A303
Sparkford to Ilchester
Dualling Scheme

Scheme Assessment Report

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Executive Summary

Introduction

Dualling of the A303 between Sparkford and Ilchester in Somerset was announced in the *Road Investment Strategy: for the 2015/16 – 2019/20 Road Period* (Department for Transport, December 2014, update March 2015) and is currently in the option selection stage.

The A303/A30 corridor forms part of the Strategic Road Network (SRN) and provides a main arterial link connecting London and the South East of England with Wiltshire, Dorset, Somerset, Devon and Cornwall in the South West of England. The corridor is used heavily by business and leisure traffic and is of critical importance to the varied economy of South West England. Not only is the A303 an important strategic long-distance road, it is also locally important, connecting several towns along the corridor including Andover, Amesbury, Salisbury, Shaftesbury, Warminster, Yeovil and Honiton.

This existing section of the A303 is predominantly single 2-lane carriageway with a short section of single 3-lane carriageway at its eastern end. It is subject to a 50mph speed limit and has long sections where overtaking is not permitted. There are several local road junctions, accesses to property and parking laybys. This section of road connects with existing dual carriageway sections of the A303 at Hazlegrove Roundabout near Sparkford to the east and at the junction with the B3151 to Podimore to the west.

The proposed scheme will create a continuous dual carriageway along this part of the A303 and will remove the existing at-grade junctions and direct accesses to property.

Key dates in the current programme include:

Preferred route announcement……....	Autumn 2017
Statutory Public Consultation	Early 2018
Submit DCO application……	Summer 2018
Secretary of State decision on DCO application…….	Winter 2019
Start of construction…….	Spring 2020
End of construction…….	Winter 2022/23

This report presents a summary of the results of the traffic and economic appraisal work carried out for this scheme at the option selection stage. It also includes the key findings of the non-statutory public consultation held in February and March 2017. From a review of this work, a recommendation is made as to the preferred route.

Scheme brief

The objectives for the A303 Sparkford to Ilchester scheme are set out in the *Client Scheme Requirements* (Highways England, last updated August 2017). Overarching the specific scheme requirements is the Department for Transport's aspiration for the strategic road network to be smoother, smarter and sustainable by 2040.

Existing setting

The A303 between Sparkford and Ilchester is in the South Somerset District of Somerset County. The proposed scheme sits within the National Character Area of the Yeovil Scarplands, which is characterised by a series of broad ridges and steep scarps separating sheltered clay vales. The landscape character of this section of A303 is largely rural with large geometric field patterns, narrow lanes, and thick hedgerows.

To the south of this section of road are a number of village settlements whilst the land to the north is more sparsely populated. The most notable settlement near the existing route is the Royal Naval Air Station (RNAS) Yeovilton which incorporates the Fleet Air Arm Museum, a noteworthy tourist attraction.

The A303 at this location is currently on a ridge line with lower ground located to the north and south. There are no river, rail or major road crossings along this section. Several statutory undertakers are known to have equipment in the area that may require protection or diversion depending on the scheme option chosen.

Existing traffic

The road currently experiences high levels of congestion and poor journey time reliability particularly at weekends and in the summer months consistent with weekly commuting traffic patterns and its use as summer holiday route. It is considered that the current delays and queues are caused by insufficient traffic capacity.

A base year traffic model has been prepared which shows that a significant amount of local traffic uses this section of the A303.

Journey time reliability has also been assessed which is defined as variation in journey times that transport users are unable to predict. An assessment of journey time reliability has been undertaken for a weekday in the neutral working month of October in accordance with Department for Transport guidelines. It should be noted that the Department for Transport method does not capture the high flow and stress levels during weekend, bank holiday and school holiday periods. For the neutral month weekday, the existing road suffers stress levels such that a scheme solution would achieve slight beneficial effects.

Accident rates on this road have been found to be above the national rate for A class trunk roads, 162 accidents per billion vehicle-kms travelled compared with the national rate of 113 accidents per billion vehicle-kms travelled.

Existing constraints

A number of constraints to development exist within the vicinity of this section of the A303 which can be seen on the constraints plan in Appendix B of this report. These include:

- Environmental constraints:
  - Scheduled Monuments
  - Site of Special Scientific Interest
  - Special Areas of Conservation for bats
  - Ancient woodland (and other Biodiversity Action Plan habitats)

- Local Wildlife Sites
- Rivers and areas of water
- Areas susceptible to surface water flooding
- Flood Zones 2 and 3
- Local Geological Sites
- Registered Common Land
- Noise Important Areas
- Registered Parks and Gardens
- Utilities
- Conservation Areas
- National Trust Land
- Historic Landfill
- Archaeological events and finds
- Surface Water Nitrate Vulnerable Zones

· Land-use and community constraints:
  - Listed buildings
  - Public Rights of Way
  - Planning applications
  - Strategic Development Areas

  Areas of tourism

Planning factors

A review of current legislation and planning policy has been carried out. This has identified the current international, European and national legislation and planning policy that the scheme would need to meet in relation to:

· Air quality
· Cultural heritage
· Nature conservation and biodiversity
· Noise and vibration
· Road drainage and the water environment
· Geology, soils and materials
· Climate change
· Environmental planning

The review has further identified funding that may be available to help meet a key environmental objective of the Highways England's *Strategic Business Plan 2015-2020* (Highways England, December 2014). The objective is for an 'improved environment'. 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. Those of relevance to this scheme include:

· Environment: A £300 million fund to deliver specific enhancements to the network.
· Cycling, Safety and Integration: A £250 million fund to deliver improved outcomes for those living or working near the network.

A review of local planning policy has identified the following which will need to be taken into account in the further development of this scheme:

- *South Somerset District Council's Local Plan 2026-2028*
- *South Somerset District Council Housing and Economic Land Availability Assessment Report* (February 2017)
- *Somerset County Council's Future Transport Plan 2011-2026*

Do nothing consequences

The Annual Average Daily Traffic (AADT) along this section of the A303 was 23,500 in the 2015 base year scenario, which compares against a Congestion Reference Flow (CRF) of approximately 28,400. The CRF gives an indication of the flow level at which the route is likely to experience congestion during the peak periods on an average day. However, this route carries much higher traffic levels during holiday periods and weekends when this section of the route currently experiences regular occurrences of delay and congestion.

The AADT is forecast to increase to 33,500 by 2038, which indicates that the A303 would not have enough capacity, leading to increased queuing and congestion on an average day as well as during holidays and weekends.

When combined with additional forecast trips due to proposed future developments, the journey time is forecast to increase by 2038 by between 2 to 5 minutes during weekday peak and interpeak time periods and by over 6 minutes during the August weekend period. Congestion acts as a constraint to development, and has an impact on the productivity and attractiveness of the South West as a key holiday destination. The severity of these issues is likely to increase if no action is taken.

Alternative schemes

The *Technical Appraisal* Report (Highways England, November 2016) recommended two options to be assessed and taken to non-statutory public consultation at the option selection stage. These are:

- Route option 1 which would follow the existing corridor of the A303 very closely
- Route option 2 which take an offline course to the north of the existing route

It is proposed that the new road will be a dual carriageway with two lanes in each direction and subject to the national speed limit. There will be no at-grade junctions or direct accesses to the road. It will be accessed via slip roads connecting to grade-separated junctions. Existing local roads will either be diverted to connect with one of these new junctions or bridges across the new road will be provided to maintain existing north-south links. Design development at this stage is compliant with geometric design standards.

An outline non-motorised user (NMU) strategy has been developed based on feedback from local users groups, the Somerset County Council's Right of Way Officers, NMU surveys and a NMU audit undertaken during the option identification stage. For each proposed options, the strategy has identified each known NMU route which currently crosses the line of that options. For each NMU route, the strategy involves either diverting the route to a crossing

point or maintaining the route on its existing line via a bridge across the new road. Specific details are contained in Chapter 5.5of this report.

Development of the options has included preliminary consideration of structures, earthworks, drainage, statutory undertakers' services lighting and technology. These will be further developed for the selected option at the preliminary design stage following the Preferred Route announcement.

At this stage, it is envisaged that option 1 would involve construction of 2 overbridges, 2 underbridges and upgrade of an existing accommodation bridge to bridleway standards. Option 2 is envisaged to involve construction of 5 overbridges and upgrade of an existing accommodation bridge to bridleway standards.

In terms of earthworks, option 1 would require greater quantities of earthworks as a result of its proposed route over the top of Camel Hill. There are a number of geotechnical challenges which are pertinent to both options. Option 1 has higher potential sources of contamination and a number of historical quarries which may be poorly backfilled. Option 2 currently has limited existing ground investigation data so currently has a higher risk of unknown ground conditions. A more detailed ground investigation would be carried out for the selected option at the next stage. Option 2 potentially has thicker alluvial deposits being close to the Dyke Brook flood plain and therefore has the potential to require increased depth to suitable foundation strata for structures.

Based on preliminary statutory undertakers' enquiries, option 1 would incur greater costs in diverting existing utilities due to the greater concentration of utilities along the existing A303 corridor.

The technical requirements for drainage, lighting and technology are not significantly different for either option.

Consideration has also been given to land-take and buildability of the scheme. Option 2 is likely to require the greatest acquisition of third-party land. Construction of option 1 would be constrained by two pinch-points due to its proximity to existing properties, a Scheduled Monument and a Ministry of Defence (MOD signal station). It would also require more complex traffic management during construction due to it being built in part on the line of the existing A303. Traffic could be maintained on the existing A303 during most of the construction of option 2, which would largely require only local minor diversions. Work would have to be phased for option 1 and any road closures would involve long diversions along similar class roads. A potential offline haulage route has been identified which would require additional temporary land-take. This would be investigated further during preliminary design.

Traffic modelling

A traffic model has been prepared using the *South West Regional Traffic Model (SWRTM) Validation Report* (Highways England, March 2017) and will be used to support the scheme during the DCO Examination process. It was developed in the SATURN software to represent three weekday time periods consistent with the SWRTM model. To represent the higher traffic flows that occur at weekends and during holiday periods, a separate factor-based highway traffic model was also developed for use in the economic appraisal.

The study area comprised the A303 corridor, the A358 corridor, the M4/M5, and the surrounding areas, which takes into account the area which would be affected by the implementation of the scheme.

Flow validation has been undertaken against independent data not used in calibration of the model or for the matrix building exercise. The journey time validation is considered to be good in all time periods with the model recreating journey times that are representative on key routes in the modelled area: the journey time route validation meets Department for Transport's web-based *Transport Analysis Guidance*: *(WebTAG)* criteria and the journey time segment validation meets or nearly meets the WebTAG criteria across all time periods. It is considered that the model calibrates and validates to within acceptable margins of the WebTAG criteria and therefore demonstrates a good representation of traffic behaviour in the study area.

Traffic forecasts

Traffic forecasts have been prepared for the current estimated opening year for the scheme, 2023, and the scheme design year, 2038. Two additional forecast years, consisting of an intermediate year of 2031 and a final forecast year of 2051, have also been used to support the economic appraisal of the scheme. Forecast have been carried out for the 2 scheme options as well as a scenario without the scheme.

There is a predicted increase in journey times between the 2015 base and the Do Minimum scenario for both 2023 and 2038. This is a result of a higher level of traffic in both forecast years. The journey times decrease between Do Minimum and the Do Something scenarios in both forecast years and for all time periods. This indicates that either scheme option would have a positive impact on the A303 corridor.

In 2023 both options are predicted to provide an average reduction in journey time close to 2 minutes in each direction on a neutral weekday compared to the Do Minimum. The corresponding reduction during August weekends is close to 4 minutes. In 2038 the reductions are similar for the weekday but larger for the August weekend, increased to almost 5 minutes.

Modelled journey times for option 1 are consistently lower than those for option 2 due to its shorter distance.

Economic performance

Economic assessment has been carried out consistent with WebTAG requirements. An analysis of monetised costs and benefits is shown below. Values are given in £000s.

Item	Option 1	Option 2
Present Value of Benefits (PVB)	184,976	176,443
Broad Transport Budget Present Value of Costs (PVC)	115,073	108,376
Net Present Value (NPV)	69,903	68,067
Initial Benefit to Cost Ratio (BCR)	**1.61**	**1.63**

Reliability Benefits	11,183	10,526
Wider Economic Benefits	12,986	11,441
Adjusted Present Value of Benefits (PVB)	209,146	198,410
Adjusted BCR	**1.82**	**1.83**

The BCR value is used to assess the value of a transport project by weighing the benefits against the costs to indicate whether it is Value for Money. Both options result in adjusted BCRs between 1.5 and 2. Under the Department for Transport's value for money criteria, these represent medium value for money.

Operational performance

A Maintenance and Repair Strategy Statement has been prepared which identifies the key maintenance issues for the proposed scheme. The only difference between the 2 options identified at this stage is that the existing A303 could be used as a diversion route during a full road closure of any part of option 2. For option 1, any diversion would be considerably longer.

A Project Safety Plan has also been prepared. Neither of the route options has been identified as having significant safety or operational implications for the strategic road network.

Environmental assessment and design

An environmental assessment has been carried out for each option in line with WebTAG requirements. The key differences between the route options are:

Option 2 is considered to have a greater adverse impact on landscape character and visual amenity during operation, mainly due to it impacting on unspoilt landscape in an area of high amenity value
.
Option 2 is considered to have a slight beneficial impact on both noise and vibration during operation compared with option 1 which is considered to have a slight adverse effect. This is due to option 2 being further from the larger existing communities to the south of the existing road, which would benefit from a reduction in noise and vibration with the northerly route option.

Option 2 is considered to have a greater adverse impact on qualifying species for Natura 2000 sites (Special Areas of Conservation and Special Protected Areas) both during construction and operation.

Option 1 is considered to have a slight beneficial impact on amenity for people and communities during operation compared with option 2 which is considered to have a slight adverse effect. This is due to changes to barriers between people and traffic, flows and provision of new facilities.

Option 2 is considered to have a neutral impact on severance both during construction and operation compared with a slight adverse impact for option 1. This is due to the number of non-motorised users (NMU) experiencing adverse effects on journey times.

Environmental objectives

The route options have been compared against the environmental objectives for the scheme. The *Client Scheme Requirements* include a Strategic Outcome for 'the delivery of better environmental outcomes'. The Strategic Outcome includes a key performance indicator for 'Noise: Number of Noise Important Areas mitigated'. There are 2 Noise Important Areas on the existing A303, one just to the east of Camel Cross and one just west of Howell Hill. Both would be mitigated for with either option. Overall, option 2 would deliver a better environmental outcome for these Noise Important Areas than option 1.

The Strategic Outcome also requires that scheme development embraces the Highways England Biodiversity Action Plan, which aligns with the key performance indicator identified within the *Roads Investment Strategy* of 'no net loss of biodiversity by 2020'. To achieve this an Ecological Mitigation Strategy will be prepared at preliminary design stage. With suitable mitigation, it is considered that there will be a net neutral effect on biodiversity for both options, one mitigation planting has matured. Biodiversity enhancement measures will also be explored as the scheme progresses.

The *Client Scheme Requirements* also include a Strategic Outcome for 'helping cyclists/walkers and other vulnerable users', with a KPI of 'the number of new and upgraded crossings'. This has been addressed to date through the development of the NMU strategy which includes locations for diversions of existing NMU routes, new crossings and potential cycle routes. It is considered that the scheme development to date is addressing the Strategic Outcome.

Public Consultation

Highways England conducted a six-week period of route options Public Consultation for the A303 Sparkford to Ilchester scheme. The consultation ran between 14 February 2017 and 29 March 2017 and included a series of public information events.

The events enabled key, local community and landowner stakeholders the opportunity to discuss the scheme options proposals with the project team and to view the scheme route option proposals.

A questionnaire was provided at the events and a total of 1,237 responses were received primarily from community stakeholders, with a number of statutory stakeholders submitting formal reports and letters instead.

Analysis of the responses identified key themes and issues. A total of 82% of all respondents were in favour of upgrading this section of the A303 to dual carriageway, with 7% against and 11% unsure or not answered. Respondents in favour cited reduced congestion and improved safety as key themes. Respondents against an upgrade cited the impact on businesses and the environment and the fact that homes could be lost among their responses.

A total of 64% of all respondents preferred option 1 with 29% in favour of option 2 and 7% unsure or not answered. Those who preferred option 1 cited that it would preserve the countryside and make use of the existing road among the reasons for their preference. Those

who preferred option 2 cited that it would be easier to construct, would allow the existing A303 to be used as a local road and would reduce noise in existing villages among their answers.

Other questions related specifically to Downhead Junction and Hazlegrove Junction and were included to help inform junction strategy at the next stage of scheme development.

Among other comments or observations, common response themes included concerns relating to flooding, design, non-motorised users, impact on local communities, environmental impact, and junction strategy.

Conclusions and recommendations

An overall comparison of the advantages of each option identified in the assessments and public consultation at this stage of the scheme is shown below.

Advantages of option 1	Advantages of option 2
· Minimises land-take · Shortest of the two options, reducing journey time and carbon emissions · Route follows existing corridor very closely, minimising construction in unspoilt rural setting with high amenity value · Slightly less impact on biodiversity · Most popular with the public · Least public opposition likely to generate objections at DCO	· Less impact on existing local journeys · Easier to construct · Disruption to travelling public during construction will be less, due to alternative route available · Less impact on existing non-motorised user journeys · Greater reduction in noise for communities near the existing A303

Option 1 has more advantages and most of these are related to the permanent post-construction situation.

The options have similar BCR values demonstrating that they are both similar value for money. It is anticipated that, if landscape disbenefits were required to be included in the assessment at a later stage, the BCR of option 2 would reduce.

There is also considerably more public support for option 1.

It is therefore recommended that option 1 is announced as the Preferred Route.

1 Introduction

1.1 Scheme background

1.1.1 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, December 2014, update March 2015) and is currently in the option selection stage.

1.1.2 Dualling of this section of the A303 has been investigated on previous occasions, most recently in 2003/04, when it was taken to public consultation but then dropped from the roads programme by the government of the day.

1.2 Scheme description

Existing route corridor

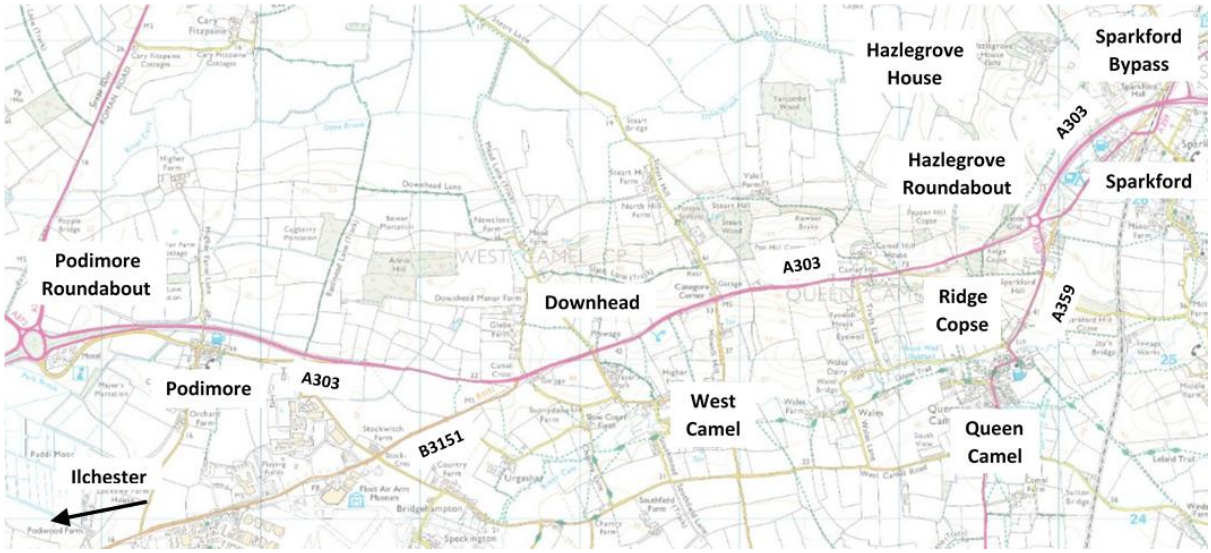
1.2.1 The A303/A30 corridor forms part of the Strategic Road Network (SRN) and provides a main arterial link connecting London and the South East of England with Wiltshire, Dorset, Somerset, Devon and Cornwall in the South West of England. The corridor is used heavily by business and leisure traffic and is of critical importance to the varied economy of South West England. Not only is the A303 an important strategic long-distance road, it is also locally important, connecting several towns along the corridor including Andover, Amesbury, Salisbury, Shaftesbury, Warminster, Yeovil and Honiton.

Existing project road

1.2.2 The section of the A303 between Sparkford and Ilchester includes Hazlegrove Roundabout which has five arms (see Figure 1.1 Sparkford to Ilchester Existing Road Layout). This roundabout forms a junction with the A359 including access to a service station located at the western end of the existing dual carriageway Sparkford bypass. Continuing west from the roundabout the A303 has 2 lanes in the westbound direction, one lane in the eastbound direction and is subject to a 50mph speed limit. This section continues up to the vicinity of Ridge Copse prior to a petrol filling station.

1.2.3 The remaining length of the Sparkford to Ilchester section is characterised by a single lane road, with double white lines negating overtaking and subject to a 50mph speed limit. There are several priority junctions along the route giving access to the settlements of Queen Camel and West Camel to the south, as well as several farm accesses and parking laybys. The road continues west until it becomes a dual carriageway road just west of the junction with the B3151 to Podimore. This section of the A303 is about 3.5 miles long.

Figure 1.1 Sparkford to Ilchester Existing Road Layout



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Proposed scheme

1.2.4 The proposed scheme is to provide a dual carriageway on the A303 between Sparkford and Ilchester in Somerset connecting the existing dual carriageway sections to the east and west. The scheme will involve the removal of at-grade junctions and direct accesses.

1.2.5 The current programme for the scheme is:

Preferred route announcement……....	Autumn 2017
Statutory Public Consultation	Early 2018
Submit DCO application…….	Summer 2018
Start of Development Consent Order examination…….....	Winter 2018
Secretary of State decision on DCO application…….	Winter 2019
Start of construction…….	Spring 2020
End of construction…….	Winter 2022/23

1.3 Report purpose and structure

1.3.1 The Scheme Assessment Report is a product required under Highways England's Project Control Framework. It has been prepared in accordance with *TD37/93 Scheme Assessment Reporting* (Highways England Design Manual for Roads and Bridges, Volume 5 Section 1 Part 2).

1.3.2 Paragraph 4.23 of TD37/93 requires that the Scheme Assessment Report should present a summary of the results of the traffic and economic appraisal work. It should

cover the following topics: modelling; forecasting; the expected effects of the scheme options; and the economic performance of the selected alternative schemes. The information presented should be sufficiently reliable to enable the relative merits of the selected alternative schemes to be compared.

1.3.3 The contents structure broadly follows Highways England's internal guidance for Scheme Assessment Reports, last updated in May 2016. It is set out as follows:

1. Introduction
2. Existing conditions
3. Planning factors
4. Do nothing consequences
5. Alternative schemes
6. Traffic and economics
7. Operational assessment
8. Environmental assessment and design
9. Public consultation
10. Appraisal summary tables
11. Conclusions
12. The recommended route

2 Existing Conditions

This chapter summarises the existing conditions described in chapter 3 of the *Technical Appraisal Report* (Highways England, November 2016).

2.1 The problem

2.1.1 The A303 Sparkford to Ilchester is a single carriageway section of the strategic road network between 2 dual carriageway sections. It currently experiences congestion and poor journey time reliability particularly at weekends and in the summer months consistent with weekly commuting traffic patterns and its use as summer holiday route.

2.1.2 The Department for Transport has identified this section of the A303 for improvement to dual carriageway in Part 2 page 17 of the *Road Investment Strategy: for the 2015/16 – 2019/20 Road Period*. This is part of its overall aspiration to achieve a smarter, safer, sustainable strategic road network by 2040 which includes transforming connectivity to and from the South West as set out in Part 1 page 55 of the *Road Investment Strategy*.

2.2 Existing conditions and constraints

Roads

Locality

2.2.1 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 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.

2.2.2 South Somerset District is generally rural in character, with substantial levels of arable farming taking place.

2.2.3 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 3-4 kilometres 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 3 kilometres to the south-west of the scheme limits.

2.2.4 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 2 runways, numerous operational buildings and the Fleet Air Arm Museum.

Highway network

2.2.5 The A303/A30 forms part of the strategic road network and is a strategic link between the South West and the South East and London. The route is comprised of multiple road standards including dual carriageway, single carriageway and single carriageway sections with overtaking lanes together with associated varying speed limits (from 40mph to 70mph).

2.2.6 The existing A303 between Sparkford and Ilchester consists of approximately 5 kilometres 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.

2.2.7 The road is on a ridge line with lower ground located to the north and south. There are no river, rail or major road crossings along this section. From the west, the single carriageway starts 1.8 kilometres east of the Podimore Roundabout. It includes a number of priority junctions 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 an overtaking lane in the westbound direction. To the east of Hazlegrove Roundabout, the route returns to dual carriageway.

Drainage

2.2.8 This section of the A303 is kerbed on both sides for most of its length with surface water runoff collected in either kerb inlet gullies or gullies set in the channels of the carriageway. There is a short section at Hawk House where runoff is collected in a filter drain.

2.2.9 Between the western end of the single carriageway near Podimore and the junction with the B3151 at Camel Cross, there is a low point where the drainage on both sides of the road is connected via a culvert which flows from north to south and outfalls into a ditch. Approximately 160 metres west of Hazlegrove Roundabout is a culvert connecting the southern side drainage to a soakaway on the northern side of the carriageway.

Utilities

2.2.10 During the options identification stage of this scheme, enquiries were undertaken in accordance with Appendix C2 of the Code of Practice *Measures Necessary where Apparatus is affected by Major Works (Diversionary Works)* (Department for Transport, June 1992) to determine the location of public utilities within the scheme area.

