road.</p> <p>However, the design of this junction should take into account future changes in traffic flows and should take careful consideration of arm spacing and geometry. It may be necessary to enlarge the roundabout to accommodate all arms or to reduce the number of arms by rationalising the network. .</p>
<p>Hazlegrove Junction - southern roundabout</p>	<p>Conversion of 5-arm roundabout to 6-arm roundabout and changed function of some arms</p>	<p>This roundabout has a historic accident problem with 11 accidents (8 slight, 3 serious) occurring between 2010 and 2014. Any alterations to this roundabout should take account of existing accident types and their potential causes.</p>

Location	Option design/existing feature	Route option F1 road safety comments
Hazlegrove Junction - northern roundabout	New roundabout as part of Hazlegrove grade-separated junction	<p>It appears that the new northern roundabout will be located on the crest of an embankment with steep approach roads which can make it difficult for drivers to appreciate the layout of the junction with the potential to cause loss of control and junction overshoot collisions.</p> <p>Ensure that drivers approaching the roundabout on all arms can adequately appreciate the layout and have adequate forward visibility to the give way points.</p>
Hazlegrove Junction - northern roundabout	New roundabout as part of Hazlegrove grade-separated junction	<p>Entry geometry for all three arms of the northern roundabout appears to be poor. This may lead to increased entry speeds and accidents.</p> <p>Ensure adequate deflection is provided.</p>
Hazlegrove Junction - northern roundabout	New roundabout as part of Hazlegrove grade-separated junction	<p>Approach speeds are likely to be high along the eastbound off-slip approach arm.</p> <p>Ensure vehicle speeds are reduced through design before they reach the roundabout. Consider appropriate speed limits at the junction and on the off-slip.</p>
Vale Farm Overbridge	New overbridge and local roads	<p>The bell mouths of the two proposed T-junctions appear unnecessarily wide which could lead to inappropriate vehicle speeds through the junctions. Design the junctions in line with the nature of the</p>  <p>local roads and the vehicles that will likely use them.</p>

Location	Option design/existing feature	Route option F1 road safety comments
Stearth Hill Overbridge	New overbridge tied in to local roads	<p>The proposed local road alignment to the north of the new overbridge appears to be on a steep gradient with tight radii which could lead to loss of control accidents (see diagram below).</p> <p>Reduce the steepness of the gradient and use larger radii where possible. Implement a Roads Restraint Risk Assessment Process (RRRAP) to determine the need for a road restraint system. Consider the use</p>  <p>of GD 04/12 Standard for Safety Risk Assessment on the Strategic Road Network (Design Manual for Roads and Bridges, Volume 0, Section 2, Part 3, Highways England, 2012)</p>
Upgrade of Downhead Lane and Mead Lane	New T-junction connecting upgraded Downhead Lane with upgraded Mead Lane	<p>The bell mouth of the proposed T-junction appears unnecessarily wide, which could lead to inappropriate vehicle speeds through the junctions.</p> <p>Design the junctions in line with the nature of the local roads and the vehicles that will likely use them.</p>
Existing A303	Existing A303 highway retained	<p>The option drawing provided does not indicate any proposed alterations to the existing A303. With a new offline highway proposed the existing A303 will become an important east-west route for local access, including NMU users, particularly if certain vehicle types are banned from using the new highway. Greatly reduced traffic levels on the existing A303 may encourage increased vehicle speeds. NMU will not be adequately catered for as there are currently very limited provisions for pedestrians, cyclists and equestrians, limited to a short section of footway.</p> <p>As a guide, cycle-specific infrastructure should be provided where 85th percentile vehicle speeds are above 20mph or traffic flows are above 2000 pcu/day. Where infrastructure is provided for NMU it</p>

Location	Option design/existing feature	Route option F1 road safety comments
		should be designed such that pedestrians, cyclists and equestrians do not come into conflict and cyclists may make use of their potentially higher speeds.
Podimore Junction	Existing roundabout on A303, west of the scheme limits, retained	This will become the first at-grade junction westbound drivers come to for some distance. This may lead to an increase in accidents. Consider methods for warning drivers of the upcoming junction and ways of reducing vehicle speeds on the approach.

8.2 Reliability and maintenance

8.2.1 Introduction

In response to the *Road Investment Strategy: for the 2015/16 – 2019/20 Road Period* (Department for Transport, March 2015), Highways England issued the *Highways England Delivery Plan 2015-2020* (Highways England, March 2015). In chapter 4 of the *Delivery Plan*, Highways England establishes a holistic approach to managing health and safety by working with suppliers and stakeholders with the goal being that no one should be harmed when travelling or working on the strategic road network. Specifically, by the end of 2020 Highways England's aim is to reach a target of a 40% reduction in the number of KSI accidents, with the longer-term aim being to get as close as possible to zero by 2040. Four at-risk populations have been identified whose health and safety needs must be addressed as part of this approach. They are:

- Road users
- Customer operations staff, which largely consists of the Traffic Officer service
- Road workers and other supply chain employees
- Highways England employees who work in and away from our offices

The A303 Sparkford to Ilchester scheme has a contribution to make to the achievement of Highways England's goal for the first three of these groups.

Potential health, safety and wellbeing factors were considered during the initial sifting process that is documented in the *Options Assessment Report* (MMSJV, due for issue in November 2016). Ongoing design developments will continue to address health, safety and wellbeing goals through a structured approach in accordance with the following publications:

- *Construction (Design and Management) Regulations 2015*. These regulations require that hazards and risks are identified and eliminated or reduced as part of the design process and, if elimination is not possible, for information to be provided regarding the nature of the residual risks.
- *Interim Advice Note 69/15 Design for Maintenance* (Highways England, April 2015). This document provides guidance on the risk assessment and liaison process regarding the development of designs that are safe to maintain. It also introduces the concept of 'Maintenance Strategy and Repair Statements' in which designers record assumptions and requirements regarding maintenance activities. The intent is to identify the key features relating to maintenance activities which:
 - Must be undertaken in a particular manner
 - Do not have an obvious approach
 - Are hazardous to those undertaking the work or others who may be affected by it
 - Require a disciplined approach

During the design process reference will also be made to feedback regarding lessons learnt from latest working and operating practices from forums such as the Road Worker Safety Forum (RoWSaF), Safe Use of Roadside Verges in Vehicular Emergencies (SURVIVE) as well as circulars such as Highways England Safety Alerts

and Monthly Health Safety and Wellbeing Briefings to ensure developing designs take account of the current experience.

8.2.2 Traffic Management

Highways England obtained initial advice from a construction delivery partner to understand how traffic on the A303 may be managed during the works.

It was determined that for all options eastbound traffic would be reduced to one lane prior to reaching Podimore roundabout. This is to keep the traffic under greater control on the approach to the works and assist in reducing the likelihood of traffic queueing across the roundabout whilst providing greater safety protection to the workforce.

It was determined that for all options traffic at the eastern tie-in with the dual carriageway Sparkford bypass would be reduced to single file for approximately 1km east of Hazlegrove Roundabout either as single lane in each carriageway or in a 1+1 contraflow configuration.

Lane width reductions and temporary speed limits would be required at each tie-in. Restrictions would be more pronounced along the online section to accommodate the works site adjacent to the live traffic lanes. Temporary speed limits along these sections may be as low as 40mph to facilitate lanes widths as low as 3.25m. For offline solutions the A303 in between each tie-in location would remain as single lane running at the existing speed limit on both carriageways.

8.2.3 Closures & diversion routes

In the event of carriageway closures, the diversion routes are likely to be of significant length. Any closures would be overnight and, if Somerset County Council required traffic to be diverted along 'A' class roads, there would be two possible routes. One route would be to the north and would involve use of the A37, A361, A36 & A350 (an additional 10 mile journey), whilst a southern route would involve the A37, A35, A354 & A350 (an additional 35 mile journey). Extensive advance notice, advice and signing would be necessary to encourage long distance traffic to use the strategic road network routes of M4 & M5 or M3, M27, A31 & A35 to bypass the closed section of the A303.

8.2.4 Cost effectiveness

The approach to ensuring cost effective construction and maintenance will centre on maximising standardisation of components such as structures, drainage and road restraint systems, and enabling the use of familiar and conventional construction and maintenance techniques. This approach should also help maximise the health and safety performance of the project during construction and operation.

This process is at an early stage, but ultimately liaison will be undertaken with Highways England's construction and maintenance supply chain partners to ensure opportunities to improve cost effectiveness are identified and implemented.

One particular area of focus will be on the treatment of the existing A303 carriageway along sections of online widening. Options in these locations range between retaining the existing carriageway as a local road and constructing an entirely new dual carriageway alongside to integrating the existing carriageway as one side of the new dual carriageway. The latter approach clearly offers significant efficiencies subject to resolution of complications such as traffic management during construction and the risk of the existing asset being in a poor condition.

9 Environmental and social assessment

9.1 Introduction

The section below presents a summary of the assessment of potential environmental and social effects during the operational stage of the A303 Sparkford to Ilchester. The assessments have been completed in accordance with *WebTAG Unit A3 Environmental Impact Appraisal* (Department for Transport, December 2015) and *WebTAG Unit A4-1 Social Impact Appraisal* (Department for Transport, November 2014). The full assessments are presented within the *WebTAG Appraisal – Environmental Impact Appraisal* (MMSJV, October 2016) for all the four options, whilst a further explanation of the noise, air quality and greenhouse gases results is provided in chapter 4.7-4.9 and 5.7-5.9 of the *Economic Appraisal Report* (Mott MacDonald, October, 2016).

Environmental and social assessments have also been completed to a Scoping Level in accordance with Volume 11, Section 3, parts 1-2 and parts 4-11 of the *Design Manual for Roads and Bridges* (Highways England, dates of issue as appropriate to each part). The full assessments are presented within the *Environmental Scoping Report: Options Assessment* (MMSJV, June 2016) for all the four options.

9.2 Consultation with statutory environmental bodies

Consultation with Statutory Environmental Bodies has been undertaken, including Historic England, Natural England, the Environment Agency, National Trust and South-West Heritage. Further information on the consultation that has taken place during the option identification stage is presented within section 10.2 of this document, as well as within the *Environmental Scoping Report: Options Appraisal* (MMSJV, June 2016).

9.3 Noise

The WebTAG noise appraisal reports results as changes in Net Present Value (NPV) and subsequently predicts positive values which indicate benefits for the proposed options, and negative values which are considered to be dis-benefits. Options A2 and E4 have the potential to increase noise levels locally which would have an adverse effect on local receptors, as shown in the negative NPV values. Conversely, options B4 and F1 have the potential to reduce noise levels locally, which would result in a beneficial effect on local receptors as shown in the positive NPV values. The change in noise NPV and potential reason for each value for each of the proposed options is as follows:

- Option A2: -£378,735. This dis-benefit is due to traffic increases at residential areas currently affected by traffic noise.
- Option B4: £489,807. This benefit is due to the removal of traffic from residential areas adjacent to the existing A303 to a more sparsely occupied area to the north.
- Option E4: -£154,535. This dis-benefit is due to the alignment of Option E4 closer to properties currently unaffected by traffic noise.
- Option F1: £593,327. This benefit is due to the removal of traffic from residential areas adjacent to the existing A303 to a more sparsely occupied area to the north.