2.2.11 Several statutory undertakers were found to have equipment in the area that may require protection or diversion depending on the scheme option chosen. These included Wessex Water, Scottish and Southern Energy (SSE), BT, Global Crossing/Fibernet, Virgin Media and Network Rail. Most of the existing public utilities that may be affected by the scheme are alongside or across the existing A303 serving local communities.

Traffic

2.2.12 During the options identification stage of this scheme, data from a Highways England Open Data Automatic traffic count site on this section of the A303 were obtained for October 2015 and August 2015 to assess the traffic levels in both a neutral and peak month, as shown in Table 2.1. School holidays have been excluded from the October averages.

Table 2.1 A303 2015 Automatic Traffic Counts

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

Note: Counts rounded to nearest 100 vehicles

2.2.13 The average October Friday flow of 29,500 is 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. 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 this section of the A303 especially at weekends and during holiday periods.

2.2.14 The 2015 base year model shows that on a neutral weekday between 35% and 45% 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 2.1. 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. Daily A303 HGV traffic accounts for around 9.4% of the total traffic flow on the single carriageway section.

Figure 2.1 Existing A303 between Cartgate Roundabout and North/South Cadbury

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Accidents and journey time reliability

Accidents

2.2.15 Collision data for this section of the A303 has been obtained from Somerset County Council and Highways England for the period 1 January 2010 to 31 December 2014. This has been analysed using *KeyAccident v7.2* (software from Keysoft Solutions). Certain cleaning processes were carried out such as removing duplicates of the same accident.

2.2.16 A summary of accident numbers is shown in Table 2.2

Table 2.2 Accidents by severity (1 January 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**

2.2.17 The accident rate has been calculated for the scheme and is presented in Table 2.3. It shows that the accident rate is higher than the national rate for A class trunk roads.

Table 2.3 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

Journey time reliability

2.2.18 References in this section to WebTAG relate to the Department for Transport's web-based *Transport Analysis Guidance: (WebTAG)*.

2.2.19 According to WebTAG unit A1-3 on user and provider impacts (March 2017), reliability is defined as variation in journey times that transport users are unable to predict. Such variations could come from recurring congestion at the same period each day (day-to-day variability) or from non-recurring events such as incidents. It excludes predictable variation relating to varying levels of demand by time of day, day of week, and seasonal effects of which travellers are assumed to be aware.

2.2.20 The stress-based approach set out in the Department for Transport's *Transport Analysis Guidance* A1.3 Appendix C.5 has been used to assess journey time reliability benefits. An assessment of journey time reliability has been undertaken which shows that the existing road suffers stress levels such that a scheme solution would achieve slight beneficial effects. 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.

Environment

Summary of environmental constraints

2.2.21 References to route options in this section relate to the route options described in chapter 5 of this report.

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

- Environmental constraints:
  - Scheduled Monuments
  - Site of Special Scientific Interest
  - Special Areas of Conservation for bats

- Ancient woodland (and other Biodiversity Action Plan (BAP) Habitats)
- Local Wildlife Sites equivalent to Sites of Importance for Nature conservation
- Rivers and areas of water
- Areas susceptible to surface water 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
- Surface Water Nitrate Vulnerable Zones

· Land-use and community constraints:
  - Listed buildings
  - Public Rights of Way
  - Planning applications
  - Strategic Development Areas
  - Areas of tourism

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

Air quality

2.2.24 Information on air quality in the UK can be obtained from a variety of sources including Local Authorities, the Department for Environment, Food and Rural Affairs (Defra), national network monitoring sites and other published sources. The most recent year of ratified monitoring data available from South Somerset District Council (SSDC) is for 2015.

2.2.25 There are no Air Quality Management Areas (AQMA) located within 1 kilometre of either route option. The nearest AQMA is located between 6-7.5 kilometres south of both route options, in Yeovil. This AQMA was declared in 2003 by SSDC for exceedances of the NO_2 (nitrogen dioxide) annual mean air quality objective.

2.2.26 No local authority monitoring is currently undertaken within the vicinity of the route options. SSDC undertakes NO_2 diffusion tube monitoring primarily within the Yeovil AQMA; in 2015, exceedances of the annual NO_2 objective were found at four sites within the AQMA. Monitoring is also undertaken at a Defra Automatic Urban and

Rural Network site at Charlton Mackrell, approximately 4.9 kilometres northwest of option 1, and 4.6 kilometres northwest of option 2. This rural background monitoring site has recorded annual mean NO_2 concentrations which are well below the annual NO_2 air quality objective.

2.2.27 Due to the lack of local authority monitoring data near to the proposed route options, a six-month air quality monitoring survey was undertaken by Highways England from December 2015 to June 2016, the results of which were adjusted to annual mean concentrations in accordance with Defra guidance[1]. This survey concluded that monitored NO_2 concentrations within the vicinity of the route options were well below the annual NO_2 air quality objective. The greatest NO_2 concentration of 29.7µg/m^3 was recorded at the Hawk House B&B monitoring site.

2.2.28 Defra uses the Pollution Climate Mapping (PCM) model to report compliance with the EU limit values and provides NO_2 concentrations for a number of roads across the UK for a number of future years. There are no PCM links within 10 kilometres of the route options exceeding 40µg/m^3 for the year of 2017. The PCM link closest to the route options, on Ilchester Road, predicts a 2017 annual NO_2 concentration of 21µg/m^3, which is well below the annual mean limit value of 40µg/m^3 for NO_2.

Cultural heritage

2.2.29 Information on the heritage and historic resources within the Somerset area was requested through the Somerset Historic Environment Record. In addition, analysis of aerial surveys and historical mapping has been undertaken as part of the option identification and option selection stages for this scheme, which has further developed the heritage and historic resources baseline.

2.2.30 There are 2 Scheduled Monuments within 1 kilometre of both route options. These are the Romano-British Settlement immediately south-west of Camel Hill Farm (list entry ID 1020936), and the medieval settlement remains north of Downhead Manor Farm (list entry ID 1021260). In addition, the scheduled multivallate hillfort and associated earthworks at South Cadbury is located at an elevated position 1.5 kilometres south-east of both options. This is outside of the 1 kilometre study area, but not necessarily outside of the zone of visual influence of the scheme.

2.2.31 There are numerous listed buildings within 1 kilometre of both options, consisting of Grade I, Grade II and Grade II* listed buildings. Both route options would pass through the southern third of the Hazlegrove House (Grade II listed) Registered Park and Garden (list entry ID 1000422).

[1] Defra (2016) Local Air Quality Management: Technical Guidance (TG16) [online] available at: https://laqm.defra.gov.uk/documents/LAQM-TG16-April-16-v1.pdf (last accessed July 2017).

2.2.32 Queen Camel Conservation Area is located approximately 650 metres south of option 1, and approximately 800 metres south of option 2. In addition, West Camel Conservation Area is located approximately 550 metres to the south of option 1, and approximately 1.5 kilometres south of option 2.

2.2.33 There are numerous records of archaeological features and finds within 1 kilometre of the route options. An analysis of both route options shows an overall high potential for significant archaeological remains to be present along the option 1 route, with evidence for archaeology from the later prehistoric periods onwards. This includes the Iron Age and Romano-British settlements close to Camel Hill Farm, as well as an early medieval cemetery. The potential for significant archaeological remains is slightly less for option 2, which is partially a reflection of the low-lying topography this route traverses to the north of Camel Hill, but also because there has been less archaeological investigation in these areas. It should be noted that the overall archaeological potential for option 2 is still classed as medium for most periods. This includes possible Bronze Age funerary features within the southern boundary of Coages Park (a former medieval deer park), as well as the surviving park pale itself. Option 2 would also lie close to the scheduled Downhead deserted medieval settlement remains.

Landscape

2.2.34 Information relating to the landscape character within the local area is obtained from Natural England's National Character Area (NCA) profiles[2]. Information relating to landscape designations can be found on Natural England's MAGIC interactive map[3], and local Conservation Areas are identified on SSDC's interactive map[4]. Information relating to the local Public Rights of Way (PRoW) have also been obtained from SSDC's interactive map[4].

2.2.35 The scheme sits within Natural England's NCA 14 Yeovil Scarplands[2], 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 geometric field patterns, narrow lanes, and thick hedgerows. The existing A303 runs along the top of the partially wooded ridge of Camel Hill before descending to Sparkford. Intermittent farmsteads punctuate the landscape to the north of the A303, whilst to the south, lie the more populated 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

[2] Natural England (2014) National Character Area profile: 140. Yeovil Scarplands [online] available at: http://publications.naturalengland.org.uk/publication/5731196449325056?category=587130 (last accessed July 2017).
[3] Natural England (2017) MAGIC Interactive Map [online] available at: http://magic.defra.gov.uk/MagicMap.aspx (last accessed July 2017).
[4] South Somerset District Council (2017) 'Your Area' Interactive Map [online] available at: https://www.southsomerset.gov.uk/generic-map/ (last accessed July 2017).

respectively. 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. Blocks of woodland occasionally punctuate the field pattern and are particularly prominent on the western section from Camel Hill to Sparkford.

2.2.36 There are no Areas of Outstanding Natural Beauty (AONB), National Parks, or Heritage Coasts located within 1 kilometre of either route options[3]. However, there are 2 Conservation Areas identified on SSDC's interactive map[4], one at West Camel and the other at Queen Camel. There are a number of listed buildings within the study area, particularly within the villages of West Camel and Queen camel.

2.2.37 There are numerous visual receptors located within the scheme's likely Zone of Theoretical Visibility. Visual receptors with a high sensitivity to change within the study areas for the proposed options include people occupying residential properties (there are approximately 100 properties within 200 metres of option 1, and 50 properties within 200 metres of option 2), users of PRoW (there are approximately 60 footpaths, 2 bridleways, 4 restricted byways, and 1 national cycle route within the study area[4]) and those using recreational features for the enjoyment of the countryside There are also several elevated views outside of the 1 kilometre study area, including viewpoints from St Michael's Hill and Cadbury Castle.

Biodiversity

2.2.38 Information regarding statutory and non-statutory sites is available from Natural England's MAGIC Interactive Map[5], with further information available from Natural England and the Joint Nature Conservation Committee. Information on the Local Wildlife Sites (LWS) within the study area has been obtained from a data request from Somerset Environment Records Centre (SERC), in April 2015 and a further request for updated information was made in June 2017. Information relating to habitats and species have been obtained from ecological surveys that have been undertaken since February 2016.

2.2.39 Natura 2000 is a network of nature protection areas within the European Union, made up of Special Areas of Conservation (SAC) and Special Protection Areas (SPA). There are no SAC, SPA or Ramsar[6] designated sites within 2 kilometres of either route option, however one Site of Special Scientific Interest (SSSI) lies 1.3 kilometres north-east of both option 1 and option 2. In addition, there are also no National Nature Reserves, Local Nature Reserves, or Royal Society for the Protection of Birds (RSPB) reserves within 1 kilometre of the route options. However, there are 3 SAC designated for bat populations located within 30 kilometres both

[5] Natural England (2017) MAGIC Interactive Mapping [online] available at: http://magic.defra.gov.uk/MagicMap.aspx (last accessed July 2017).
[6] Ramsar sites are designated under the Convention on Wetlands, known as the Ramsar Convention, an intergovernmental environmental treaty established in 1971 by UNESCO

route options. These include North Somerset and Mendip Bats SAC, Mells Valley SAC and Bracket's Copse SAC.

2.2.40 There are 11 LWS within 1 kilometre of both route options; several of these LWS comprise of ancient woodland at least in part. The proposed route alignments of both route options would pass through the southern extent of Hazlegrove Park LWS. Option 2 would also lie approximately 25 metres from Annis Hill LWS (which includes ancient woodland), and option 1 would lie adjacent to Camel Hill Transmitter Site, and Gason Lane Field.

2.2.41 A Phase 1 habitat survey was undertaken in February and March 2016. This is a standardised method for classifying and mapping wildlife habitats. The nature and condition of the vegetation provides information about many of the living and non-living components of the environment. A study of the vegetation can thus provide an effective means of classifying and surveying habitats. Each habitat type/feature is defined by a brief description and is allocated a specific name, an alpha-numeric code, and unique mapping colour.

2.2.42 The main habitats recorded within the study area during the Phase 1 habitat survey were poor semi-improved grassland and arable fields intersected by hedgerows, and scattered trees with 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* (Highways England, May 2016).

2.2.43 Phase 2 protected species surveys are currently being undertaken for a number of species. These define the vegetation of selected areas more precisely in terms of their plant communities and may include surveys of animal species and communities. The objective is to produce detailed information on the frequency or abundance of communities and species for site management and monitoring purposes.

2.2.44 Phase 2 protected species surveys have identified the presence of great crested newts and common reptiles such as slow worm, common lizard, and grass snake. Numerous bat roosts have been found within buildings and include species such as brown long-eared, lesser horseshoe and barbastelle bats. Along watercourses, evidence of both water vole and otter have been found. Schedule 1 bird species such as barn owl and kingfisher have been recorded and BAP species include sky lark, tree pipit, common linnet, yellowhammer, house sparrow, hedge accentor (dunnock), common starling and song thrush.

2.2.45 BAP Priority Habitats are located within 1 kilometre of both 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.

Geology and soils

2.2.46 Information on geology and soils within the UK can be obtained from the Geology of Britain viewer[7], and information from the Ministry of Agriculture, Fisheries, and Food (MAFF) Agricultural Land Classification mapping. The SERC data request (June 2017) also provided information on the Local Geological Sites (LGS) within the vicinity of the route options.

2.2.47 The Geology of Britain viewer[7] indicates that the Ridge Copse/Podimore area at the western extent of both route options is partially underlain by superficial deposits of Alluvium and River Terrace Deposits (undifferentiated). There is a large region of Alluvium underlying parts of option 2, approximately 1.4 kilometres to the north of the existing A303. There is another region of River Terrace Deposits (undifferentiated) immediately north of the A303 at Sparkford. The majority of the remaining study area does not appear to be underlain by any superficial deposits. In regions where superficial deposits are absent, the underlying bedrock will be near the surface.

2.2.48 The bedrock is comprised of Langport Member, Blue Lias Formation, and Charmouth Mudstone Formation (undifferentiated) for the majority of the area. There is also a region of Westbury Formation and Cotham Member (undifferentiated) partially underlying the route of the existing A303 and extending eastward, south of the Hazlegrove Roundabout, with a small outcrop of Mercia Mudstone Group present proximal to Sparkford Hill Lane and Hill View.

2.2.49 The Alluvium and River Terrace Deposits superficial geology, and Langport Member, Blue Lias Formation and Charmouth Mudstone Formation are designated as Secondary A Aquifers. The Environment Agency defines a ‘Secondary A’ aquifer as ‘permeable layers capable of supporting water supplies at a local rather than a strategic scale, and in some cases forming an important source of base flow to rivers, these are generally aquifers formerly classified as minor aquifers’.

2.2.50 The Westbury Formation and Cotham Member (undifferentiated) and Mercia Mudstone are designated as Secondary B Aquifers. The Environment Agency defines a ‘Secondary B’ Aquifer as ‘predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers’.

[7] British Geological Survey (2017) Geology of Britain Interactive Map [online] available at: http://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer.html (last accessed July 2017).

2.2.51 There are no groundwater Source Protection Zones within 1 kilometre of either of the proposed route options.

2.2.52 No post 1988 Agricultural Land Classification (ALC) surveys have been undertaken within the vicinity of the proposed route options. However, provisional ALC maps[8] indicate that the majority of land is Grade 3 (Good to Moderate quality) with a small amount of Grade 2 (the Best and Most Versatile Land) and Grade 4 (Poor quality) ALC land present.

2.2.53 There are 2 LGS equivalent to Regionally Important Geological Sites. These are detailed below, identified by the SERC data request (June 2017):

- Camel Hill Quarry East (Local Authority File Code ST52/516), adjacent south of existing A303 (approximate central National Grid Reference (NGR) ST 59422 25575), described as 'hummocky area in woods assumed to be quarry'.
- Sparkford Hill Copse (Local Authority Field Code ST62/630), 140 metres southeast of existing A303 (NGR ST 60159 25368, described as 'Useful sections of Rhaetic Langport Beds in disused quarries in wood owned by the Sparkford Copse Trust'.

Materials

2.2.54 Information on the current waste arisings, and the waste management facilities have been determined through a desk-top study, using a number of readily available resources, in particular data from the Environment Agency, Defra, SSDC, and Somerset County Council.

2.2.55 The latest data from the Environment Agency indicated that England produced over 191.1 million tonnes of waste in 2015, which was managed in 6,427 permitted waste facilities[9]. The South West region produced over 22.6 million tonnes of waste in 2015, which was managed by 874 waste sites. With respect to construction and demolition waste, the Environment Agency recorded that 715,000 tonnes of inert construction and demolition waste was deposited in landfill in the South West region, with 27,000 tonnes landfilled in Somerset. Regarding hazardous waste, the ENV23 – UK Statistics on waste[10] produced by Defra details that in 2014, over 4 million tonnes was produced in the UK with just under 750,000 tonnes produced by the construction sector. Just over 600,000 tonnes of this was produced in England.

[8] Ministry of Agriculture, Fisheries, and Food (MAFF) (1995) Agricultural Land Classification: South Somerset Local Plan, Yeovil [online] available at: https://www.southsomerset.gov.uk/media/462854/north_alc_map.pdf (last accessed July 2017).
[9] Environment Agency (2017) Waste Management for England 2015 [online] available at: https://www.gov.uk/government/statistics/waste-management-for-england-2015#history (last accessed May 2017)
[10] Department for Environment, Food and Rural Affairs (updated 2017) ENV23 – UK statistics on waste [online] available at: https://www.gov.uk/government/statistical-data-sets/env23-uk-waste-data-and-management (last accessed May 2017)

2.2.56 In terms of sources of contamination, there are no authorised landfills and 2 historic landfills within 500 metres of both route options. There may also potential contamination risks from infilled historic quarries, fuel stations/garages and underground tanks, presence of made ground, and Ministry of Defence (MoD) land.

2.2.57 In terms of waste facilities, the Environment Agency reported that in 2015, 874 sites accepted waste in the South West and, at the end of 2015, 1,182 sites in the South West had environmental permits to accept waste. Somerset has 5 operational landfill sites accepting inert and non-hazardous waste[11]; approximately 27 facilities which generate recycled aggregates, treat, or transfer construction and demolition waste[12]; and approximately 10 inert waste recovery projects[13]. There are approximately four operational incinerators within 100 kilometres of both route options[14].

Noise and vibration

2.2.58 Information for noise is obtained from Defra's Noise Mapping[15] which identifies Noise Important Areas (NIA), as well as sensitive receptors within the vicinity of the proposed route options. There is currently no baseline noise environment data within the vicinity of the route options.

2.2.59 Two of Defra's NIA are located on the existing A303 just to the east of Camel Cross and approximately 150 metres to the west of Howell Lane. The NIA to the east of Camel Cross is located adjacent to option 1, and approximately 650 metres to the south of option 2. The NIA to the west of Howell Hill is located within the footprint of option 1, and approximately 900 metres from option 2.

2.2.60 There are several sensitive receptors within 500 metres of both route options. There are approximately 230 residential properties, 20 farms, 1 school and 12 commercial properties within 500 metres of option 1, and approximately 140 residential properties, 10 farms, 1 school and 10 commercial properties within 500 metres of option 2.

People and communities

2.2.61 Information relating to people and communities has been obtained from SSDC's interactive map[16]. During the option identification stage, a Non-motorised user (NMU)

[11] Somerset County Council (2015) Waste Core Strategy and Environment Agency (2017) What's in your backyard?
[12] Somerset County Council (2016) Inert Waste Review [online] available at: http://www.somerset.gov.uk/policies-and-plans/plans/somerset-waste-plan/ (last accessed June 2017)
[13] Somerset County Council (2016) Inert Waste Review [online] available at: http://www.somerset.gov.uk/policies-and-plans/plans/somerset-waste-plan/ (last accessed June 2017)
[14] Environmental Agency (2017) Waste Management in South West 2015
[15] Defra (2017) Noise Mapping [online] available at: http://noisemapping.defra.gov.uk/ (last accessed July 2017).
[16] South Somerset District Council (2017) 'Your Area' Interactive Map [online] available at: https://www.southsomerset.gov.uk/generic-map/ (last accessed July 2017).

Context Report was produced which considered existing NMU desire lines and trip generators, rights of way, potential survey locations and views of user groups.

2.2.62 Following on from this report, NMU counts were undertaken by Tracsis, a specialist NMU survey company, at 29 locations within the vicinity of the scheme.

Non-motorised users

2.2.63 There are a number of PRoW to the north and south of both route options. For option 1, there are 24 footpaths, 2 bridleways and 2 restricted byways. There is also a national cycle route, a long-distance path and 4 footways within the study area. For option 2, there are 16 footpaths, 2 bridleways and a restricted byway. There is also a national cycle route, a long-distance path and 3 footways within the study area.

Amenity

2.2.64 For both route options, amenity is considered to be generally poor, or very poor, due to the current lack of barriers between people and the existing traffic within the vicinity. There is only one crossing facility across the A303 for NMU at Higher Farm Lane, to the north of Podimore, where amenity is considered to be good.

Severance

2.2.65 Both route options would be located within the vicinity of several communities; Downhead and Camel Hill, Sparkford to the east of the A303, Queen Camel, West Camel, and Podimore to the south of the A303. Community facilities located within 250 metres of both route options include The Podymore Inn public house (located in Podimore) and Sparkford Inn public house (located in Sparkford). In addition, West Camel Methodist Church (150 metres east of Plowage Lane) would be located within 250 metres of option 1.

Agricultural land

2.2.66 The land within the study area of both route options is predominantly agricultural. The MAFF 1975 ALC data provides an indication of the ALC Grades for the entire land area; however, these Grades are indicative and not derived from assessment. MAFF ALC Grades indicates the majority of the land within the study area of both route options is Grade 3 (good to moderate) with a small amount of Grade 2 (very good quality) and Grade 4 (poor quality) agricultural land.

Individual farm businesses

2.2.67 The land within the study area contains approximately 60 field parcels, predominantly separated by hedgerows. These land parcels are owned by a number of landowners. It would appear that the land use ranges from pastoral and arable to commercial and

potentially subsistence, however in the absence of specific agricultural land use information which will be gained during preliminary design, this is speculative.

Private property

2.2.68 The area encompassing both option 1 and option 2 is predominantly rural, used for agriculture with some residential dwellings and businesses.

Driver stress

2.2.69 At present, significant congestion occurs between Sparkford and Ilchester on the A303, particularly during peak periods such as holidays, the summer and weekends, leading to delays for drivers and increased traffic flows. The inability for vehicles to travel at a speed with which they are comfortable in relation to the standard of the road leads to driver frustration, which is perceived to be high on the existing A303 between Sparkford and Ilchester. Congestion on the A303 may also lead to delays in public transport movements, community service vehicles and emergency services, further exacerbating driver frustration. Driver stress is considered to be high along the A303 between Sparkford and Ilchester during peak periods as a result of high traffic flow levels and inconsistent speeds. Route uncertainty is considered to be low along the A303, due to existing signage which provides the required standard of information to road users.

Road drainage and the water environment

2.2.70 Information relating to flood zones has been obtained from the Environment Agency's indicative flood mapping[17], and information on Surface Water Nitrate Vulnerable Zones, Water Framework Directive (WFD) waterbodies, and priority outfalls, has been obtained using the Environment Agency's Catchment Data Explorer[18].

2.2.71 The Environment Agency's indicative flood mapping[9] shows that option 1 lies approximately 400 metres to the north of Flood Zone 2 and Flood Zone 3, and option 2 lies adjacent to Flood Zone 2 and 3 to the north. 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 greater chance of flooding from fluvial sources 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

[17] Environment Agency (2017) Flood mapping for Planning [online] available at: https://flood-map-for-planning.service.gov.uk/ (last accessed July 2017)
[18] Environment Agency (2017) Catchment Data Explorer [online] available at: http://environment.data.gov.uk/catchment-planning/ (last accessed July 2017).

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.

2.2.72 Both options 1 and 2 would lie within a Surface Water Nitrate Vulnerable Zone. Three WFD waterbodies are within the vicinity of both route options: the River Cam – Lower lies approximately 400 metres to the south of option 1 and approximately 1 kilometre to the south of option 2; and the River Cary – source to confluence with King's Sedgemoor Drain is 1 kilometre north of Options 1 and 2 at the western extent of the route alignments. In addition, the Dyke Brook is located approximately 1 kilometre to the north of option 1, and 70 metres to the north of option 2.

2.2.73 There are no priority outfalls within the footprint of option 1 and option 2. However, there is one priority outfall which is listed as 'not determined' within the proposed works extent of option 1. In addition, no balancing ponds have been identified within the vicinity of either route options. There is no underlying groundwater within the study area for either route options.

Climate change

2.2.74 Information relating to the existing climate within the UK as a whole and the South Somerset region has been obtained from Department for Business, Energy, and Industrial Strategy. Information relating to the vulnerability of the scheme to climate change has been obtained from the Met Office. The baseline information detailed below relates to both route options.

2.2.75 The UK 2015 greenhouse gas emissions decreased by 38% from 1990. In 2015, UK net carbon dioxide ($CO_{2)}$ emissions were estimated at 403.8 million tonnes, a decrease of 3.8% in comparison to 2014 levels[19]. In 2015, 24% of UK greenhouse gas emissions were from the transport sector with emissions of 120 $MtCO_2e$ (million tonnes of carbon dioxide equivalent) in 2015.