9.4 Air quality and greenhouse gases

All four of the proposed options have the potential to result in an overall improvement of local ambient air quality within the study area with respect to nitrogen dioxide (NO₂) and Particulate Matter 10µm (PM₁₀). There are no predicted locations where the scheme would cause an exceedance of Air Quality Objectives (AQOs). However, all the proposed options are predicted to increase regional emissions of mono-nitrogen oxides (NO_x) and PM₁₀, resulting in an overall Air Quality dis-benefit. The total value of change in air quality Net Present Value (NPV) for each of the proposed options is as follows:

- Option A2: -£34,007
- Option B4: -£88,277
- Option E4: -£75,833
- Option F1: -£148,790

The WebTAG greenhouse gas appraisal indicated that all four of the proposed options would lead to an increase in greenhouse gas emissions. The greenhouse gas NPV over the 60-year appraisal period from the scheme for each of the proposed options is presented below, with a detrimental impacts expected for all options.

- Option A2: -£5,198,579
- Option B4: -£5,306,002
- Option E4: -£5,251,082
- Option F1: -£6,780,630

9.5 Landscape

For option A2, given that the proposed route would have sections of being either online or very close to the existing A303 route corridor, the impacts upon landscape character and nearby visual receptors would be minimised by keeping the impacts of major road corridors limited to an isolated area already characterised by a major road. The expansion to dual carriageway would however be at odds with the local landscape pattern and scale. The eastern end of the route would have a direct impact upon the designated Hazlegrove House Registered Park and Garden with views likely from elevated positions towards the scheme in the south. Where the route would not pass in cutting, option A2 would be visible from local receptors such as residential properties and PRow. As such, a Moderate Adverse significance of effect would be anticipated as a result of option A2.

Given the undeveloped nature of the area to the north of the existing A303, the placement of options B4, E4 and F1 in an otherwise rural and tranquil environment would lead to a more notable change. Where feasible, design options have placed the route alignments in cutting, limiting the visual prominence by allowing the route to follow the lie of the land and accommodate screening planting well. However, existing far reaching views would be disrupted by the presence of option E4 which would traverse the topography which would lead to wide open cuts, and options B4 and F1 which would be visible from elevated ground to the south. Similar to option A2, direct impacts would be noted at Hazlegrove House Registered Park and Garden as the route would traverse the southern extents of the garden, impacting the setting of the heritage asset. Without mitigation, options B4, E4 and F1 therefore present the potential for Large Adverse effects once operational.

9.6 Historic environment

In terms of effects on unknown archaeological buried remains, options A2 and E4 present the potential for Large Adverse effects, as these options cut through an area which are considered to have a high archaeological potential, situated immediately south of the western extent of the proposed options. For options B4 and F1 this effect was assessed as Moderate Adverse as although potential remains were considered to also be of medium value, the overall potential to encounter remains in these areas was considered to be lower than for options A2 and E4.

All options would lead to the removal of agricultural earthwork remains within the proposed carriageway corridors, resulting in a Slight Adverse effect, whilst the majority of the local resource that represent better preserved examples of this asset type are present within the locality. All the proposed options present the potential for Moderate Adverse effects on Hazlegrove House Registered Park and Garden, as all proposed routes would cut through the southern section of the park removing elements of the historic parkland and further damaging the context of the asset. Similarly, options B4 and F1 present a Moderate Adverse effect on the medieval settlement remains 100m and 250m north of Downhead Manor Farm Scheduled Monument through the introduction of the intrusive new carriageway approximately 100m north, which would affect the context of this asset. For option E4, a Large Adverse effect is anticipated on the Romano-British settlement immediately south-west of Camel Hill Farm Scheduled Monument, as the north-west corner of the scheduled area will be graded resulting in the direct loss of potential archaeological remains within this section as well as intrusions due to the introduction of the of the new carriageway, which would cumulatively affect the context of this asset.

An overall Moderate Adverse effect is anticipated as a result of options B4 and F1, whilst a Large Adverse effect would be anticipated for options A2 and E4.

9.7 Biodiversity

Options A2, B4 and E4 are anticipated to have Slight Adverse effects on several Local Wildlife Sites (LWS), whilst option F1 would present Moderate Adverse effects as this option would also intersect Annis Hill LWS, which includes Ancient Woodland.

The proposed works for all options would result in the permanent loss of habitats, several of which are listed on the Somerset Biodiversity Action Plan. For options A2, B4 and E4, effects would be anticipated to be Slight Adverse, whilst for option F1, the potential loss of broad-leaved semi-natural woodland presents the potential for Moderate Adverse effects without mitigation.

The proposed works have the potential to affect bats, dormice, reptiles, badgers, barn owls, great crested newts and breeding birds through the loss of habitats. For all of the proposed options, a Slight Adverse effect would be anticipated on protected species, as there is the potential for fragmentation of wildlife corridors that would reduce connectivity of foraging areas, an increase in noise levels and visual intrusion during construction which could temporarily disturb protected species, the potential displacement of breeding birds and barn owls during operation due to increased vehicular noise levels, and the potential for bat species and birds that could be killed or injured as a result of collision with passing vehicles.

As such, and without mitigation, there would be an overall Slight Adverse effect anticipated for options A2, B4 and E4, and a Moderate Adverse effect anticipated as a result of option F1.

9.8 Water environment

All of the proposed options are unlikely to affect water resources, as works would not be located within the flood plain and no rivers or streams would be crossed. The installation of new carriageways would give a potential of flooding with an increase in hardstanding areas, and there are a number of small drainage ditches within the area that would be crossed. The potential incorporation of sustainable drainage systems (SuDS) and pollution control measures within the drainage design would prevent any adverse effects. While a risk of disturbance of contaminated ground exists, due to the rural nature of the all route options, this is a very low risk. A precautionary Slight Adverse score has been assigned for all options without consideration for mitigation.

9.9 Physical activity

There are a number of non-motorised user (NMU) amenities that exist within the study area for all of the proposed options, consisting of footpaths, one bridleway, three restricted byways, one cycle route, a National Train (the Celtic Way) as well as one long distance footpath (the Leland Trail). All of the proposed options would require the severance of several of these Public Rights of Way (PRoW). These severed PRoWs would likely be replaced in the form of footbridges or underpasses, if deemed necessary following the completion of NMU surveys. As such, all of the proposed options have the potential to result in changes to journey distances, although at this stage, it is unknown whether journey distances will increase or decrease.

Effects associated with physical activity as a result all of the proposed options are therefore anticipated to be Neutral. It is important to note that effects could potentially change following completion of NMU surveys, and following confirmation of the preferred locations for footbridges and underpasses.

9.10 Journey quality

All four of the proposed options would result in an improvement to journey quality, with option A2 anticipated to have a Slight Beneficial effect, and options B4, E4 and F1 anticipated to have Moderate Beneficial effects. At present, all four of the proposed options would not include provision for new facilities such as lay-bys, toilets and service stations. Options B4, E4 and F1 would retain access to Sparkford Services and Camel Hill Services, whilst alternative arrangements are yet to be considered for the access to Camel Hill Services for option A2.

In terms of traveller stress, all four options have the potential to reduce traveller stress along the A303, as the provision of a new route alignment either directly to the north (A2) or further north (B4, E4 and F1) of the existing A303 will provide the main through-route and should increase journey time reliability across the area, in order to allow the use of existing A303 for local access.

Current proposals for NMU would comprise the stopping up of uncontrolled routes over the A303 which would improve safety and the subsequent fear of potential accidents,

resulting in a beneficial impact for travellers. Furthermore, NMU crossings will be diverted across bridges or through underpasses to ensure that pedestrians do not encroach on the A303, and further reducing driver stress, although the exact locations of these will not be known until early in Stage 2.

9.11 Severance

All options would be likely to result in changes to pedestrian movements, potentially resulting in increased journey lengths, whilst journeys would become less attractive. There is potential for all proposed options to result in severance to pedestrians' journeys to community facilities. However, effects are anticipated to be slight given that the lack of NMU amenities connecting residents to them. There is also potential for severance to occur from additional facilities further than 250m from each option. Pedestrians could be dissuaded from making journeys to facilities on foot. NMU facilities would be installed for each option at appropriate locations as determined by the NMU surveys, which would minimise severance impacts to pedestrian journeys.

As such, there would be an overall Slight Adverse effect anticipated as a result of all four options.

10 Appraisal summary

10.1 Appraisal summary tables (ASTs)

Appraisal summary tables with corresponding worksheets have been produced in accordance with the Department for Transport's *Transport Analysis Guidance* (WebTAG) (last updated in July 2016). The environmental and social worksheets are presented in the *WebTAG Summary Report* (MMSJV, October 2016). The summary tables are reproduced in Appendix C of this report.

10.2 Summary of consultation with stakeholders

10.2.1 Stakeholder identification and engagement

Identifying and engaging with stakeholders has been an integral element of the options generation and development process as specified in Highways England's option identification stage guidelines.

The approach taken during this option identification stage of the appraisal process has been to ensure that all three main components of the engagement – consultation, participation and information – are considered and undertaken on an on-going basis with key stakeholders.

A stakeholder mapping exercise was undertaken during July and August 2015. Identified stakeholders were categorised, following Highways England's guidelines, according to the role and the level of involvement they would have throughout the project lifecycle.

Following this process, the first of a series of workshops with key statutory stakeholders took place in December 2015. The workshop was attended by representatives from:

- Local Authorities: Somerset County Council, South Somerset District Council and Taunton Deane Borough Council
- Statutory environmental bodies: Environment Agency, Natural England and Historic England
- Non-statutory consultee, the National Trust, who were invited due to key interests in this area

The purpose of the workshops was to keep the key statutory stakeholders up to date with the project's progress, seek views to ensure the project was aligned with local plans and receive input into the ongoing stakeholder engagement programme.

During the initial meeting, the attendees identified a number of other stakeholders, who they considered possessed additional technical knowledge and local area expertise that would be beneficial during the options development stage. The additional stakeholders were subsequently included in the stakeholder engagement programme.

A Value Management Workshop was held on 12 January 2016 at Mott MacDonald's Bristol Office. Key statutory stakeholders were invited to this meeting as set out in the *Value Management Workshop Report* (MMSJV, April 2016). The purpose of the workshop was:

- To review the project objectives and brief with stakeholders and obtain their feedback and views
- To present any options currently being considered and to enable stakeholders to engage with the project team in assessing the costs and benefits of these options
- To encourage stakeholders to identify value improvements to the current options and/or to identify any alternative concept options
- To explain the forward programme to stakeholders
- To confirm the options being taken forward for further investigation

In addition to the stakeholder workshops, a group was formed to assist with the development of a non-statutory Statement of Community Consultation (SoCC). The SoCC development group comprised local authority communications, planning and community engagement officers. Many of the group's suggestions and local information knowledge was incorporated in a draft SoCC, which included recommendations about engaging all sectors of the community, including hard to reach groups.

A period of stakeholder engagement commenced during the summer of 2016 with a series of meetings with key and statutory stakeholders. The information and views captured during the meetings contributed to route option development and planning of the public consultation period.

Key input from stakeholders that informed option development included:

- Historic England advised during the Value Management Workshop that they could not support options that crossed over a Scheduled Monument and this was a consideration taken into account during the development of potential options – see section 9.3.2.2 of the *Options Assessment Report* (MMSJV, due for issue in November 2016).
- During discussions, the Environment Agency raised concerns over the proximity of certain options to the Dyke Brook flood plain and this was a consideration taken into account during the development of potential options - see section 9.3.2.2 of the *Options Assessment Report*.

10.2.2 Information provision – stakeholder workshops

The main role of the stakeholder workshops is to ensure views of key stakeholders are captured and considered during the options development process, and to introduce and discuss the inclusive engagement processes involved with a Development Consent Order application.

A number of workshops were carried out during the options development stage to ensure that comments and views from the host local authorities, statutory and key stakeholders were collected and input back into the options development process.

Scheme opportunities and constraints were discussed with key stakeholders as part of meeting presentations. Route corridor options were discussed and stakeholders were able to provide feedback on a number of relevant topics including environmental, economic and social elements of the proposal. There is unanimous agreement among

key stakeholders that there is a need to upgrade this section of the A303 to increase traffic capacity, reduce congestion and improve motorised and non-motorised accessibility for local communities.

Details of the workshops held, the topics discussed and the location are summarised in Table 10.1.

Table 10.1: Stakeholder workshops held

Meeting agenda	Date	Location
Introduction to the A303 project and Highways England/MMSJV team	4 December 2015	Taunton Deane Borough Council offices
Scheme progress and DCO process	22 March 2016	Taunton Deane Borough Council offices
Scheme progress and communications proposals update	26 May 2016	Taunton Deane Borough Council offices
Scheme progress and options development	13 July 2016	Taunton Deane Borough Council offices
Scheme progress and options development	11 November 2016	Taunton Deane Borough Council offices

10.2.3 Local authority communications and community engagement meeting

A meeting was held with the local authority communications and community engagement officers to introduce the scheme and to discuss the communications strategy.

In addition to this, the discussion involved the role that the local authorities' communications and community engagement teams would have in assisting with the preparation of a Statement of Community Consultation (SoCC).

This group met once, before transforming into the SoCC development group, with the addition of local authority planning officers. A summary of the topics discussed during the meeting is detailed in Table 10.2.

Table 10.2: Topics discussed at local authority communications and community engagement meeting

Meeting agenda	Date	Location
Introduction to Highways England/MMSJV communications team and outline of communications strategy	14 January 2016	Taunton Visitor Centre

10.2.4 SoCC development group meetings

The SoCC development group comprises representatives from the local authorities' communications, community engagement and planning officers. The purpose of the meetings is to seek input and advice to create a SoCC that takes into consideration all sections of the local community and the methods used to communicate to them.

Much of the feedback gained during the group's first meeting was included in a non-statutory SoCC, which will be used as a guide to producing the statutory SoCC once the scheme reaches the statutory pre-application consultation stage under the DCO planning regime.

Feedback from the meetings included suggestions for public exhibition venues and public viewing areas during the non-statutory consultation period, discussion of consultation zones and consultation channels and consideration of hard to reach community groups.

Feedback was collated and included in a proposed final SoCC which was circulated with explanatory guidance to host and adjoining local authorities for a formal 30-day review and comment period.

Details of the meetings held, the topics discussed and the location are summarised in Table 10.3.

Table 10.3: Details of SoCC development group meetings

Meeting agenda	Date	Location
Non-statutory SoCC development and community engagement	22 March 2016	Taunton Deane Borough Council offices
Non-statutory SoCC review	26 May 2016	Taunton Deane Borough Council offices

10.3 Comparison of options

Economics

In the economic assessment summarised in chapter 7 of this report, Option A2 has the highest present value benefits (£225.053 million) and option F1 has the lowest (£204.684 million), whilst the present value costs are highest for option E4 (£114.366 million) and lowest for option F1 (£101.162 million). Option F1 has the highest Benefit to Cost Ratio (BCR) of 2.10 when adjusted to include reliability benefits, whilst option E4 has the lowest at 1.93. Options A2 and B4 have BCR values of 2.07 and 2.01 respectively. The range between the highest and lowest is small, making them comparable in terms of economic benefits. Under the Department for Transport's value for money criteria, these represent medium to high value for money with the BCR around the threshold of 2.0 between medium and high value for money. However, it should also be noted that the assessment of wider economic benefits undertaken with TEAM (Mott MacDonald's Transparent Economic Assessment Model) shows that these benefits are likely to be significant providing further justification of the scheme.

Overall, in terms of value for money the best option is F1, followed by options A2, B4 and E4. The difference between the highest and lowest is small.

Safety – Accident Savings

The COBALT (Cost and Benefit of Accidents – Light Touch) results used in the economic assessment give the cost of accidents in monetary form for the 60-year appraisal period. The COBALT results show that there would be a benefit with all four options when compared with no improvements to the existing route. This is because all four options would lead to a reduction in accidents compared with the Do Minimum option i.e. with no improvement scheme.

The economic benefits of accident savings would be greatest for option F1 which showed a saving of 3 fatal accidents, 21 serious injury accidents and 76 slight injury accidents with a consequent economic benefit of £5.147 million. Option E4 showed a saving of 2 fatal accidents, 19 serious injury accidents and 75 slight injury accidents with an economic benefit of £5.073 million. Option B4 showed a saving of 2 fatal accidents, 20 serious injury accidents and 63 slight injury accidents with an economic benefit of £4.899 million. Option A2 showed a saving of 2 fatal accidents, 19 serious injury accidents and 42 slight injury accidents with an economic benefit of £4.221 million.

Overall, option F1 demonstrates the highest economic benefit of accident savings, followed by options E4, B4 and A2 respectively.

Safety – Strategic Safety Action Plan

The Strategic Safety Action Plan presented in chapter 8 of this report raised a number of safety concerns that were common to all the options and will require further consideration at the next stage of design.

The following additional concerns were raised specific to option A2:

- Option A2 would be less safe during the construction phase due to the scheme being in part on the line of the existing A303. Traffic would still need to use the existing A303 during construction. This would lead to more hazards for both road users and the construction workforce due to their proximity to each other during the construction phase.
- Option A2 is the only option where a junction is proposed part way along its length at Steart Lane/Howell Hill connecting to the B3151. The traffic model confirms that this would take local traffic away from Hazlegrove Roundabout, potentially making Hazlegrove Roundabout safer than in the other options. However, an intermediate junction would reduce the weaving lengths between junctions and create more conflict points on the A303. The safety appraisal also raised the question of whether the reduced distance between slip roads resulting from the extra junction would meet expressway standards in the long term.
- Due to being a part online solution, option A2 would not provide a parallel access road along the existing A303 route for local traffic unlike the offline options. The traffic model confirms that this would cause local traffic to use the A303 instead. The safety appraisal raises concerns that this would increase the amount of weaving and

merging on the A303 compared with other options as local traffic would be 'junction hopping' in the absence of a suitable parallel route.

Overall, options B4, E4 and F1 perform similarly in the safety appraisal but there are additional safety concerns specific to option A2 as described above.

Buildability and maintenance

In the qualitative assessment presented in chapter 8.2 of this report, option A2 is less favourable in terms of buildability as it would require more complex traffic management. There would be more lane width restrictions and temporary speed limits on the existing road than for the other options. The other options would only require traffic management at the tie in points on the A303. All four options are similar in terms of maintenance.

In the QUADRO analysis of the cost of roadworks, all four options are predicted to have an economic dis-benefit. Option A2 is predicted to have a significantly higher dis-benefit than the other options which concurs with the qualitative assessment. The dis-benefits would be -£6.117 million for option A2; -£1.350 million for option E4; -£1.227 million for option F1; and -£1.110 million for option B4.

Environment

Options A2 and E4 have the potential to increase noise in local residential areas, whilst options B4 and F1 have the potential to reduce noise in local residential areas. Option F1 would have the highest positive benefit of £593,327 due to it being furthest from residential areas and option B4 would have a positive benefit of £489,807. Option E4 would have a dis-benefit of -£154,535 whilst option A2 would have the greatest dis-benefit of -£378,735, being closest to residential areas.

All four options are predicted to result in an overall air quality dis-benefit primarily as a result of increases in regional emissions of nitrogen oxides (NOx) and PM10 from increases in speed on the affected road network. However none of them would exceed air quality objectives. Option A2 is predicted to have the smallest air quality dis-benefit at -£34,007; option E4 would have a dis-benefit of -£75,833; option B4 would have a dis-benefit of -£88,277; and option F1 would have the largest dis-benefit of -£148,790.

The greenhouse gas appraisal indicates that all the options would lead to an increase in greenhouse gas emissions. Option A2 is predicted to have the smallest dis-benefit at -£5.199 million; option E4 would have a dis-benefit of -£5.251 million; option B4 would have a dis-benefit of £5.306 million; while option F1 would have the greatest dis-benefit of -£6.781 million.

Other environmental issues have been subject to a qualitative assessment. Option A2 has been assessed as having a Moderate Adverse effect on landscape with the other options having a Large Adverse effect without any mitigation. Option E4 would have a Large Adverse effect on the historic environment with the other options having a Moderate Adverse effect. In the area of biodiversity, option F1 would have a Moderate Adverse impact with the other options having a Slight Adverse impact. All four options would have a Slight Adverse impact on the water environment; a neutral on physical

activity; a Moderate Beneficial effect on journey quality; and a Slight Adverse impact on the severance of communities.

Overall, the options show mixed results in the environmental assessment, with none performing significantly better across all criteria.

11 Programme

A scheme programme has been developed and the latest version at the time of issue of this report is contained in Appendix D of this report. The construction period may vary depending on the route option selected at the next stage of the scheme development. The programme allows for the longest construction period of the four route options appraised in this report.

Key programme dates are:

■ Commence public consultation	January 2017
■ Ministerial Preferred Route Announcement	September 2017
■ Application for Development Consent Order	June 2018
■ Publish Development Consent Order (latest date)	October 2019
■ Secretary of State decision (latest date)	October 2019
■ End of legal challenge period	December 2019
■ Start of construction (entry by negotiation)	March 2020
■ Scheme open to traffic	February 2023

12 Conclusion and recommendations

12.1 Options for public consultation

12.1.1 Conclusions

Of the four options for which a technical appraisal has been carried out, all the routes have benefits and dis-benefits to the point that the overall differences between them are small. Having carried out the appraisal, we conclude that options A2 and E4 have several similarities sharing the same route over approximately the western third of their length and both can be considered as central routes within the vicinity of the existing A303 corridor. Similarly, options B4 and F1 have several similarities and share the same route over approximately the eastern third of their length. Both can be considered as northern alternatives to the existing A303 corridor between Sparkford and Ilchester.

We therefore conclude that one central and one northern route should be taken forward to public consultation. A full comparison of the options is given in chapter 10.3 of this report. A comparison of the differences between the two central routes and the two northern routes is given below to demonstrate which central and which northern route we consider should be taken forward. The comparison considers:

- The overall results of the economic appraisal presented in chapter 7.3 of this report)
- The qualitative appraisal of environmental and social impacts carried out in accordance with WebTAG guidance and presented in chapter 9 of this report and summarised in the Appraisal Summary Tables (see chapter 10.1 of this report)
- The qualitative appraisal of safety, buildability and maintenance presented in chapter 8 of this report

Central options A2 and E4

A comparison of options A2 and E4 is summarised in Table 12.1 below. This shows that option A2 performs better than option E4 in economic terms having both a higher overall PVB and a lower PVC. This results in a BCR of 2.07 for option A2 compare with 1.93 for option E4, when reliability benefits are taken into account. The BCR for option A2 is also above the BCR threshold of 2.0 between medium and high value for money.

In the qualitative environment and social appraisal, options A2 and E4 perform equally, except in terms of landscape and historic environment where option A2 performs better. This is mainly due to it being partly online, thus affecting smaller areas of existing landscape and historic remains. In a qualitative assessment of safety, buildability and maintenance, option E4 performs better than option A2. However, it should be noted that this is already taken into account in the quantitative appraisal of accident savings and cost of roadworks from the COBALT and QUADRO assessments presented in the economic appraisal (see Chapter 7.3 of this report).

We therefore consider that option A2 performs better than option E4 overall, making it the better central route option.