2.2.76 Within the South Somerset region, the carbon emissions from A roads in 2015 was 221.1$ktCO_2e$ (kilotonnes of carbon dioxide equivalent), which represents a 13% decrease since 2005 and an 8.2% decrease in overall transport emissions[20]. There were 36.5 million vehicles licensed for use on roads in the UK in 2015, of which 3.2 million extra vehicles were registered in 2015 alone. However, in 2015 the

[19] Department for Business, Energy and Industrial Strategy (2015) 2015 UK Greenhouse Gas Emissions [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/589602/2015_Final_Emissions_Statistics_one_page_summary.pdf

[20] Department for Business, Energy and Industrial Strategy (2017) Local Authority Carbon Dioxide Emissions Estimates [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/623015/2005_to_2015_UK_local_and_regional_CO2_emissions_statistical_release.pdf (last accessed July 2017).

percentage of ultra-low emission vehicles has reached 0.9% which is an 800% increase since 2013[21].

2.2.77 High-level climate observations for the South West of England[22] over a 30-year averaging period of 1981-2010 are presented in Table 2.4 below.

Table 2.4 Climate baseline for South West England (1981-2010)

Climatic Conditions	Climate Observations
Temperature	Mean daily minimum temperatures in Somerset can range from 1°C to 2°C in winter, whilst summer daily maximum temperatures are in the region of 21.5°C.
Rainfall	Vigorous Atlantic depressions are the source of the majority of rain in the south west in autumn and winter. Annual rainfall in the low-lying parts of central Somerset averages at 700mm. Monthly rainfall is variable, but is highest in the autumn and winter months. The number of days with rainfall totals greater than 1mm in Somerset are 12-13 days in winter, dropping to an average of 7-9 days in summer.
Wind	Southwest England is one of the more exposed areas of the UK. The strongest winds are associated with the passage of deep depressions close to or across the British Isles. The frequency and strength of these depressions is greatest in the winter half of the year when mean speeds and gusts are strongest at approximately 15 knots.
Sunshine	The southwest of England has a favoured location with respect to the Azores high pressure when it extends its influence north eastwards towards the UK, particularly in summer. Average annual sunshine totals are between 1450 and 1600 hours.
Air Frost	The first air frost in Somerset can be expected around mid-October with over 50 days per year experiencing air frost.

Combined and cumulative effects

2.2.78 For combined effects, the baseline is obtained from the preceding environmental disciplines.

2.2.79 For cumulative effects, the baseline data relating to other proposed developments within 2 kilometres of the route options have been identified using SSDC's Interactive Planning website[23], South Somerset District Council's Housing and Economic Land Availability Assessment (HELAA)[24], the Planning Inspectorate's Programme of Projects (although no Nationally Significant Infrastructure Projects (NSIP) are proposed within the 2 kilometres study area) and further information obtained directly from Somerset County Council and Highways England's Operations Directorate. The developments identified to be included within the cumulative effects assessment are contained within Table 2.5.

[21] Department for Transport (2016) Vehicle Licensing Statistics: Quarter 4 (Oct-Dec) 2015 [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/516429/vehicle-licensing-statistics-2015.pdf (last accessed July 2017).
[22] The Met Office (2016) South West England: Climate [online] available at: http://www.metoffice.gov.uk/climate/uk/regional-climates/sw (last accessed July 2017).
[23] South Somerset District Council (2017) Planning Interactive Map [online] available at: https://www.southsomerset.gov.uk/your-area/ (last accessed August 2017).
[24] South Somerset District Council (2017) https://www.southsomerset.gov.uk/planning-and-building-control/planning-policy/early-review-of-local-plan-2006-2028/evidence-base/south-somerset-housing-and-employment-land-availability-assessment/ (last accessed August 2017).

Table 2.5 Proposed – 'other developments' within 2 kilometres of both scheme options.

Proposed 'other development'	Description of the 'other development'
16/00725/OUT	**Other Development**: Outline planning application seeking permission for mixed use redevelopment (residential/commercial) together with associated works and access ways. **Site Address**: Haynes Publishing, High Street, Sparkford, Yeovil, BA22 7JJ **Applicant**: Boon Brown Architects (agent) **Development Description**: It is proposed to develop the site of 2.2ha for a mix of residential and commercial use.
14/04945/R3C and 15/00788/R3C	**Other Development**: Construction of a new single storey primary school **Site Address**: Land Opposite the Medical Centre, West Camel Road, Queen Camel, Yeovil, Somerset **Applicant**: Somerset County Council **Development Description**: Construction of a new single storey primary school (359437/124379) (1.4ha)
15/00024/OUT	**Other Development**: Outline application for the erection of up to 150 dwellings, site access, provision of associated landscaping and open spaces/play facilities (GR 352508/123950) **Site Address**: Land North of Troubridge Park, Ilchester, Yeovil, Somerset **Applicant**: Executors of PCH Young Deceased **Development Description**: Erection of up to 150 dwellings, site access, provision of associated landscaping and open spaces/play facilities

2.3 Scheme brief

Road Investment Strategy objectives

2.3.1 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

Highways England scheme objectives

2.3.2 The objectives for the A303 Sparkford to Ilchester scheme are set out in the *Client Scheme Requirements* (Highways England, last updated August 2017). These are reproduced below

Transport and operational objectives

2.3.3 The scheme will be developed as a high quality all-purpose dual carriageway making an essential contribution to the 'expressway' link between the South East and South West. It is anticipated that future enhancements will make this section 'expressway' compatible to support the long-term aspirations of the Road Investment Strategy.

2.3.4 The specific Transport Objectives agreed through the Value Management Workshop at option selection stage are:

- Safe and serviceable network
- More free-flowing network
- More accessible and integrated network
- Improved environment

2.3.5 The specific Transport Objective agreed through Value Management Workshop are:

- To contribute to regeneration and sustainable economic growth
  - To support employment and residential development opportunities
- To improve the safety, operation and efficiency of the network
- Improve network reliability and reduce journey times
  - To deliver capacity enhancements to the Strategic Road Network
- Supporting the use of sustainable modes of transport
- Delivering better environmental outcomes
- To improve local and strategic connectivity

2.3.6 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 Key Performance Indicator (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.

3 Planning Factors

3.1.1 As part of this scheme, a review of the current legislation and planning policy concerning the scheme has been undertaken.

Legislation

3.1.2 Relevant international, European, and national land use planning and environmental legislation applicable to the scheme and identified scheme constraints has been listed in Table 3.1 below. The legislation included in Table 3.1 contains key relevant legislation and is not exhaustive.

Table 3.1 Key international and national environmental legislation

Topic	Key international, European and national environmental legislation
Air Quality	International and European **The Ambient Air Quality Directive (2008/50/EC)** - Sets legally binding limit values and target values for concentrations of major outdoor air pollutants that impact public health such as particulate matter (PM_{10} and $PM_{2.5)}$ and nitrogen dioxide (NO_2). · The proposed options have the potential to reduce air quality. The scheme would need to ensure that air quality limit values are not exceeded
	National **The Air Quality Standards Regulations 2010** and **The Air Quality Standards Regulations (Amendment) 2016 -** Implements the EU's Directive 2008/50/EC and transposes the Directive's limit and target values into legally binding 'air quality standards' 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, and ecosystems. – The scheme would need to ensure that air quality standards 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 air quality objectives within a given time period for local authorities in carrying out the air quality management duties in accordance with **Part IV of the Environment Act 1995**. This requires local authorities to monitor the air quality in their area and designate Air Quality Management Areas (AQMAs) where air quality objectives are not being achieved or are unlikely to be achieved by the relevant compliance date. Local authorities must then prepare an Air Quality Action Plan which sets out measures to pursue the achievement of the air quality objectives within the AQMA. – The proposed options have the potential to reduce air quality and the scheme would need to comply with the requirements of an air quality action plan. **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. – The construction stage of either of the proposed options has the potential to cause nuisance from construction dust.
Cultural Heritage	International and European · No applicable legislation.
	National · **The Ancient Monuments and Archaeological Areas Act 1979 (as amended)** – This act relates to the investigation, preservation and recording of matters of archaeological

Topic	Key international, European and national environmental legislation
	and historical interest. The act provides for the protection of Scheduled Monuments through a designated schedule of monuments and allows the Secretary of State to designate areas of archaeological importance. – Relevant with regard to the impact upon the Scheduled Monuments, as well as 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 1990 (as amended) – Provides for the protection of Listed Buildings and Conservation Areas. – Relevant with regard to the direct impact upon Listed Buildings and Conservation Areas, as well as the setting of the Listed Buildings and Conservation Areas that have the potential to be affected by the proposed scheme.
Nature Conservation and Biodiversity	International and European · 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. – There are numerous protected habitats and species within the footprint of both proposed options. · **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. – There are habitats suitable for wild birds, including nesting and breeding birds, within the footprint of both proposed options.
	National · **Wildlife and Countryside Act 1981 (as amended)** – Protects all wild birds, certain wild animals, and certain wild plants. – 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. – There are three Special Areas of Conservation designated for their bat populations within 30 kilometres 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. – There are numerous habitats and species of conservation importance within the footprint of both proposed options. · **Natural Environment and Rural Communities (NERC) Act 2006** – Requires public bodies, including local authorities, '*to have regard to the conservation of biodiversity in England*' when carrying out their normal functions. – There are numerous habitats and species of conservation importance within the footprint of both proposed options.
Noise and Vibration	International and European · **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. – Both construction and operation phases for all the proposed options have the potential to increase noise levels and adversely affect sensitive receptors.

Topic	Key international, European and national environmental legislation
	National · **The Environmental Noise (England) Regulations 2006 -** These Regulations implement European legislation requiring noise action plans to be developed on a five-year rolling programme. Action plans have to be developed for the major noise sources and areas for which maps have been produced. The action plans seek to manage noise issues and effects including noise reduction if necessary, based on the results obtained through the mapping process. – There are 2 NIAs within the scheme extents. Highways England has an obligation under its Key Performance Indicators (KPI) to reduce noise levels at NIAs. · **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 causes by a vehicle, machinery…' – 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	International and European · **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. – 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. – 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. – There are numerous waterbodies with the potential to support wild birds that require protection.
	National · **The Water Environment (WFD) (England and Wales) Regulations 2017** – Implements the WFD Directive into UK Legislation to ensure that the objectives of the Water Framework Directive are met. – 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. – The proposed options lie within close proximity to Flood Zones 2 and 3.
Geology, Soils and Materials	International and European · **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. – There are three surface water WFD waterbodies within close proximity of the proposed route options. There are no groundwater WFD waterbodies within close proximity to the proposed route options.

Topic	Key international, European and national environmental legislation
	· **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. – The construction activities associated with both route options would lead to the production of some waste.
	National · **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. – 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. – There are 2 historic landfills either directly within or adjacent to the footprints of the proposed options. · **The Contaminated Land (England) Regulations 2006 (as amended)** and **The Contaminated Land (England) (Amendment) Regulations 2012** – Set out provisions relating to the identification and remediation of contaminated land under Part 2A of the Environmental Protection Act 1990. – There are 2 historic landfills either directly within or adjacent to the footprints of the proposed options. · **Waste (England and Wales) Regulations 2011 (as amended)** and **The Waste (England and Wales) (Amendment) Regulations 2014** – 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. – 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 2016** – 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. – The construction of the scheme may lead to excess soil/rock materials to require off-site disposal, if contaminated some of this material may be classified as hazardous waste. · Environmental Protection (Duty of care) Regulations 1991 and The Environmental Protection (Duty of Care) (England) (Amendment) Regulations 2003 – 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 'transferrer' and the 'transferee', and the place and time of the transfer. - The construction of the scheme may lead to excess soil/rock materials to require off-site disposal · **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. – Will be of particular relevance during the construction of the proposed scheme. · Landfill (England and Wales) Regulations 2002 (as amended) and The Landfill (England and Wales) (Amendment) Regulations 2005 – Aims to reduce the negative environmental and health impacts associated with landfilling waste. – The scheme has the potential to produce waste that cannot be used and will therefore need to be landfilled.

Topic	Key international, European and national environmental legislation
	- There are 2 historic landfills either directly within or adjacent to the footprints of the proposed options which could impact on engineering options and constructability. · **Water Resources Act 1991** – Section 161 allows the Environment Agency to recover the costs of cleaning up any poisonous, noxious, or polluting matter, or any solid waste matter, that persons have caused or knowingly permitted to be present in controlled waters. – There are 2 historic landfills either directly within or adjacent to the footprints of the proposed options with the potential for contaminated land to be present. · **Wildlife and Countryside Act 1981 (as amended)** – Although there are no geologically designated Sites of Special Scientific Interest in the vicinity of the scheme, there are Local Geological Sites which are protected under this Act from operations which may damage their interest. - There are Local Geological Sites within the vicinity of the scheme. · **Control of Substances Hazardous to Health Regulations 2002 (COSHH) and Construction and Design Management (CDM) Regulations 2015** – Under these sets of regulations, where a 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.
Climate Change	International and European No applicable legislation.
	National · **Climate Change Act 2008** - forms part of the UK government's plan to reduce greenhouse gas emissions, committing the government to a reduction of greenhouse gases by at least 80% of 1990 levels by 2050. The Climate Change Act creates a new approach to managing and responding to climate change in the UK, by: – Setting ambitious, legally binding emission reduction targets; – Taking powers to help meet those targets; – Strengthening the institutional framework; – Enhancing the UK's ability to adapt to the impact of climate change; and, – Establishing clear and regular accountability to the UK Parliament and to the devolved legislatures. **The Carbon Plan 2011** - sets out how the UK will achieve decarbonisation within the framework of the energy policy. UK local authorities and at a regional level must report on their CO_2 emissions. However, all emissions from the motorways sector have been removed and are not factored into the annual CO_2 emissions.
Environmental Planning	International and European · **The Environmental Impact Assessment (EIA) Directive (2014/52/EU)** – 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 (EIA. – The scheme will be subject to an EIA as this type of development falls within Annex 1 of the EIA Directive.
	National · **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. – 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.

Topic	Key international, European and national environmental legislation
	· **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. – As described above, the scheme is considered to be an NSIP. · **The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017** – 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. – 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 Highways England Integrated Project Team

National Policy

3.1.3 Guidance at the national level for each environmental topic is set out in the *National Planning Policy Framework* (NPPF)[25], *National Planning Practice Guidance* (NPPG)[26] , and the *National Networks National Policy Statement* (NNNPS)[27]. A summary of each is given below, and Table 3.1 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)

3.1.4 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 3.2 are the policies from the NPPF of relevance to each environmental topic.

National Networks National Policy Statement (NNNPS)

3.1.5 There are no specific policies for NSIPs in the NPPF. The Secretary of State for Transport determines these in accordance with the Planning Act 2008 and relevant national policy statements for major infrastructure, as well as any other matters that

[25] Department for Communities and Local Government (March 2012) National Planning Policy Framework [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf (last accessed July 2017)

[26] Department for Communities and Local Government (March 2016) National Planning Practice Guidance [online] available at: https://www.gov.uk/government/collections/planning-practice-guidance (last accessed July 2017).

[27] Department for Transport (December 2014) National Networks National Policy Statement (NNNPS) [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/387223/npsnn-web.pdf (last accessed July 2017).

are considered both important and relevant. The NNNPS sets out the need for, and Government's policies to deliver, development of NSIPs on the national road and rail networks in England. It provides planning guidance for promoters of NSIPs on the road and rail networks, and the basis for the examination by the Examining Authority and decisions by the Secretary of State. Listed in Table 3.2 are the policies from the NNNPS of relevance to each environmental topic.

Table 3.2 National Policy

Topic	Relevant National Policies
Air Quality	**NPPF** Paragraph 124 states that compliance with EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas (AQMAs) 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.
	NNNPS Paragraphs 5.12 and 5.13 state that 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.
Cultural Heritage	**NPPF** 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.
	NNNPS In accordance with Paragraph 5.128, 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.

Topic	Relevant National Policies
Landscape	**NPPF** The planning system should contribute to and enhance the natural and local environment by protecting and enhancing valued landscapes, geological conservation interest and soils (Paragraph 109), whilst decisions should encourage the effective use of land by re-using land which has been previously developed (Paragraph 111). Great weight should be given to conserving landscape and scenic beauty in AONBs and National Parks (Paragraph 115). Whilst preparing local plans, local planning authorities should set out environmental criteria against which planning applications will be assessed to ensure permitted operations do not have unacceptable adverse impacts on visual intrusion (Paragraph 143).
	NNNPS Where a development is subject to an EIA, an assessment of any likely significant landscape and visual impacts should be undertaken by the applicant within the EIA and described within the ES (Paragraph 5.144). The Applicant's assessment should consider any relevant national and local development policy, significant effects during construction and operation, and visibility and conspicuousness (Paragraphs 5.146-148). 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 (SoS) (Paragraph 5.156), but not be used in themselves to refuse consent. The SoS will judge whether visual effects on sensitive receptors outweigh the benefits of the development (Paragraph 5.158).
Biodiversity	**NPPF** 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.
	NNNPS Paragraph 5.22 requires that where the project is subject to EIA, the applicant should ensure that the environmental statement clearly sets out any likely significant effects on internationally, nationally, and locally designated sites of ecological or geological conservation importance on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity and that the statement considered the full range of potential impacts on ecosystems. Paragraph 5.23 states that 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.
Noise and Vibration	**NPPF** 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

Topic	Relevant National Policies
	amenity value for this reason. Developments which contribute to unacceptable levels or place unacceptable risk of adverse effects from noise pollution should be prevented.
	NNNPS As stated in Paragraph 5.193, developments are 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.
Flood Risk, Road Drainage, and the Water Environment	**NPPF** 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.
	NNNPS As stated in Paragraph 5.92, 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. As per Paragraph 5.96, 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 (Paragraph 5.97).
People and Communities	**NPPF** 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 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.
	NNNPS 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. PRoW, National Trails, and other rights of access to land (e.g. 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 PRoW, and open access land and, where appropriate, to consider what opportunities there may be to improve access.

Topic	Relevant National Policies
Geology and Soils	**NPPF** Paragraph 120 required that in order to prevent unacceptable risks from pollution and land instability, planning policies and decisions should ensure that new development is appropriate for its location. The effects (including cumulative effects) of pollution on health, the natural environment or general amenity, and the potential sensitivity of the area or proposed development to adverse effects from pollution, should be taken into account. Where a site is affected by contamination or land stability issues, responsibility for securing a safe development rests with the developer and/or landowner. Furthermore, Paragraph 121 states that planning policies and decisions should also ensure that the site is suitable for its new use taking account of ground conditions and land instability, including from natural hazards or former activities such as mining, pollution arising from previous uses and any proposals for mitigation including land remediation or impacts on the natural environment arising from that remediation; after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990.
	NNNPS Paragraph 5.168 states that where possible, developments should be on previously developed (brownfield) sites provided that it is not of high environmental value. For developments on previously developed land, applicants should ensure that they have considered the risk posed by land contamination and how it is proposed to address this.
Materials	**NPPF** Paragraph 5 indicates that waste policy will be set out in the National Waste Management Plan for England (2013)[28]. In terms of achieving sustainable development, the NPPF identifies that minimising waste and pollution is a fundamental part of the environmental role of the planning system.
	NNNPS Section 5.52 of the National Networks National Policy Statement[29] requires the applicant to set out the arrangements that are proposed for managing any waste produced. It states that '*The arrangements described should include information on the proposed waste recovery and disposal system for all waste generated by the development. The applicant should seek to minimise the volume of waste produced and the volume of waste sent for disposal unless it can be demonstrated that the alternative is the best overall environmental outcome'.*
Climate Change	**NPPF** Paragraphs 93 to 98 state that local authorities should adopt proactive strategies to mitigate and adapt to climate change (in line with the objectives and provisions of the Climate Change Act 2008), taking into account flood risk, coastal change and water supply and demand considerations. The flood risk requirements outlined in the NPPF are stated in Section 13.2.6.
	NNNPS Paragraphs 4.36 to 4.47 set out how the effects of climate change should be taken into account when developing and consenting infrastructure. It states that the latest UK Climate Projections should be used to take into account the potential impacts of climate change and influence adaptation measures, covering the estimated lifetime of the new infrastructure.

Source: Table prepared by Highways England Integrated Project Team

[28] Department for Environment, Food, and Rural Affairs (2013) Waste Management Plan for England. [online] available at: https://www.gov.uk/government/publications/waste-management-plan-for-england (last accessed March 2017).

[29] Department for Transport (2015) National Networks National Policy Statement [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/387223/NNNPS-web.pdf (last accessed March 2017).

Highways England Policy

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

3.1.6 In addition to the above national guidance documents, the *Road Investment Strategy: for the 2015/16 – 2019/20 Road Period*[30] (Department for Transport, March 2015) outlines a long-term programme to improve England's strategic road network. The *Road Investment Strategy* has been produced in accordance with Highways England's licence (Department for Transport, April 2015), in which the Secretary of State outlines what they expect Highways England to achieve and how they must be behaving in discharging their duties. 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.

3.1.7 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 is further reduced ensuring a long-term and sustainable benefit to the environment. Highways England has 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 Highways England 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 Highways England 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

[30] Department for Transport (2015) National Networks National Policy Statement [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/387223/NNNPS-web.pdf (last accessed March 2017).

example through the provision of new crossings and 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.

Local Policy

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

South Somerset District Council Local Plan 2006-2028

3.1.9 The *South Somerset District Council (SSDC) Local Plan 2006-2028*[31] 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.

[31] South Somerset District Council (March 2015) South Somerset Local Plan (2006 – 2028) [online] available at: https://www.southsomerset.gov.uk/media/707200/south_somerset_local_plan_2006-2028_adoption_version_march_2015.pdf (Last accessed April 2017).

  - 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.

3.1.10 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 NPPF and the NPPG. 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 (sic)' and is no longer in place.

South Somerset District Council Housing and Economic Land Availability Assessment, February 2017

3.1.11 The *Housing and Economic Land Availability Assessment* (HELAA) *Report*[32] provides a suite of evidence that brings together important information related to future housing and employment land delivery in South Somerset. This report updates the *Strategic Housing Land Availability Assessment 2013* (South Somerset District Council, 2013) and part of the *Employment Land Review 2009/10*[33] to support the production of the *Early Review of the Local Plan* and the Council's five-year housing supply. Numerous potential housing and employment sites have been identified in

32 South Somerset District Council (2017) South Somerset Housing and Economic Land Availability Assessment (HELAA) 2017 [online] available at: https://www.southsomerset.gov.uk/planning-and-building-control/planning-policy/early-review-of-local-plan-2006-2028/project-management--monitoring/south-somerset-housing-and-employment-land-availability-assessment/ (Last accessed April 2017).
33 South Somerset District Council (2009) Employment Land Review (ELR) 2009/10 [online] available at: https://www.southsomerset.gov.uk/planning-and-building-control/planning-policy/evidence-base/district-wide-documents/employment-land-review-august-2009/ (Last accessed April 2017).

the HELAA. Development proposals within 1 kilometre of the scheme extents (all located towards the east) include the following:

- E/QUCA/0001A (mixed)
- E/QUCA/0001B (mixed)
- E/QUCA/0001C (mixed)
- E/SPAR/0001 (housing)
- E/SPAR/0003 (housing)
- E/SPAR/0004 (housing)
- E/SPAR/0005 (mixed)
- E/SPAR/1200 (employment)

3.1.12 The locations of these development sites are shown on the environmental constraints plan contained in Appendix B of this report.

Somerset County Council's Future Transport Plan 2011-2026

3.1.13 *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.

4 Do nothing consequences

4.1.1 The A303 between Sparkford and Ilchester currently consists of approximately 5 kilometres of single carriageway between adjacent sections of dual carriageway.

4.1.2 The Annual Average Daily Traffic (AADT), to the nearest hundred vehicles, along this section of the A303 was 23,500 in the 2015 base year scenario, which compares against a Congestion Reference Flow (CRF) of approximately 28,400. The CRF gives an indication of the flow level at which the route is likely to experience congestion during the peak periods on an average day. However, this route carries much higher traffic levels during holiday periods and weekends so even though the AADT is below the CRF at present, this section of the route experiences regular occurrences of delay and congestion. The AADT is forecast to increase to 28,400 in 2023 (the planned scheme opening year) and 33,500 in 2038 (15 years after scheme opening), which indicates that the A303 would not have enough capacity, leading to increased queuing and congestion on an average day as well as during holidays and weekends.

4.1.3 The increase in traffic in the forecast years is due to forecast growth in trips, as well as transport and development schemes which are expected to be completed. These include other transport schemes in the region as well as those in surrounding regions which could influence A303 traffic. Specific housing and employment developments planned for Somerset, Wiltshire and Devon have also been represented in the forecasts and these can have more local impacts on A303 traffic.

4.1.4 Table 2.2 in section 2.2 of this report shows that there were 34 personal injury accidents over the five-year period from 1 January 2010 to 31 December 2014. Table 2.3 shows that this is above the national average for A class trunk roads. The AADT is predicted to rise from 23,500 in the base year 2015 to 33,500 in 2038 (15 years after opening), a rise in AADT of 43%. It is anticipated that, without a scheme solution, the number of accidents would rise in proportion to the predicted growth in traffic. This would equate to 48 personal injury accidents over a five-year period.

4.1.5 This single carriageway section of the A303 acts as a significant bottleneck, especially during weekend and holiday periods, causing long queues and delays, with accident rates above the national average for similar class roads.. Without intervention, the journey time between Ilminster and Mere along the A303 is forecast to increase in the future, from the base year 2015 to 2038 by between 2 to 5 minutes during weekday peak and interpeak time periods and by over 6 minutes during the August weekend period. Congestion acts as a constraint to development, and has an impact on the productivity and attractiveness of the South West as a key holiday destination. The severity of the issues highlighted above is likely to increase if no action is taken.