Table 12.1: Comparison of options A2 and E4

OVERALL IMPACTS	Option A2	Option E4	Comparison
ECONOMICS (quantitative assessment from Economic Appraisal)			
Present Value of Benefits (PVB)	222,053	212,719	A2 has higher PVB
Broad Transport Budget Present Value of Costs (PVC)	111,721	114,366	A2 has lower PVC as it is a lower cost scheme
Net Present Value (NPV)	110,332	98,353	A2 has higher NPV due to both higher benefits and lower cost
Initial Benefit to Cost Ratio (BCR)	1.99	1.86	A2 offers better value for money
Reliability Benefits	8,719	8,279	A2 slightly better
Adjusted BCR	2.07	1.93	A2 offers better value for money
ENVIRONMENT AND SOCIAL (qualitative assessment from Appraisal Summary Tables)			
Landscape	Moderate Adverse	Large Adverse	A2 better as it is partly online
Historic environment	Moderate Adverse	Large Adverse	A2 better as it is partly online
Biodiversity	Slight Adverse	Slight Adverse	No difference
Water	Slight Adverse	Slight Adverse	No difference
Physical activity	Neutral	Neutral	No difference
Journey quality	Moderate Beneficial	Moderate Beneficial	No difference
Security	Neutral	Neutral	No difference
Access to services	Neutral	Neutral	No difference
Affordability	Neutral	Neutral	No difference
Severance	Slight Adverse	Slight Adverse	No difference
Option and non-use values	Neutral	Neutral	No difference
SAFETY, BUILDABILITY AND MAINTENANCE (qualitative assessment from Chapter 8 of this report)			
Strategic Safety Action Plan	Concerns over shorter weaving length on main line due to additional junction at Downhead Lane and lack of offline diversion route Safety issues on side roads and junctions that would need to be addressed at future stages	Safety issues on side roads and junctions that would need to be addressed at future stages	E4 better
Buildability and maintenance	An online option would be more complicated to construct and involve more	An offline option would be less complicated to construct and involve less	E4 better

OVERALL IMPACTS	Option A2	Option E4	Comparison
	disruption to existing traffic during construction	disruption to traffic during construction	

Northern options B4 and F1

A comparison of options B4 and F1 is summarised in Table 12.2 below. This shows that, whilst option B4 has the slightly higher NPV, option F1 has a higher BCR of 2.10 compared with 2.01 for option B4, when reliability benefits are taken into account. This makes option F1 better value for money although both options are above the BCR threshold of 2.0 between medium and high value for money.

In the qualitative environment and social appraisal, option F1 performs slightly worse than option B4 as it intersects the corner of Annis Hill Local Wildlife Site. In a comparison of the quantitative environmental impacts presented in the economic appraisal (see chapter 7.3 of this report), option B4 performs slightly better than option F1 due to lower dis-benefits associated with air quality and greenhouse gas emissions.

In a qualitative assessment of safety, buildability and maintenance, there is no difference between the two schemes. In a comparison of the quantitative effect of accident savings and cost of roadworks from the COBALT and QUADRO assessments presented in the economic appraisal (see Chapter 7.3 of this report), option B4 performs marginally better than option F1. This is mainly due to it being slightly shorter in length than option B4, and we do not consider the difference to be significant.

Although option F1 performs marginally worse in the qualitative assessment of the scheme, primarily in terms of its impact on the Annis Hill Local Wildlife Site, F1 offers best value for money in the quantitative assessment. We consider that the benefits of option F1 outweigh its dis-benefits compared with option B4 and we therefore conclude that option F1 should be taken forward to public consultation.

Table 12.2: Comparison of options B4 and F1

OVERALL IMPACTS	Option B4	Option F1	Comparison
ECONOMICS (quantitative assessment from Economic Appraisal)			
Present Value of Benefits (PVB)	216,605	204,684	B4 has higher PVB
Broad Transport Budget Present Value of Costs (PVC)	111,722	101,162	F1 has a lower PVB as it is a lower cost scheme
Net Present Value (NPV)	104,883	103,522	B4 has slightly higher NPV
Initial Benefit to Cost Ratio (BCR)	1.94	2.02	F1 offers better value for money
Reliability Benefits	8,326	8,102	B4 slightly better
Adjusted BCR	2.01	2.10	F1 offers better value for money
ENVIRONMENT AND SOCIAL (qualitative assessment from Appraisal Summary Tables)			
Landscape	Large Adverse	Large Adverse	No difference

OVERALL IMPACTS	Option B4	Option F1	Comparison
Historic environment	Moderate Adverse	Moderate Adverse	No difference
Biodiversity	Slight Adverse	Moderate Adverse	F1 would intersect the corner of Annis Hill Local Wildlife Site and therefore performs slightly worse in the qualitative assessment
Water	Slight Adverse	Slight Adverse	No difference
Physical activity	Neutral	Neutral	No difference
Journey quality	Moderate Beneficial	Moderate Beneficial	No difference
Security	Neutral	Neutral	No difference
Access to services	Neutral	Neutral	No difference
Affordability	Neutral	Neutral	No difference
Severance	Slight Adverse	Slight Adverse	No difference
Options and non-use values	Neutral	Neutral	No difference
SAFETY, BUILDABILITY AND MAINTENANCE (qualitative assessment from Chapter 8 of this report)			
Strategic Safety Action Plan	Safety issues on side roads and junctions that would need to be addressed at future stages	Safety issues on side roads and junctions that would need to be addressed at future stages	No difference
Buildability and maintenance	An offline option would be less complicated to construct and involve less disruption to traffic during construction than on an online option	An offline option would be less complicated to construct and involve less disruption to traffic during construction than an online option	No difference

Recommendation

We recommend that the following options be taken to public consultation:

- Central option - Option A2
- Northern option - Option F1

12.2 Preferred solution

At this stage, no option has clearly better performance in all aspects of safety and operation, environmental impacts and value for money. Thus a judgement will need to be made on the balance of these aspects, which should include stakeholder feedback, in reaching a conclusion about the best option for a preferred route. Option F1 performs slightly better than option A2 in economic terms; option A2 is the better option in environmental terms; and F1 is better in terms of safety, buildability and maintenance.

12.3 Naming of route for public consultation

The options have been re-named for public consultation as shown below and will be referred to by these names going forward: The options have been re-named for public consultation as shown below and will be referred to by these names going forward:

- Option A2 will be known as Option 1
- Option F1 will be known as Option 2

Appendices

Appendix A Glossary

Appendix B Environmental constraints plan

Appendix C Appraisal summary tables

Appendix D Scheme programme

Appendix A Glossary

■ AADT	Analysis of Annual Average Daily Traffic
■ AQMA	Air Quality Management Area
■ ATC	Automatic Traffic Count
■ BCR	Benefit Cost Ratio
■ COBALT	Cost and Benefits of Accidents – Light Touch
■ dB	Decibel
■ DCO	Development Consent Order
■ DfT	Department for Transport
■ FMA	Fully Modelled Area
■ HADDMS	Highways Agency Drainage Data Management System
■ HDV	Heavy duty vehicle
■ KSI	Killed or seriously injured
■ LWS	Local Wildlife Site
■ NMU	Non-motorised user(s)
■ NPPF	National Planning Policy Framework
■ NPPG	National Planning Practice Guidance
■ NPSNN	National Policy Statement for National Networks
■ NPV	Net Present Value
■ NSIP	Nationally Significant Infrastructure Project
■ NTEM	National Trip End Model
■ MOD	Ministry of Defence
■ MMSJV	Mott MacDonald Sweco Joint Venture
■ PCU	Passenger car unit
■ PRoW	Public Rights of Way
■ QUADRO	Queues and Delays at ROadworks
■ RSPB	Royal Society for the Protection of Birds
■ SAC	Special Area of Conservation
■ SATURN	Simulation and Assignment of Traffic to Urban Road Networks
■ SCC	Somerset County Council
■ SOBC	Strategic Outline Business Case
■ SoCC	Statement of Community Consultation
■ SSDC	South Somerset District Council
■ SSSI	Site of Special Scientific Interest
■ SuDS	Sustainable drainage systems
■ SWARMMS	South West Area Multi Modal Study
■ SWRTM	South West Regional Traffic Model

- TAG Transport Analysis Guidance
- TEAM Transparent Economic Assessment Model
- VOC Vehicle operating costs
- VfM Value for Money
- WebTAG Transport Analysis Guidance
- WFD Water Framework Directive