5 Alternative schemes

5.1 Introduction

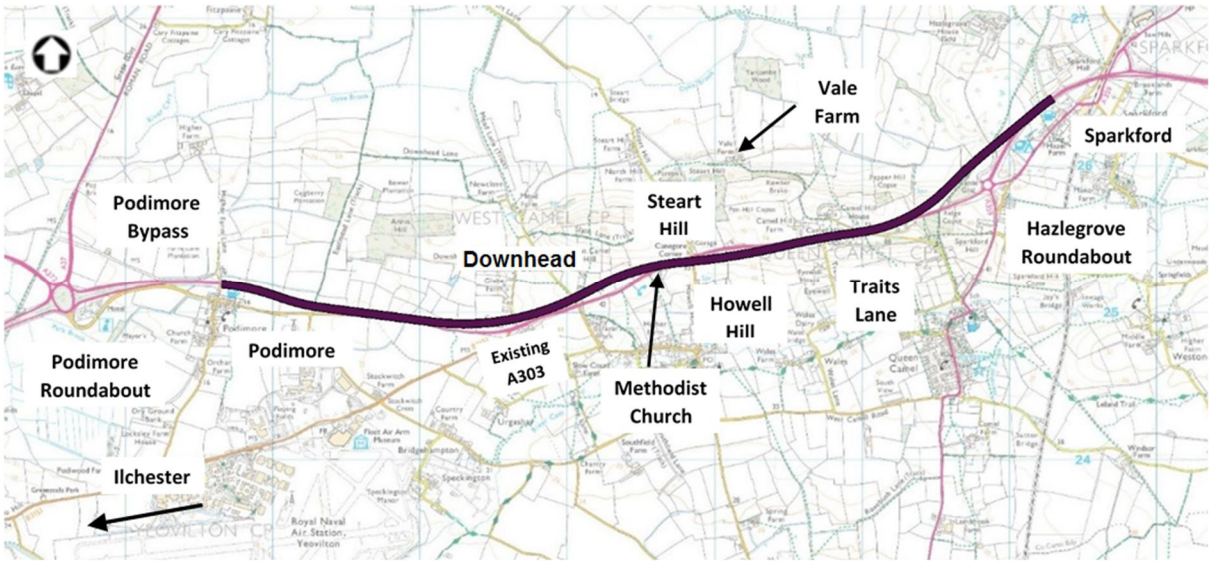
Route option 1

5.1.1 Option 1 would follow the existing corridor of the A303 very closely. It is generally considered to be the 'online option' although it is often deliberately aligned just to the side of the existing carriageway to allow re-use of the existing route for local access, avoid property or facilitate construction. At its maximum offset the route would typically be 100 metres either north or south of the existing A303.

5.1.2 The centreline of option 1 is illustrated in Figure 5.1.

5.1.3 At its western limits, it is proposed that the option would tie in with the existing A303 Podimore Bypass (a dual carriageway). Travelling eastwards, the route would bear north of the existing A303. The road would then rise up West Camel Hill before crossing over the existing A303 at the junction with Steart Hill and Howell Hill. This would pass very close to the Noise Important Area at the West Camel Methodist Church. The route would then take a southerly alignment briefly before meeting up with the existing road again to pass between the Scheduled Ancient Monument at Camel Hill Farm and the MOD signal station at Traits Lane. Finally, the route would bypass the existing Hazlegrove Roundabout to the north through the Registered Park and Garden associated with Hazlegrove House before tying into the existing A303 north of Sparkford Village.

Figure 5.1 Route option 1



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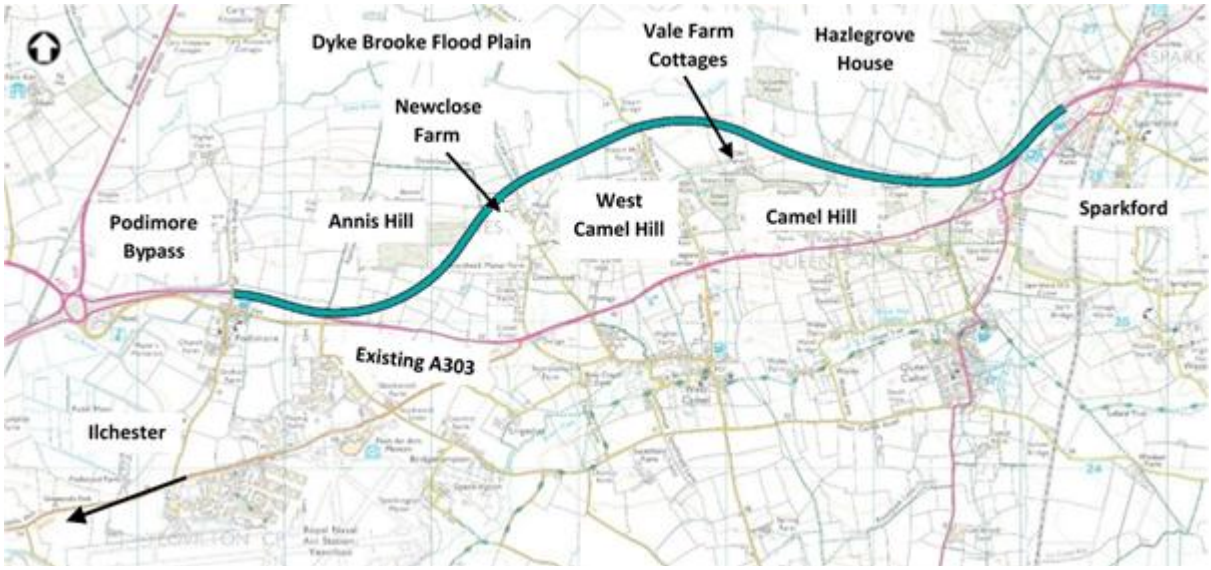
Route option 2

5.1.4 Option 2 would take an offline course to the north of the existing route. At its maximum distance the route would be approximately 1 kilometre north of the existing A303.

5.1.5 The centreline of option 2 is illustrated in Figure 5.2.

5.1.6 Immediately east of the tie-in with the Podimore Bypass, this route would bear north-east passing Annis Hill to the south-east. The route would then pass immediately north-west of Newclose Farm and continue north-east so that it ran close to, but not into, the Dyke Brook flood plain. The topography here is low-lying and the route would thus be separated from the existing route by intermediate hills of West Camel Hill and Camel Hill which lie between the proposed route and the existing A303. The proposed road would then bear south-east passing Vale Farm Cottages, then skirt around the foot of Camel Hill and through the Registered Park and Garden of Hazlegrove House to rejoin the existing A303 north of Sparkford Village.

Figure 5.2 Route option 2



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5.2 Junction strategy

Route option 1

5.2.1 A new all movements grade separated junction is currently being considered at Hazlegrove. This would provide connections to Hazlegrove House, the A359 (north and south) and access to villages south of the route.

5.2.2 A limited movements junction comprising eastbound slips only is currently being considered at Downhead. A limited movement junction would be provided at Camel Cross comprising a westbound exit slip road, a connection to the B3151 and a connection to West Camel via a retained section of the existing A303. At the western end of the scheme, a westbound entry slip would be provided enabling traffic from the B3151 and West Camel to join the westbound carriageway.

Route option 2

5.2.3 A new all movements grade separated junction is currently being considered at Hazlegrove. This would provide connections to Hazlegrove House, the A359 (north and south) and access to villages south of the route.

5.2.4 At the western end of the scheme, west-facing slip roads would be provided to connect the proposed route to the B3151 and West Camel via a retained section of the existing A303.

5.3 Treatment of local roads

Route option 1

5.3.1 Option 1 has the potential to be most disruptive to local journeys as it would directly impact on a greater number of side roads than option 2. Existing local roads along the proposed route include:

- The B3151, to and from Royal Naval Air Station (RNAS) Yeovilton and Ilchester
- Downhead Lane. This is the only access to the settlement of Downhead, to the north of the existing A303
- Plowage Lane, to and from West Camel
- Steart Hill, to and from Babcary
- Howell Hill, to and from West Camel
- Traits Lane, to and from Eyewell, Wales and Queen Camel
- Gason Lane, to and from Queen Camel
- An un-named lane to Camel Hill Farm and Vale Farm

5.3.2 Between Podimore and Steart Hill the proposed road is likely to be situated to the north of the existing A303, allowing the existing carriageway to be retained as a local link, connecting Podimore, the B3151, Plowage Lane and Howell Hill.

5.3.3 It is proposed that Downhead Lane would be connected to the retained section of the A303 carriageway via a new overbridge (the Downhead Junction Overbridge).

5.3.4 Steart Hill is likely to be connected to the retained section of the A303 carriageway via a new overbridge (the Steart Hill Overbridge).

5.3.5 Traits Lane is likely to be connected to the un-named road to Camel Hill Farm and Vale Farm via an agricultural underpass under the proposed road.

5.3.6 Additional accommodation structures may be required depending upon further consultation with land-owners and businesses who may be affected as a result of land being severed by the proposed road.

Route option 2

5.3.7 The existing A303 carriageway would be left in place entirely to provide access to local villages such as West Camel, Downhead, Wales and Queen Camel and to Camel Hill Farm and Vale Farm.

5.3.8 Steart Hill, which provides a route from the existing A303 to Babcary, would be crossed by the proposed route mid-way along its length. The road would be retained via a bridge over the proposed dual carriageway (the Steart Hill Overbridge). The byway known as Downhead Lane would also be crossed and would be retained via an overbridge (the Downhead Lane Overbridge).

5.3.9 It is expected that an accommodation bridge would be required across the proposed route to enable continued access from Vale Farm to associated land to the north (Vale Farm Overbridge).

5.3.10 Additional accommodation structures may be required depending upon further consultation with land-owners and businesses who may be affected as a result of land being severed by the proposed road.

5.4 Highway alignment and compliance with standards

Standards used

5.4.1 The geometric design of the proposed A303 main carriageway and associated junction connector roads for both route options has been developed in accordance with the *Design Manual for Roads and Bridges* (DMRB) Volume 6. In particular, the following Design Standards have been used:

- TD9/93 *Highway Link Design* (DMRB 6.1.1)
- TD27/05 *Cross Sections and Headroom* (DMRB 6.1.2)
- TD22/06 *Layout of Grade Separated Junctions* (DMRB 6.2.1)

5.4.2 Principles of DMRB Volume 6 will also be applied to the design of local roads although this approach is subject to agreement with the local highway authority, Somerset County Council. Relaxations from the requirements of the DMRB may be necessary along local roads to ensure these works are appropriate to the standard and character of adjacent existing roads.

Design speed

5.4.3 The mainline A303 is proposed to be a dual carriageway, subject to the National Speed Limit, with a Design Speed of 120kph in accordance with Figure 1 of TD 9/93. Slip roads and other junction link roads will have a Design Speed of 70kph as per Table 4/1 of TD22/06.

5.4.4 Design speeds for local roads will be subject to agreement with the local highway authority.

Cross sections

5.4.5 Dual carriageway sections have been designed as Dual 2 lane All-Purpose (D2AP) carriageways as detailed in Figure 4-3a in TD27/05. It is possible that a rigid (concrete) vehicle restraint system may be selected for the central reserve as an alternative to a flexible (steel) system that is conventionally used on D2AP carriageways.

5.4.6 Single carriageway sections will generally be single carriageway (S2) standard as detailed in Figure 4-3a in TD27/05. However, in many cases these cross-sectional standards may be relaxed by agreement with Somerset County Council to ensure works to local roads are appropriate to the standard and character of adjacent existing roads.

Junction design

5.4.7 For both options, all junctions will be designed as fully grade separated junctions in accordance with TD22/06 *Layout of Grade Separated Junctions*. However, these types of junctions generally occupy a large area and are sometimes inappropriate for lightly trafficked rural junctions. The approach will therefore be reviewed during preliminary design development to determine if design optimisations might be possible.

5.4.8 For both options, a grade separated junction is currently being considered for the Hazlegrove Junction. This would utilise the existing Hazlegrove Roundabout as part of the junction.

5.4.9 The traffic forecasts show the merging and diverging traffic at all junctions on the scheme will be sufficiently low to justify single lane slip roads and simple tapered merges and diverges.

Departures from standard

5.4.10 The layout of the main carriageway and junction links have all currently been developed to be compliant with geometric design standards, for both options.

5.5 Non-motorised users (NMU)

Existing facilities

5.5.1 Existing NMU routes along the proposed routes include:

- A footpath crossing of the Podimore Bypass via an existing bridge at Podimore (the Higher Farm Lane Accommodation Bridge).
- A byway, known as Eastmead Lane, which connects with the eastern end of the Podimore Bypass and runs northwards. This appears to be part of a historical north-south route that was severed by the construction of the bypass and, although it can still be accessed from the road, is not likely to be well used due to the difficulty of accessing it.
- Various north-south footpath connections across the existing A303 providing links between Downhead and West Camel; Steart Hill and Howell Hill; Traits Lane and Camel Hill Farm; and Gason Lane and the grounds of Hazlegrove House Registered Park and Garden.
- Byways known as Downhead Lane and Mead Lane which cross the proposed route of option 2 north of Downhead.
- A long-distance walking route known as the Celtic Way, which crosses the existing A303 adjacent to Traits Lane, and continues northwards to cross the route of option 2 near Vale Farm.
- An at-grade footpath crossing of the existing dual carriageway Sparkford Bypass which connects Sparkford village with the grounds of Hazlegrove House Registered Park and Garden.

Development of the NMU strategy

5.5.2 An outline NMU strategy for both route options was developed during the scheme option selection stage. This was based on:

- Initial feedback from user groups
- Initial feedback from Somerset County Council's Right of Way Officer
- An NMU audit undertaken during the scheme option identification stage
- NMU surveys undertaken during the scheme option identification stage

<u>Initial feedback from user groups</u>

5.5.3 In 2016, a number of user groups were contacted for their suggestions on the development of proposals for NMU. Somerset Ramblers, Somerset Bridleways Association and Blackmore Vale and Yeo Valley Cycling Touring Club all responded in writing. Feedback that was applicable to the scope of this scheme included:

- There is a popular cycle route between Babcary and West Camel which crosses the existing A303 carriageway at the Steart Hill/Howell Hill junction.

- The possibility of upgrading existing Higher Farm Lane Accommodation Bridge to bridleway standard should be considered.
- In principle, user groups would support short diversions of existing rights of way if this enabled at-grade crossings to be replaced by grade separated crossings.

5.5.4 Further liaison with user groups, including reviews of any formal responses received during the non-statutory consultation, will be used to inform the development of the preliminary design.

Initial feedback from Somerset County Council (SCC) Rights of Way Officer

5.5.5 During initial discussions SCC's Rights of Way Officer has made the following requests:

- Gateway treatments should be provided along the retained section of the A303 to control speeds and make the route more suitable for NMU.
- The upgrade of the Higher Farm Lane Accommodation Bridge to accommodate equestrian use and the connection of this bridge to the severed southern end of Eastmead Lane.
- SCC expects a regular spacing of NMU crossings between Sparkford and Podimore.

5.5.6 Further liaison with the Rights of Way Officer, including reviews of any formal responses received during the non-statutory consultation, will be undertaken to inform the development of the preliminary design.

2016 NMU survey results

5.5.7 In August and September 2016, an NMU survey was undertaken across the scheme area. Four locations with a relatively high number of NMU counts were observed:

- Podimore high street (cyclists)
- Higher Farm Lane (pedestrians)
- Steart Hill (cyclists)
- Grounds of Sparkford Hall (pedestrians)

NMU audit

5.5.8 An NMU audit, undertaken in 2016, made the following principal suggestions:

- Consideration be given to the upgrade of the Higher Farm Lane Accommodation Bridge to accommodate equestrian use and the continuation of this bridleway link to the severed southern end of Eastmead Lane.
- Consideration be given to the grade separation of the Celtic Way as it crosses the proposed route.

- Consideration be given to a grade separated NMU provision near Hazlegrove Junction, to connect Sparkford village and areas to the north of the proposed route.
- Careful consideration and accommodation be given to east-west cycle movements through the scheme area.
- Implementation of speed reduction measures along retained de-trunked sections of the existing A303 where it is proposed to use this for NMU provision.

5.5.9 The above suggestions and recommendations have been used to develop the following NMU strategy for each option.

Option 1 NMU strategy

5.5.10 Option 1 has the potential to be most disruptive to NMU journeys as it directly impacts on a greater number of routes than option 2.

5.5.11 It is proposed to upgrade the existing Higher Farm Lane Accommodation Bridge to enable use as a bridleway crossing. This is likely to involve upgrading the parapets to an appropriate standard for equestrian use, and may also require amendment to the legal status of the route across the existing bridge.

5.5.12 Footpaths in the vicinity of Downhead, Plowage Lane, Steart Hill and Howell Hill which would be directly affected by the proposed route would be locally diverted to cross the proposed route on the same structure(s) as the local road network. The cycle route from Babcary would be accommodated via the proposed Steart Hill Overbridge.

5.5.13 It is proposed that the route of the Celtic Way would be diverted under the proposed Traits Lane Underbridge.

5.5.14 At-grade crossings of the A303 to the west of the existing Hazlegrove roundabout would be extinguished and diverted to the existing roundabout and then through the junction via the Hazlegrove Junction Underbridge.

5.5.15 It is possible that the works would involve the closure of the at-grade crossing of the Sparkford Bypass, in which case the footway alongside Sparkford High Street would be extended to Hazlegrove Junction thus providing a link from the village to the Hazlegrove Registered Park and Garden.

Option 2 NMU strategy

5.5.16 It is proposed to upgrade the Higher Farm Lane Accommodation Bridge as for option 1.

5.5.17 The byway known as Downhead Lane would be reconnected via a new overbridge across the proposed road (the Downhead Lane Overbridge).

5.5.18 The byway known as Mead Lane would be extinguished and each end connected via the Downhead Lane crossing.

5.5.19 An existing footpath to the west of Steart Hill would be severed by the proposed route. It is proposed that this footpath would be diverted over the new route via the proposed Steart Hill Overbridge.

5.5.20 It is proposed that the Celtic Way, which currently runs to the east of Vale Farm, would be diverted across the proposed Vale Farm Overbridge.

5.5.21 It is possible that the works would involve the closure of the at-grade crossing of the Sparkford Bypass, in which case the footway alongside Sparkford High Street would be extended to Hazlegrove Junction thus providing a link from the village to the Hazlegrove Registered Park and Garden.

5.6 Structures

Existing structures

5.6.1 There are 2 existing structures adjacent to or within the scheme limits. At the western limits of the scheme is Higher Farm Lane Accommodation Bridge, a reinforced concrete voided deck slab with reinforced concrete substructures. No alteration is required to the superstructure, although it is proposed that the parapet will be upgraded for the structure to be used as a bridleway for both options. It is understood that the edge beams were strengthened in 2007 and the parapets replaced. Strengthening of the edge beams should therefore not be required to facilitate increasing the height of the parapets.

5.6.2 The other existing structure is Sparkford Railway Bridge, a three-span concrete beam and slab deck spanning 2 side roads and the Weymouth to Castle Cary railway line. This structure is currently outside the scheme limits and should not be affected by the current proposals for either option.

New structures

5.6.3 Four new structures are proposed for option 1, in addition to the parapet upgrades at Higher Farm Lane Accommodation Bridge. These structures are listed in Table 5.1.

Table 5.1 Option 1 structures

Name	Cross section	Main span length	Nominal minimum Headroom	Proposed Structural Form	Overall Bridge length	Overall Bridge Width
Higher Farm Lane Accommodation Bridge	As existing	As existing	As existing	Existing Structure	N/A	N/A

Name	Cross section	Main span length	Nominal minimum Headroom	Proposed Structural Form	Overall Bridge length	Overall Bridge Width
Downhead Junction Overbridge	Local Road + Footway	23m	6.45m	Steel composite 2 span	46m	14.1
Steart Hill Overbridge	Local road + Footway	24.3m	6.45m	Steel composite 2 span	88.6m	15.4
Traits Lane Underbridge	Dual Carriageway	14.5m	5.3m	Single Span PC Beam and RC slab (Integral)	15.5	27.2
Hazlegrove Junction Underbridge	Dual Carriageway	23.2m	5.3m	Single Span PC Beam and RC slab	26.5m	59m

5.6.4 Five new structures are proposed for option 2, in addition to the parapet upgrades at Higher Farm Lane Accommodation Bridge. These structures are listed in Table 5.2.

Table 5.2 option 2 structures

Name	Cross section	Main span length	Nominal minimum Headroom	Proposed Structural Form	Overall Bridge length	Overall Bridge Width
Higher Farm Lane Accommodation Bridge	As existing	As existing	As existing	Existing Structure	N/A	N/A
Podimore Overbridge	Slip road	38m	6.45m	Steel composite 2 span	74m	15.4m
Downhead Lane Overbridge	Byway	23m	6.45m	Steel composite 2 span	46.0m	6.1m
Steart Hill Overbridge	Local Road + Footway	27m	6.45m	Steel composite 2 span	51.2m	14.1m
Vale Farm Overbridge	Farm Access	23m	6.45m	Steel composite 2 span	46m	6.1m
Hazlegrove Junction Overbridge	Junction link road	40m	6.45m	Steel composite four span	129m	15.4m

5.6.5 It is proposed that overbridge structures will be designed as a family of structures, providing similar arrangements and details which consist of open span structures supported on reinforced concrete substructures. Proposed pier arrangements will consist of discrete piers, avoiding leaf piers, to maintain a more open appearance.

5.6.6 Where possible, piers will be avoided in the central reserve to minimise maintenance operations in this location. However due to limitations on some of the structural arrangements and the difficulties with accommodating skewed structures within the scheme layout this may not always be possible. The number of spans may therefore vary from structure to structure, depending on the specific circumstances.

5.6.7 It is proposed that underbridges will be single span reinforced concrete structures and, where possible, will be designed as integral structures. Typically underbridges will be formed of precast beam and slab superstructures on reinforced concrete sub-structures.

5.7 Earthworks and Geotechnics

Earthworks

5.7.1 The layout design is being developed in 3D modelling software. This enables the quantification of bulk excavation and deposition that will be required to establish the road foundation levels. A primary objective of the design of both options is to ensure there is an overall surplus of material (i.e. more excavation than deposition). The quantity of surplus has been deliberately engineered according to the anticipated requirement for landscaping fill which, although not assessed yet, may be required in order to mitigate visual and acoustic disturbance.

5.7.2 Modelling has assumed scheme wide slopes of 1:3. This approach will be refined during development of the preliminary design following ground investigation.

5.7.3 Anticipated quantities of material associated with each option are presented in Table 5.3. These quantities exclude items such as topsoil/resoil, granular material to structures and drainage, and removal of unsuitable in-situ material.

Table 5.3 Estimated bulk earthworks quantities

Option	Cut	Fill to embankments	Available fill for landscaping
1	773,959m^3	597,284m^3	176,675m^3
2	505,570m^3	296,155m^3	209,415m^3

5.7.4 It can be seen that option 1 would require greater quantities of earthworks as a result of its proposed route over the top of Camel Hill.

Geotechnical

5.7.5 A Preliminary Sources Study Report (PSSR) has been produced for this scheme. This report documents geotechnical (below ground) risks, implications and feasibility of scheme options. A geotechnical site investigation is planned for later in 2017 and,

in the interim, knowledge of the properties and risks associated with in situ material on the site is limited to the content of the PSSR.

5.7.6 Challenges associated with the site generally, and specifically with each option, are listed below.

Generic technical challenges pertinent to both route options

- Unforeseen ground conditions – potential issues regarding insufficient bearing capacity, excessive settlements, slope instability for cuttings and embankments, groundwater control and temporary works.
- Achieving earthworks mass balance across cut and fill operations on site.
- Ensuring a suitable volume of fill is generated to facilitate embankment construction – potential requirement to import large quantities of replacement fill if insufficient material produced on site.
- Acceptability of locally sourced fill – potential for site won embankment fill to be unsuitable for use thereby requiring replacement fill to be imported from an off-site source.
- High concentration of pyrites in natural strata and sulphates in made ground – potential for thaumasite sulphate attack on buried concrete affecting the integrity of concrete structures.
- Camel Hill Fault – most significant geological fault in the area and strikes roughly east west affecting both proposed route options around the location of the Steart Hill Overbridge.
- Compressible ground causing intolerable movements.
- Potential solution features in the White Lias Formation.
- Limestone bands and interbeds causing obstructions and creating permeable pathways - potential constructability issues (e.g. piling though limestone beds).
- Potential for variable ground conditions underlying highway structures – leading to foundation design and serviceability issues.
- High groundwater levels – potential issues surrounding elevated pore pressures driving slope instability, hydrostatic uplift effects on structures during and post construction, ingress into excavations leading to collapse and delays, periodic softening of formation strata where shallow groundwater persists during heavy rainfall.
- Stability of cut slopes within the Lower Lias deposits – target design slope angles may not be achievable.
- Relic shear surfaces and propensity for slope instability – potential for pre-existing slope failures which may be remobilised during construction of earthworks.
- Landfill in location of the tie-in to the Sparkford Bypass (common to both options) – laterally extensive deposits of material (potentially contaminated) which may be highly compressible.

Specific technical challenges relevant to option 1

- Potential sources of contamination – Existing and former fuel storage sites identified along proposed option 1 alignment in the vicinity of Steart Hill and Gason Lane. Potential for deleterious ground conditions which may require extensive remediation of potentially contaminated land.
- Historical quarries identified along option 1 alignment just to the west of Traits Lane and in the vicinity of the Camel Hill Services. Potential for quarries to be poorly backfilled leading to excessive/differential settlement, may require soft ground design solutions to be implemented.
-

Specific technical challenges relevant to option 2

- Severely limited existing ground investigation data across much of the proposed option 2 alignment. High risk associated with unknown ground conditions.
- Potential for increased thickness of alluvial/superficial deposits owing to low-lying land in close proximity to the Dyke Brook flood plain, particularly at the western and central sections of the proposed alignment.
- Consequential effects of potentially thicker alluvial deposits – increased depth to competent founding stratum; potential requirement to pile structural foundations; alluvial deposits potentially unsuitable for use as embankment fill; serviceability implications on proposed earthworks.