Appendix B Environmental constraints plan

Appendix C Appraisal summary tables

Appraisal Summary Table				Date Produced:		Oct-16		Contact:			
Name of Scheme:		A303 Sparkford to Ilchester - Option A2						Name		David Stock	
Description of Scheme:		The Scheme is to provide a dual carriageway on the A303 trunk road between Sparkford and Ilchester in Somerset. The Scheme links existing sections of dual carriageway and is likely to include grade separated interchanges and the removal of at-grade junctions and direct accesses. Option A2 follows the existing corridor of the A303 very closely. It is generally considered to be the online option although is often deliberately aligned just to the side of the existing carriageway in order to allow re-use of the existing route for local access, avoid property or facilitate construction. At its maximum offset the route is typically 100m either north or south of the existing A303.						Organisation		Highways England	
						Role		Promoter/Official			
Impacts		Summary of Key Impacts				Assessment					
				Quantitative		Qualitative		Monetary £(NPV)	Distributional 7-pt scale/ vulnerable grp		
Economy	Business users & transport providers	Journey time benefits by converting old single carriageway section to modern dual carriageway with associated junction improvements. Net journey time changes is the net of positive and negatives in a given time band. Monetary (NPV) includes both journey times and vehicle operating cost impacts.				Value of journey time changes(£) 105.6m		N/A	95.5m	Yes	
				Net journey time changes (£)							
		0 to 2min	2 to 5min	> 5min							
		9.9m	83m	12.6m							
	Reliability impact on Business users	Reliability benefits by converting old single carriageway section to modern dual carriageway with associated junction improvements.				N/A		N/A	3.9m		
	Regeneration	N/A				N/A		N/A			
	Wider Impacts	N/A				N/A		N/A			
Environmental	Noise	Results indicate an overall dis-benefit owing to re-alignment and traffic increases at residential areas currently affected by traffic noise. The traffic increases associated with this option would lead to an on balance increase in traffic noise at sensitive receptors which could result in nuisance impacts for the local population.				Households experiencing increased daytime noise in forecast year: 120. Households experiencing reduced daytime noise in forecast year: 16. Households experiencing increased night time noise in forecast year: 120. Households experiencing reduced night time noise in forecast year: 16		N/A	£-378,735	Yes	
	Air Quality	The WebTAG local air quality appraisal results show there is a net benefit in air quality within the study area. The scheme does not result in an exceedance of the NO2 or PM10 air quality standards or limit values (there are no PCM links in the study area) and is not within an existing AQMA. The regional assessment predicts an increase in emissions of NOx and PM10 primarily as a result of increased speeds on the network. Overall, the total change in NPV is negative indicating a net deterioration in air quality when considering both local and regional effects.				Local Air quality effects at properties (Improvements / No effect / Deterioration): NO2 2022 (122 / 1 / 175), PM10 2022 (52 / 71 / 175) Overall Assessment Score: NO2: (2022): -70.4, PM10: (2022): -30.4 Change in Regional Emissions: NOx (2022): 4.6 t/year, PM10 (2022): 0.06 t/year		N/A	Value of change in PM concentrations: £105,985 Value of change in NOx emissions: £-139,992 Total value of change in air quality: £-34,007	Yes	
	Greenhouse Gases	Increase in GHG emissions due to increased numbers of vehicles on the road network in future years, which leads to a negative NPV.				Change in non-traded carbon over 60y (CO2e) 113,551 Change in traded carbon over 60y (CO2e) 42		N/A	£-5,198,579		
	Landscape	The new route would have sections either online or very close to the existing A303 corridor which would result in impacts on landscape character and nearby visual receptors. Impacts would be minimised by limiting the highway corridor to an isolated area already characterised by a major road. The expansion to dual carriageway would be at odds with the local landscape pattern and scale. The eastern end of this option would be located within Hazlegrove House Registered Park and Garden, resulting in impacts on the setting of this feature. There would also be indirect impacts to the setting of other designated assets close to the scheme. This scheme option would be visible from local visual receptors such as residential properties and Public Rights of Way (PROW), including those within villages to the south at West Camel and Queen Camel which are designated Conservation Areas. Views would be limited in some areas where the route would pass in cutting, aiding the visual integration of the scheme, and limiting views of associated traffic in some areas.				N/A		Moderate Adverse	N/A		
	Townscape	N/A				N/A		N/A	N/A		
	Historic Environment	The proposed option would require large areas of medium value unknown archaeological buried remains to be excavated for the construction of the new route, resulting in potential damage. The route would cut through the southern section of Hazlegrove House Registered Park and Garden, removing elements of the historic parkland. In this context the road would be out of scale, visually intrusive and alter the context of the asset. Agricultural earthwork remains within the proposed route corridor, although of low value, would be fully removed by the scheme.				N/A		Moderate Adverse	N/A		
	Biodiversity	The option presents a Slight Adverse effect on Hazlegrove Park, Parsons Steeple and Camel Hill Transmitter Local Wildlife Sites (LWS), due to the close proximity of the option. The permanent loss of habitat listed on the Somerset Biodiversity Action Plan would result in a Slight Adverse effect. The proposed works have the potential to affect numerous protected species through the loss of habitats.				N/A		Slight Adverse	N/A		
	Water Environment	Option A2 would not be located within the flood plain and no rivers or streams would be crossed. There are a number of small drainage ditches and field drains within the area, which would be crossed. The potential incorporation of SuDS and pollution control measures within the drainage design would prevent any adverse effects. A precautionary Slight Adverse score has been assigned without mitigation.				N/A		Slight Adverse	N/A		
Social	Commuting and Other users	Journey time benefits by converting old single carriageway section to modern dual carriageway with associated junction improvements. Net journey time changes is the net of positive and negatives in a given time band. Monetary (NPV) includes both journey times and vehicle operating cost impacts.				Value of journey time changes(£) 116.8m		N/A	107.9m	Yes	
				Net journey time changes (£)							
		0 to 2min	2 to 5min	> 5min							
		11.6m	92.4m	12.8m							
		Reliability impact on Commuting and Other users	Reliability benefits by converting old single carriageway section to modern dual carriageway with associated junction improvements.				N/A		N/A	4.3m	
		Physical activity	Option A2 would require the severance of several PROw. However, it is considered likely that most of the severed routes will be replaced in the form of a crossing footbridge or underpass if deemed necessary following the Non-Motorised User (NMU) survey results. Given that the majority of severed NMU routes are proposed to be replaced, Option A2 has the potential to result in change to journey distances. At this stage, it is unknown whether journey distances will increase or decrease, and as such effects are considered to be Neutral.				N/A		Neutral	N/A	
		Journey quality	Option A2 is anticipated to improve traveller care through the provision of new signage and gantries. Traveller views are not anticipated to hugely alter with this option in place, with impacts anticipated to be Neutral as a result of the presence of additional road infrastructure and mitigation. Traveller stress is anticipated to significantly reduce on the whole, with the inclusion of new safety related infrastructure such as new lane markings, cat's eyes and road studs, as well as adequate NMU provisions ensuring the likelihood of encroachment onto the main road is minimised.				N/A		Moderate Beneficial	N/A	
		Accidents	Reduction in the number of PIAs and casualties by converting old single carriageway section to modern dual carriageway with associated junction improvements.				Reduction in casualties Fatal = 2, Serious = 19, Slight = 42		N/A	4.2m	Yes
		Security	Effects to security as a result of Option A2 are likely to be Neutral as there are not anticipated to be any changes to security indicators as a result of this proposed option.						Neutral	N/A	No
		Access to services	Access to services within the area are unlikely to be affected by Option A2. As such, no change is expected and Option A2 is considered to have a Neutral effect.				N/A		Neutral	N/A	No
	Affordability	Changes to vehicle operating costs and therefore changes to affordability as a result of Option A2 are unlikely. As such, no change is expected and Option A2 is considered to have a Neutral effect.				N/A		Neutral	N/A	No	
	Severance	Severance impacts to community facilities as a result of this option are anticipated to be slight given that the lack of NMU amenities connecting residents to them. There is also potential for severance to occur to additional facilities further than 250m from Option A2. Pedestrians could be dissuaded from making journeys to facilities on foot. NMU facilities would be installed at appropriate locations as determined by the NMU surveys, which would minimise severance impacts to pedestrian journeys.				N/A		Slight Adverse	N/A	Yes	
	Option and non-use values	The scheme is expected to have little or no impact on option and non-use values.				N/A		Neutral	N/A		
Public Account	Cost to Broad Transport Budget	The scheme will be funded through Central Government Funds				Central Government Funding: 111.7m		N/A	111.7m		
	Indirect Tax Revenues	There would be some increase in the tax being paid to the Exchequer				Central Government Funding: Wider Public Finances = 12.1m		N/A	12.1m		

Appraisal Summary Table				Date Produced:		Oct-16		Contact:					
Name of scheme:		A303 Sparkford to Ilchester - Option B4						Name		David Stock			
Description of Scheme:		The Scheme is to provide a dual carriageway on the A303 trunk road between Sparkford and Ilchester in Somerset. The Scheme links existing sections of dual carriageway and is likely to include grade separated interchanges and the removal of at-grade junctions and direct accesses. Option B4 takes an offline course to the north of the existing route. At its maximum distance the route is approximately 750m north of the existing A303.						Organisation		Highways England			
								Role		Promoter/Official			
Impacts		Summary of Key Impacts				Assessment							
						Quantitative			Qualitative	Monetary £(NPV)	Distributional 7-pt scale/ vulnerable grp		
Economy	Business users & transport providers	Journey time benefits by converting old single carriageway section to modern dual carriageway with associated junction improvements. Net journey time changes is the net of positive and negatives in a given time band. Monetary (NPV) includes both journey times and vehicle operating cost impacts.				Value of journey time changes(£)		100.1m		N/A	89.3m	Yes	
						Net journey time changes (£)							
		0 to 2min		2 to 5min		> 5min							
		3.4m		83.8m		12.9m							
	Reliability impact on Business users	Reliability benefits by converting old single carriageway section to modern dual carriageway with associated junction improvements.				N/A		N/A		N/A	3.7m		
	Regeneration	N/A				N/A		N/A		N/A			
	Wider Impacts	N/A				N/A		N/A		N/A			
Environmental	Noise	Results indicate an overall benefit owing to the removal of traffic from residential areas adjacent to the existing A303 to a more sparsely occupied area. The traffic decreases associated with this option would lead to an on balance decrease in traffic noise at sensitive receptors which would benefit the local population.				Households experiencing increased daytime noise in forecast year: 44. Households experiencing reduced daytime noise in forecast year: 107. Households experiencing increased night time noise in forecast year: 44. Households experiencing reduced night time noise in forecast year: 107		N/A		N/A	£489,807	Yes	
		The WebTAG local air quality results show there is a net benefit in air quality within the study area. The scheme does not result in an exceedance of the NO2 or PM10 air quality standards or limit values (there are no PCM links in the study area) and is not within an existing AQMA. The regional assessment predicts an increase in emissions of NOx and PM10 primarily as a result of increased speeds on the network. Overall, the total change in NPV is negative indicating a net deterioration in air quality when considering both local and regional effects.				Local Air quality effects at properties (Improvements / No effect / Deterioration): NO2 2022 (199 / 74 / 145), PM10 2022 (129 / 242 / 47) Overall Assessment Score: NO2: (2022): -91.2, PM10: (2022): -11.2 Change in Regional Emissions: NOx (2022): 4.5 t/year, PM10 (2022): 0.05 t/year		N/A		N/A	Value of change in PM concentrations: £47,719 Value of change in NOx emissions: £-135,995 Total value of change in air quality: £-88,277	Yes	
		Air Quality	Increase in GHG emissions due to increased numbers of vehicles on the road network in future years, which leads to a negative NPV.				Change in non-traded carbon over 60y (CO2e)		115,907		N/A	£-5,306,002	
		Greenhouse Gases					Change in traded carbon over 60y (CO2e)		46.38187097		N/A		
		Landscape	This route option would be situated in a rural and tranquil environment (nearly 1km from the existing A303) and would lead to a more notable change than other options in close proximity of the existing A303 corridor. This option would lead to a notable impact upon tranquillity in the area surrounding the scheme. The scheme would be set at the base of the hillside which rises to the south and could therefore be screened from the north through mitigation planting, given its low lying location. Existing far reaching views would be disrupted by the presence of the new route which would be visible from elevated ground in the south and would likely still be possible even with mitigation planting, although planting would still help to settle the Scheme in the surrounding landscape and reduce its visual prominence over time. The eastern end of the route would have a direct impact on the setting of Hazlegrave House Registered Park and Garden, with views likely from elevated positions. There would also be indirect impacts to the setting of other designated assets situated close to the scheme.				N/A		N/A		Large Adverse	N/A	
		Townscape	N/A				N/A		N/A		N/A		
		Historic Environment	The proposed option would require large areas of medium value unknown archaeological buried remains to be excavated for the construction of the new route, resulting in potential damage. The route would cut through the southern section of Hazlegrave House Registered Park and Garden, removing elements of the historic parkland, which would be out of scale, visually intrusive, alter the context of the asset and could remove evidence relating to earlier phases of the development of the parkland. The option would be in conflict with a Scheduled Monument, the context of the asset would be modified by the introduction of the intrusive new route approximately 100m north of the asset. Agricultural earthwork remains within the proposed route corridor, although of low value, would be fully removed.				N/A		N/A		Moderate Adverse	N/A	
		Biodiversity	The option presents a Slight Adverse effect on three of the thirteen LWSs identified in the surveyed area, due to the close proximity with these sites. The permanent loss of habitat listed on the Somerset Biodiversity Action Plan would result in a Slight Adverse effect. The proposed works have the potential to affect numerous protected species through the loss of habitats.				Not applicable		Slight Adverse		Not applicable		
	Water Environment	Option B4 would not be located within the flood plain and no rivers or streams would be crossed. There are a number of small drainage ditches and field drains within the area, which would be crossed. The potential incorporation of SuDS and pollution control measures within the drainage design would prevent any adverse effects. A precautionary Slight Adverse score has been assigned without mitigation.				N/A		Slight Adverse		N/A			
Social	Commuting and Other users	Journey time benefits by converting old single carriageway section to modern dual carriageway with associated junction improvements. Net journey time changes is the net of positive and negatives in a given time band. Monetary (NPV) includes both journey times and vehicle operating cost impacts.				Value of journey time changes(£)		111.7m		N/A	102.1m	Yes	
						Net journey time changes (£)							
		0 to 2min		2 to 5min		> 5min							
		5.5m		93.1m		13.1m							
		Reliability impact on Commuting and Other users	Reliability benefits by converting old single carriageway section to modern dual carriageway with associated junction improvements.				N/A		N/A		N/A	4.1m	
		Physical activity	Option B4 would require the severance of several PRoW. However, it is considered likely that most of the severed routes will be replaced in the form of a crossing footbridge or underpass if deemed necessary following the NMU survey results. Given that the majority of severed NEMU routes are proposed to be replaced, Option B4 has the potential to result in change to journey distances. At this stage, it is unknown whether journey distances will increase or decrease, and as such effects are considered to be Neutral.				N/A		Neutral		N/A		
		Journey quality	Option B4 is anticipated to improve traveller care through the provision of new signage and gantries. Traveller views are not anticipated to hugely alter with this option in place, with impacts anticipated to be Neutral as a result of the presence of additional road infrastructure and mitigation. Traveller stress is anticipated to significantly reduce on the whole, with the inclusion of new safety related infrastructure such as new lane markings, cat's eyes and road studs, as well as adequate NEMU provisions ensuring the likelihood of encroachment onto the main road is minimised.				N/A		Moderate Beneficial		N/A		
		Accidents	Reduction in the number of PIAs and casualties by converting old single carriageway section to modern dual carriageway with associated junction improvements.				Reduction in casualties Fatal = 2, Serious = 20, Slight = 63		N/A		4.9m	Yes	
		Security	Effects to security as a result of Option B4 are likely to be Neutral as there are not anticipated to be any changes to security indicators as a result of this proposed option.				N/A		Neutral		N/A	No	
		Access to services	Access to services within the area are unlikely to be affected by Option B4. As such, no change is expected and Option B4 is considered to have a Neutral effect.				N/A		Neutral		N/A	Yes	
	Affordability	Changes to vehicle operating costs and therefore changes to affordability as a result of Option B4 are unlikely. As such, no change is expected and Option B4 is considered to have a Neutral effect.				N/A		Neutral		N/A	No		
	Severance	Option B4 has the potential to result in severance to pedestrians journeys to community facilities. However, severance impacts to the community facilities are only anticipated to be slight given that the lack of NEMU amenities connecting residents to them. There is also potential for severance to occur to additional facilities further than 250m from Option B4. Pedestrians could be dissuaded from making journeys to facilities on foot. NEMU facilities would be installed at appropriate locations as determined by the NEMU surveys, which would minimise severance impacts to pedestrian journeys.				N/A		Slight Adverse		N/A	No		
	Option and non-use values	The Scheme is expected to have little or no impact on option and non-use values.				N/A		Neutral		N/A			
Public Accounts	Cost to Broad Transport Budget	The scheme will be funded through Central Government Funds				Central Government Funding: 111.7m		N/A		111.7m			
		There would be some increase in the tax being paid to the Exchequer				Central Government Funding: Wider Public Finances = 12.7m		N/A		12.7m			
		Indirect Tax Revenues											