5.8 Drainage

5.8.1 Edge of carriageway drainage systems will be selected in accordance with the *Design Manual for Roads and Bridges* (DMRB) Volume 4, in particular HD33/16 *Design of Highway Drainage Systems* (DMRB 4.2.3). This approach is likely to lead to a mixture of solutions such as surface water concrete channels, filter drains and kerbs/gullies, depending on the location, road type and whether the road is in cutting or embankment.

5.8.2 A risk assessment will be undertaken in accordance with HD45/09 *Road Drainage and the Water Environment* (DMRB 11.3.10) to establish the potential for runoff from the proposed road to cause pollution to receiving watercourses. This risk assessment will inform the selection of treatment measures to address pollution risk.

5.8.3 Although the preferred destination for runoff water is normally via infiltration to ground, it is expected that the ground conditions in this area are not suitable for infiltration systems. However the potential for infiltration will be reviewed following acquisition of data from ground investigation studies.

5.8.4 It is proposed that carriageway drainage systems will connect to new detention basins which will provide attenuation prior to outfalling into the receiving watercourses. These basins will be sized to accommodate the runoff from a 1:100

year storm, ensuring that flood risk to surrounding property does not increase as a result of the proposed road drainage.

Option 1

5.8.5 The carriageway profile of option 1 consists of a high point towards the centre of the scheme, with the road falling away to low points to the west and east.

5.8.6 The drainage strategy for option 1 consequently comprises of 2 new detention basins, one at each end of the scheme. The basin at the western limits of the scheme would outfall, via a tributary, to the River Cary. The second basin, towards the eastern limits of the scheme, would outfall into the Dyke Brook via a short length of ditch.

5.8.7 An existing pond in the grounds of Hazlegrove Park and Garden which is part of the Sparkford Bypass drainage system would be retained.

5.8.8 During design development, opportunities will be considered to supplement the detention basins with intermediate attenuation features along the length of the road so that attenuation (and pollution control) is provided continuously along the length of the drainage system rather than only at a single point prior to outfall.

Option 2

5.8.9 The carriageway profile of option 2 consists of a low point towards the centre of the scheme with the road generally rising to the west and east away from this point. The low point is situated very close to the mapped extents of the Dyke Brook flood plain.

5.8.10 The drainage strategy for option 2 consequently involves the provision of a detention basin at the centre of the scheme, at the low point. This would outfall to the Dyke Brook via a short length of ditch. A second detention basin is also likely to be required at the western limits of the scheme at a similar location to the basin proposed in option 1.

5.8.11 The existing pond in the grounds of Hazlegrove Park and Garden which is part of the Sparkford Bypass drainage system would be retained.

5.8.12 During design development, opportunities will be considered to supplement the detention basins with intermediate attenuation features along the length of the road so that attenuation (and pollution control) is provided continuously along the length of the drainage system rather than only at a single point prior to outfall.

5.9 Statutory Undertakers

Existing utilities

5.9.1 Enquiries have been undertaken to determine the location of public utilities within the scheme area in accordance with Highways England's Interim Advice Note (IAN) 59/04 *The New Roads & Street Works Act 1991 - Diversionary Works* section 2 'Preliminary Inquiries (C2)'

The results of the preliminary (C2) enquiries 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 5.3**.

Figure 5.3 Locations referred to in relation to public utilities

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<u>Wessex Water</u>

5.9.2 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 option 1.

5.9.3 A further water main crosses the existing Hazlegrove Roundabout under the A359 arm and runs along the southern A303 verge up to the Camel Hill services. From Hazlegrove Roundabout this main also runs into Sparkford village through the Sparkford service area site. There is a chance that this main may be affected by option 1 but not option 2.

5.9.4 A third distribution main runs up Traits Lane from Queen Camel and crosses the A303 to supply Camel Hill Farm. This main is only likely to be affected by option 1.

5.9.5 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 option 1.

5.9.6 Wessex Water records also indicate that 2 foul sewers cross the Sparkford bypass between Hazlegrove House and Sparkford village. These sewers are in the vicinity of the eastern tie-in for both options and so may be affected.

Scottish and Southern Energy (SSE)

5.9.7 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.

5.9.8 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.

5.9.9 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.

5.9.10 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.

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

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

BT

5.9.13 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.

5.9.14 To the east of Blue Haze to 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.

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

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

Level 3

5.9.17 Instalcom, who act on behalf of a company called Level 3, have provided details of a fibre optic cable which is owned by Level 3, and 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 both options, particularly option 1.

Virgin Media

5.9.18 Virgin Media'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. It is understood that the Virgin Media cables occupy the same duct route as the Level 3 cables.

BSkyB

5.9.19 BSkyB did not provide any record information, although have since advised that they own or lease cables that are within Level 3's corridor, similar to Virgin Media.

Network Rail

5.9.20 Instalcom have provided records regarding the presence of a fibre optic cable running alongside the Wilts, Somerset and Weymouth Railway as it runs in a north-south direction at 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

5.9.21 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 records have been obtained relating to live services at this site. Neither option 1 nor option 2 pass through the site.

Camel Hill telecommunications site

5.9.22 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. The layout of option 1 has been designed to avoid this plot.

Diversionary works

5.9.23 Budgetary estimates have been obtained from utility companies who are likely to be affected by the works. The estimates have been added together and the resulting budgetary estimate is shown in Table 5.4.

Table 5.4 Budget estimates for statutory undertakers works

Option	Budget Estimate for Statutory Undertakers Works (incl VAT)
1	£4,355,429
2	£1,602,427

5.9.24 Option 1 is anticipated to incur the greatest costs due to there being a greater concentration of utilities along the existing A303 corridor. Of particular concern is the presence of three fibre optic services which run along the full length of the existing verge within the same duct route. The route is owned by Level 3 (who are represented by Instalcom) who lease space within this route to BSkyB and Virgin Media. Any work to this corridor will have to be well co-ordinated, and this exercise is likely to be complicated by numerous works phases that may be required in order to construct the scheme around the existing A303 traffic.

5.9.25 In view of the complexities surrounding planning of the diversionary works for the fibre optic services, these organisations will be engaged early in the preliminary design process to ensure their requirements and influence over the project programme are fully understood.

5.10 Land-take and pinch-points

5.10.1 The current design of both route options will require permanent and temporary land acquisition during construction. An estimate of the likely requirement for land acquisition is given in Table 5.5.

Table 5.5 Land acquisition requirements (figures in hectares)

	Option 1	Option 2
Total area of scheme footprint measured from the engineering model	53.0	55.3
Additional allowance for landscaping and drainage outfall works	10.7	11.6
Deductions		
Total area of land already registered to Secretary of State for Transport within the scheme footprint	-25.6	-20.4
Total Area of third party land requiring acquisition	**38.1**	**46.6**

5.10.2 It can be seen from Table 5.5 that option 2 is likely to require the greatest acquisition of third party land.

5.10.3 This estimate includes allowances for all works within a permanent highway boundary which will either be maintained by Highways England or by Somerset County Council. It excludes allowances for temporary works such as compounds, lay down areas, haulage routes, land required for wayleaves/easements, rights of way dedications and accommodation works such as access tracks. These items will be developed as part of the preliminary design.

5.10.4 Being an online option, much of option 1 would make use of the footprint of the existing A303 corridor. Some agricultural land would need to be acquired adjacent to the existing road. An area of the Hazlegrove Registered Park and Garden at the eastern end of scheme would also need to be acquired.

5.10.5 The majority of the land required for option 2 is agricultural farmland. An area of the Hazlegrove Registered Park and Garden, larger than that needed for option 1, would also be required.

Pinch-points

5.10.6 Of particular concern, in respect of ease of construction and impact on adjacent interests, are sections of the scheme where the available corridor for road construction appears to be limited. There are 2 pinch-points along the route of option 1.

5.10.7 At the Howell Hill/Steart Hill junction, the proposed route crosses the existing A303 carriageway to move south. At this location, there are also properties to the north and south of the road. The footprint of the scheme is particularly close to the property

known as Sheira-Leigh, located on the south-western corner of the A303/Steart Hill Junction.

5.10.8 At Camel Hill, the route of option 1 crosses the existing A303 carriageway near Traits Lane. At this location, the route alignment is constrained by a Scheduled Monument (a Romano-British settlement) to the north and the MOD signal station to the south, both of which are considered to be unavailable for the scheme.

5.10.9 Option 2 does not appear to be constrained by any such pinch-points.

5.11 Buildability

5.11.1 The services of a Delivery Partner were commissioned during the option selection stage to provide advice regarding the buildability of both options under consideration. Aspects considered included construction phasing, temporary works considerations, programme constraints, traffic management, potential environmental impacts and constraints, and risks and opportunities.

5.11.2 Principal findings from this work are summarised in the following sections.

Option 1

- As a result of this option being essentially online, there is a risk that full closures of the A303 may be necessary for items such as traffic management changes and lifting bridge beams over existing carriageways. If this is necessary the diversion routes, which will need to follow roads of similar or better class to the A303, may cover considerable distances. Full road closures will therefore need to be minimised or, if possible, avoided.
- Traffic management will be more complex than for option 2, and is likely to involve a number of phases resulting from construction of the new dual carriageway along both sides of the existing road. This is likely to complicate construction elements such as earthworks and statutory undertakers' diversionary works.
- The construction programme is highly dependent upon the early establishment of a haulage route to enable material to be moved from the main area of excavation in West Camel Hill to the main area of fill at Hazlegrove Junction. An online haulage route (i.e. adjacent to the existing A303 carriageway) is considered possible although will require sequential construction which would prolong the overall construction duration.
- Flexibility of construction sequencing is particularly constrained at the 2 pinch-points highlighted earlier in this chapter. The impact of these pinch-points on the construction programme would be minimised by the adoption of the offline haulage route.
- Working space will be at a premium along much of the site, due to adjacent property and live traffic.
- The proposed horizontal and vertical alignment of the proposed road will be influenced not only by geometric design standards but also by the requirement to

ensure the scheme is buildable in close proximity to the existing road. At locations where the proposed road is being constructed close to live traffic this may place constraints on the vertical alignment of the proposed road which will need to be similar to the existing road levels.

Option 2

5.11.3 The following items were raised as principle issues for consideration during the development of the preliminary design of option 2.

- There will be significant ecological and environmental restrictions as the majority of the route passes through undeveloped land, the landscape character of which is significant.
- Mitigation works could have a significant influence on the construction schedule, particularly during mobilisation.
- Option 2 passes in close proximity to the Dyke Brook flood zone. Management of surface water runoff during construction may stifle progress in inclement weather.

5.12 Lighting

5.12.1 It is not expected that the main carriageway will require lighting for either option.

5.12.2 All significant junctions have been assessed to determine if lighting is required, in accordance with TA49/07 *Appraisal of New and Replacement Lighting on the Strategic Motorway and All-Purpose Trunk Road Network* (DMRB 8.3). This assessment highlighted the need to light only Hazlegrove Roundabout (south), for both options 1 and 2. No other junctions, including the Hazlegrove Junction Roundabout (north) are expected to require illumination.

5.12.3 The proposed lighting at Hazlegrove Roundabout (south) is expected to comprise 10 metre columns and will use LED lanterns. The extent of lighting along each of the roundabout arms is expected to follow the guidance given in Institution of Lighting Professionals document PLG02 *The Application of Conflict Areas on the Highway*.

5.13 Technology

5.13.1 An assessment of the technology requirements for the scheme has been undertaken. Whilst the Road Investment Strategy commits to the A303/A358 becoming an expressway corridor from London to Exeter via the M5 by 2028, there are currently no technical standards for expressways with regards to the provision of technology. Proposals for this scheme therefore involve the provision of minimum technology required for a dual two-lane all-purpose carriageway. This is likely to involve the provision of National Traffic Information Service (NTIS) vehicle counting sites and Emergency Roadside Telephones only, including any ducting and cabling routes within the proposed verge to accommodate these installations.

5.13.2 It is currently not intended to provide any additional features that would constitute 'future-proofing' for anticipated expressway standards. Further assessment work will be undertaken during the preliminary design stage, and this will include adoption of any technical expressway standards that are formally published during this stage.

5.14 Cost Estimates

5.14.1 The current scheme estimates for the two options are:

- Option 1: £179,172,419
- Option 2: £168,105,795

6 Traffic and Economics

6.1 Traffic Modelling

6.1.1 References in this section to WebTAG relate to the Department for Transport's web-based *Transport Analysis Guidance: (WebTAG)*.

6.1.2 The proposed A303 dual carriageway scheme between Sparkford and Ilchester and the proposed A358 dual carriageway scheme between Taunton and Southfields in Somerset would be relatively close to each other so a traffic model has been developed to be used in the appraisal of both schemes. This model has been prepared using the *South West Regional Traffic Model (SWRTM) Validation Report* (Highways England, March 2017) and will be used to support the scheme during the Development Consent Order (DCO) Examination process. The traffic model is fully documented in the Local Model Validation Report (Highways England, May 2017).

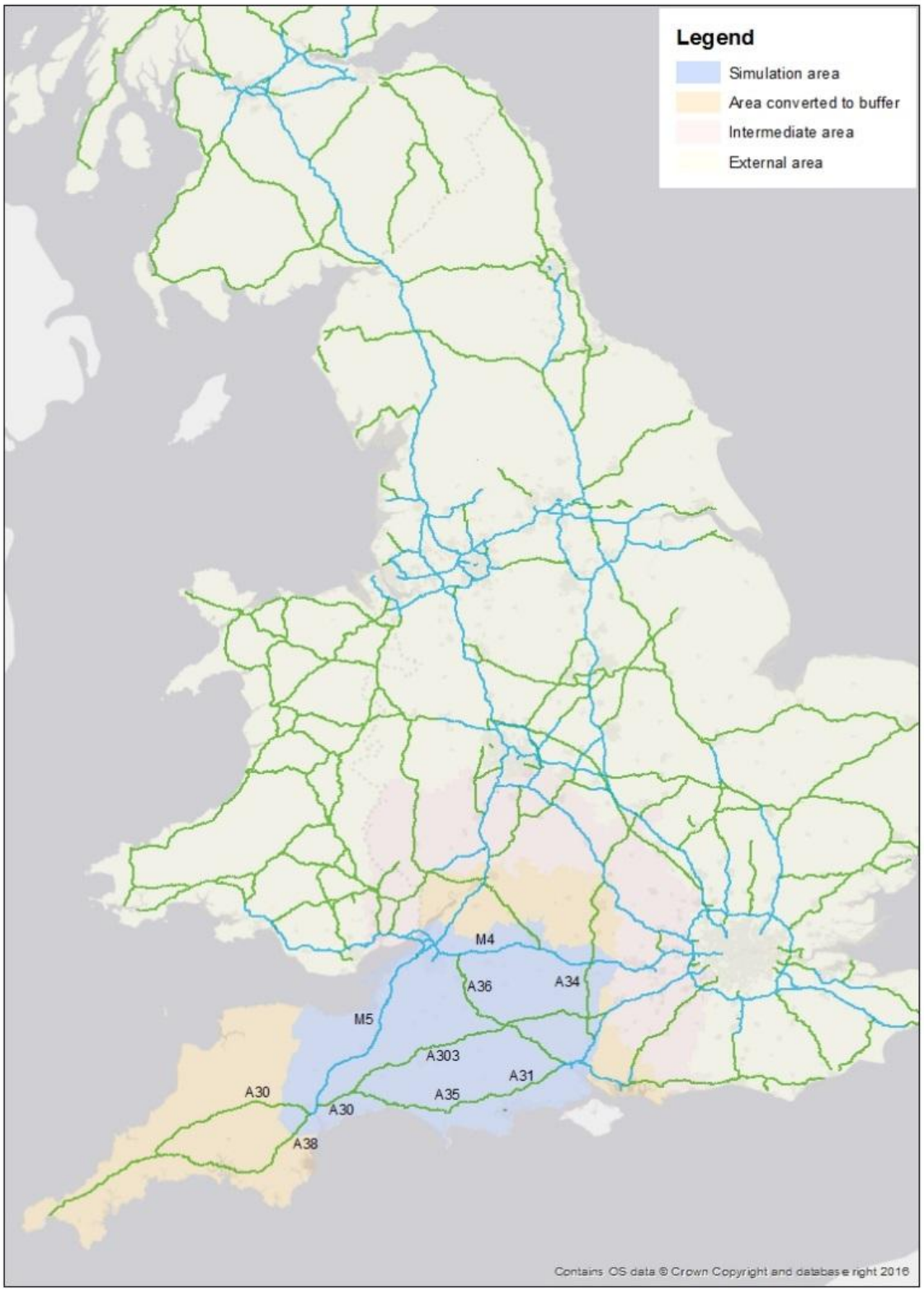
6.1.3 The traffic model has been developed in the SATURN software to represent three weekday time periods that are consistent with the SWRTM model time periods. These are an average AM peak period hour (07:00-10:00), an average hour in the inter-peak (10:00–16:00) and an average PM peak period hour (16:00–19:00) for an average Monday to Friday weekday in March 2015 (excluding school holidays and bank holidays).

6.1.4 To represent the higher traffic flows that occur at weekends and during holiday periods, a separate factor-based highway traffic model was also developed to represent these peak traffic periods in the economic appraisal.

6.1.5 The development of the traffic model relied on the data used in the SWRTM and the A358 and A303 models created at option identification stage as well as additional surveys carried out in autumn 2017.

6.1.6 The definition of the study area needs has taken into account the area which would be affected by the implementation of the scheme. In this sense, the study area was defined for both the A303 and A358 schemes with both schemes to be assessed using one model. Therefore, the study area comprised the A303 corridor, the A358 corridor, the M4/M5, and the surrounding areas. The simulation area is shown below in Figure 6.1.

Figure 6.1 Areas of Coverage



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6.1.7 The SATURN model comprised of 1,933 zones and a sub-regional road network. The simulation area covers the majority of the simulation area of the SWRTM; namely the area between Exeter to the south-west, the M4 to the north and the A34/M3 to the east. It was decided that it was unnecessary for the remainder of the SWRTM simulation area to be fully simulated in the option selection stage model so this has been converted into buffer coding and combined with the SWRTM buffer network to form the option selection stage buffer network which will allow movements into, out of and through the study area to be correctly allocated. Detailed local network has been added in the vicinities of the proposed schemes: predominantly between Taunton and Southfields and close to Sparkford and Podimore, but also near Exeter and between Honiton and Taunton.

6.1.8 The SWRTM trip matrices have been adapted with additional local zones added to better represent the distribution of trips local to the proposed schemes. A matrix estimation process was also carried out in the calibration process.

6.1.9 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.

6.1.10 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 achieves link flow validation in line with the WebTAG criteria and screenline flow validation close to the WebTAG criteria.

6.1.11 The journey time validation is considered to be good in all time periods with the model recreating journey times that are representative on key routes in the modelled area: the journey time route validation meets WebTAG criteria and the journey time segment validation meets or nearly meets the WebTAG criteria across all time periods.

6.1.12 In conclusion, it is considered that the 2015 base year traffic assignment model developed for the A303 Sparkford to Ilchester and A358 Taunton to Southfields option selection stage calibrates and validates to within acceptable margins of the WebTAG criteria and therefore demonstrates a good representation of traffic behaviour in the study area and forms a robust basis from which future year forecasts and option testing can be developed.

6.2 Traffic forecasting

6.2.1 Traffic forecasts have been prepared for the current estimated opening year for the scheme, 2023, and the scheme design year, 2038. Two additional forecast years, consisting of an intermediate year of 2031 and a final forecast year of 2051, have also been used to support the economic appraisal of the scheme. The forecasts have

used NTEM/TEMPRO v7.2 and Road Traffic Forecasts (RTF) 2015 forecasting data as well as accounting for local developments which have been assessed in an uncertainty log in accordance with WebTAG unit M4.

6.2.2 The traffic forecasts have been undertaken using a variable demand modelling approach that is consistent with that applied in the development of SWRTM. This represents redistribution, mode choice and time period choice in response to changes in travel costs.

6.2.3 Traffic forecasts have been prepared for the 2 scheme options as well as a scenario without the scheme.

6.2.4 Since the completion of the forecasting work the government has announced the removal of the toll charges from the Severn Crossing in 2018. This is likely to have a very small impact on the forecast traffic in the local area. These changes would occur both with and without the scheme so that the differences for economic and environmental appraisal would be limited. It is proposed that this will be fully assessed in the next stage of scheme development.

6.3 Effects of Scheme Options

6.3.1 The link flows on the network were compared between the Do Minimum scenario and both Do Something options for 2038, the design year (i.e. 15 years after planned scheme opening). The Do Minimum scenario is described in chapter 4 of this report. The Do Something scenarios include the proposed dual carriageway options. Both option 1 and option 2 are forecast to lead to an increase in Annual Average Daily Traffic (AADT) along the Sparkford to Ilchester section of the improved A303 in 2038 compared to the Do Minimum scenario.

6.3.2 Option 1 is forecast to result in an AADT of 40,000 in 2038. Option 2, the offline option, is projected to lead to an AADT in 2038 of 37,300 along the new dual carriageway and 2,000 along the existing single carriageway.

6.3.3 The impacts on journey times along this route are shown in Table 6.1.

Table 6.1 Journey Times (minutes)

Direction	Scenario	Weekday			August Weekend
		AM	IP	PM	IP
A - A303 Ilminster to Mere	2015 Base	39.76	39.50	39.55	43.67
	2023 Do Minimum	40.70	40.38	40.74	47.20
	2023 Option 1	38.40	38.19	38.95	42.58
	2023 Option 2	38.54	38.33	39.03	42.68
	2038 Do Minimum	44.42	42.25	42.72	49.92
	2038 Option 1	41.91	39.82	40.36	45.04

Direction	Scenario	Weekday			August Weekend
	2038 Option 2	41.96	39.93	40.46	45.10
B - A303 Mere to Ilminster	2015 Base	39.54	39.64	40.33	42.90
	2023 Do Minimum	40.21	40.65	41.78	46.16
	2023 Option 1	38.65	39.15	39.85	42.16
	2023 Option 2	39.34	39.82	40.52	42.35
	2038 Do Minimum	41.72	42.46	45.18	49.15
	2038 Option 1	39.63	40.42	42.72	44.56
	2038 Option 2	40.29	41.06	43.24	44.67

6.3.4 There is a predicted increase in journey times between the 2015 base and the Do Minimum scenario for both 2023 and 2038. This is a result of a higher level of traffic in both forecast years. The journey times decrease between Do Minimum and the Do Something scenarios in both forecast years and for all time periods. This indicates that the schemes have a positive impact on the A303 corridor.

6.3.5 In 2023 both options are predicted to provide an average reduction in journey time close to 2 minutes in each direction on a neutral weekday compared to the Do Minimum. The corresponding reduction during August weekends is close to 4 minutes. In 2038 the reductions are similar for the weekday but larger for the August weekend, increased to almost 5 minutes.

6.3.6 Modelled journey times for option 1 are consistently lower than those for option 2 due to its shorter distance.

6.3.7 The journey time savings are consistently higher in the eastbound direction compared to the westbound direction. This is related to increased delays at Podimore junction in the westbound direction.

6.4 Economic Performance of Options

6.4.1 Economic assessment has been carried out in a manner consistent with WebTAG Unit A1.1 Cost Benefit Analysis using TUBA v1.9.8. TUBA calculates benefits using trip and cost matrices output from the VDM process. In addition to the four weekday time periods, the economic assessment made use of a model of an August weekend to capture the full extent of benefits associated with the options. The assessment masked model noise at locations far away from the scheme, and therefore the benefits reported are for only for the primary traffic movements.

6.4.2 Scheme costs are presented in Table 6.2. Changes in maintenance costs have not been included in the economic assessment at this stage.

Table 6.2 : Scheme Cost Summary – Core Scenario

Cost Type	Option 1	Option 2
Preparation	£10,221,622	£10,679,487
Supervision	£2,461,438	£2,209,868
Works	£113,015,288	£104,717,776
Land	£12,469,991	£11,877,587
Total Costs (PVC)	£138,168,340	£129,484,718

Source: Highways England Options Estimates (July 2017). Values are expressed in 2010 prices, undiscounted

6.4.3 Both options have similar costs overall, the costs for option 1 are slightly higher largely due to the higher construction costs.

6.4.4 The benefits and costs of the 2 scheme options are presented in Table 6.3. In accordance with Department for Transport guidance, Reliability Benefits and Wider Economic Benefits are added to the Initial Benefit Cost Ratio (BCR) to produce an adjusted BCR.

Table 6.3 Analysis of Monetised Costs and Benefits - Core Scenario (£000s)

Item	Option 1	Option 2
Accidents (not assessed by TUBA)[1]	9,290	4,043
Roadworks (not assessed by TUBA)[2]	-19,195	-2,425
Greenhouse Gases (assessed by TUBA)	-21,417	-21,939
Noise (not assessed by TUBA)[3]	-121	747
Air Quality (not assessed by TUBA)[4]	-117	-167
Economic Efficiency: Consumer Users (Commuting)	15,554	13,372
Economic Efficiency: Consumer Users (Other)	27,662	24,319
Economic Efficiency: Business Users and Providers	129,863	114,412
Wider Public Finances (Indirect Taxation Revenues)	43,458	44,081
Present Value of Benefits (PVB)	184,976	176,443
Broad Transport Budget Present Value of Costs (PVC)	115,073	108,376
OVERALL IMPACTS		
Net Present Value (NPV)	69,903	68,067
Initial Benefit to Cost Ratio (BCR)	**1.61**	**1.63**
Reliability Benefits	11,183	10,526
Wider Economic Benefits	12,986	11,441
Adjusted Present Value of Benefits (PVB)	209,146	198,410
Adjusted BCR	**1.82**	**1.83**

Notes: [1] from COBALT, [2] from QUADRO,,[3] TAG Unit A3 Chapter 2,[4] TAG Unit A3 Chapter 3, All monetary values are expressed in 2010 prices discounted to 2010

6.4.5 The BCR value is used to assess the value of a transport project by weighing the benefits against the costs to indicate whether it is Value for Money and in doing this a wide spectrum of impacts is considered in a detailed appraisal, including various impacts on the economy, the environment and social welfare. Both options result in adjusted BCRs between 1.5 and 2. Under the Department for Transport's value for money criteria, these represent medium value for money. The BCRs differ slightly from those provided in the *Technical Appraisal Report* (Highways England,

November 2016) due to the use of the SWRTM in the traffic modelling. The SWRTM was not available when the traffic modelling was carried out for the Technical Appraisal Report.