Appraisal Summary Table		Date Produced:	Oct-16	Contact:			
Name of scheme:	A303 Sparkford to Ilchester - Option E4			Name	David Stock		
Description of scheme:	The Scheme is to provide a dual carriageway on the A303 trunk road between Sparkford and Ilchester in Somerset. The Scheme links existing sections of dual carriageway and is likely to include grade separated interchanges and the removal of at-grade junctions and direct accesses. Option E4 takes an offline course to the north of the existing A303. At its maximum distance the route is typically 350m north of the existing road.			Organisation	Highways England		
				Role	Promoter/Official		
Impacts	Summary of Key Impacts	Assessment					
		Quantitative		Qualitative	Monetary £(NPV)	Distributional 7-pt scale/ vulnerable grp	
Economy	Business users & transport providers	Journey time benefits by converting old single carriageway section to modern dual carriageway with associated junction improvements. Net journey time changes is the net of positive and negatives in a given time band. Monetary (NPV) includes both journey times and vehicle operating cost impacts.	Value of journey time changes(£)	99.6m	N/A	87.1m	Yes
			Net journey time changes (£)				
			0 to 2min	2 to 5min	> 5min		
			3.5m	83m	13m		
	Reliability impact on Business users	Reliability benefits by converting old single carriageway section to modern dual carriageway with associated junction improvements.	N/A		N/A	3.7m	
	Regeneration		N/A		N/A		
	Wider Impacts		N/A		N/A		
Environmental	Noise	Results indicate an overall dis-benefit owing to the alignment of Option E4 closer to properties currently unaffected by traffic noise. The traffic increases associated with this option would lead to an on balance increase in traffic noise at sensitive receptors which could result in nuisance impacts for the local population.	Households experiencing increased daytime noise in forecast year: 87. Households experiencing reduced daytime noise in forecast year: 30. Households experiencing increased night time noise in forecast year: 87. Households experiencing reduced night time noise in forecast year: 30.			£-154,535	Yes
	Air Quality	The WebTAG local air quality results show there is a net benefit in air quality within the study area. The scheme does not result in an exceedance of the NO2 or PM10 air quality standards or limit values (there are no PCM links in the study area) and is not within an existing AQMA. The regional assessment predicts an increase in emissions of NOx and PM10 primarily as a result of increased speeds on the network. Overall, the total change in NPV is negative indicating a net deterioration in air quality when considering both local and regional effects.	Local Air quality effects at properties (Improvements / No effect / Deterioration): NO2 2022 (173 / 75 / 170), PM10 2022 (103 / 244 / 71) Overall Assessment Score: NO2 (2022): minus -68.7, PM10: (2022): -15.9 Change in Regional Emissions: NOx (2022): 4.4 t/year, PM10 (2022): 0.04 t/year		N/A	Value of change in PM concentrations: £59,735 Value of change in NOx emissions: £-135,568 Total value of change in air quality: £-75,833	Yes
	Greenhouse Gases	Increase in GHG emissions due to increased numbers of vehicles on the road network in future years, which leads to a negative NPV.	Change in non-traded carbon over 60y (CO2e)	114,695	N/A	£-5,251,082	
			Change in traded carbon over 60y (CO2e)	42			
	Landscape	This option would in the most part run in close proximity to the existing A303 or online as it does in the most western extents. This option would require significant earthworks and extensive cutting traversing contours which would be visible, particularly to and from receptors in the north and the south with elevated views. This would be visually intrusive and affect landscape character as local topography is irreversibly altered. Mitigation planting alongside the new route would help to reduce the visual prominence of the cut and associated route and traffic over time, however it is unlikely it could be fully mitigated for. Direct impacts would be predicted to the setting of Hazlegrave House Registered Park and Garden, with the route footprint traversing the southern extents of this feature. It is not considered there would be an impact upon local Conservation Areas at West Camel and Queen Camel.	N/A		Large Adverse	N/A	
	Townscape		N/A		N/A	N/A	
	Historic Environment	The proposed option would require large areas of medium value unknown archaeological buried remains to be excavated for the construction of the new route, resulting in potential damage. The option would be constructed immediately north of the Camel Hill Farm Scheduled Monument; the north west corner of the asset would be graded resulting in the removal of potential archaeological remains within this section, which would directly damage this asset as well as altering its context. The route would cut through the southern section of Hazlegrave House Registered Park and Garden, removing elements of the historic parkland. The road would be out of scale, visually intrusive and alter the context of the asset. Agricultural earthwork remains within the proposed route corridor would be fully removed.	N/A		Large Adverse	N/A	
Biodiversity	The option presents a Slight Adverse effect on Hazlegrave Park and Parsons Steeple LWSs, due to the close proximity with these sites. The permanent loss of habitat listed on the Somerset Biodiversity Action Plan would result in a Slight Adverse effect. The proposed works have the potential to affect numerous protected species through the loss of habitats.	N/A		Slight Adverse	N/A		
Water Environment	Option E4 would not be located within the flood plain and no rivers or streams would be crossed. There are a number of small drainage ditches and field drains within the area, which would be crossed. The potential incorporation of SuDS and pollution control measures within the drainage design would prevent any adverse effects. A precautionary Slight Adverse score has been assigned without mitigation.	N/A		Slight Adverse	N/A		
Social	Commuting and Other users	Journey time benefits by converting old single carriageway section to modern dual carriageway with associated junction improvements. Net journey time changes is the net of positive and negatives in a given time band. Monetary (NPV) includes both journey times and vehicle operating cost impacts.	Value of journey time changes(£)	112m	N/A	100.9m	Yes
			Net journey time changes (£)				
			0 to 2min	2 to 5min	> 5min		
				6.1m	92.6m	13.3m	
	Reliability impact on Commuting and Other users	Reliability benefits by converting old single carriageway section to modern dual carriageway with associated junction improvements.	N/A		N/A	4.1m	
	Physical activity	Option E4 would require the severance of several PRoW. However, it is considered likely that most of the severed routes will be replaced in the form of a crossing footbridge or underpass if deemed necessary following the NMU survey results. Given that the majority of severed NMU routes are proposed to be replaced, Option E4 has the potential to result in change to journey distances. At this stage, it is unknown whether journey distances will increase or decrease, and as such effects are considered to be Neutral.	N/A		Neutral	N/A	
	Journey quality	Option E4 is anticipated to improve traveller care through the provision of new signage and gantries. Traveller views are not anticipated to hugely alter with this option in place, with impacts anticipated to be Neutral as a result of the presence of additional road infrastructure and mitigation. Traveller stress is anticipated to significantly reduce on the whole, with the inclusion of new safety related infrastructure such as new lane markings, cat's eyes and road studs, as well as adequate NMU provisions ensuring the likelihood of encroachment onto the main road is minimised.	N/A		Moderate Beneficial	N/A	
	Accidents	Reduction in the number of PIAs and casualties by converting old single carriageway section to modern dual carriageway with associated junction improvements.	Reduction in casualties Fatal = 2, Serious = 19, Slight = 75			5.1m	Yes
	Security	Effects to security as a result of Option E4 are likely to be Neutral as there are not anticipated to be any changes to security indicators as a result of this proposed option.	N/A		Neutral	N/A	No
	Access to services	Access to services within the area are unlikely to be affected by Option E4. As such, no change is expected and Option E4 is considered to have a Neutral effect.	N/A		Neutral	N/A	Yes
Affordability	Changes to vehicle operating costs and therefore changes to affordability as a result of Option E4 are unlikely. As such, no change is expected and Option E4 is considered to have a Neutral effect.	N/A		Neutral	N/A	No	
Severance	Option E4 has the potential to result in severance to pedestrians journeys to community facilities. However, severance impacts to the community facilities are only anticipated to be slight given that the lack of NMU amenities connecting residents to them. There is also potential for severance to occur to additional facilities further than 250m from Option A2. Pedestrians could be dissuaded from making journeys to facilities on foot. NMU facilities would be installed at appropriate locations as determined by the NMU surveys, which would minimise severance impacts to pedestrian journeys.	N/A		Slight Adverse	N/A	NO	
Option and non-use values	The scheme is expected to have little or no impact on option and non-use values.	N/A		Neutral	N/A		
Public Account	Cost to Broad Transport Budget	The scheme will be funded through Central Government Funds	Central Government Funding: 114.4m		N/A	114.4m	
	Indirect Tax Revenues	There would be some increase in the tax being paid to the Exchequer	Central Government Funding: Wider Public Finances = 13.7m		N/A	13.7m	

Appraisal Summary Table			Date produced:		Oct-16		Contact:					
Name of scheme:		A303 Sparkford to Ilchester - Option F1					Name		David Stock			
Description of scheme:		The Scheme is to provide a dual carriageway on the A303 trunk road between Sparkford and Ilchester in Somerset. The Scheme links existing sections of dual carriageway and is likely to include grade separated interchanges and the removal of at-grade junctions and direct accesses. Option F1 also takes an offline course to the north of the existing A303. At its maximum distance the route is approximately 1,000m north of the existing A303.					Organisation		Highways England			
							Role		Promoter/Official			
Impacts		Summary of key impacts			Assessment							
					Quantitative		Qualitative		Monetary £(NPV)	Distributional 7-pt scale/ vulnerable grp		
Economy	Business users & transport providers	Journey time benefits by converting old single carriageway section to modern dual carriageway with associated junction improvements. Net journey time changes is the net of positive and negatives in a given time band. Monetary (NPV) includes both journey times and vehicle operating cost impacts.			Value of journey time changes(£)		97.1m		N/A	83.6m	Yes	
					Net journey time changes (£)							
					0 to 2min	2 to 5min	> 5min					
					3.1m	81.3m	12.8m					
	Reliability impact on Business users	Reliability benefits by converting old single carriageway section to modern dual carriageway with associated junction improvements.			N/A		N/A		3.6m			
	Regeneration	N/A			N/A		N/A					
	Wider Impacts	N/A			N/A		N/A					
Environmental	Noise	Results indicate an overall benefit owing to the removal of traffic from residential areas adjacent to the existing A303 to a more sparsely occupied area. The traffic decreases associated with this option would lead to an on balance decrease in traffic noise at sensitive receptors which would benefit the local population.			Households experiencing increased daytime noise in forecast year: 51. Households experiencing reduced daytime noise in forecast year: 102. Households experiencing increased night time noise in forecast year: 51. Households experiencing reduced night time noise in forecast year: 102		N/A		NPV: £593,327	Yes		
	Air Quality	The WebTAG local air quality results show there is a net benefit in NO2 and a net deterioration in PM10 within the study area in the opening year. The scheme does not result in an exceedance of the NO2 or PM10 air quality objectives or limit values (there are no PCM links in the study area) and is not within an existing AQMA. The regional assessment predicts an increase in emissions of NOx and PM10 primarily as a result of increased speeds on the network. Overall, the total change in NPV is negative indicating a net deterioration in air quality when considering both local and regional effects.			Local Air quality effects at properties (Improvements / No effect / Deterioration): NO2 2022 (183 / 58 / 56), PM10 2022 (113 / 128 / 56) Overall Assessment Score: NO2: (2022): -113.2, PM10: (2022): 5.5 Change in Regional Emissions: NOx (2022): 5.1 t/year, PM10 (2022): 0.1 t/year		N/A		Value of change in PM concentrations: £4,777 Value of change in NOx emissions: £-153,567 Total value of change in air quality: £-148,790	Yes		
	Greenhouse Gases	Increase in GHG emissions due to increased numbers of vehicles on the road network in future years, which leads to a negative NPV.			Change in non-traded carbon over 60y (CO2e)		148,081		N/A	£-6,780,630		
						Change in traded carbon over 60y (CO2e)		102				
		Landscape	This option would be situated in an otherwise rural and tranquil environment and would be at greater odds with existing landscape features than options closer to the existing A303 corridor. There would be a notable impact upon tranquillity in the area surrounding the scheme. Whilst the scheme would be set at the base of the hillside, existing far reaching views from elevated views in the south would be disrupted by the presence of the new route in the field of view. Planting would help to settle the scheme in the surrounding landscape and reduce its visual prominence over time. The eastern end of the route would result in direct impacts on the setting of Hazlegrove House Registered Park and Garden, with anticipated views from elevated positions looking south towards the scheme. There would also be indirect impacts to the setting of other designated assets close to the scheme, with the exception of the Scheduled Monument at Downhead, where the setting of this asset would be affected.			N/A		Large Adverse		N/A		
	Townscape	N/A			N/A		N/A		N/A			
	Historic Environment	The proposed option would require large areas of medium value unknown archaeological buried remains to be excavated for the construction of the new route, resulting in potential damage. The route would cut through the southern section of Hazlegrove House Registered Park and Garden, removing elements of the historic parkland, which would be out of scale, visually intrusive and alter the context of the asset and could remove evidence. The agricultural, rural context of Downhead Manor Farm Scheduled Monument would be modified by the introduction of the intrusive new route approximately 100m north of the asset. Agricultural earthwork remains within the proposed route corridor would be fully removed.			N/A		Moderate Adverse		N/A			
	Biodiversity	The option presents a Moderate effect on Annis Hill LWS due to the location within the footprint of this option. The permanent loss of habitat that would result from this option would be in a Slight Adverse effect, given the conservation value of the habitat types, whilst for those habitats listed on the Somerset Biodiversity Action Plan, a Moderate effect would be anticipated. The proposed works have the potential to affect numerous protected species through the loss of habitats.			N/A		Moderate Adverse		N/A			
	Water Environment	Option F1 would not be located within the flood plain and no rivers or streams would be crossed. There are a number of small drainage ditches and field drains within the area, which would be crossed. The potential incorporation of SuDS and pollution control measures within the drainage design would prevent any adverse effects. A precautionary Slight Adverse score has been assigned without mitigation.			N/A		Slight Adverse		N/A			
Social	Commuting and Other users	Journey time benefits by converting old single carriageway section to modern dual carriageway with associated junction improvements. Net journey time changes is the net of positive and negatives in a given time band. Monetary (NPV) includes both journey times and vehicle operating cost impacts.			Value of journey time changes(£)		109.1m		N/A	97.2m	Yes	
					Net journey time changes (£)							
					0 to 2min	2 to 5min	> 5min					
					5m	91m	13m					
		Reliability impact on Commuting and Other users	Reliability benefits by converting old single carriageway section to modern dual carriageway with associated junction improvements.			N/A		N/A		4m		
		Physical activity	Option F1 would require the severance of several PRoW, although most of the severed routes would be replaced in the form of a crossing footbridge or underpass if deemed necessary following the NMU survey results. Given that the majority of severed NMU routes are proposed to be replaced, Option F1 has the potential to result in change to journey distances. At this stage, it is unknown whether journey distances will increase or decrease.			N/A		Neutral		N/A		
		Journey quality	Option F1 is anticipated to improve traveller care through the provision of new signage and gantries. Traveller views would be largely enclosed by mitigation planting and would include new infrastructure including signs and gantries; these views are anticipated to be Neutral given that there is no baseline in which conditions can be compared. Traveller stress is anticipated to significantly reduce on the whole, with the inclusion of new safety related infrastructure such as new lane markings, cat's eyes and road studs, as well as adequate NMU provisions ensuring the likelihood of encroachment onto the main road is minimised.			N/A		Moderate Beneficial		N/A		
		Accidents	Reduction in the number of PIAs and casualties by converting old single carriageway section to modern dual carriageway with associated junction improvements.			Reduction in casualties Fatal = 3, Serious = 21, Slight = 76		N/A		5.2m	Yes	
		Security	Effects to security as a result of Option F1 are likely to be Neutral as there are not anticipated to be any changes to security indicators as a result of this proposed option.			N/A		Neutral		N/A	No	
		Access to services	Access to services within the area are unlikely to be affected by Option F1. As such, no change is expected and Option F1 is considered to have a Neutral effect.			N/A		Neutral		N/A	Yes	
	Affordability	Changes to vehicle operating costs and therefore changes to affordability as a result of Option F1 are unlikely. As such, no change is expected and Option F1 is considered to have a Neutral effect.			N/A		Neutral		N/A	No		
	Severance	Option F1 has the potential to result in severance to pedestrians journeys to community facilities. However, severance impacts to the community facilities are only anticipated to be slight given that the lack of NMU amenities connecting residents to them. There is also potential for severance to occur to additional facilities further than 250m from Option F1. Pedestrians could be dissuaded from making journeys to facilities on foot. NMU facilities would be installed at appropriate locations as determined by the NMU surveys, which would minimise severance impacts to pedestrian journeys.			N/A		Slight Adverse		N/A	No		
	Option and non-use values	The scheme is expected to have little or no impact on option and non-use values.			N/A		Neutral		N/A			
Public Account	Cost to Broad Transport Budget	The scheme will be funded through Central Government Funds			Central Government Funding: 101.2m		N/A		101.2m			
	Indirect Tax Revenues	There would be some increase in the tax being paid to the Exchequer			Central Government Funding: Wider Public Finances = 14.2m		N/A		14.2m			