7 Operational Assessment

7.1 Maintenance and repair strategy

7.1.1 A Maintenance and Repair Strategy Statement has been prepared which identifies the key maintenance issues for the proposed scheme. At this stage of the scheme, it considers aspects applicable to both options. It does not identify the maintenance and repair requirements for the 2 options separately as the level of detail considered at this stage shows similar maintenance requirements for both.

7.1.2 The strategy considers new assets that will require long-term maintenance and existing assets that will need to be repaired or replaced to bring them up to an acceptable standard at opening of the proposed scheme. These include:

- Safety barrier
- Drainage
- Structures
- Earthworks
- Street lighting

7.1.3 Requirements for future ease of maintenance of these assets are among the factors driving the design.

7.1.4 The only distinguishing aspect between the 2 options identified at this stage is that the existing A303 could be used as a diversion route when maintenance activities necessitated a carriageway or full road closure of any part of option 2. This would not be possible with option 1 and any diversion would be considerably longer in order to keep traffic on major county roads thus avoiding minor roads.

7.2 Safety management

7.2.1 A Project Safety Plan has been prepared for this scheme. The key outcomes of this plan are reproduced below.

- Interim Advice Note (IAN) 191/16 Safety Governance for Highways England (Highways England, March 2016) provides guidance on the selection and implementation of the appropriate safety management system for a scheme based on several criteria. The result of the classification process deems that whichever route option is chosen, the scheme should be subject to a Type A Safety Management System (SMS), with one Type B feature (for a definition of the types of SMS see paragraph 7.2.2).
- The preferred A303 Sparkford to Ilchester Dualling scheme will satisfy the road user safety objective if it is demonstrated from the Post Opening Performance period that:
  - The average number of Fatalities and Weighted Injuries (FWI) casualties per year is less than the safety baseline, where the safety baseline is based

on data for a national 'average' high quality all-purpose dual carriageway (D2AP) road.
  - The rate of FWI per billion vehicle-miles per annum is no more than the safety baseline where the safety baseline is based on data for a national 'average' D2AP road.
  - For each link, no population (eg car drivers, pedestrians, HGV drivers and motorcyclists) is disproportionately adversely affected in terms of safety and risk to each population remains tolerable.

7.2.2 The types of Safety Management System referred to in IAN 191/16 are:

- Type A – Basic. This is likely to apply to projects/interventions that are routine, familiar and without operational implications. As such, these will be largely satisfied by the application of existing standards and guidance.
- Type B – Moderate. This is likely to apply to:
  - Projects/interventions that could have some significant operational impacts.
  - Those which may lead to an increased level of stakeholder interest (specifically in terms of how safety will be addressed or managed).
  - This will include the application of existing standards and guidance.
- Type C – Complex. This is likely to apply to:
  - Complex, infrequent projects/interventions which may have major implications for the strategic road network.
  - This will include the application of existing standards and guidance.

7.3 Summary

7.3.1 Neither of the route options under consideration in this report have significant safety or operational implications for the strategic road network. There is no significant difference between the safety management or maintenance and repair requirements for the 2 route options under consideration. Option 2 has the benefit of a diversion route via the existing A303 road during maintenance activities and emergency closures of the new road.

8 Environmental assessment and environmental design

8.1 Introduction

8.1.1 This chapter summarises the results of the environmental assessment that has been undertaken for option 1 and option 2, during both construction and operation.

8.2 Summary of potential environmental effects

Air quality

8.2.1 The construction phase is expected to last approximately 3 years and could affect local air quality through the generation and subsequent deposition of construction dust arising from construction activities and vehicle movements. With the implementation of the mitigation measures identified, such as avoiding double handling of materials and minimising height of stockpiles, air quality effects from the construction phase of both option 1 and option 2 are not expected to be significant.

8.2.2 Nitrogen dioxide (NO_2) concentrations have been predicted for a number of receptors shown on the plans in Appendix C of this report. During operation for option 1, the highest predicted annual mean NO_2 concentrations occur at receptor 7, which is on the existing A303 near Stoke Sub Hamdon, to the west of the scheme. The greatest increase in annual mean NO_2 is predicted at receptor 4 and receptor 9, where increases of 1.1µg/m^3 are predicted due to option 1. The greatest reductions in predicted annual mean NO_2 concentrations occur at receptors 1 and 2. All predicted annual mean concentrations of NO_2 are well below 60µg/m^3 and therefore no exceedances of the 1-hour NO_2 objective are predicted. As such, an overall Not Significant Adverse effect on human health and wellbeing would result. With regards to ecological effects, the annual mean nitrogen oxide (NOx) concentrations at receptor E1 (Stockwood and Down Site of Special Scientific Interest (SSSI)) are predicted to exceed the critical level of 30µg/m3 at the closest point to the road. The change in NOx at this location is predicted to be 0.98µg/m3 and so is considered 'small' in accordance with *IAN 174/13. , Updated advice for evaluating significant local air quality effects for users of DMRB Volume 11, Section 3, Part 1 'Air Quality (HA207/07)*. This suggests that there is potential for a significant effect to occur at this site.

8.2.3 During operation for option 2, the highest predicted annual mean NO_2 also occurs at receptor 7 however, with the greatest increase occurring at receptor 5, where an increase of 1.2µg/m^3 is predicted due to the scheme. Similarly, the greatest reductions in predicted annual mean NO_2 occurs at receptor 2, as for option 1. The NO_2 levels would be well below 60µg/m^3 and therefore no exceedances of the 1-hour NO_2 objective are predicted. As such, an overall Not Significant Adverse effect on human health and wellbeing would result. With regards to ecological effects, the annual mean NO_X concentrations at receptor E1 (Stockwood and Down SSSI) are

predicted to exceed the critical level of 30µg/m3 at the closest point to the road. The change in NO_x at this location is predicted to be 0.85µg/m^3 and so is considered 'small' in accordance with IAN 174/13. This suggests that there is potential for a significant effect to occur at this site.

8.2.4 There is a low risk that either of the route options would lead to significant air quality effects at human receptors in accordance with IAN 174/13 and the change in NO_2 associated with the scheme is not expected to result in non-compliance with EU Directive 2008/50/EC, *Ambient Air Quality Directive*. There is a potential risk of a significant effect at the Stockton Wood and Down SSSI as a result of both route options. Therefore, during preliminary design, further assessment will be undertaken for this designation to assess the potential changes in nitrogen deposition.

Cultural heritage

8.2.5 Both route options have the potential to result in the adverse effects to heritage assets and buried archaeology. Previous archaeological surveys and investigations, as well as the archaeological aerial survey and appraisal undertaken as part of the option identification stage, has demonstrated that there is a high potential for multi-period archaeological remains spanning the prehistoric period to WWII within the study area, which have the potential to be permanently affected during construction. In addition to sub-surface archaeological features, there is the potential for significant effects to the setting of multiple Listed Buildings and significant effects from the physical impact to Hazlegrove Grade II Registered Park and Garden, and an early 19th century milestone. Therefore, during construction, the overall significance of effects on designated heritage assets would be Moderate to Large Adverse, and the overall significance of effect on buried archaeology would be Moderate Adverse for both route options.

8.2.6 During operation, the overall significance of effect on designated heritage assets would be Slight Adverse for both options due to the potential adverse effects on the setting of these assets. Option 1 would have a permanent adverse effect to Hazlegrove House (Grade II Listed Registered Park and Garden) due to total loss of approximately the southern third of the park, which would cause a fundamental alteration to its significance, and substantial alteration to the setting of the remainder. This effect would also occur for option 2 as there would be loss of large area of the park. A specific Conservation Management Plan for the Hazlegrove Grade II Registered Park and Garden would be produced, which would identify the heritage significance of the various elements of the park, determine the effect of the scheme and inform the design and mitigation in this area as well as identifying appropriate enhancements to the park.

8.2.7 During operation, there would be no impacts on sub-surface archaeological remains and therefore the overall significance of effect on buried archaeology would be Neutral for both route options.

Landscape and visual effects

8.2.8 During construction of option 1, new detracting features such as heavy machinery, materials stockpiling, compounds and haul routes, would be present in the local landscape. However, given the online or near online nature of the works the new road features would be in close proximity to the existing A303 which in places presents a detracting feature in its own right. Despite the existing A303, the moderate to high value of the landscape within the study area does lead to the potential for significant adverse effects during construction. In terms of visual effects, given the close proximity of receptors, such as Downhead, Eyewell, Camel Hill and Hazlegrove House to elements of the works, significant visual effects would be likely during construction, from the introduction of new features within the view such as those described above.

8.2.9 Given option 1 would have sections of being either online or very close to the existing A303 corridor, the effects upon landscape character and nearby visual receptors would limited to an isolated area already characterised by a major highway. In particular the eastern end of the route would have a direct effect upon the designated Hazlegrove House Registered Park and Garden with views likely from elevated positions towards the scheme in the south. Option 1 would also be in proximity to other designated assets, however they would not be directly affected by the scheme. Option 1 would also be visible from local visual receptors such as residential properties and PRoW, including those within villages to the south at West Camel and Queen Camel which are designated Conservation Areas. On balance, the overall effect is considered to be Slight Adverse by Year 15 of operation. Mitigation would aid the integration of option 1 however the route would still not quite fit the landform and scale of the landscape and would still have an effect upon certain views. It is unlikely that option 1 could be fully mitigated, particularly at its eastern extents where it would tie into the existing A303 at Sparkford.

8.2.10 The construction of option 2 would introduce new features into the landscape. Given that option 2 would pass through an open flat vale landscape in part, with rising ground to the north and south, it is likely that these new features would affect the wider landscape character to a greater degree than option 1. As such the magnitude of change associated with constructing a new highway across farmland is likely to be large and therefore lead to significant adverse effects. Whilst the ridgeline to the south would contain views from village settlements to the south of the A303, there would be individual farmsteads and small groups of properties to the north of the ridgeline that would be visually affected by the construction of option 2. Likewise, a

number of PRoW would likely be affected, although these would be addressed at the next stage of assessment.

8.2.11 Once operational, option 2 would be the furthest from the existing A303, and therefore its placement in an otherwise rural and tranquil environment would be at greater odds with existing landscape features than option 1. The scheme would be set at the base of the hillside which rises to the south. Despite this landform preventing views from settlements to the south, existing far-reaching views from the north of the ridgeline would be disrupted by the presence of the new route which would traverse from east to west. Planting would however help to settle the scheme in the surrounding landscape and reduce its visual prominence over time. Sections of the route placed in shallow cutting may help reduce these effects further.

8.2.12 Similar to option 1, the eastern end of option 2 would have a direct effect upon Hazlegrove House Registered Park and Garden, affecting the setting of this designated asset. Option 2 would also be immediately adjacent to the Scheduled Monument at Downhead, where a local access road would run along the northern boundary of the Scheduled Monument. Option 2 would also run in proximity to other designated assets, which would be indirectly affected by the scheme. On balance, the overall significance of effect at Year 15 is considered to be Moderate Adverse given the magnitude of change associated with option 2. The unspoilt and rural character, whilst not designated, is of high value and consequently option 2 would be very difficult to fully mitigate, and features of interest would be both partly destroyed or their setting affected as a result.

Biodiversity

8.2.13 It is anticipated that option 1 would have a Neutral effect on the Natura 2000 sites (see 2.2.39 of this report) both during construction and operation, if the mitigation proposed is implemented. Option 1 is anticipated to have a Neutral effect on Sparkford Wood SSSI during construction and operation, as the SSSI is located over 300 metres from this option. It is anticipated there would be a Slight Adverse effect in terms of air quality on Whitesheet Hill SSSI, Yarnbury Castle SSSI, Parsonage Down SSSI and Stockton Wood and Down SSSI during construction, and a Neutral effect for Whitesheet Hill SSSI, Yarnbury Castle SSSI, and Parsonage Down SSSI once operational. However, there would be a Slight Adverse/Moderate Adverse effect for Stockton Wood and Down SSSI. It is anticipated that there would be a Slight Adverse effect on Hazlegrove Park LWS during construction and operation, due to potential for pollution events and changes in airborne pollutants as well as loss of habitat within the Hazlegrove Park LWS. There would also be a Slight Adverse effect on Camel Hill Transmitter Site LWS, Gaston Lane Field LWS, Ridge Copse LWS, Vale Farm Field LWS, and Yarcombe Wood LWS, due to the potential for pollution events and changes in airborne pollutants. This would reduce to Neutral during operation.

8.2.14 In terms of protected species, potential effects include the loss, damage or fragmentation of habitats, and the potential for disturbance. Providing best practice mitigation measures are implemented, a Slight Adverse effect is considered to be likely for bats during construction, and a Neutral to Slight Adverse effect is likely for reptiles and invertebrates. A Slight Adverse effect reducing to Neutral is anticipated for bats, reptiles and invertebrates during operation. For barn owls, dormice, badgers, great crested newts (GCN) and White clawed crayfish, the effect is considered to be Slight Adverse both during construction and operation. It is anticipated that there will be no impact on otters and watervole during construction and operation, resulting in a Neutral effect. The overall on-balance significance of effects on Nature Conservation as a result of option 1 would therefore be Slight Adverse for construction and Neutral for operation.

8.2.15 It is anticipated that option 2 would have a Moderate to Slight Adverse effect during construction and operation on Mells Valley SAC and North Somerset and Mendip Bats SAC, due to the potential disturbance to qualifying species, the fragmentation of commuting and foraging routes, and the barrier to dispersal, preventing access to the SACs. A Neutral effect on Bracketts Coppice SAC and Sparkford Wood SSSI is anticipated during construction and operation. It is anticipated there would be a Slight Adverse effect in terms of air quality on Whitesheet Hill SSSI, Yarnbury Castle SSSI, Parsonage Down SSSI and Stockton Wood and Down SSSI during construction. However, a Neutral effect is considered for Whitesheet Hill SSSI, Yarnbury Castle SSSI, and Parsonage Down SSSI once operational. Also, a Slight Adverse/Moderate Adverse effect is considered once operational for Stockton Wood and Down SSSI.

8.2.16 A Slight Adverse effect is anticipated for Hazlegrove Park LWS and Downhead Manor Farm Candidate LWS during construction and operation, due to the potential for pollution events and changes in airborne pollution, and loss of habitat within these LWS. There would also be a Slight Adverse effect on Annis Hill Woodland LWS, Camel Hill Transmitter Site LWS, Gaston Lane Field LWS, Ridge Copse LWS, Vale Farm Field LWS, and Yarcombe Wood LWS, due to the potential for pollution events and changes in airborne pollutants. This would reduce to Neutral during operation.

8.2.17 For bats, a Moderate/Slight Adverse effect is anticipated during construction, depending which bat species are present in the study area and a Slight Adverse effect is anticipated during operation. For barn owls, dormice, badger, great-crested newts and white clawed crayfish, a Slight Adverse effect is anticipated during construction and operation. For reptiles, invertebrates, water voles and otters, a Slight Adverse effect is considered to be likely during the construction phase, providing all mitigation is implemented. A Slight Adverse effect reducing to Neutral is anticipated during operation. For breeding birds, a Slight Adverse effect is likely during construction, and a Neutral effect is anticipated during operation. The overall on-balance significance of effects on nature conservation as a result of option 2 is Slight Adverse for construction and Slight Adverse, reducing to Neutral for operation.

8.2.18 Both route options would result in temporary and permanent loss and severance of Priority Habitats, including hedgerows, lowland mixed deciduous woodland and ponds. Furthermore, there would be temporary habitat loss in order to facilitate works, although mitigation in the form of replacement planting would be undertaken in accordance with the National Planning Policy Statement (NPPS) to compensate for the loss of priority habitat.

Geology and soils

8.2.19 Both route options would require a range of construction activities which have the potential to result in adverse effects on geology and soils, including the permanent removal/sterilisation of site soils and superficial deposits, excess (waste) materials generated requiring off-site disposal/transport, soil deterioration and consolidation due to poor storage and handling, effects on controlled waters, encountering contaminated materials (within landfills/made ground, mobilisation of contaminants and generation of contaminant transport pathways from site activities), effects on construction workers, and the degradation of construction materials such as thaumasite concrete attack.

8.2.20 During construction, best practice mitigation measures would be implemented through construction documents including the Construction Environmental Management Plan (CEMP), Site Waste Management Plan (SWMP), Materials Management Plan, Soil Management Plan, and Contaminated Land Risk Assessment. With mitigation measures in place, effects on identified receptors are not considered to be significant for either option 1 or option 2, with an on-balance effect anticipated to be Slight Adverse for both options.

8.2.21 A scoping exercise carried out at the option selection stage concluded that there was no requirement for further assessment of geology and soils during operation, as neither route option is expected to result in any adverse effects on geology and soils.

Materials

8.2.22 The construction of a new carriageway and associated structures, including roundabouts, culverts, and bridges, would require the use of material resources, which has the potential to generate significant effects associated with the extraction, processing and transport of material resources, the manufacture of construction products, and their subsequent transport to and use on construction sites. During construction, it is anticipated that the quantity of materials required for both route options would be significant, especially steel, concrete and materials required for pavement construction. Whilst best practice mitigation measures within construction documents including the CEMP and SWMP would reduce the effect on material resources, due to the uncertainty at this stage regarding the exact material quantities required, it is concluded that there is potential for significant effects on material

resources during construction, for both options. Further assessment is required during the preliminary design stage to confirm this conclusion.

8.2.23 There is anticipated to be a large quantity of green waste generated during site clearance; particularly for option 2 which traverses through some woodland areas. However, this would be chipped and re-used on-site within the landscaping, or, if this is not possible, would be chipped and re-used on site for composting. All excavated/cut material could be re-used as fill material within the embankments and within the landscaping. Option 1 would result in an estimated 176,675m^3 of material available for landscaping, and option 2 would result in an estimated 209,415m^3. No demolition of structures or properties would be required, therefore quantities of waste arisings are not expected to result in significant effects. Specific quantities of waste arising from redundant pavements, road planings, metals from existing signage and the like have not been finally quantified at this stage. However, this waste would be minimised as far as possible through re-use on-site. If properly managed through the implementation of a SWMP, the construction phase has the potential to produce minimal waste.

8.2.24 A carbon assessment undertaken to support the environmental assessment of this scheme identified that option 2 would produce the largest quantity of carbon emissions. This can be attributed to the fact that option 2 would be greater in length than option 1, and is currently expected to require an additional structure. The results of the carbon assessment also identified that for both route options, the materials required for new pavement construction would have the largest contribution to the total carbon emissions, closely followed by concrete.

8.2.25 The scoping exercise carried out at the option selection stage of this scheme that further assessment for materials was not required, as neither route option is expected to result in any adverse effects on materials, through the use of material resources and the generation of waste.

Noise and vibration

8.2.26 For both options, there is potential for construction activities to result in significant effects through the noise levels likely to be generated, and mitigation would be necessary at some locations to reduce the noise and vibration levels. With suitable mitigation, including the shielding of noisy items of plant, appropriate siting of haul routes, enclosures, screening and monitoring, no significant adverse effects are anticipated. However, this conclusion will need to be confirmed when a construction method statement becomes available at a later stage.

8.2.27 The effect of noise in terms of human health and well-being can be assessed by considering the number of receptors subject to noise levels above Significant

Observed Adverse Effect Level (SOAEL). This is the level above which significant adverse effects on health and wellbeing occur.

8.2.28 During operation, the likelihood and occurrence of significant effects would depend on the balance between changing traffic flows on existing roads, new traffic noise sources on new or improved sections of road, and the level of mitigation designed into the preferred option. There would be a small increase in numbers of receptors at or above SOAEL with option 1 in the opening year compared to do-minimum in the same year. A small increase would remain by the design year, as is the case in the do-minimum scenario.

8.2.29 There would be no net increase in the number of properties above SOAEL in the short-term for option 2, but a modest increase in the long-term either with or without option 2. In terms of effects on human health and wellbeing, both options provide the same modest increase of 12 receptors above SOAEL in the long term.

8.2.30 Overall option 2 would produce a greater noise benefit for some receptors than option 1, but fewer receptors would be exposed to moderate and major increases for option 1 than for option 2. An overall Not Significant Adverse effect is therefore anticipated for Option1, and an overall Not Significant Beneficial effect is therefore anticipated for Option 2.

People and communities

8.2.31 For both options, journey length and time are predicted to temporarily increase for a number of non-motorised user (NMU) facilities during construction, which would result in a Slight Adverse effect for NMU. During operation, some benefits and adverse effects are predicted to occur for both options, due to increase or decreases in journey length, provision of new facilities or degradation to existing facilities. On balance, a Slight Adverse effect for NMU is predicted for both options during operation.

8.2.32 In terms of amenity, during construction, existing barriers between people and traffic would change for both options, which would result in a Slight Adverse effect on amenity. During operation, amenity would change in a number of ways, with changes to barriers between people and traffic, flows and provision of new facilities. Option 1 would result in an on-balance Slight Beneficial effect on amenity whilst option 2 would result in a Slight Adverse effect.

8.2.33 In terms of severance, a number of NMU routes connecting to community facilities would experience Slight Adverse effects to journey time and quality during both construction and operation for option 1. For option 2, a small number of NMU routes connecting to community facilities would experience Slight Adverse effects during both construction and operation. However the majority of NMU routes connecting to

facilities would not be affected during construction or operation, therefore option 2 would have a Neutral effect on severance.

8.2.34 For agricultural land, due to the absence of construction information, effects on agricultural land and individual farm businesses during construction of both options cannot be deduced, although there is the potential for adverse effects from agricultural land take. For both options, due to the Agricultural Land Classification (ALC) grade and the area of required land take, a Moderate Adverse effect is anticipated.

8.2.35 Due to the absence of construction information, effects on individual farm businesses during construction of both options cannot be deduced, although there is the potential for adverse effects from land take. For both options during operation, due to the number of land parcels anticipated to experience a significant magnitude of land take as a direct result of the scheme, particularly small land parcels, a Moderate Adverse effect is anticipated.

8.2.36 Due to the absence of construction information, demolition of private property and associated land take for both route options is currently unknown during construction. During operation, option 1 would result in a Slight Adverse effect due to the demolition of a small number of assumed derelict buildings as a direct result of the scheme. There would be no demolition of private property for option 2. During operation, both options would experience a Slight Adverse effect due to land take on areas of parking or private land.

8.2.37 Both options would be likely to result in some new views for vehicle travellers. However, the establishment of vegetation alongside the new road during Year 1 of operation would gradually screen open views to the wider area in part. An overall Slight Beneficial effect is anticipated for both options with a shift from restricted views to with open views in part from the new road.

8.2.38 For both options during construction, a Slight Adverse effect is predicted for driver stress due to the temporary presence of traffic management which would cause increases in driver frustration and fear of accidents, although the provision of a Traffic Management Plan would minimise effects on vehicle travellers. During operation, a Moderate Beneficial effect is predicted for both options with vehicle travellers able to drive along the road at a more consistent speed, with improved journey time reliability.

8.2.39 During construction, any temporary increases in journey length and time and subsequently in NMU physical activity resulting from diversions/closures to NMU routes would be considered beneficial for human health and wellbeing. Temporary reductions in amenity, severance to routes connecting to community facilities, and impacts to private property would detrimentally affect people’s health and wellbeing.

Once operational, permanent increases and decreases to journey length and time resulting from changes to NMU facilities from the baseline would be likely, and result in human health and wellbeing benefits and disbenefits. Changes to amenity, potential severance to routes connecting to community facilities and impacts to private property have potential to affect people's health and wellbeing.

Road drainage and the water environment

8.2.40 The construction and operation of highways can have a range of effects on the water environment, including the contamination of surface or ground waters with sediments or pollutants, thereby affecting their ecological or fishery value or their value as a source of water for human use; contamination as a result of construction site runoff associated with contaminated land, spillages during construction, routine runoff during operation, or spillages during operation (usually following road accidents); and increased flood risk as a result of increased areas of impermeable ground surfaces, loss of flood plain land, or changes in road drainage.

8.2.41 To attenuate surface water runoff, prevent pollution within surface water discharge, reduce physical effects from new structures such as piling, outfalls and embankments, and to ensure no increase in flood risk, standard mitigation measures would be included in the CEMP, and sustainable drainage systems (SuDS) would be implemented. With mitigation measures in place, Neutral effects are anticipated on the water environment for both option 1 or option 2 during construction.

8.2.42 During detailed design, groundwater level/flow would be considered and piling would be minimised where possible. Therefore, during operation, with the implementation of an appropriate drainage design, incorporating sustainable drainage systems (SuDs) and pollution control measures, and ensuring the design is in accordance with Environment Agency guidance and does not increase runoff rates in accordance with the NPPF and NNNPS, both route options would result in Neutral effects to the water environment.

Climate change

8.2.43 The carbon assessment encompasses 2 sub-topics: the effects on climate (effects of the scheme on climate change in terms of greenhouse gas emissions from the scheme and mitigation potential), and vulnerability of the scheme to climate change (effects relevant to climate resilience/adaptation including the effects of climate change on the scheme and the contribution of the scheme to wider resilience).

8.2.44 During construction, the carbon assessment has indicated that option 1 would release approximately 19,082tCO_2e (tonnes of carbon dioxide equivalent). The carbon output specifically from the materials required for option 1 would be 16,153tCO_2e. Option 2 would release approximately 19,193tCO2e. The carbon output specifically from the materials required for option 2 would be 16,942tCO_2e.