Appendix D Scheme programme

Activity ID	Activity Name	Start	Finish	Original Duration	Total Float	2017 2018 2019 2020 2021 2022 2023 2024																											
						Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
A303 Sparkford to Ilchester																																	
Summary Schedule																																	
Key Milestones																																	
A55860	SGAR 0	23-Dec-15 A		0	0	◆ SGAR 0																											
A55870	SGAR 1		11-Nov-16*	0	17	◆ SGAR 1																											
A55920	Commence Public Consultation	28-Nov-16		0	0	◆ Commence Public Consultation, 28-Nov-16																											
A55880	SGAR 2		12-Jul-17	0	0	◆ SGAR 2																											
A55930	Ministerial Preferred Route Announcement PRA (latest date)		07-Sep-17	0	0	◆ Ministerial Preferred Route Announcement PRA (latest date)																											
A55890	SGAR 3 (and Portfolio Office review)		14-Jun-18	0	0	◆ SGAR 3 (and Portfolio Office review)																											
A56440	Decision Point		14-Jun-18	0	0	◆ Decision Point																											
A55940	Application for DCO	15-Jun-18		0	0	◆ Application for DCO, 15-Jun-18																											
A55900	SGAR 4 (and Portfolio Office Review)		06-Aug-19	0	0	◆ SGAR 4 (and Portfolio Office Review)																											
A56410	Publish DCO (Latest Date)		31-Oct-19	0	0	◆ Publish DCO (Latest Date)																											
A56420	Secretary of State Decision (Latest Date)		31-Oct-19	0	0	◆ Secretary of State Decision (Latest Date)																											
A55910	SGAR 5		19-Dec-19	0	0	◆ SGAR 5																											
A56430	End of Legal Challenge Period		19-Dec-19	0	0	◆ End of Legal Challenge Period																											
A55970	Start of Construction (Entry by Negotiation)	23-Mar-20		0	0	◆ Start of Construction (Entry by Negotiation), 23-Mar-20																											
A55960	Scheme Open to Traffic		08-Feb-23	0	0	◆ Scheme Open to Traffic																											
PCF Stages																																	
A55980	PCF Stage 0	01-Jun-15 A	26-Jun-24	2141	0																												
A55990	PCF Stage 1	19-Oct-15 A	11-Nov-16	0	0	PCF Stage 1																											
A56000	PCF Stage 2	29-Nov-16	07-Sep-17	192	0	PCF Stage 2																											
A56010	PCF Stage 3	08-Sep-17	14-Jun-18	190	0	PCF Stage 3																											
A56020	PCF Stage 4	15-Jun-18	06-Aug-19	286	0	PCF Stage 4																											
A56030	PCF Stage 5	07-Aug-19	20-Mar-20	156	0	PCF Stage 5																											
A56040	PCF Stage 6	23-Mar-20	08-Feb-23	746	0	PCF Stage 6																											
A56050	PCF Stage 7	09-Feb-23	26-Jun-24	360	0	PCF Stage 7																											
Stage 1 - Option Identification																																	
Key Milestones																																	
A8630	Two Week Period	11-Nov-16	25-Nov-16	10	0	■ Two Week Period																											
A5120	SGAR 1		11-Nov-16	0	0	◆ SGAR 1																											
A8640	Scheme Ready for Consultation		28-Nov-16	0	0	◆ Scheme Ready for Consultation																											
Deliverable Tracking																																	
A4440	Issue for Comment Technical Appraisal Report	10-Oct-16		0	0	◆ Issue for Comment Technical Appraisal Report, 10-Oct-16																											
A4760	Issue for SRO sign-off Technical Appraisal Report	31-Oct-16		0	0	◆ Issue for SRO sign-off Technical Appraisal Report, 31-Oct-16																											
A48500	Technical Appraisal Report signed off by SRO		04-Nov-16	0	0	◆ Technical Appraisal Report signed off by SRO																											
Highways England Scheme Input																																	
A4460	Highways England Comment on Technical Appraisal Report (CONSULTATION)	10-Oct-16	21-Oct-16	10	0	■ Highways England Comment on Technical Appraisal Report (CONSULTATION)																											
A4770	Highways England Approve Technical Appraisal Report	31-Oct-16	04-Nov-16	5	0	■ Highways England Approve Technical Appraisal Report																											
A7220	Final Sign off by Senior Responsible Officer prior to SGAR1	07-Nov-16	11-Nov-16	5	0	■ Final Sign off by Senior Responsible Officer prior to SGAR1																											
Infrastructure																																	
A48000	Include delivery schedule - Justin Barnett	21-Sep-16 A	26-Jun-24	1979	0	■ Include delivery schedule - Justin Barnett																											
A48030	10.1 Appraisal summary tables (ASTs)	21-Sep-16 A	04-Oct-16	10	0	■ 10.1 Appraisal summary tables (ASTs)																											
A47970	10.1 Appraisal summary tables (ASTs)	22-Sep-16 A	04-Oct-16	9	0	■ 10.1 Appraisal summary tables (ASTs)																											
A48020	12.2 Preferred solution	28-Sep-16 A	04-Oct-16	5	0	■ 12.2 Preferred solution																											
A48050	Collate Technical Appraisal Report	05-Oct-16	07-Oct-16	3	0	■ Collate Technical Appraisal Report																											
A4600	Amend Technical Appraisal Report	24-Oct-16	28-Oct-16	5	0	■ Amend Technical Appraisal Report																											
A48420	11 Conclusions and recommendations	19-Jun-24	26-Jun-24	6	0	■ 11 Conclusions and recommendations																											
Statutory Process																																	
A46670	Book door to door letter drop (Royal Mail) (6 weeks)	05-Oct-16	06-Oct-16	1	0	■ Book door to door letter drop (Royal Mail) (6 weeks)																											
A46790	Pre-consultation event Cabinet briefing (Local Authority Level)	10-Oct-16	24-Oct-16	10	0	■ Pre-consultation event Cabinet briefing (Local Authority Level)																											
A46810	Notify MP S42 (4 weeks before consultation)	31-Oct-16	28-Nov-16	20	0	■ Notify MP S42 (4 weeks before consultation)																											
A46820	Dispatch consultation material to RM depot (all mailed media)	17-Nov-16	18-Nov-16	1	0	■ Dispatch consultation material to RM depot (all mailed media)																											
A46850	Highways England press release	18-Nov-16	21-Nov-16	1	0	■ Highways England press release																											
A46830	Commence S47 door to door distribution	21-Nov-16	28-Nov-16	5	0	■ Commence S47 door to door distribution																											
A46870	Update scheme web page with planned consultation material	21-Nov-16	28-Nov-16	5	0	■ Update scheme web page with planned consultation material																											
A46880	Distribute consultation material to deposit sites	21-Nov-16	28-Nov-16	5	0	■ Distribute consultation material to deposit sites																											
A46890	Pre-consultation team briefing session	25-Nov-16	28-Nov-16	1	0	■ Pre-consultation team briefing session																											
A46900	Consultation pre-check/setup - materials and staff	25-Nov-16	28-Nov-16	1	0	■ Consultation pre-check/setup - materials and staff																											
A46920	Consultation GO LIVE	28-Nov-16	20-Jan-17	33	0	■ Consultation GO LIVE																											
A46871	Consultation web page go live	28-Nov-16		0	0	◆ Consultation web page go live, 28-Nov-16																											
A46950	Prepare and distribute for review	20-Jan-17	27-Jan-17	5	0	■ Prepare and distribute for review																											
Stage 2 - Option Selection																																	
Key Milestones																																	
A5470	Approvals	15-Jun-17	12-Jul-17	20	0	■ Approvals																											
A5530	SGAR 2		12-Jul-17	0	0	◆ SGAR 2																											
A7070	Ministerial Preferred Route Announcement PRA (latest date)		07-Sep-17	0	0	◆ Ministerial Preferred Route Announcement PRA (latest date)																											

▶ Remaining Level of Effort
 ■ Actual Work
 ■ Critical Remaining ...
▶ Actual Level of Effort
 ■ Remaining Work
 ◆ ◆ Milestone

Activity ID	Activity Name	Start	Finish	Original Duration	Total Float	2017				2018				2019				2020				2021				2022				2023				2024			
						Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4		
Assessment																																					
A5050	Environmental Assessment Report	20-Jan-17	12-Jul-17	120	0	█ Environmental Assessment Report																															
A5480	AIES	17-May-17	14-Jun-17	20	0	█ AIES																															
A5500	AIES EG Review and Iterations	15-Jun-17	28-Jun-17	10	0	█ AIES EG Review and Iterations																															
A5510	Natural England Approval of AIES	29-Jun-17	12-Jul-17	10	0	█ Natural England Approval of AIES																															
Infrastructure																																					
A5080	Complete Preferred Option	09-Jan-17	17-Mar-17	50	0	█ Complete Preferred Option																															
Governance																																					
A5540	IDC 2	13-Jul-17	09-Aug-17	20	0	█ IDC 2																															
A5550	OGC 2	13-Jul-17	09-Aug-17	20	0	█ OGC 2																															
A5560	Ministerial Preferred Route Announcement PRA	10-Aug-17	07-Sep-17	20	0	█ Ministerial Preferred Route Announcement PRA																															
Stage 3 - Preliminary Design																																					
Key Milestones																																					
A5770	Design Fix 3	16-Mar-18	14-Jun-18	60	0	◆ Design Fix 3																															
A5820	Approvals	17-May-18	14-Jun-18	20	0	█ Approvals																															
A5830	SGAR 3 (and Portfolio Office review)		14-Jun-18	0	0	◆ SGAR 3 (and Portfolio Office review)																															
A5840	Decision Point		14-Jun-18	0	0	◆ Decision Point																															
Statutory Process																																					
A5630	Consult Local Authorities on SoCC	08-Sep-17	02-Nov-17	40	0	█ Consult Local Authorities on SoCC																															
A5660	Publish Updated SoCC	03-Nov-17	30-Nov-17	20	0	█ Publish Updated SoCC																															
A5680	S48 Publicity	01-Dec-17	02-Feb-18	40	0	█ S48 Publicity																															
A5720	Prepare Application	22-Jan-18	16-Mar-18	40	0	█ Prepare Application																															
A5750	Detailed S42 Consultation	05-Feb-18	02-Mar-18	20	0	█ Detailed S42 Consultation																															
A5740	Detailed S47 Consultation (if required)	05-Feb-18	02-Mar-18	20	0	█ Detailed S47 Consultation (if required)																															
A5780	Finalise Pre-Application Consultation Report & Application	19-Mar-18	16-May-18	40	0	█ Finalise Pre-Application Consultation Report & Application																															
Stage 4 - Statutory Procedures and Powers																																					
Key Milestones																																					
A6040	SGAR 4 (and Portfolio Office Review)	06-Aug-19	06-Aug-19	0	0	◆ SGAR 4 (and Portfolio Office Review)																															
Governance																																					
A5850	Ministerial Approval	15-Jun-18	12-Jul-18	20	0	█ Ministerial Approval																															
Statutory Process																																					
A5860	Acceptance (Validation Period)	15-Jun-18	12-Jul-18	20	0	█ Acceptance (Validation Period)																															
A5900	Application for DCO	15-Jun-18		0	0	◆ Application for DCO, 15-Jun-18																															
A5910	Issue Notices	13-Jul-18	21-Sep-18	50	0	█ Issue Notices																															
A48490	Planning Inspectorate publish EIA Notification		21-Sep-18	0	0	◆ Planning Inspectorate publish EIA Notification																															
A5920	Rule 6 Letter Preliminary Meeting	24-Sep-18	16-Nov-18	40	0	█ Rule 6 Letter Preliminary Meeting																															
A5930	Preliminary Meeting	19-Nov-18	19-Nov-18	1	0	█ Preliminary Meeting																															
A5940	Rule 8 Letter	20-Nov-18	17-Dec-18	20	0	█ Rule 8 Letter																															
A5950	Written Question	18-Dec-18	23-Jan-19	20	0	█ Written Question																															
A5960	Written Reps	24-Jan-19	20-Feb-19	20	0	█ Written Reps																															
A5970	LIR Submitted	21-Feb-19	20-Mar-19	20	0	█ LIR Submitted																															
A6000	Hearings, Responses & Comments	21-Mar-19	13-May-19	35	0	█ Hearings, Responses & Comments																															
A6020	PINS Recommendation	14-May-19	06-Aug-19	60	0	█ PINS Recommendation																															
Stage 5 - Construction Preparation																																					
Key Milestones																																					
A55820	SGAR 5	19-Dec-19	20-Mar-20	60	0	◆ SGAR 5																															
A6160	Notice to proceed		20-Mar-20	0	0	◆ Notice to proceed																															
Statutory Process																																					
A6050	SOS Decision	07-Aug-19	30-Oct-19	60	0	█ SOS Decision																															
A48660	Publish DCO	31-Oct-19	31-Oct-19	1	0	█ Publish DCO																															
A6100	Legal Challenge Period	01-Nov-19	19-Dec-19	35	0	█ Legal Challenge Period																															
A55830	Prepare Notices to Treat and Enter	22-Nov-19	19-Dec-19	20	0	█ Prepare Notices to Treat and Enter																															
Governance																																					
A6140	Final Business Case	20-Dec-19	24-Jan-20	20	0	█ Final Business Case																															
A55780	ICF3 Funding Approval	27-Jan-20	21-Feb-20	20	0	█ ICF3 Funding Approval																															
A55790	HIB3 Funding Approval	27-Jan-20	21-Feb-20	20	0	█ HIB3 Funding Approval																															
A55800	OGC3	27-Jan-20	21-Feb-20	20	0	█ OGC3																															
A55810	Ministerial Approval	24-Feb-20	20-Mar-20	20	0	█ Ministerial Approval																															
Stage 6 - Construction, Commissioning and Handover																																					
A6180	Contractor Mobilisation	24-Feb-20	21-Apr-20	40	0	█ Contractor Mobilisation																															
A6190	Start of Construction (Entry by Negotiation)	23-Mar-20		0	0	◆ Start of Construction (Entry by Negotiation), 23-Mar-20																															
A6200	Construction	23-Mar-20	08-Feb-23	746	0	█ Construction																															
A6210	End of Construction		08-Feb-23	0	0	◆ End of Construction																															
A55950	Scheme Open to Traffic		08-Feb-23	0	0	◆ Scheme Open to Traffic																															
Stage 7 - Closeout																																					
A6220	Project Closeout	09-Feb-23	26-Jun-24	360	0	█ Project Closeout																															
A6230	Project Complete		26-Jun-24	0	0	◆ Project Complete																															

█ Remaining Level of Effort
 █ Actual Work
 █ Critical Remaining ...
█ Actual Level of Effort
 █ Remaining Work
 ◆ Milestone

If you need help accessing this or any other Highways England information, please call **0300 123 5000** and we will help you.