Option 2 would produce a larger quantity of carbon emissions due to its length and requirement for additional structures. In the absence of established assessment criteria for the effects on climate it is predicted that during the construction stage neither route option will have an impact on climate due to the relatively low quantity of emissions in comparison to the overall UK emissions for construction. Overall, effects on climate are anticipated to be Not Significant Adverse during construction for both route options.

8.2.45 During operation, option 1 is predicted to cause an increase in emissions of 467,314tCO_2e in non-traded emissions over 60-years and 1,637tCO_2e in traded emissions. Option 2 is predicted to cause an increase in emissions of 478,384tCO_2e in non-traded carbon over 60-years and 1,548tCO_2e in traded emissions. Option 2 has a greater predicted carbon output than option 1 due to its longer footprint. However, it is noted that the difference is negligible at 10,981tCO_2e over 60-years. This increase in carbon will be caused primarily by an increase in traffic volume and flow along the route. Maintenance work undertaken on the scheme will also increase carbon, but to a much lesser extent compared to the projected road transport emissions. Therefore, overall effects on climate are anticipated to be Neutral during operation, for both route options.

8.2.46 It is not expected that climate change would result in a change in the risk of severe weather by the end of the two-year construction period, although the construction site may be vulnerable to extremes of weather, leading to the risk of delay in activities. However, adaptation measures included in the CEMP, such as ensuring construction materials are covered when stored and pro-active planning, would minimise adverse effects. Therefore, changes in climate are not expected to significantly affect scheme construction, for both route options.

8.2.47 During operation, there would be the potential for scheme assets and environmental receptors to be affected by changes in climate, for example, increases in winter precipitation could result in increased sub-surface moisture content, decreasing the strength of the pavement foundations. Overall, a Slight Adverse effect is anticipated for both Scheme options.

Combined and cumulative effects

8.2.48 The assessment for combined effects involved the identification of effect interactions associated with both option 1 and option 2 upon separate environmental receptors.

8.2.49 As a result of the combined assessment, during construction is the following effects are anticipated:

- A Slight Adverse effect on geology and soils
- A Moderate Adverse effect on the local landscape
- A Slight to Moderate Adverse effect on heritage features

- A Not Significant Adverse effect on communities
- A Moderate Adverse effect on vehicle travellers
- A Slight Adverse effect on the water environment
- A Significant Adverse effect on material resources
- A Not Significant Adverse effect on ecological receptors, climate, and human health and wellbeing.

8.2.50 The on-balance residual combined effect during construction for both options is anticipated to be Not Significant Adverse.

8.2.51 During operation, it is anticipated that there would be a Neutral effect on geology and soils; the water environmental, material resources, and climate; and a Not Significant Adverse effect on the local landscape, heritage features, communities, vehicle travellers, ecological receptors, and human health and wellbeing. The on-balance residual combined effect during operation for both options is anticipated to be Not Significant Adverse.

8.2.52 The assessment for cumulative effects involved the identification of incremental changes likely to be caused by ‘other developments’ together with both option 1 and option 2.

8.2.53 As a result of the cumulative assessment, during construction it is anticipated that there would be a Significant Adverse effect on cultural heritage and landscape, a Not Significant Adverse effect on biodiversity, geology and soils, and people and communities, and a Neutral effect on road drainage and the water environment. Therefore, the residual cumulative effects during construction as a result of all of the ‘other developments’ with both options are anticipated to be Not Significant Adverse. During operation, it is anticipated that there would be a Not Significant Adverse effect on cultural heritage, landscape, and people and communities, a Not Significant Adverse reducing to Neutral effect on biodiversity, and a Neutral effect on geology and soils, and road drainage and the water environment. Therefore, during operation the on-balance, residual cumulative effects for both options are anticipated to be Not Significant Adverse

Conclusions

8.2.54 Table 8.1 below provides a summary of the potential effects for each of the specialist environment chapters, for option 1 and option 2. This is a summary of the conclusions of the environmental assessment that was produced for the option selection stage of this scheme.

Table 8.1 Summary of Residual Environmental Effects

Environmental Topic	Residual Effect during construction		Residual Effect during operation	
	Option 1	Option 2	Option 1	Option 2
Air Quality				
Human Health and Wellbeing	Not Significant Adverse	Not Significant Adverse	Not Significant Adverse	Not Significant Adverse
Ecological Effects	Significant Adverse	Significant Adverse	Significant Adverse	Significant Adverse
Cultural Heritage				
Heritage Assets	Significant Adverse	Significant Adverse	Slight Adverse (Not Significant)	Slight Adverse (Not Significant)
Sub-Surface Archaeological Remains	Significant Adverse	Significant Adverse	Neutral (no effects anticipated)	Neutral (no effects anticipated)
Landscape and Visual Effects				
Landscape Character	Significant Adverse	Significant Adverse	Slight Adverse (Not Significant)	Moderate Adverse (Significant)
Visual Amenity	Significant Adverse	Significant Adverse	Slight Adverse (Not Significant)	Moderate Adverse (Significant)
Biodiversity				
Qualifying species for Natura 2000 sites	Neutral (no effects anticipated)	Moderate to Slight Adverse	Neutral (no effects anticipated)	Moderate to Slight Adverse
Nationally Designated Sites	Slight Adverse (Not Significant)	Slight Adverse (Not Significant)	Slight Adverse (Not Significant)	Slight Adverse (Not Significant)
Locally Designated Sites	Slight Adverse (Not Significant)	Slight Adverse (Not Significant)	Slight Adverse (Not Significant)	Slight Adverse (Not Significant)
Priority Habitats	Slight Adverse (Not Significant)	Slight Adverse (Not Significant)	Slight Adverse (Not Significant)	Slight Adverse (Not Significant)
Protected and Notable Species	Slight Adverse (Not Significant)	Slight Adverse (Not Significant)	Slight Adverse reducing to Neutral	Slight Adverse reducing to Neutral
Geology and Soils				
Geology, soils, surface water, groundwater, human receptors, buildings, structures and utilities, and flora	Slight Adverse (Not Significant)	Slight Adverse (Not Significant)	Not assessed	Not assessed
Materials				
Material resource use	Potentially Significant Adverse	Potentially Significant Adverse	Not assessed	Not assessed
Waste generation	Not Significant Adverse	Not Significant Adverse	Not assessed	Not assessed
Noise and Vibration				
Noise and Vibration	Not Significant Adverse	Not Significant Adverse	Not Significant Adverse	Not Significant Beneficial(

Environmental Topic	Residual Effect during construction		Residual Effect during operation	
	Option 1	Option 2	Option 1	Option 2
People and Communities				
Human Health and Wellbeing	Unknown at this stage	Unknown at this stage	Unknown at this stage	Unknown at this stage
Non-Motorised Users	Slight Adverse (Not Significant)	Slight Adverse (Not Significant)	Slight Adverse (Not Significant)	Slight Adverse (Not Significant)
Amenity	Slight Adverse (Not Significant)	Slight Adverse (Not Significant)	Slight Beneficial (Not Significant)	Slight Adverse (Not Significant)
Severance	Slight Adverse (Not Significant)	Neutral (no effects anticipated)	Slight Adverse (Not Significant)	Neutral (no effects anticipated)
Agricultural Land and Individual Farm Businesses	Unknown at this stage	Unknown at this stage	Moderate Adverse (Significant Adverse)	Moderate Adverse (Significant Adverse)
Demolition of Private Property and Associated Land Take	Unknown at this stage	Unknown at this stage	Slight Adverse (Not Significant)	Slight Adverse (Not Significant)
Motorised Travellers View from the Road	N/A	N/A	Slight Beneficial (Not Significant Beneficial)	Slight Beneficial (Not Significant Beneficial)
Motorised Travellers Driver Stress	Slight Adverse (Not Significant)	Slight Adverse (Not Significant)	Moderate Beneficial (Significant Beneficial)	Moderate Beneficial (Significant Beneficial)
Road Drainage and the Water Environment				
Surface water, groundwater, and floodplain	Neutral (no effects anticipated)	Neutral (no effects anticipated)	Neutral (no effects anticipated)	Neutral (no effects anticipated)
Climate Change				
Effects on climate	Not Significant Adverse	Not Significant Adverse	Neutral (no effects anticipated)	Neutral (no effects anticipated)
Vulnerability to climate	Neutral (no effects anticipated)	Neutral (no effects anticipated)	Slight Adverse (Not Significant)	Slight Adverse (Not Significant)
Combined and Cumulative Effects				
Combined Effects	Not Significant Adverse	Not Significant Adverse	Not Significant Adverse	Not Significant Adverse
Cumulative Effects	Not Significant Adverse	Not Significant Adverse	Not Significant Adverse	Not Significant Adverse

Environmental Objectives

8.2.55 The *Client Scheme Requirements* (Highways England, last updated August 2017) includes a Strategic Outcome for 'the delivery of better environmental outcomes', with a key performance indicator (KPI) for 'Noise: Number of Noise Important Areas mitigated'. The scheme contribution section of this KPI states 'road surface materials to be selected to reduce noise alongside the A303 in the Camel Hill and West Camel areas'. Two of Defra's Noise Important Areas (NIA) are located on the existing A303 just to the east of Camel Cross and approximately 150 metres to the west of Howell Lane. The NIA to the east of Camel Cross is located adjacent to option 1, and approximately 650 metres to the south of option 2. The NIA to the west of Howell Hill is located within the footprint of option 1, and approximately 900 metres from option 2. Both the NIAs would be mitigated for as a result of both option 1 and option 2. Overall option 2 would produce a greater noise benefit for some receptors than option 1 but fewer receptors are exposed to moderate and major increases for option 1 than for option 2. Furthermore, generally the environmental effects are more adverse associated with option 2, rather than option 1. As such, option 2 would deliver a better environmental outcome with regards to NIAs than option 1.

8.2.56 The scheme contribution element of this Strategic Outcome states 'Scheme development will fully embrace the Biodiversity Action Plan throughout all aspects of the PCF process'. Highways England's BAP[34] identifies the approach to meeting the key performance indicator identified within the *Roads Investment Strategy* (RIS) of 'no net loss of biodiversity by 2020'. Biodiversity is required to be fully considered during the building of any new roads and opportunities sought to work with stakeholders and enhance the network for wildlife. In order to ensure there would be no net loss of biodiversity as part of either option, an Ecological Mitigation Strategy will be prepared as part of the preliminary design, detailing proposals to manage and mitigate for ecological effects associated with the scheme. This document will be a live document that will be updated as and when required during scheme design, and as protected species information is updated. This document will also be used to inform the CEMP for the scheme, which will be prepared by the contractor prior to construction. A SWMP will also be prepared outlining the correct handling, transport, and disposal of waste. Both option 1 and option 2 would result in an overall Neutral effect to biodiversity, once mitigation planting has matured.

8.2.57 Biodiversity enhancement measures would also be explored as part of the proposed scheme. Potential measures could include replanting of native species-rich hedgerows and trees, creation of species-rich grassland and the provision of nesting and roosting opportunities for bats and birds. New planting should be connected to existing habitat within the landscape to compensate for

[34] Highways England (2015) Biodiversity Plan [online] available at https://www.gov.uk/government/publications/biodiversity-plan (Last accessed July 2017)

the loss of wildlife corridors and reduce fragmentation of habitats caused by the scheme. The species composition of any new planting should take account of the habitats lost and those within the surrounding area. It is therefore considered that the scheme design and proposed mitigation measures meet the requirements of the Strategic Outcome and that the 'Scheme development will fully embrace the Biodiversity Action Plan throughout all aspects of the PCF process'.

8.2.58 The *Client Scheme Requirements* also include a Strategic Outcome for 'helping cyclists/walkers and other vulnerable users', with a KPI of 'the number of new and upgraded crossings'. An NMU strategy has been produced during the options selection stage for both options which sets out proposals for changes to NMU routes. These include the locations for diversions of existing NMU routes, new crossings, potential cycle routes and PRoW to be extinguished, which would ensure that NMU routes are not adversely effected as part of either route option. For individual farm businesses adversely affected by the scheme through loss of farm access points, replacement access would be provided. In addition, the provision of replacement land will be assessed, and compensation explored for landowners should agricultural land, individual farm businesses and private property currently in use be directly affected during operation of the proposed scheme, through the Compensation Code.

8.2.59 Both option 1 and option 2 are anticipated to have Slight Adverse effects in terms of changes to journey lengths and times for NMU. However, in terms of amenity, option 1 is anticipated to have Slight Beneficial effects, whilst option 2 is anticipated to have Slight Adverse effects, taking into account mitigation included within the NMU Strategy. This would predominantly be due to the provision of new NMU crossings where none previously existed and where NMU are also currently required to cross the A303 at-grade. The crossings provided for option 2 would minimise the effects of the scheme for NMU, however generally these effects are considered adverse as NMU in the vicinity of this route option are, on the whole, currently separated from traffic.

8.2.60 It is therefore considered that the scheme meets the requirements of the Strategic Outcome and that the 'the number of new and upgraded crossings' are being considered within the scheme design and proposed mitigation measures.

9 Public Consultation

9.1 Introduction to the route options public consultation

9.1.1 Highways England conducted a six-week period of route options Public Consultation for the A303 Sparkford to Ilchester scheme. The consultation ran between 14 February 2017 and 29 March 2017 and included a series of public information events.

9.1.2 The events enabled key, local community, and landowner stakeholders the opportunity to discuss the scheme options proposals with the project team and to view the scheme route option proposals.

Table 9.1 Consultation Launch Event

Date	Venue	Time
Thursday 14 February 2017	Haynes Motor Museum, Wolverlands, Sparkford, Yeovil BA22 7LH	6.00pm to 8.00pm

Table 9.2 Landowner events

Date	Venue	Time
Wednesday 15 February 2017 Thursday 16 February 2017	Haynes International Motor Museum Sparkford, Yeovil, Somerset BA22 7LH	11.00am to 7.00pm Appointment only

Table 9.3 Public information events

Date	Venue	Time
Thursday 23 February 2017	Sparkford Inn, High Street, Sparkford, Yeovil, BA22 7JH	12.00 midday to 8.00pm
Saturday 25 February 2017	Queen Camel Memorial Hall, High Street, Queen Camel, Yeovil, BA22 7NF	10.00am to 5.00pm
Thursday 9 March 2017	Red Lion, Babcary TA11 7ED	6.00pm to 8.30pm
Friday 10 March 2017	Davis Hall, Howell Hill, West Camel, Yeovil, BA22 7QX	10.00am to 6.00pm

- **Consultation launch event –** an evening event was held for local dignitaries with an interest in the scheme, a total of 20 people attended including Members of Parliament and representatives from local councils and statutory bodies.
- **Landowner Events** – landowner events were held to allow stakeholders who own land within 150 metres of the scheme, or land which the scheme proposes to intersect. These events were appointment only sessions where stakeholders could discuss their land titles with specialists from the project team. Issues and concerns were brought to the attention of Highways England. Over the two landowner events there were 23 stakeholder appointments confirmed and undertaken.
- **Public information events -** the public events provided valuable insight into how the local community felt about the scheme and how they use the existing

road network. There were 4 public information events held at venues along both route options, with a total number of 735 stakeholders visiting the events.

9.1.3 Additional presentations were undertaken at the request of Sparkford Parish Council and South Somerset District Council and these meetings are summarised in Table 9.4.

Table 9.4 Additional Presentations

Date	Stakeholders	Meeting type	Discussion / topics raised
28 February 2017	South Somerset District Council	Presentation followed by questions and answers.	Scheme overview, DCO process, future liaison.
6 March 2017	Sparkford Parish Council	Presentation followed by questions and answers.	Scheme overview, DCO process, future liaison.

9.2 Overview of consultation questionnaire responses

9.2.1 The consultation period closed on 29 March 2017, with a total of 1,237 responses received from key, local community and landowner stakeholders. The questionnaire responses received were primarily from community stakeholders, with a number of statutory stakeholders submitting formal reports and letters in place of a questionnaire. The additional reports and letters have been included with the free text responses in question 9 of the questionnaire for analysis.

9.2.2 Of the 1,237 questionnaires received, 389 paper questionnaires were submitted to the freepost address. These were manually entered onto the Highways England questionnaire portal Citizen Space, before all the responses were analysed collectively.

9.2.3 Postcode areas were used to classify responses by geographical area, allowing for the views of different communities to be identified and considered. Understanding how the local community views the scheme is important to Highways England as it will help to inform selection of a preferred route. Responses are analysed to understand the views of key, local community and landowner stakeholders to help refine the route options designs and inform the preferred route selection.

9.2.4 Analysis of the questionnaires and formal responses has identified key themes and issues from responding key, local community and landowner stakeholders. These key themes and issues have been collated and summarised in a response log for the project team specialists to review.

9.2.5 Highways England have used the analysis derived from consultation responses to develop and refine elements of scheme proposal prior to selection of a preferred route.

9.2.6 These findings are illustrated on Figures E-1 & E-2.

Figure E-1: Do you agree the A303 between Sparkford and Ilchester needs upgrading to a dual-carriageway?

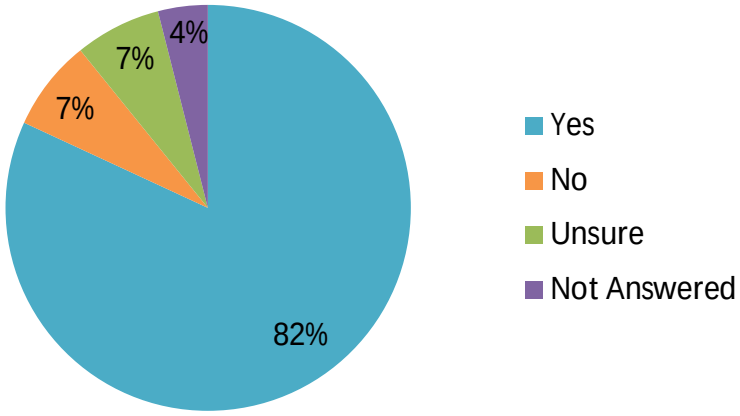
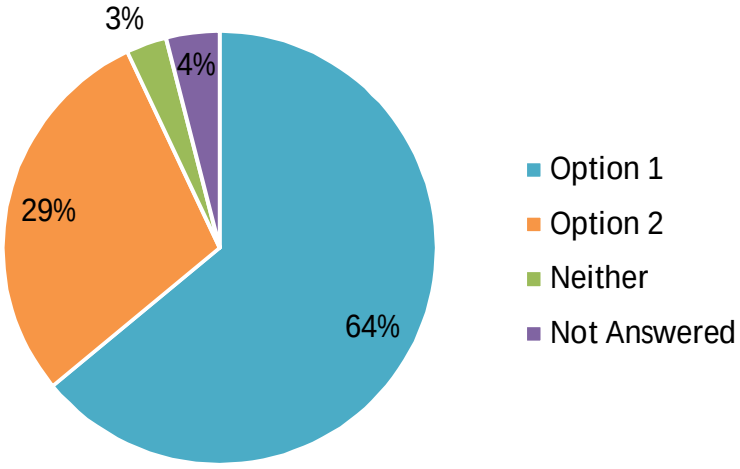


Figure E-2: Which option do you prefer?



9.2.7 It was clear from the consultation findings that there was overwhelming agreement for the proposed upgrading to a dual-carriageway, with a significant majority preferring Option 1. The main considerations raised by respondents centred on:

- flooding issues
- environmental effects, particularly in the Sparkford Vale area of Option 2
- safe provision for pedestrians, cyclists and equestrians
- the need for ready, safe access with the local road network

9.2.8 A more detailed report of the consultation feedback can be found in the *Report on Public Consultation, Highways England 2017* which can be viewed on the scheme website https://highwaysengland.citizenspace.com/he/a303-sparkford-to-ilchester/.

10 Appraisal Summary Tables

10.1.1 Appraisal Summary Tables have been prepared in accordance with the Department for Transport's web-based Transport Analysis Guidance: (WebTAG)[35]. These are included in Appendix D of this report.

[35] Department for Transport (October 2013, last updated July 2017) Transport Analysis Guidance: WebTAG [online] available at: https://www.gov.uk/guidance/transport-analysis-guidance-webtag (last accessed August 2017)

11 Conclusion

11.1 General

11.1.1 The existing single carriageway section of the A303 between Sparkford and Ilchester currently experiences congestion and journey time delays particularly at weekends and in the summer months consistent with its use for weekly commuting and holiday traffic.

11.1.2 Traffic levels are predicted to rise due to forecast growth in trips as well as transport and development schemes which are expected to be completed. The severity of the existing problems is likely to increase if no action is taken.

11.2 Route options

11.2.1 Dualling of this section of road was announced in the *Road Investment Strategy: for the 2015/16 – 2019/20 Road Period* (Department for Transport, December 2014, update March 2015). Two possible route options were taken to public consultation in February and March 2017. These were:

- Option 1 which would closely follow the existing corridor of the A303, although in some sections it would be aligned just to the north or south of the existing carriageway to facilitate construction.
- Option 2 which would take on offline course up to 1 kilometre to the north of the existing A303. This option would join the existing A303 at Sparkford roundabout to the existing dual carriageway east of Podimore roundabout.

11.3 Overall comparison of options

11.3.1 Based on the assessments in chapters 5-9 of this report, a comparison of the main differences between the two options is given in Table 11.1. A list of the main advantages of each option is given in Table 11.2.

Table 11.1 Comparison of options

Assessment criteria	Comparison
Engineering/ Buildability	**Differences identified in the description of options in chapter 5**
Disruption to local journeys	Option 1 would impact more on existing local journeys as more existing roads and non-motorised user routes would have to be diverted than with option 2.
Land acquisition	Option 2 would require the largest amount of third party land, an estimated 46.6ha compared with 38.1ha for option 1.
Buildability	Option 1 would be more difficult to construct due to being partly on the line of the existing road and there being more statutory undertakers' utilities that would require diversion. There would also be more disruption to traffic during construction as there

Assessment criteria	Comparison
	would be no alternative route available and the overall construction period is likely to be longer as a result.
Cost	Option 1 cost estimate is £179 million. Option 2 cost estimate is £168 million. Option 2 would be the cheaper of the two options to construct.
Traffic	**Comparison of forecast journey time savings summarised in chapter 6.3**
Journey time savings	Both options are predicted to result in journey time savings compared with the Do Minimum scenario. Journey times for option 1 are consistently lower than for option 2 due to its shorter length.
Economics	**Differences between options identified in Economic Assessment summarised in chapter 6.4**
Benefit to Cost Ratio (BCR)	Option 1 has higher Present Value of Costs (PVC) but also higher Present Value of Benefits (PVB). This results in BCRs as follows: Option 1 = 1.82 Option 2 = 1.83 Both options represent almost the same value for money.
Operation	**Differences between options identified in Maintenance and Repair Strategy Statement and Project Safety Plan summarised in chapter 7**
Maintenance and repair strategy	Option 2 has the benefit of a diversion route via the existing A303 road during maintenance activities and emergency closures of the new road.
Safety management	No significant difference between options
Environment	**Differences between options identified in Environmental Assessment summarised in chapter 8**
Air Quality	No significant difference between options
Cultural heritage	No significant difference between options. Both options would have a significant adverse effect on cultural heritage particularly Hazlegrove Registered Park and Gardens.
Landscape character and visual amenity	Option 1 is expected to have less impact than option 2 due to option 1 being on or close to the existing route. Option 2 will pass through unspoilt rural landscape with high amenity value.
Biodiversity	Overall, the two options are expected to have similar impacts. Option 1 is expected to have slightly less impact in the long term on bat populations.
Geology and soils	No significant difference between options

Assessment criteria	Comparison
Materials	In most respects, there is no anticipated difference between options, except option 1 is anticipated to generate a greater surplus cut material than option 2. The potential associated waste could be minimised through re-use on site.
Noise and vibration	Option 2 would produce a greater noise benefit for some receptors than option 1, due to it being further away from existing villages. Fewer receptors would be exposed to moderate and major increases for option 1 than for option 2, due to its proximity to the existing route. The overall assessment is not significant adverse for option 1 and not significant beneficial for option 2.
People and communities	In most respects, there is no anticipated difference between options, except that option 1 would result in increases in journey times on a larger number of non-motorised user routes.
Road drainage and the water environment	No significant difference between options
Climate change	Option 2 would result in greater carbon emissions due to its longer length
Public consultation	**Results of public consultation summarised in chapter 9**
	There is significant public preference for option 1
	Significant opposition to option 2 from local pressure groups likely to generate objection at DCO

Table 11.2 Advantages of each option

Advantages of option 1	Advantages of option 2
· Minimises land-take · Shortest of the two options, reducing journey time and carbon emissions · Route follows existing corridor very closely, minimising construction in unspoilt rural setting with high amenity value · Slightly less impact on biodiversity · Most popular with the public · Least public opposition likely to generate objections at DCO	· Less impact on existing local journeys · Easier to construct · Disruption to travelling public during construction will be less, due to alternative route available · Less impact on existing non-motorised user journeys · Greater reduction in noise for communities near the existing A303

12 The Recommended Route

12.1.1 In many respects, there is little difference between the options in terms of the assessment criteria. However, where there are differences, option 1 not only has more advantages but nearly all the advantages are associated with the scheme post-construction. The majority of advantages of option 2 occur during construction which is a temporary stage.

12.1.2 Option 2 has the lower cost estimate of the two route options.

12.1.3 The two options have BCRs which differ by 0.1 showing that they represent equal value for money. Although Option 2 is the lower cost option, it also has lower monetised benefits, hence the similar BCRs of the two options. At present, it is not required to monetise the landscape disbenefits associated with the proposals, however if this becomes a requirement at a later stage, the option 2 BCR would drop significantly.

12.1.4 There is considerably more public support for option 1 and least public opposition likely to generate objections at DCO.

12.1.5 It is therefore recommended that option 1 is announced as the Preferred Route.

Appendix A Glossary and Abbreviations

AADT	Annual Average Daily Traffic
ALC	Agricultural Land Classification
AQMA	Air Quality Management Area
BAP	Biodiversity Action Plan
BCR	Benefit to Cost Ratio - a ratio used by the Department for Transport to determine value for money of a scheme
CEMP	Construction Environmental Management Plan
D2AP	Dual 2-lane all purpose (a high quality all-purpose dual carriageway)
DCO	Development Consent Order
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges
FWI	Fatalities and Weighted Injuries
HELAA	Housing and Economic Land Availability Assessment
IAN	Interim Advice Note
KPI	Key performance indicator
LGS	Local Geological Site(s)
MAFF	Ministry of Agriculture, Fisheries, and Food (now part of Defra but MAFF ALC mapping is still in use)
MOD	Ministry of Defence
NCA	National Character Area
NIA	Noise Important Area(s)
NO2	Nitrogen dioxide
NMU	Mon-motorised user(s)
NNNPS	National Networks National Policy Statement
NPPF	National Planning Policy Framework
NPPG	National Planning Practice Guidance
NSIP	Nationally Significant Infrastructure Project(s)
PCM	Pollution Climate Mapping
PRoW	Public Right(s) of Way
Ramsar	The Convention on Wetlands, known as the Ramsar Convention, is an intergovernmental environmental treaty established in 1971 by UNESCO
SAC	Special Area(s) of Conservation
SCC	Somerset County Council
SERC	Somerset Environmental Records Centre
SOAEL	Significant Observed Adverse Effect Level
SSDC	South Somerset District Council
SSE	Scottish and Southern Energy
SSSI	Site of Special Scientific Interest
SWMP	Site Waste Management Plan
SWRTM	Highways England's South West Regional Traffic Model
WebTAG	Department for Transport's web-based Transport Analysis Guidance
WFD	Water Framework Directive

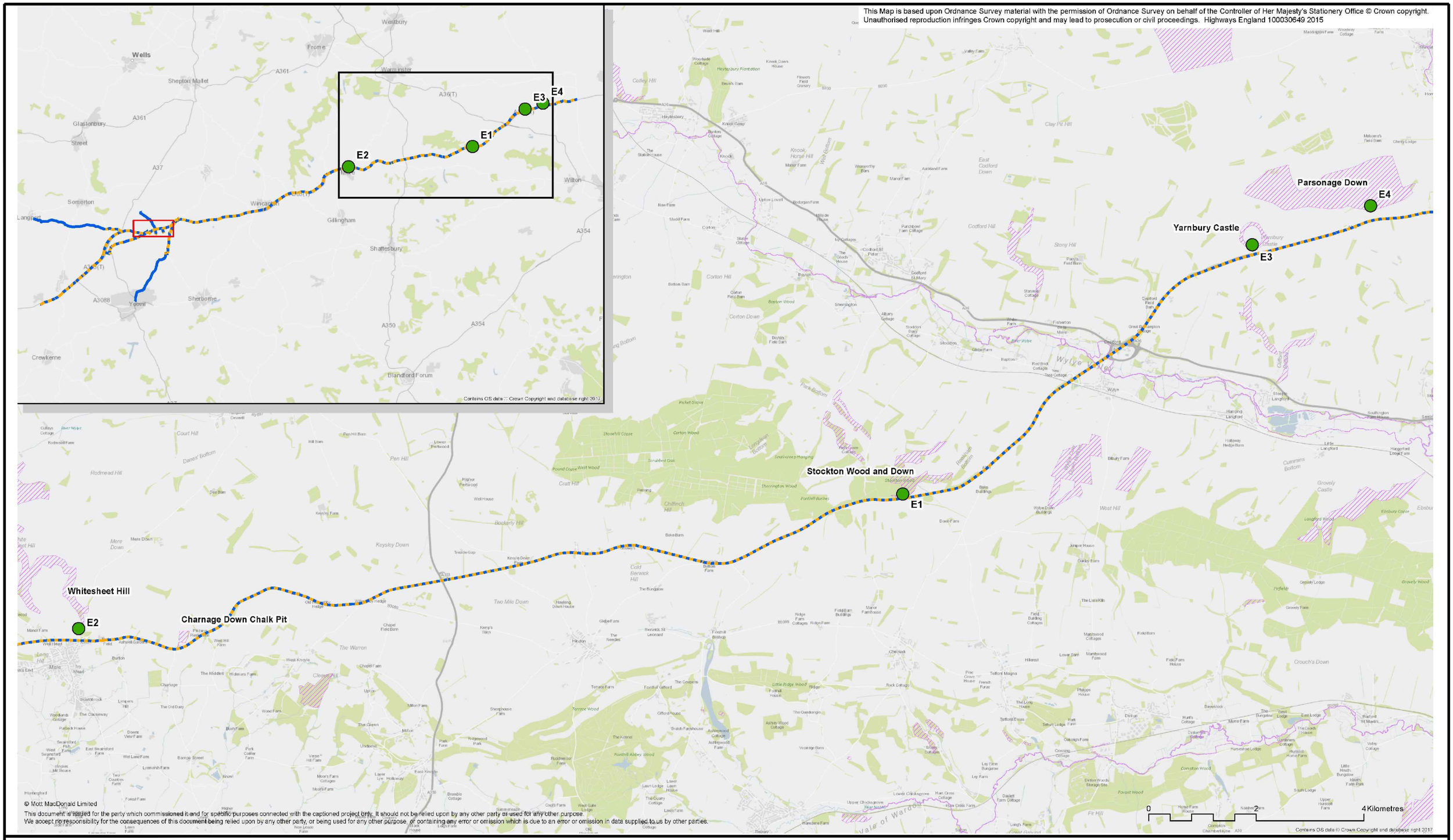
Appendix B Environmental Constraints Plan

River Cary - Source to confluence with King Sedgemoor Drain (KSD)
Dyke Brook
Celtic Way
Steart Hill
Meand Lane (track)
Option 2
Steart Hill
Celtic Way
A303
Sparkford
High Street
River Cam - Upper
Downhead Lane (track)
Eastnead Lane (track)
Downhead
West Camel Hill
Camel Hill
A303
Option 1
Hazell Hill
Trails Lane
Gason Lane
A359
Celtic Way
Sparkford Hill
A303
B3151
Podimore
River Cam - Lower
Leland Trail
West Camel
Queen Camel
Leland Trail
Leland Trail
Parsonage Road
Royal Naval Air Station, Yeovilton
1:10,000
0
500m
1000m

Key:

- Option 1
- Option 2
- Named Walking Routes
- Footpath Alongside Carriageway
- Footpath
- Bridleway
- Restricted Byway
- Cycle Route
- Fosse Way
- Registered Park and Garden
- Historic Landfill
- Ponds, Lakes and Running Water
- Listed Building
- Ancient Woodland
- Noise Important Area
- Candidate Local Wildlife Site (Somerset Environmental Records Centre, June 2017)
- Conservation Area
- Scheduled Monument
- Local Geological Site
- Flood Zone 2
- Flood Zone 3
- National Trust Land
- Local Wildlife Site (Somerset Environmental Records Centre, June 2017)
- Sites of Special Scientific Interest
- Registered Common Land
- Proposed developments identified in the Somerset District Council Housing and Economic Land Availability Assessment
- Ancient Woodland Identified by Somerset Environmental Records Centre

Appendix C Nitrogen dioxide ($NO_{2)}$ receptors



Key:

- Ecological receptor
- Option 1 local affected road network
- Option 2 local affected road network
- Site od Special Scientific Interest
- Scheme extent

1:28,000 0 1.5 3 Kilometres

Key:

- Human health receptors
- Option 2 2023 local affected road network
- Option 1 2023 local affected road network
- Scheme extent

Appendix D Appraisal Summary Tables

Appraisal Summary Table

Date produced:	September 2017

Contact:	
Name	Tom Roberts
Organisation	Highways England
Role	Promoter/Official

Name of scheme:	A303 Sparkford to Ilchester - Option 1
Description of scheme:	The proposed Scheme would provide a dual carriageway on the A303 between Sparkford and Ilchester in Somerset, connecting the existing dual carriageway sections to the east and west. Route Option 1 would follow 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 to allow re-use of the existing route for local access, avoid property or facilitate construction. At its maximum offset the route would typically be 100m either north or south of the existing A303. This AST has been prepared at PCF Stage 2.

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(£): 128.9m Net journey time changes (£) 0 to 2min: 43.5m; 2 to 5min: 90.7m; > 5min: -5.3m	Not applicable	£129.9m	Yes
	Reliability impact on Business users	Reliability benefits by converting old single carriageway section to modern dual carriageway with associated junction improvements.	Not applicable	Not applicable	£6.4m	
	Regeneration	Option 1 does not lie within or close to regeneration areas.	Not applicable	Not applicable	Not applicable	
	Wider Impacts	Wider economic benefits (output change in imperfectly competitive markets) by converting an old single carriageway section to modern dual carriageway with associated junction improvements.	Not applicable	Not applicable	£13.0m	
Environmental	Noise	Results indicate an overall dis-benefit owing to re-alignment closer to residences, resulting in traffic noise increases, within the Affected Road Network (ARN). The Distributional Impacts (DI) Screening Matrix concluded that impacts of the Scheme would be sufficiently minor and spatially dispersed such that a detailed DI appraisal would be disproportionate to the potential impacts.	Households experiencing increased daytime noise in forecast year: 103. Households experiencing reduced daytime noise in forecast year: 74. Households experiencing increased night time noise in forecast year: 79. Households experiencing reduced night time noise in forecast year: 53	Not applicable	£121,193	No
	Air Quality	Net improvement in local air quality within the study area. The Scheme would not result in a new exceedance of the NO2 or PM10 annual mean air quality objectives. There are several PCM links which would overlap with the Scheme's ARN in the design year of the Scheme. While there is one AQMA within the study area (Yeovil AQMA), annual NO2 and PM10 concentrations are expected to be below the annual mean air quality objectives within the AQMA in the opening year. In addition, there is predicted to be an improvement in air quality in some areas of this AQMA as a result of the Scheme as there is predicted to be a decrease in vehicles travelling through the AQMA. The regional assessment predicts an increase in emissions of NOx and PM10 primarily as a result of an increase in the number of vehicles. Overall, the total change in NPV is negative indicating a net worsening in air quality when considering both local and regional effects.	Local Air quality effects at properties (Improvements / No effect / Deterioration) NO2 2023 (2127 / 62 / 1820) PM10 2023 (1764 / 1017 / 1228) Overall Assessment Score (negative score reflect benefit) NO2: (2023): -78.2 PM10: (2023): -25.7 Change in Regional Emissions NOx (2023): 4.3 t/year PM10 (2023): 0.4 t/year	Not applicable	Value of change in PM concentrations: £120,844 Value of change in NOx emissions: - £237,400 Total value of change in air quality: - £116,555	No
	Greenhouse gases	Not applicable	Change in non-traded carbon over 60y (CO2e): 467,314 Change in traded carbon over 60y (CO2e): 1637	468,951	-£21,417,000	
	Landscape	The proposed route would be either online or very close to the existing A303 route corridor, minimising impacts upon landscape character and nearby visual receptors by keeping the impacts of major road corridors limited to an isolated area already characterised by a major highway. The expansion to dual carriageway would however be at odds with the local landscape pattern and scale. There would be a direct impact upon the designated Hazlegrove House Registered Park and Garden and the Scheme would also be in proximity to other designated assets, including Conservation Areas at West Camel and Queen Camel, however they would not be directly affected by the Scheme. This Scheme option would be visible from local visual receptors including residential properties and Public Rights of Way, however views would be limited in some areas where the route would pass in cutting, aiding its visual integration, and limiting views of associated traffic in some areas. Whilst mitigation would aid the Scheme's integration, the route would still not quite fit the landform and scale of the landscape and would still have an adverse impact upon certain views. The overall effect on landscape would be Slight Adverse with mitigation in place.	Not applicable	Slight Adverse	Not applicable	
	Townscape	Not applicable	Not applicable	Not applicable	Not applicable	
	Historic Environment	For the purposes of the historic environment assessment construction and operational effects have been assessed. This is because permanent impacts to the historic environment will occur during construction, for example removal of archaeological or historic remains. Option 1 would require large areas of medium value unknown archaeological buried remains to be removed during the construction of the new route, resulting in potential damage. During construction, Option 1 would cut through the southern section of Hazlegrove House Registered Park and Garden, removing elements of the historic parkland and related archaeological and historic evidence. In the context of the park and garden the road would be out of scale, visually intrusive and alter the context of the asset even with mitigation screening in place. Agricultural earthwork remains within the proposed route corridor, although of low value, would be fully removed during construction by Option 1. The overall effect on the historic environment as a result of Option 1 would be Large Adverse with mitigation in place.	Not applicable	Large Adverse	Not applicable	
	Biodiversity	Option 1 is located adjacent to Camel Hill Transmitter Site LWS, Gason Lane Field LWS and Ridge Copse LWS and within Hazlegrove Park LWS. Small scale direct loss of broad-leaved woodland, parkland, hedgerows and ditches would be likely to occur for this option. These habitats are also listed on the Somerset Biodiversity Action Plan. Wildlife using these habitats such as bats, breeding birds, barn owls, dormice, reptiles, great crested newts, badger and water vole are likely to be subject to increased disturbance and loss of habitat. The loss of any habitat of conservation value would be replaced like-for-like as a minimum requirement. New planting should be connected to existing habitat within the landscape to compensate for the loss of wildlife corridors and reduce the fragmentation impact of the Scheme. The overall effect on biodiversity would be Neutral with mitigation in place.	Not applicable	Neutral	Not applicable	
	Water Environment	Option 1 is unlikely to affect waterbodies as works would include standard mitigation measures in the CEMP, and SuDS and pollution control measures would be incorporated in the drainage design. These would prevent adverse effects from pollutants or increased surface water run-off, during construction and operation reaching the downstream waterbodies. Some drainage ditches and ponds would be lost as they would be infilled to accommodate the new carriageway. Physical impacts due to the new/upgraded outfall during construction would cause a Slight Adverse Impact on drainage ditches. New drainage ditches and pond would be created. Option 1 would be located within Flood Zone 1 and would not affect the areas of Flood Zones 3 and 2. The overall impact on the water environment would be Neutral with mitigation in place.	Not applicable	Neutral	Not applicable	
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(£): 94.8m Net journey time changes (£) 0 to 2min: 21.6m; 2 to 5min: 72.8m; > 5min: 0.4m	Not applicable	£43.2m	Yes
	Reliability impact on Commuting and Other users	Reliability benefits by converting old single carriageway section to modern dual carriageway with associated junction improvements.	Not applicable	Not applicable	£4.7m	
	Physical activity	This option would result in the severance of some NMU routes, leading to the potential to increase journey times. This would have a beneficial effect on the physical activity of NMUs. The Scheme includes the provision of new cycle routes with an associated increase in connectivity to the wider areas north and south of the A303, increasing levels of physical activity.	Not applicable	Slight Beneficial	Not applicable	
	Journey quality	Option 1 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.	Not applicable	Slight Beneficial	Not applicable	
	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 = 4.1 Serious = 29.0 Slight = 194.7	Not applicable	£9.3m	Yes
	Security	Effects to security as a result of Option 1 are likely to be Neutral as there are not anticipated to be any changes to security indicators as a result of this proposed option.	Not applicable	Neutral	Not applicable	No
	Access to services	Access to services within the area are unlikely to be affected by Option 1. As such, no change is expected and Option 1 is considered to have a Neutral effect.	Not applicable	Neutral	Not applicable	No
	Affordability	Changes to vehicle operating costs and therefore changes to affordability as a result of Option 1 are unlikely. As such, no change is expected and Option 1 is considered to have a Neutral effect.	Not applicable	Neutral	Not applicable	No
	Severance	There are four community facilities within the study area, all of which connect to public rights of way. NMU connectivity to two of the facilities would experience a slight positive effect as a result of the provision of a new cycle route. Connectivity to the remaining two facilities would be severed due to the removal of several NMU routes, resulting in increases in journey times. The provision of a cycle route and new NMU crossings results in an overall Slight Beneficial effect on connectivity for these two facilities.	Not applicable	Slight Beneficial	Not applicable	No
	Option and non-use values	The Scheme is expected to have little or no impact on option and non-use values.	Not applicable	Neutral	Not applicable	
Public Account	Cost to Broad Transport Budget	The Scheme will be funded through Central Government Funds.	Central Government Funding: 115.1m	Not applicable	£115.1m	
	Indirect Tax Revenues	There would be some increase in the tax being paid to the Exchequer.	Central Government Funding: Wider Public Finances = -43.5m	Not applicable	£-43.5m	

Appraisal Summary Table

Date produced:	September 2017	**Contact:**	
Name of scheme:	A303 Sparkford to Ilchester - Option 2	**Name**	Tom Roberts
Description of scheme:	The proposed Scheme would provide a dual carriageway on the A303 between Sparkford and Ilchester in Somerset, connecting the existing dual carriageway sections to the east and west. Route Option 2 takes would an offline course to the north of the existing route. At its maximum distance, the route would be approximately 1km north of the existing A303. This AST has been prepared at PCF Stage 2.	**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(£)** 121.5m **Net journey time changes (£)** 0 to 2min: 47.0m; 2 to 5min: 78.8m; > 5min: -4.3m	Not applicable	£114.4m	Yes
	Reliability impact on Business users	Reliability benefits by converting old single carriageway section to modern dual carriageway with associated junction improvements.	Not applicable	Not applicable	£6.1m	
	Regeneration	Not applicable	Not applicable	Not applicable	Not applicable	
	Wider Impacts	Wider economic benefits (output change in imperfectly competitive markets) by converting an old single carriageway section to modern dual carriageway with associated junction improvements.	Not applicable	Not applicable	£11.4m	
Environmental	Noise	The alignment of Option 2 to the north of the existing A303 results in increases at relatively few dwellings compared with decreases at a greater number of dwellings to the south of the existing A303, within the Affected Road Network (ARN). The Distributional Impacts (DI) Screening Matrix concluded that it is unlikely that mitigation measures would fully eliminate all adverse residual effects, and as such, further assessment for Distributional Impacts associated with noise would be required.	Households experiencing increased daytime noise in forecast year: 77. Households experiencing reduced daytime noise in forecast year: 209. Households experiencing increased night time noise in forecast year: 70. Households experiencing reduced night time noise in forecast year: 91	Not applicable	£746,505	Yes
	Air Quality	Net improvement in local air quality within the study area. The Scheme would not result in a new exceedance of the NO2 or PM10 annual mean air quality objectives. There are several PCM links which would overlap with the Scheme's ARN in the design year of the Scheme. While there is one AQMA within the study area (Yeovil AQMA), annual NO2 and PM10 concentrations are expected to be below the annual mean air quality objectives within the AQMA in the opening year. In addition, there is predicted to be an improvement in air quality in some areas of this AQMA as a result of the Scheme as there is predicted to be a decrease in vehicles travelling through the AQMA. The regional assessment predicts an increase in emissions of NOx and PM10 primarily as a result of an increase in the number of vehicles. Overall, the total change in NPV is negative indicating a net worsening in air quality when considering both local and regional effects.	Local Air quality effects at properties (Improvements / No effect / Deterioration) NO2 2023 (792 / 145 / 1330) PM10 2023 (509 / 772 / 986) Overall Assessment Score (negative score reflects benefit) NO2: (2023): 14.60 PM10: (2023): -7.70 Change in Regional Emissions NOx (2023): 3.3 t/year PM10 (2023): 0.3 t/year	Not applicable	Value of change in PM concentrations: £58,830 Value of change in NOx emissions: -£225,817 Total value of change in air quality: - £166,987	No
	Greenhouse gases	Not applicable	Change in non-traded carbon over 60y (CO2e) 478,384 Change in traded carbon over 60y (CO2e) 1548	479,932	-£21,939,000	
	Landscape	This option would move away from the existing A303 (1100m at its furthest point) and therefore its placement in an otherwise rural and tranquil environment would be at greater odds with existing landscape features than those in close proximity to the existing A303 corridor. Given the undeveloped nature of the landscape, there would be a notable impact upon tranquillity surrounding the Scheme. Existing far reaching views would be disrupted by the presence of the new route which would be visible from elevated ground in the south. Planting would however help to settle the Scheme in the surrounding landscape and reduce its visual prominence over time. The route would have a direct impact upon the designated Hazlegrove House Registered Park and Garden. The Scheme would also be immediately adjacent to the Scheduled Monument at Downhead. This option would also run in proximity to other designated assets, which would not be directly affected by the Scheme. The unspoilt and rural character, whilst not designated, is of high value and consequently this option would be very difficult to fully mitigate, and features of interest would be both partly destroyed or their setting affected as a result of the Scheme. The overall effect on biodiversity would be Moderate Adverse with mitigation in place.	Not applicable	Moderate Adverse	Not applicable	
	Townscape	Not applicable	Not applicable	Not applicable	Not applicable	
	Historic Environment	For the purposes of the historic environment assessment construction and operational effects have been assessed. This is because permanent impacts to the historic environment will occur during construction, for example removal of archaeological or historic remains. Option 2 would require large areas of medium value unknown archaeological buried remains to be removed during the construction of the new route, resulting in potential damage. Option 2 would cut through the southern section of Hazlegrove House Registered Park and Garden, removing elements of the historic parkland and related archaeological and historic evidence. The road would be out of scale, visually intrusive and alter the context of the asset even with mitigation screening in place. 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 during construction. The overall effect on the historic environment would be Large Adverse with mitigation in place.	Not applicable	Large Adverse	Not applicable	
	Biodiversity	Option 2 would bisect open countryside, resulting in the loss of hedgerows, which may be used for commuting between roost sites and Mells Valley and North Somerset & Mendip Bats SAC. Option 2 is located 30m from Annis Hill Wood LWS and within Hazlegrove Park LWS and Downhead Manor Farm Candidate LWS. Small scale direct loss of broad-leaved woodland, parkland, hedgerows and ditches is likely to occur for this option. Wildlife such as bats, breeding birds, barn owls, dormice, reptiles, great crested newts, badger, invertebrates and water vole are likely to be subject to increased disturbance and loss of habitat. Species would be adversely affected until the replacement habitat has established, reducing the effect to these species to Neutral. The loss of any habitat of conservation value would be replaced like-for-like as a minimum requirement. New planting should be connected to existing habitat within the landscape to compensate for the loss of wildlife corridors and reduce the fragmentation impact of the Scheme. The overall effect on biodiversity would be Slight Adverse with mitigation in place.	Not applicable	Slight Adverse	Not applicable	
	Water Environment	Option 2 is unlikely to affect waterbodies as works would include standard mitigation measures in the CEMP, and SuDS and pollution control measures would be incorporated in the drainage design. These would prevent adverse effects from pollutants or increased surface water run-off, during construction and operation reaching the downstream waterbodies. Some drainage ditches and pond would be lost as they would be infilled to accommodate the new carriageway. Physical impacts due to the new/upgraded outfall during construction would cause a Slight Adverse Impact on drainage ditches. Option 2 would be located within the flood plain, however Flood Zone 3 and 2 are located along Dyke Brook (within 10m-185m to the north of the central section of the main carriageway), Cary - Source to conf with KSD (approx. 1.2km to the north-west/west) and Cam - Lower (approx. 460m to the south-west). The embankment of Steart bridge would be within Flood Zone 2 (along Dyke Brook), therefore compensatory flood storage would be provided to ensure no increase in flood risk. The overall effect on the water environment would be Neutral with mitigation in place.	Not applicable	Neutral	Not applicable	
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(£)** 89m **Net journey time changes (£)** 0 to 2min: 23.5m; 2 to 5min: 65.3m; > 5min: 0.2m	Not applicable	£37.7m	Yes
	Reliability impact on Commuting and Other users	Reliability benefits by converting old single carriageway section to modern dual carriageway with associated junction improvements.	Not applicable	Not applicable	£4.4m	
	Physical activity	Option 2 would result in the severance of some NMU routes, leading to the potential to increase journey times. This would have a beneficial effect on the physical activity of NMUs. The Scheme includes the provision of new cycle routes with an associated increase in connectivity to the wider areas north and south of the A303, increasing levels of physical activity.	Not applicable	Slight Beneficial	Not applicable	
	Journey quality	Option 2 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.	Not applicable	Moderate Beneficial	Not applicable	
	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 = 2.1 Serious = 14.7 Slight = 68.9	Not applicable	£4.0m	Yes
	Security	Effects to security as a result of Option 2 are likely to be Neutral as there are not anticipated to be any changes to security indicators as a result of this proposed option.	Not applicable	Neutral	Not applicable	No
	Access to services	Access to services within the area are unlikely to be affected by Option 2. As such, no change is expected and Option 2 is considered to have a Neutral effect.	Not applicable	Neutral	Not applicable	No
	Affordability	Changes to vehicle operating costs and therefore changes to affordability as a result of Option 2 are unlikely. As such, no change is expected and Option 2 is considered to have a Neutral effect.	Not applicable	Neutral	Not applicable	No
	Severance	There are two community facilities within the study area, all of which connect to public rights of way. NMU connectivity to one of the facilities would experience a slight positive effect as a result of the provision of a new cycle route. Connectivity to the remaining facility would be severed due to the removal of several NMU routes, resulting in increases in journey times. The provision of a cycle route and new NMU crossings results in an overall Slight Beneficial effect on connectivity for this facility.	Not applicable	Slight Beneficial	Not applicable	No
	Option and non-use values	The Scheme is expected to have little or no impact on option and non-use values.	Not applicable	Neutral	Not applicable	
Public Accounts	Cost to Broad Transport Budget	The Scheme would be funded through Central Government Funds.	Central Government Funding: 108.4m	Not applicable	£108.4m	
	Indirect Tax Revenues	There would be some increase in the tax being paid to the Exchequer.	Central Government Funding: Wider Public Finances = -44.1m	Not applicable	£-44.1m	

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